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Themed issue: The New Zealand business cycle and monetary policy

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Editor's note

This edition of the Reserve Bank *Bulletin* is built around the theme of monetary policy and its interaction with the business cycle in New Zealand. In its pursuit of price stability, the Reserve Bank must form views on the current economic situation and outlook, understand how its interest rate decisions influence economic developments, and judge how best to respond to emerging events. These are ongoing and incremental tasks. The economy and economic behaviour are never at rest (nor should they be). Keeping knowledge current, and policy settings appropriate, are continuous challenges.

In the first article in this edition, Michael Reddell and Cath Sleeman look at six New Zealand recessions since the Depression, at a time when the New Zealand economy is weakening again. In each of the recessions, both international disruptions and local pressures or imbalances were important factors. The exchange rate regimes in place, and fiscal and monetary policy responses, also strongly influenced how the recessions played out, and how severe they were. The article collects together for the first time economic data covering as much as seven decades until the present day, a much longer time period than is usual for economic analysis.

Our second article, by Rishab Sethi, summarises research by Reserve Bank staff and others about changes over time in the monetary policy “transmission mechanism” in New Zealand. The transmission mechanism is the collection of economic processes through which changes in official interest rates influence CPI inflation, via effects through market interest rates, the exchange rate, household and firm spending, and expectations about future economic conditions. The research summarised in the article suggests that the transmission mechanism has changed in a number of dimensions. However, changes in official interest rates continue to act with about the same overall strength on future inflation.

Leni Hunter discusses in our third article the relationship and interdependencies between the Reserve Bank's monetary policy and financial stability functions. Price stability and effective monetary policy depend on a well-functioning financial system, and the stability of the financial system is enhanced by effective monetary policy. The article notes

the need for a level of coordination between monetary and financial stability policy actions in response to business cycle developments, and discusses issues and possibilities for mutual support.

In this edition, we also present two articles on the subject of New Zealand's coins. Two important features of coins are what they look like and how they are made.

Matthew Wright tells the story of the imagery adopted for New Zealand's decimal coins when they were introduced in 1967. Deciding among the diverse range of candidate images was a lengthy, revealing and at times tortuous process, but the results have stood the test of time.

Don Oliver documents the analysis behind the physical specification of New Zealand's new 10 cent, 20 cent and 50 cent coins. The new coins had to be durable and a convenient size, and also work reliably in vending machines – meaning both that genuine coins would be accepted, and fake coins rejected. The new coins achieve all these objectives, while also being cheaper to manufacture than the coins they replaced.

Five years ago, we surveyed our readers on the *Bulletin's* content and style. I am very keen to hear again what you think. Hard-copy subscribers have received a short survey questionnaire that should take only a few minutes to fill out and send back. The survey can also be filled out via our website www.rbnz.govt.nz, accessible from the home page. I would appreciate a few minutes of your time to tell me what you think of the *Bulletin*, so I can improve it. Please send your response by 31 August 2008. We will publish a report of the findings in the December issue.

As usual, I hope you enjoy the range of articles in this edition.

Tim Ng
Editor

RESERVE BANK MUSEUM

The Reserve Bank Museum celebrates and records New Zealand's economic and banking heritage.

Displays range from timelines and interactive exhibits to comprehensive display panels outlining both the Reserve Bank's history and role, and how the New Zealand economic system has developed.

Artefacts include the only working example in New Zealand of the MONIAC hydro-mechanical econometric computer developed by New Zealand economist and inventor Bill Phillips in the late 1940s.

In early 2008, the museum received its 10,000th visitor.

The museum is open 9.30 a.m.–4.00 p.m. weekdays. It is closed weekends, public holidays, and for special events. Please call to confirm opening hours.

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Photography by Stephen A'Court.

ARTICLES

Some perspectives on past recessions

Michael Reddell and Cath Sleeman[†]

As the economy slows in 2008, this article sketches out some key features of past recessions in New Zealand – all the downturns since the mid-1960s, plus the Depression of the 1930s. Each recession was triggered, in significant part, by international events, but each was exacerbated, in part, by domestic pressures or imbalances. History doesn't mechanically repeat itself, but these past experiences are a sobering backdrop against which to consider the outlook for the New Zealand economy over the next year or two.

1 Introduction¹

A recession is a material period over which the level of economic activity is falling. Understanding the events that have triggered past recessions, and exacerbated or mitigated their severity, may help to shed some light on the current situation.

We selected six previous recessionary periods in New Zealand, beginning with the Depression in the early 1930s. Our decision to examine the Depression was motivated by recent comments that the current stresses on international financial markets are as severe as those in the 1930s. Our main focus, however, is on the five main recessionary periods in New Zealand since the mid-1960s. As time has gone on, the structure of the economy and the policy framework have become progressively more similar to that today.

For each recession, we sketch out the important factors and events leading up to the recession, the likely causes of the recession, the impact of the recession on the economy, and finally the responses of fiscal and monetary policy. More in-depth formal treatments could be usefully undertaken of each of these episodes. Here, we take a more impressionistic approach – briefly highlighting key considerations, and looking for common themes and patterns across the various episodes.

2 The Depression (1930–1934)

The starting point

At this time, New Zealand's exports were highly concentrated. In 1929, around 84 percent of exports were pastoral and Britain took around 80 percent of the total. The Depression was, however, an international event and a more diversified export sector may not have significantly lessened the impact on New Zealand.

New Zealand had few of the initial imbalances that often exacerbate downturns. There had been no major credit, share price, or house price boom in New Zealand in the mid-late 1920s, no particular inflation problem, and fiscal policy was no more than mildly stimulatory. However, many New Zealand farmers entered the Great Depression with large debts, a legacy of a boom in the early 1920s following the end of World War One.

New Zealand had no central bank, and hence no independent monetary policy, until 1934. The exchange rate for the New Zealand pound had been informally fixed to sterling, but this relationship was managed by the commercial banks rather than by any government agency. Maintaining a fixed exchange rate was seen, internationally, as an important indicator of financial soundness and of a commitment to prudent economic management.

The recession

The causes of the global Depression are still debated. The stock market crash in the US beginning in October 1929, to which the Federal Reserve responded with sharp reductions in US interest rates, was certainly not the cause. However, the resulting losses and interruptions to the availability of

[†] We would like to thank Andrew Coleman at Motu for compiling the house prices series.

¹ To prepare this article, we have collected economic data from a variety of sources. Most data extend back to 1900. The data allows us to compare and contrast the various recessions. We hope to publish the data in the coming months. A selection of graphs from the database is provided in box 1.

credit were among the many factors that exacerbated the downturn.

Exchange rates and capital flows mattered a lot. For much of the 1920s, countries had focused on trying to re-establish the Gold Standard (under which a currency was convertible to gold at a fixed and pre-announced price). At the same time, much of Europe's growth in living standards was heavily reliant on short-term capital inflows from the US to finance post-war reparation payments and to service large war debts. This flow of capital was curtailed in the late 1920s when the US experienced a speculative boom (on some measures, US leverage reached levels not seen again until this decade). The rapid rise in asset prices, and higher interest rates in the US, attracted capital and drew funds away from Europe.

To limit the losses of gold reserves to the US (and to France, which was seeking to accumulate large gold holdings), many European countries had to keep their interest rates high, constraining demand and economic activity. Britain was of particular importance to New Zealand; it had rejoined the Gold Standard in 1925 at an exchange rate widely regarded as overvalued and faced constant pressure through the late 1920s to lower domestic prices and wages to levels more consistent with the exchange rate.

Closer to home, Australia faced seriously constrained access to financial markets by 1929 – following on from a large borrowing binge and serious imbalances that had built up in the mid-1920s. The disruption in Australia's access to international financial markets probably adversely affected New Zealand because many of the main banks in New Zealand were Australian-owned, and their foreign exchange receipts were to some extent managed jointly across the Australian and New Zealand businesses. The New Zealand government remained able to borrow in London until 1931, although the risk of constrained access will have shaped some of the fiscal choices made in response to the economic downturn.

The impact

Export prices were the primary channel through which the world Depression affected New Zealand. Between 1929 and

1933, international prices for New Zealand's exports fell by 45 percent. In an attempt to maintain incomes, New Zealand farmers increased production. Export volumes increased by 33 percent between 1929 and 1933. Despite this, export receipts fell by 27 percent over the same period.

As export revenues fell, farmers reduced their spending and this, in turn, lowered incomes and spending in the rest of the economy. In 1932, real GDP is estimated to have fallen by 7 percent (in these somewhat imprecise estimated historical series).

As demand fell, unemployment rose from the low levels of the late 1920s. Estimates of the peak in unemployment vary widely. The peak may have been around 20 percent (and, in addition, there was a net migration outflow, after material inflows in the 1920s). Consumer prices fell, with the annual rate of deflation peaking at 12 percent in 1932. Wages for those in employment also fell, but by less than prices. Deflation, of course, increases the real value of debt outstanding. Partly as a result, the 'interest burden' on farmers rose from about 13 percent of their gross incomes in 1928/29 to 26 percent in 1931/32.

Despite the sharp drop in export receipts, the Depression did not lead to a large deterioration in New Zealand's current account balance. In part, this was because the drop in export receipts – the main source of new funds for the banks – reduced the ability of banks to meet customer demands for credit and foreign exchange.² The exchange rate was informally managed by the banks, and rather than allow the impact of the fall in export receipts to show through in a sharp reduction in the exchange rate, access to funds was administratively rationed by the banks for several years. This was supported for a time by explicit government measures requiring all export receipts to be sold to the banks. If customers could not access foreign exchange or credit, they could not spend. Imports, therefore, also fell sharply.

² The economic downturn in Australia was much more severe than that in New Zealand, and the Australian ownership of the banks may have reinforced limits on access to funds in New Zealand.

Policy responses

The government went into the Depression with a large public debt – approximately 160 percent of GDP in 1930. The subsequent fall in prices and real activity led to a sharp reduction in the Government's revenues. Even if the government had been willing to increase its borrowing, access to international credit markets became increasingly constrained as the Depression went on.

At the time, it was believed important, both nationally and internationally, for a government to maintain a balanced budget so as to retain business and public confidence. Faced with a downturn in revenue and the need for some relief spending, a balanced budget could be maintained only by cutting core spending and raising tax rates. That was the approach adopted, which no doubt further deepened the Depression.

As noted earlier, there was no independent monetary policy. Global interest rates fell as the Depression intensified, which meant that New Zealand interest rates also tended to fall. However, as in almost every other country, the inflation rate fell further than nominal interest rates did, lifting the real interest rate. And with banks short of funds and concerned not to weaken the exchange rate further, there was little strong downward pressure on New Zealand interest rates. Governments were not indifferent to the resulting debt burden. Legislation was passed to facilitate both lower long-term mortgage rates for heavily-indebted farmers and to induce holders of government debt to convert to new lower interest rate issues.

As discussed earlier, the exchange rate had for some years been managed by the banks, which rationed access to credit and foreign exchange to maintain parity with sterling. The Depression made this unsustainable and the banks had to informally devalue the New Zealand pound by around 10 percent in 1930. Even after the UK had left the Gold Standard in mid-1931, any further depreciation of the New Zealand currency was hugely contentious: a devaluation might boost export receipts, but would also increase living costs of urban consumers. In the meantime, defending the exchange rate involved limiting domestic demand.

The worst of the Depression had already passed in New Zealand when, in January 1933, a reluctant government³ formally devalued the New Zealand pound against sterling by 25 percent, offering indemnities to the banks to protect them from any subsequent losses. For exporters of meat and wool this was a material gain – Australia had devalued earlier – but for others the benefits were more limited. For example, Denmark, a key competitor in dairy, followed New Zealand's devaluation by also devaluing against the pound.

Ultimately, the defence of the exchange rate was the major choice that shaped the way the Depression unfolded in New Zealand. Had consensus opinion at the time allowed for the exchange rate to be floated, or even to have been devalued sharply earlier in the downturn, the recession in economic activity would have been milder. Without that flexibility, serious constraints on access to international capital markets as the crisis deepened left a heavily indebted government with few fiscal options. A less contractionary fiscal policy and any associated greater strength in private domestic demand would simply have exacerbated the demand for foreign exchange. That would have reinforced the pressure on the exchange rate regime.

3 The Wool Bust (1967–1969)

The starting point

The undiversified nature of the export sector may not have been important in the Depression, but it certainly was in the Wool Bust. In 1965/66, around 31 percent of New Zealand's exports were wool.

The early sixties was a period of strong growth. In 1963/64, world commodity prices for New Zealand's exports boomed. As incomes rose, so did expenditure on imports. Supported by relatively loose macroeconomic policy, the current account began to deteriorate and, with a fixed exchange rate, this led the nation's reserves of foreign exchange to fall. Efforts to rein in domestic demand had begun, but were to be overwhelmed by the scale of the shock.

³ Over the opposition of its own Minister of Finance, who resigned in protest.

Box 1

Figure 1

Annual real growth

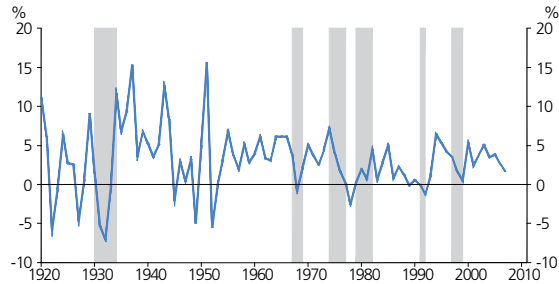


Figure 5

Annual real house price inflation

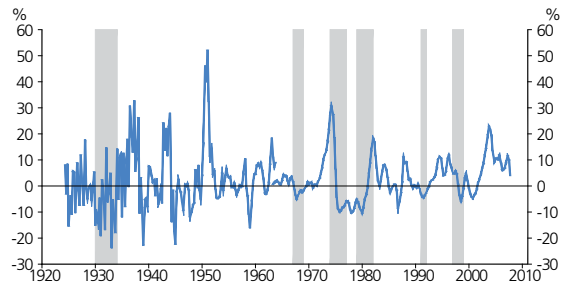


Figure 2

Annual CPI inflation

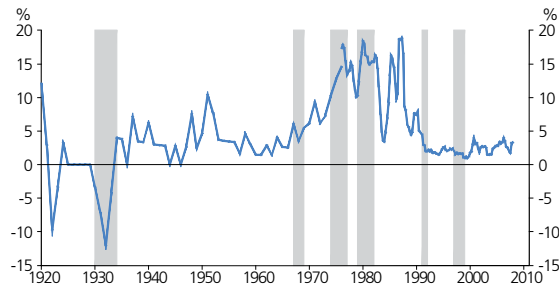


Figure 6

Annual population growth and migration

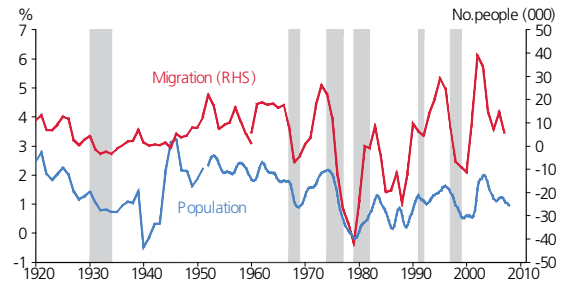


Figure 3

Nominal and real USD/NZD

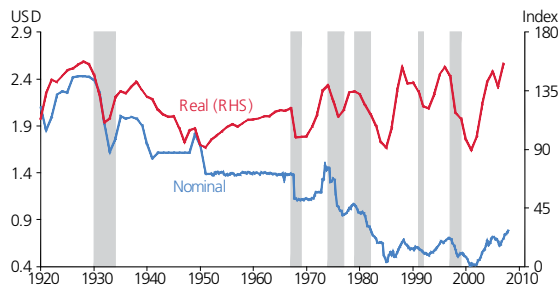


Figure 7

Unemployment rate

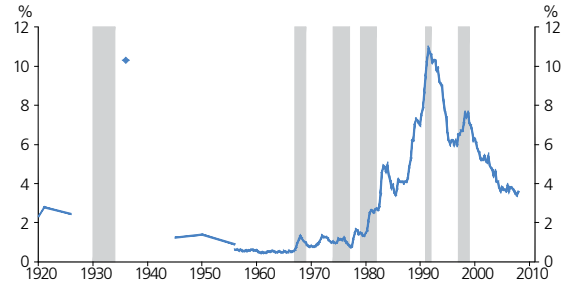


Figure 4

Real mortgage interest rate

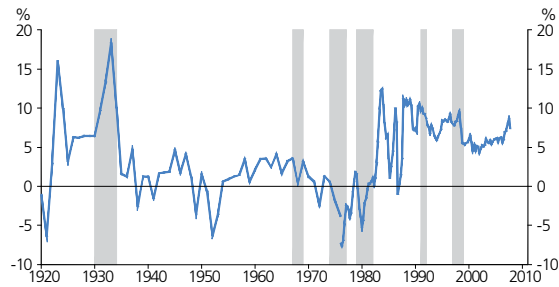


Figure 8

Government debt (as a % of GDP)

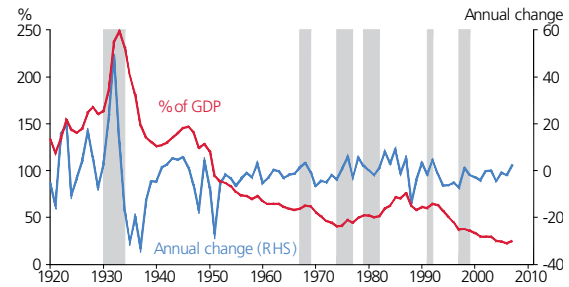


Figure 9

Southern oscillation index

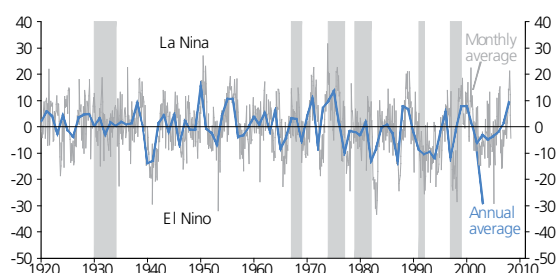


Figure 10

Real spot oil price (West Texas Intermediate)

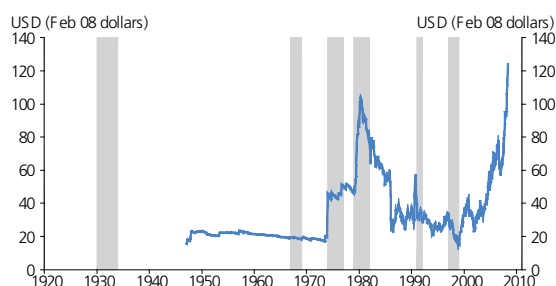


Figure 11

Annual real foreign GDP growth

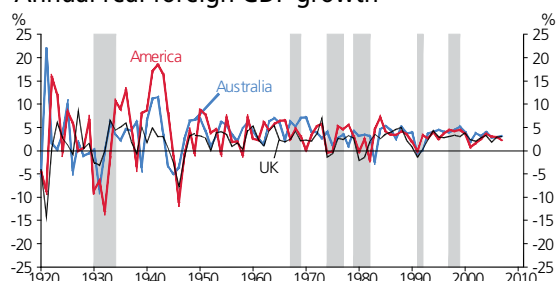


Figure 12

Terms of trade

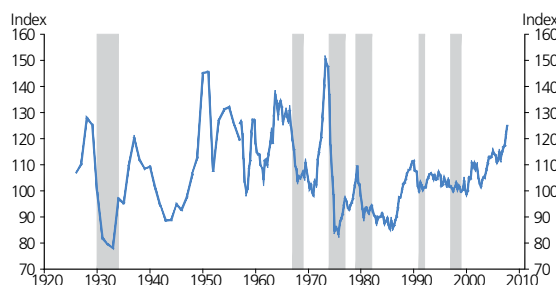


Figure 13

Trade balance and current account balance

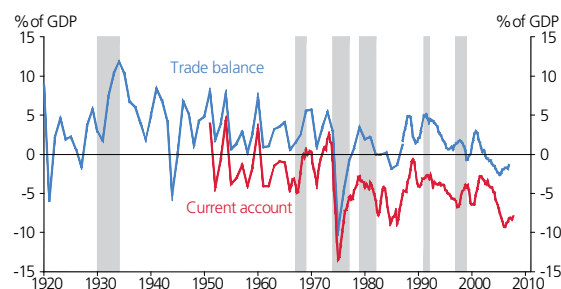
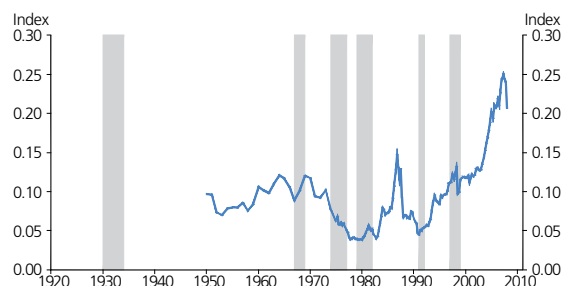


Figure 14

Real share price index



Sources: American Bureau of Economic Analysis; Australian Government Bureau of Meteorology (<http://www.bom.gov.au/climate/current/soihtml.shtml>); Australian Bureau of Statistics; Federal Reserve Bank of St. Louis; International Monetary Fund; Motu Economic and Public Policy Research; New Zealand Institute of Economic Research (<http://www.nzier.org.nz/includes/download.aspx?ID=26894>); Quotable Value Ltd.; RBNZ; RBNZ (1963) Money and Banking in New Zealand, Wellington: Harry H. Tombs Ltd; Statistics NZ; Statistics NZ Long-Term Data Series (<http://www.stats.govt.nz/tables/ltds/default.htm>); United Kingdom Statistics Authority.

Exchange rate stability was a feature of the 1950s and 1960s. Controls on private capital flows that had emerged internationally in the wake of the Depression helped to support the Bretton Woods system of pegged exchange rates. The New Zealand exchange rate had not, by this time, been altered since 1949, and in real effective terms had probably become somewhat overvalued.

The recession

On 24 November 1966, three days before the general election, the wool market collapsed and New Zealand lost an eighth of its total export income overnight. Overall, wool prices fell by 20 percent in 1967 and a further 20 percent in 1968. These price falls understate the severity of the shock, as the Wool Commission – acting with a price stabilisation mandate – ended up buying more than 700,000 bales of wool. That action helped to sustain farmers' incomes, and associated import demand, but of course there were no matching foreign exchange earnings. Stabilising the wool market aggravated the balance of payments pressures, which saw the current account deficit widen further to around 5 percent of GDP by 1967.

There was no global recession at the time, which makes this New Zealand slowdown unusual. However, the sharp fall in the wool price was no doubt exacerbated by the tightening in credit conditions in the US and in the UK going on at the time.

The impact

Between 1966 and 1968, GDP growth fell by 2.9 percent. Adjusting for terms of trade effects, income per head may have fallen by as much as 5 percent. Unemployment remained very low in absolute terms, and rose by less than 1 percentage point, but for a country used to two decades of extremely low unemployment the change was noticeable.

Annual inflation also began to rise and in 1967 inflation rose above 5 percent for the first time since the Korean War boom in the 1950s. The rise in inflation reflected a combination of factors: the direct price effects of fiscal measures discussed below, but also 'cost-push' pressures, stemming in part from

large increases in wages.

Partly in response to the reduction in job vacancies, emigration increased substantially, so that New Zealand experienced a significant net migration outflow for the first time since the Depression. The impact on demand of the unexpected migration outflow was visible most immediately in the housing sector.

Policy responses

The deterioration in the current account led to a fall in reserves of foreign exchange and placed pressure on the New Zealand dollar.⁴ To ease this pressure, the government drew on some of its borrowing facilities at the International Monetary Fund, but also took a wide range of measures to significantly reduce demand for imports.

In February 1967, consumer subsidies on food were removed, and State Housing rentals and Post Office charges were increased. Electricity and rail charges were also increased. In May 1967 there were sharp increases in a number of indirect taxes. On the expenditure side, public works expenditure was cut.

At the time, interest rates were under heavy administrative influence, and there was a greater willingness to rely on quantitative limits on credit growth, rather than interest rate adjustments. Hire purchase regulations were tightened and in May 1967, the trading banks were directed to effect a 10 percent reduction in each customer's overdraft limit (the main form of borrowing from banks)⁵ within two months.

The option of devaluing the New Zealand dollar began to come into focus. Most orthodox thought favoured fiscal and monetary restraint to defend the longstanding exchange rate parity. Some also worried that devaluing would place pressure on Britain (whose currency was under constant pressure) to devalue sterling. Access to credit markets was also a consideration – in particular, the authorities found it difficult to roll over maturing loans in London,

⁴ As it became on the conversion to decimal currency on 10 July 1967.

⁵ Housing finance was largely provided by trustee savings banks, building societies, and the State Advances Corporation.

and the government was forced to borrow again from the International Monetary Fund.

In the event, it was British choices that finally triggered a New Zealand exchange rate adjustment. In November 1967, the British Government devalued sterling (in terms of the US dollar) by 14.3 percent. The New Zealand Government followed, devaluing by 19.45 percent, achieving a 5 percent gain in competitiveness relative to both the UK and Australia (which had also devalued), with the aim of improving returns to farmers and reducing import demand.

4 The First Oil Price Shock (1974–1977)

The starting point

In the early 1970s, the world experienced a broad-ranging commodity price boom. Between March 1971 and June 1973, New Zealand's terms of trade rose by 53 percent. The current account moved into surplus, where it had been rarely, and foreign reserves passed one billion dollars (around 16 percent of GDP).

From 1970 to 1973, net immigration rose sharply, reaching 26,000 in 1973, equivalent to 0.86 percent of the total population. The large inflow of migrants, the strong terms of trade and low real interest rates led to a very rapid increase in credit growth and property prices. M1, a measure of money supply, increased by 25 percent between March 1972 and March 1973 and by a further 14.5 percent in the next 12 months. Real annual house price inflation reached 30 percent in June 1974. From 1970 to 1974, real house prices rose by approximately 62 percent.

Inflation had been rising gradually around the world from the late 1960s. In general, governments and central banks were reluctant to tighten monetary policy sufficiently to offset the rising inflation, and in several countries (including New Zealand, the UK, and the US) attempts were made to use unorthodox approaches to keep the pressures in check. These measures included direct price and wage restrictions.

Internationally, easy global credit conditions, prolonged growth, and low (often negative) real interest rates saw global stock markets become severely overvalued. Through

this period, the international exchange rate regime was in transition, as the post-war Bretton Woods fixed exchange rate regime broke down and most major developed countries ended up floating their exchange rates.

The domestic boom reached its peak in 1973. New Zealand made several attempts to reduce the inflationary pressures that were building. The New Zealand dollar, which was now pegged to a basket of currencies, was revalued three times in 1973, and the real exchange rate reached a 34-year high (against the US dollar). A wage freeze and a property speculation tax were imposed. Nonetheless, the rate of CPI inflation reached 10 percent by 1974.

The recession

OPEC began to flex its muscles in late 1973 following the Arab-Israeli war. After two decades of relatively flat oil prices, against a backdrop of an increasingly tight supply situation (ie excess production capacity had shrunk dramatically) the price of oil more than doubled between December 1973 and January 1974 from USD4.31 per barrel to USD10.11 per barrel (West Texas Intermediate).⁶ In addition, actual oil exports were physically restricted.

The rise in oil prices and temporary reduction in supply, at a time when the oil intensity of production was much greater than it is today, together with the not-entirely successful efforts by many countries to rein in the inflation pressures that had built up over the previous few years, led to a sharp slump in share prices and a world recession. Between January 1973 and December 1974, for example, the Dow Jones lost more than half its value in real terms, while in the UK, the FT30 fell over 90 percent in real terms.

Locally, an El Niño weather event drove the country into drought in 1972/73 – New Zealand's second-driest year on record.

⁶ In real terms, prices rose from USD19.79 to USD45.92 per barrel (West Texas Intermediate, Feb 2008 prices).

The impact

In the year to March 1975, New Zealand's terms of trade fell by 38 percent; the largest fall ever recorded in a single year. The fall was only partly due to the direct effects of the rise in oil prices. Over 1974, as world economic activity slowed and the commodity boom came to an end, world export prices fell by around 12 percent and export volumes also fell. The economic effects hit New Zealand badly for several years following.

The current account balance deteriorated very rapidly, from a surplus of 2.5 percent in June 1973 to its largest ever deficit of 13.4 percent in March 1975. Annual growth fell from 7.2 percent in 1974 to a trough of -2.6 percent in 1978.⁷ Unemployment rose but remained below 2 percent. New Zealand share prices fell by about 47 percent in real terms. As economic conditions in New Zealand deteriorated, the contraction was amplified by a massive turnaround in migration. From the peak inflow of 26,000 in 1973, migration fell to an outflow of 42,000 in 1979.

As growth slowed, there was a sharp squeeze in credit. Real house price inflation fell quickly, from 31 percent in June 1974 to -10 percent in December 1975. From 1975, real house prices fell every quarter for the following five-and-a-half years, as the migration outflow reinforced the correction from the previous extreme overvaluation.

Despite lower growth, monetary policy was insufficiently firm to prevent inflation rising: annual inflation reached 17.8 percent in 1976 and double-digit inflation increasingly came to be factored into the behaviour of firms and households. This pattern was far from unique to New Zealand – in the US, UK and Australia, inflation also tended to settle at new higher levels.

Policy responses

Initially and in contrast to past recessions, the government implemented expansionary fiscal policies to promote growth and employment. From 1973 to 1976, total government expenditure rose by around 10 percent of GDP.

The exchange rate was devalued three times in an effort to boost exporters' incomes; in September 1974 by 10 percent, August 1975 by 15 percent and November 1976 by 2.75 percent. From 1975, the government also began to expand subsidies for farmers (and the Wool Marketing Corporation, successor to the Wool Commission, again engaged in purchasing wool at a price floor). The aim was to support production, to maintain foreign exchange earnings and to meet rising import costs.

The expansion in spending and decline in real revenue led, of course, to a deterioration in the Crown's accounts. The Government's deficit turned out to be more than twice what had been budgeted, as income and tax revenues fell. The current account also deteriorated further as the expansionary policies supported expenditure on imports. Growth in credit leapt upwards and M1 grew by almost 20 percent in the year to March 1976.

To fund the current account deficit and gather sufficient foreign exchange to pay for imports, the government undertook very substantial borrowing overseas, both commercially and from the IMF and the Bank of International Settlements (BIS). Globally, credit remained quite readily available through this period, as the huge surpluses run up by oil-producing nations were recycled through Western banking systems. Moreover, New Zealand had entered this period with public and external debt levels the lowest they had been in many decades. Official advice was broadly supportive of using some borrowing to help maintain living standards. The widespread view was that the slump in the terms of trade would prove to be temporary.

In 1976, the newly elected government took a different tack and introduced a number of measures to dampen down activity in an effort to lower inflation. The government exercised significant budgetary restraint and also took some substantial steps to liberalise the financial markets and allow interest rates to rise. The efforts had some success – inflation fell from around 17.8 percent in 1976 to 10.0 percent in 1978. However, the contractionary policies exacerbated the severity of the downturn, and as the 1978 election approached the budgetary restraints were relaxed.

⁷ On some measures, growth in real per capita consumption fell from around 14 percent per annum in 1974 to around -9 percent per annum in 1975.

5 The Second Oil Price Shock (1979–1982)

The starting point

The New Zealand economy was only beginning to recover from the first oil price shock and the limited disinflationary adjustment. Real house prices were still falling despite low or even negative real mortgage interest rates, the terms of trade remained relatively weak, net migration outflows were continuing, and unemployment was beginning to trend upwards. Economic growth had recovered only modestly. The global backdrop was brighter, but not markedly so, as countries grappled with persistently high inflation and an apparent decline in the potential rate of growth.

The recession

Oil prices more than doubled following the Iranian revolution and the start of the Iran-Iraq war, both of which materially disrupted the supply of oil. Prices rose by 150 percent between April 1979 and April 1980 (from USD15.85 to USD39.50 per barrel, West Texas Intermediate).⁸ The rise in oil prices helped push the world economy back into a recession. It did so through two channels. First, higher oil prices represented a significant tax on economic activity in the Western world, and boosted inflation across the world in the short term. But second, through a combination of circumstances, 1979 marked a turning point in the Anglo world's willingness to pay the price of lowering inflation. Rising inflation and a weakening US dollar saw Paul Volcker lead a marked change in the Federal Reserve's direction, pushing up the federal funds rate to 19 percent in early 1980, which dampened economic activity and eventually lowered inflation markedly. On the other side of the Atlantic, the Thatcher government, elected in May 1979, adopted a similar approach, at the short-term cost of a deep recession. The US recession in particular weakened activity, and export commodity prices, across much of the world.

The impact

The second oil price shock meant that the economic recovery stalled. The conventional effects of the oil price shock on activity were amplified by measures such as carless days and weekend closures of petrol stations, designed directly to reduce oil consumption and the borrowing required to finance the widening current account deficit. The terms of trade fell, although by far less than the decline that followed the first oil price shock. Net migration outflow reached an unprecedented peak of over 40,000 in the year to December 1979.

Unemployment rose quite rapidly, from 1.3 percent in December 1979 to a then-unprecedented level of 4.9 percent in June 1983. Measures to boost domestic demand (rather prematurely) in 1981, which seem to have finally triggered a recovery in the housing market, led to a balance of payments blow-out in 1982. The associated pressure on liquidity and access to credit reinforced the upward trend in the numbers of those unemployed.

Policy responses

The exchange rate was quite quickly devalued, cut by 5 percent in mid-1979 and then set on a crawling peg – designed to maintain the real exchange rate by devaluing the nominal exchange rate each month by the difference between domestic and foreign inflation rates.

The government also sought to use relatively expansionary fiscal policy – both directly, and by encouraging, as part of an economic transformation agenda, the 'Think Big' energy projects.⁹ Investment boomed as these projects got under way, although the domestic demand effects were more muted, because the investment was very import-intensive. Export incentives to manufacturers and subsidies to farmers were also stepped up. Through this period, the measured fiscal deficit remained quite large, although real interest rates were mostly low or negative so that real servicing costs

⁸ In real terms, prices rose from USD47.72 to USD103.79 per barrel (West Texas Intermediate, Feb 2008 prices).

⁹ The 'Think Big' projects were predicated on the assumption of continuing high and rising real oil prices, although were also influenced by a 'take or pay' agreement in respect of Maui gas that had been signed by a previous government in the early 1970s.

were not high, and for a time the debt-to-GDP ratio did not increase particularly sharply.

Overall, policy struggled to juggle objectives – maintaining living standards, limiting the rise in unemployment, limiting the rise in interest rates, while also trying not to let inflation get out of hand. With the latter objective in view, the crawling peg was abandoned in mid-1982 at the same time a wage/price/interest rate freeze was imposed.

6 The 91–92 Recession

The starting point

By the mid-1980s, Western economies were well into recovery phase. Oil prices were falling, interest rates were falling in many countries as inflation dropped away sharply, and increased credit availability was spilling over into a widespread boom in equities and commercial property in particular.

The effects of the boom were exaggerated in New Zealand by the wide-ranging deregulation of the financial sector and the abolition of exchange controls implemented over a relatively short period in 1984/85. From December 1984, for the first time since the 1930s, there were no material restrictions on portfolio inflows and outflows of capital.

Deregulation gave financial institutions the freedom to create credit, without much experience in actually doing so. A significant portion of the new credit, fuelled by the inflows of foreign funds attracted by New Zealand's relatively high interest rates, was used to finance speculation in the share market and the property market. Numerous entrepreneurial companies joined the stock market, and from some of the rhetoric one might have supposed that New Zealand in fact had a comparative advantage in takeovers. Talk of New Zealand becoming the Switzerland of the South Pacific went hand in hand with fevered speculation around the first unsuccessful tilt at the America's Cup.

Share prices more than doubled between July 1984 and the end of 1986. Commercial property prices rose very substantially in the four years to June 1988 (on one measure around 45 percent in real terms) and commercial building

activity boomed. The move to introduce GST in October 1986 probably reinforced the rush to buy physical assets (property and shares).

After the 20 percent devaluation in 1984, once the exchange rate was floated and interest rates rose to the sort of levels needed to get inflation back under control, the real exchange rate appreciated substantially between 1985 and its peak in 1988. Interest rates were high but volatile, with 90-day rates still above 20 percent at times in 1987.

On 19 October 1987 ('Black Monday'), global share prices collapsed. In three-and-a-half months, the value of the New Zealand share market halved. The share market crash in New Zealand was part of a de-leveraging process that wiped out huge amounts of wealth, brought down several major corporations and some financial institutions, and severely impaired the health of the entire Australasian banking system. It did not, of course, do this overnight. It took years for the full effects to become apparent. Indeed, for a time many were quite blasé about the likely impact. Ongoing economic restructuring, in the state and private sector, reinforced the fragility. Fiscal deficits remained quite large, and perhaps more importantly a shift to financing more of that debt onshore and a marked rise in real New Zealand interest rates saw the public debt become increasingly burdensome. The 1990 Budget, in particular, took a relatively expansionary route, with projections of increasingly large deficits in subsequent years.

By late 1990, the accumulated effects of five years of anti-inflationary policies, with real short-term interest rates still around 8 to 10 percent, the exchange rate still relatively high, and three years of increasingly constrained access to credit, meant that the economy was relatively weak and quite exposed to any further negative shocks.

In December 1990, however, and in line with the campaign promises of the incoming government, the target date for the achievement of price stability (0 to 2 percent inflation, as then defined) was pushed back from December 1992 to December 1993.

The recession

Global contribution

Although the 1987 share market crash had been a global event, it had a particularly significant impact in New Zealand. Interest rates fell back somewhat in New Zealand immediately following the crash, but in a range of other developed countries (including the US, UK and Australia) monetary policy had been loosened markedly. Global demand recovered rapidly and with it inflationary pressures. Eventually, central banks in these countries needed to move to bring inflation back under control, which helped to induce the 1991 global downturn. This downturn appears to have been exacerbated by a six-month surge in oil prices, beginning in the second half of 1990 and associated with the first Gulf War. The price of oil rose by 32 percent between August and October in 1990 (from USD27.17 to USD35.92, West Texas Intermediate).¹⁰

Fiscal policy

The newly-elected government in late 1990 discovered that it had inherited something of a fiscal 'crisis'. Net public debt sat at 50 to 60 percent of GDP, and forward forecasts – not then published in the way they are now – revealed a deteriorating outlook. Moreover, the government faced the pressing need to recapitalise the largely state-owned Bank of New Zealand (for the second time since 1987). Credit-rating agencies indicated that they were considering a double downgrade in New Zealand's sovereign credit rating, which could have materially increased the cost of funds as well as undermining investor confidence in New Zealand. In some quarters, at least, there were worries that New Zealand's ability to continue to borrow abroad might be jeopardised if early and dramatic action was not taken.

Against this backdrop, in late 1990, the government announced large cuts in income support entitlements to welfare beneficiaries and the establishment of reviews to reduce expenditure in other areas. The 1991 Budget (described by its author as the 'mother of all budgets') continued the sharp fiscal contraction.

The impact

GDP growth had been subdued (at best) since around 1988, but took a further sharp step down in 1991. Confidence fell away sharply, as did real activity in both the business and household sectors. On our current estimates, the output gap is estimated to have fallen to -3.7 percent in September 1992¹¹ (quarterly activity itself is now estimated to have reached a trough in March 1991). Many would probably judge the overall level of spare resources in the economy was even greater than suggested by that output gap number. The unemployment rate rose from 7.0 percent in March 1990 to peak at 10.9 percent in September 1991.

The rise in unemployment, in particular, and fall in GDP caused expenditure on social security to increase as a percentage of GDP as the automatic fiscal stabilisers cut in. This mitigated somewhat the short-term demand effects of the substantial contraction in discretionary fiscal expenditure. Gross public debt did not fall below 50 percent until 1996; however the threat of a double downgrade in the sovereign credit rating was averted.

House prices fell, with real prices declining by 4.7 percent over 1991. These falls occurred even though interest rates were falling throughout 1991, banks were becoming increasingly keen on housing loans in preference to commercial loans (after the experiences of the late 1980s) and the initial degree of overvaluation had not been large (at least by comparison with the current situation and that in the 1970s).

Policy responses

Monetary policy was held tighter than was strictly necessary for much of 1991. At the time, monetary policy was not implemented by formally setting an official interest rate, but the Bank nonetheless on various occasions sought to slow the speed at which interest rates, especially the key 90-day bank bill rate, were falling. Even though the inflation target date had been extended from December 1992 to December 1993, inflation actually fell into the target range in late

¹⁰ In real terms, prices rose from USD43.89 to USD57.24 per barrel (West Texas Intermediate, Feb 2008 prices).

¹¹ Exacerbated by the impact of very low hydro lake levels, and associated reductions in electricity production and consumption in the winter of 1992.

1991, something that was not forecast by the Bank until very late.

The speed of the fall in inflation was missed largely because the recession itself was a surprise (as it was to many other forecasters). Quarterly forecasts from that period are hard to track down, but the falls in GDP during 1991 took the Reserve Bank by surprise. Indeed, in its published August 1991 Economic Forecasts, it was estimated that annual growth was around 1 percent in the March 1990/91 year. In fact, based on the latest GDP estimates, annual growth was actually close to -1 percent for the year to March 1991. Although interest rates were progressively falling, monetary policy was not finally explicitly eased until September 1991, and by the end of that year 90-day rates were under 8 percent, down from rates in excess of 14 percent that had prevailed for much of 1990. Even then, the Bank expected inflation would temporarily rebound outside the target range, before settling back by the formal target in 1993. There was, in fact, no material rebound in inflation.

The exchange rate played an important role in the Reserve Bank's thinking, from two angles. First, direct price effects on inflation from exchange rate changes were still thought to be quite large. With inflation expectations still not clearly anchored on price stability, excessive falls in the exchange rate posed medium-term inflation risks. On the other hand, the Bank was firmly of the view that the exchange rate was materially overvalued, and that external adjustment would require a substantial fall in the currency.¹² Making room for this fall was one reason the Bank had supported extending the price stability target date to 1993. The exchange rate had fallen somewhat in 1988 but remained overvalued. In fact, despite the weak economy and the marked falls in interest rates, the TWI remained firm through much of 1991, only finally falling by around 10 percent in the wake of the explicit policy easing in September.

In the end, markedly lower real interest rates, a significant reduction in the exchange rate, a waning of the first intense contractionary pressures from fiscal policy, and a gradual recovery in the world economy laid the ground for economic growth to recover in 1992.

¹² These issues were highlighted quite explicitly in the Bank's published 1990 *Post-election Briefing* for the incoming government.

7 The Asian Crisis and drought (1997–1999)

The starting point

Domestic growth recovered quickly from the downturn in the 1991/92 recession. Annual growth peaked at 7.3 percent in September 1993. At the same time, unemployment fell, from 10.9 percent in September 1991 to 6 percent in September 1995.

In the early 1990s, there was a significant upsurge in net immigration. Annual permanent and long-term migration rose from 4,500 in 1992 to 29,000 in 1995.

The sharp rise in immigration, along with a gradual recovery in household incomes, a return of confidence, and much easier access to credit for households, combined to produce a significant house price boom. Real house prices rose every quarter for what was then a record of five-and-a-half years, leading to a cumulative rise of 36 percent between 1992 and 1997. Real house price inflation peaked at just under 12 percent in June 1996. Credit growth reached 4 percent per quarter in December 1995 – growing at an annual rate of around 15 percent at a time when nominal GDP was growing at around 7 percent.

In line with world interest rates, New Zealand's 90-day rate rose sharply in 1994, and was above 6 percent for all of 1995 and 1996. Signs of a resurgent housing market led the Reserve Bank to allow or encourage 90-day bill rates to rise to 10 percent in 1996 and stand back as the TWI moved materially higher (finally reaching its peak in early 1997).

Accumulated domestic demand pressures meant that inflation was around, or just outside, the top of the target range for much of 1996, while the government, now running large budget surpluses, was planning significant personal tax cuts that were expected to boost household demand. Immediate pressures on monetary policy were eased somewhat when the inflation target was revised, with the target ceiling being lifted to 3 percent in December 1996. Short-term interest rates began to fall quite materially, but the exchange rate remained very high.

The recession

The Asian financial crisis, beginning in July 1997, saw a number of important Asian economies forced to float their exchange rates, which then fell very sharply, leading to serious losses in the corporate and banking sectors, and some very large falls in GDP. Around one third of New Zealand's exports were destined for Asia – and much of Australia's trade was also with Asia.

Just as the Asian crisis was easing, the world was convulsed by two other financial shocks in 1998: Russia's default on its domestic and external debt, and then the collapse of Long-term Capital Management (LTCM) (a large highly-leveraged US hedge fund). Neither of these had too much direct economic effect on New Zealand, but they accentuated global financial nervousness and risk aversion, and contributed to a further weakening in the New Zealand dollar. International market liquidity and access to credit was somewhat impaired for a time.

The New Zealand economy faced two successive severe droughts in 1997/98 and 1998/99. In 1997/98, an El Nino weather event brought drought conditions to the eastern regions of New Zealand and was New Zealand's driest year on record. In 1998/99, a La Nina event prolonged the drought in North and Central Otago and brought drier than normal conditions to western districts and Southland. These droughts substantially cut agricultural output, with flow-on effects through the rest of the economy.

The impact

In the March quarter of 1998, the seasonally adjusted value of merchandise exports to New Zealand's main Asian trading partners outside of Japan fell by over 26 percent – equivalent to a 1 percent fall in New Zealand's GDP. The monthly value of log exports from New Zealand and short-term visitor arrivals from Asia outside Japan both fell dramatically.

The direct impact of the drought-induced fall in supply was estimated to account for 0.4 percent of the total 1 percent fall in GDP growth over the March 1998 quarter.¹³

Net migration fell as sharply as it had risen. The combination of falling net migration, falling consumer confidence and continued high levels of interest rates produced a sudden drop in private residential investment in 1997/98. Credit growth fell to around 1.5 percent per quarter by the second half of 1998.

Annual growth, based on current estimates, fell steadily from 6.4 percent in 1994 to 0.5 percent in 1999. There was a small tick up in unemployment.

Policy responses

The Reserve Bank (along with many other forecasters, here and abroad) was slow to recognise the full impact of the Asian crisis and the first drought through late 1997 and early 1998. This was the first economic slowdown and financial crisis forecasters had ever had to deal with emanating from Asia, and it was unclear quite what it would mean for New Zealand – although it was worth noting that our ties to Asian central banks meant that we were lowering our projections for foreign growth more rapidly than the international *Consensus* forecasts that were usually used.

The policy response problem was compounded by difficulties with the new policy implementation approach the Bank had introduced in early 1997 – centering policy statements around desired levels of the Monetary Conditions Index (MCI). With hindsight, it was clear that the Bank did not have a good grasp on how this system would work faced with major changes in the exchange rate, or in the appropriate level of interest rates.

Once the Asian crisis was under way, the New Zealand dollar began to fall quite rapidly. In the way the MCI system was used, the Bank ended up treating much of the fall as something that needed to be offset by higher interest rates. The Bank saw itself as easing monetary policy in response to the Asian crisis, and then the drought by lowering the published desired level of the MCI, but doing so in a form that involved a much lower exchange rate and somewhat higher interest rates. Short-term interest rates had fallen materially in the first six months of 1997, but this fall was quickly reversed. For a year or so after that, short-term interest rates were higher than they had been in mid-1997

¹³ This does not take into account any second-round effects on the rest of the economy.

and very volatile. This is likely to have compounded the falls in business and consumer confidence and, hence, in economic activity.

Even as late as May 1998, when the June *Monetary Policy Statement* forecasts were finalised, the Bank was still projecting quarterly growth to trough at just 0.2 percent. Based on the latest estimates of GDP, New Zealand had already had three quarters of negative growth. As the recession became apparent, interest rates were allowed to fall markedly, reaching just below 5 percent by the end of the year. Cuts in international interest rates following the LTCM failure also supported a rebound in global growth.

The fiscal consolidation of the early 1990s and a period of strong growth had produced substantial actual and prospective fiscal surpluses. Debt levels remained higher than the medium-term desired level, although by this stage all net debt outstanding was in New Zealand dollars. Substantial personal tax cuts had occurred in 1996 and were planned again for 1998. The Asian crisis and the associated recession appeared to unnerve some decision-makers, and in the midst of the downturn, some contractionary fiscal

measures were implemented (such as cuts to future National Superannuation payments). These measures probably had relatively little impact on demand at the time, but did reflect a reluctance to allow the automatic stabilisers to operate untrammelled through what was a relatively mild downturn, which New Zealand entered with a fairly healthy fiscal position.

8 Characteristics of recessions in New Zealand

Table 1 briefly summarises the pre-existing imbalances, triggers and exacerbating events and structural factors that have characterised each of the recessionary periods we have looked at in this article. Dark blue squares denote features critical to the recessionary period, light blue squares denote factors that were less significant, while white squares denote factors that were not relevant to the period. This exercise obviously demands a certain amount of judgement. The shadings of some squares are, of course, open to debate.

Box 2

The 2001 global slowdown

The 2001 global slowdown did not lead to a domestic slowdown. This example adds weight to the idea that it usually takes both domestic and global factors to align, in some form or another, to produce a recession in New Zealand.

In 2001, the Dotcom crash in technology stocks, and the associated sharp fall in computer and telecoms technology led to a sharp downturn in world growth. Annual growth for New Zealand's trading partners fell below 2 percent and reached a trough similar to the Asian crisis. Facing the risk that the weakness in the world economy would drag down activity in New Zealand, the Bank cut the Official Cash Rate (OCR) progressively from March 2001 – and then instituted further precautionary cuts following the

11 September terrorist attacks, for a total of 175 basis points of cuts.

In contrast to past global slowdowns, the 2001 slowing had a rather muted impact on New Zealand and Australia (although our output gap measure shows a material narrowing in 2001). There seem to have been several reasons for this. First, international prices for our export commodities remained quite buoyant. Second, the overall starting level of interest rates was low by historical New Zealand standards (cuts were from a starting OCR of 6.5 percent). Third, the real exchange rate had reached its record low in late 2000, providing a considerable buffer for the traded goods sector. Finally, there were no significant domestic imbalances – the housing market, for example, was still working through a gradual adjustment downwards following the mid-1990s boom.

Table 1

The characteristics of recessionary periods

			Recessionary periods					
			Depress.	Wool Bust	1st Oil Shock	2nd Oil Shock	91-92	Asian Crisis
Pre-existing imbalances	Rapid credit and asset price expansion:	Global						
		NZ						
	Well above trend:	Commodity prices						
		Real exchange rate						
		House prices						
		Real interest rates						
	Unusually large current account deficit							
	Large public debt							
	Inflation problem							
	Domestic financial fragility							
Triggers and exacerbating events	World downturn							
	Global credit/asset price squeeze							
	Large fall in export commodity prices							
	Large rise in oil prices							
	Drought							
	Contractionary discretionary fiscal policy							
	Tightened monetary policy/ interest rates rose after the downturn was under way							
Exacerbating structural factors	Fixed or pegged exchange rate							
	Capital controls in place							

Key: A critical factor A contributing factor Not a factor

9 Conclusions

History doesn't repeat itself. Shocks differ, policy frameworks differ, and so do the markets in which firms, markets and financial institutions operate. But useful perspectives can be gained from past economic slowdowns here and abroad. The range of New Zealand experiences briefly sketched out in this note highlight a few of those:

- Material global slowdowns almost always lead to marked slowdowns in the New Zealand economy. The recent exception (2001) highlights the way in which pre-existing domestic conditions matter – undervalued exchange rates, healthy financial sectors, rising commodity prices and relatively low interest rates can provide meaningful buffers.
- No major domestic slowdown or recession in the last 40 years has been triggered by domestic factors alone.
- Financial excess reflected in overvalued asset prices, or indeed the subsequent financial fragility, often seems to be associated with some of the deeper recessions here and abroad. Doubts about continuing access to credit markets can exacerbate any downturn.
- Substantial slowdowns tend to lead to net migration outflows, which in turn deepen the downturn. The effects of fluctuations in migration are most immediately apparent in the housing market.
- Sharp increases in oil prices have often been associated with recessions.
- Resisting falls in the exchange rate usually exacerbates the downturn.
- Forecasters, at the Bank and outside, typically have little idea how deep any slowdown will be until we are well into it.

Where then does this leave us in thinking about the current situation? The Bank's current central economic forecasts were outlined in the June *Monetary Policy Statement* published earlier this month. As those forecasts indicate, the New Zealand economy has already slowed markedly and growth is expected to remain quite weak for some time. There is nothing in the material in this article to suggest greater reason for optimism. World growth is easing, and

very large credit booms here and in many Western countries look to be unwinding. This de-leveraging is occurring at a time when oil prices are at record highs and inflation in much of the emerging world appears to be becoming increasingly problematic. This is linked in part to a period of prolonged fixed exchange rates and rapid accumulation of foreign reserves in a number of countries.

Locally, real interest rates and exchange rates have been quite high for a protracted period, and inflation has not been quiescent. International financial fragilities have increased domestic interest rates further at the same time as economic activity has begun to slow. Finally, the summer's drought and low lake levels may act as a material short-term drag on growth. There are mitigating factors of course – in particular, the healthy overall fiscal position, the fiscal stimulus already in train including the tax cuts announced in Budget 2008, and the possibility that the prices of New Zealand's commodity exports could be carried higher in the current global commodities boom. But it appears that these factors have much to mitigate.

10 Recommendations for further reading

For those interested in exploring New Zealand's previous recessions further, there are a number of books and papers worth reading. No publication is comprehensive, and in particular, there appears to be little in-depth treatment of the two most recent recessions.

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The changing transmission mechanism of New Zealand monetary policy

Rishab Sethi¹

This is the second of two *Bulletin* articles on the transmission mechanism of New Zealand monetary policy. In the first article (Drew and Sethi 2007), we described this mechanism, detailing the process by which changes in the Reserve Bank's primary monetary policy instrument, the Official Cash Rate (OCR), eventually influence the general level of prices. This article examines how certain aspects of the transmission mechanism have changed over time. Assessing these changes is especially topical given that, in the estimation of some commentators, the most recent period of monetary tightening has witnessed policy that has been less effective at dampening inflation than previously. We briefly review the case for these claims and catalogue evidence from several sources to show that the overall impact of monetary policy on activity and inflation has not obviously weakened, and that some intermediate links in the mechanism may have, in fact, strengthened over the past decade.

1 Introduction

In Drew and Sethi (2007), we described the process by which changes in the Reserve Bank's primary monetary policy instrument, the Official Cash Rate (OCR), eventually influence the general level of prices. In this article, our focus turns to assessing how this process, known as the transmission mechanism of monetary policy, may have changed over time. This is an especially topical exercise given that the present economic cycle and monetary response have exhibited characteristics that have led to some concern about the efficacy of New Zealand monetary policy.

Specifically, we look at several intermediate links in the mechanism, assessing possible changes in either the strength of response of one variable to changes in another, or in the timing with which this response occurs. Consistent with the approach in Drew and Sethi (2007), we organise the discussion in this article around a stylised representation of the transmission mechanism (Figure 1). In Drew and Sethi (2007), we identified 17 intermediate links in a detailed representation of the mechanism, such as “from the OCR

to wholesale short-term interest rates” and “from effective mortgage rates to house prices”. In this article, the flow chart is somewhat less comprehensive, featuring fewer links because gaps in available research or data permit conclusions on only a subset of the intermediate links identified in our first article.

In figure 1, links that are deemed to have become stronger over time are mapped in solid lines, weaker ones in dotted lines, and those that have remained largely unchanged in dashed lines. Green lines continue to represent the interest rate channel of the transmission mechanism, blue lines denote the effect of changes in the exchange rate, and red lines refer to effects related to inflation expectations. The numbers next to the links provide easy reference to points in the discussion below.

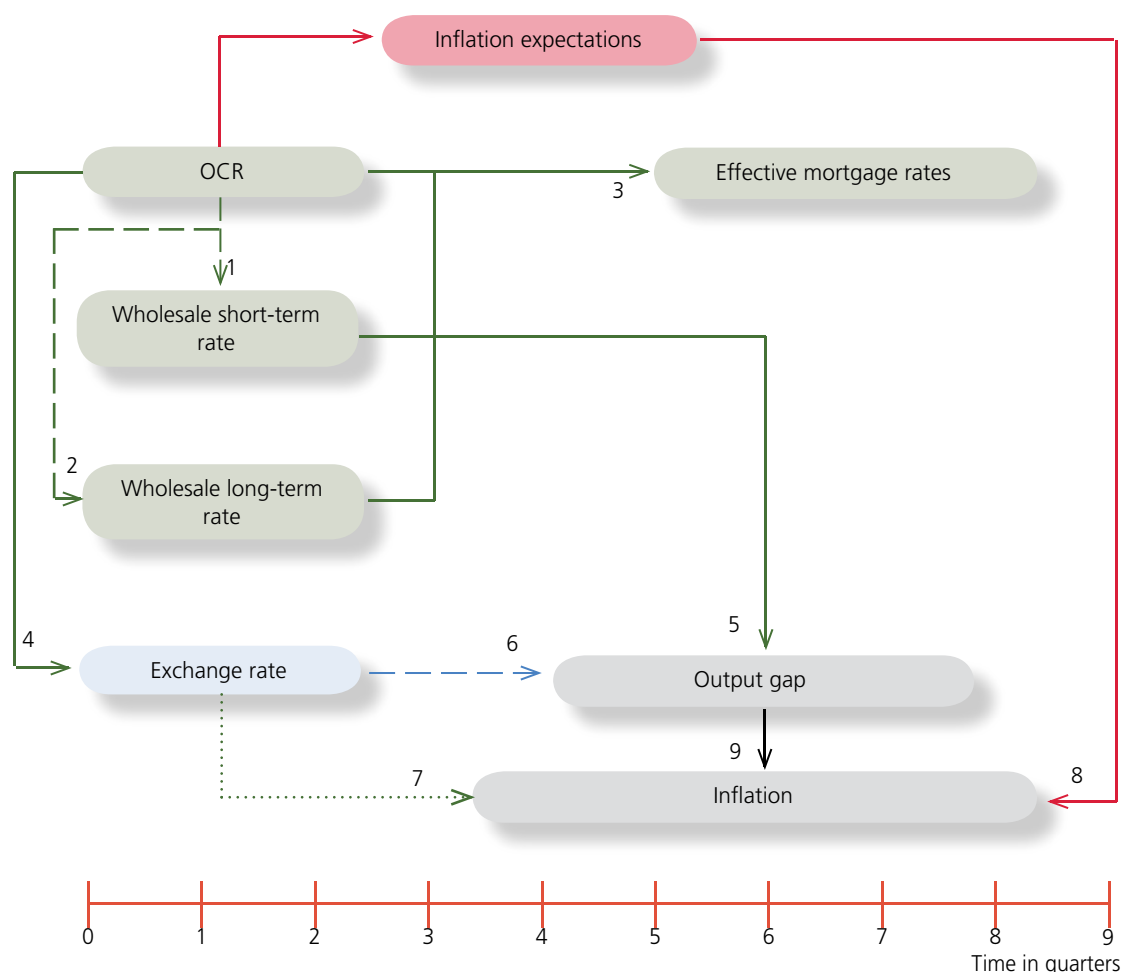
For each of the links considered, the evidence presented in this article is based on either (a) available academic or internal Reserve Bank research, or (b) the three economic models used to study the transmission mechanism in Drew *et al.* (2008). These models are summarised in Box 1.² Note that the various analyses differ in their data definitions and sample periods, and an element of judgement is necessary when aggregating this evidence. Consequently, we are conservative in our conclusions here, defaulting to the view

¹ This article is based on Drew *et al.* (2008), a Reserve Bank of New Zealand discussion paper, to which interested readers are referred for the econometric detail underlying the results presented in this article. The research was initially prepared for a conference on the business cycle, housing, and the role of policy hosted by The Treasury and the Reserve Bank in December 2007. Drew and Buckle (2008) summarise the main themes from this conference. I thank Tim Hampton, John McDermott, and Tim Ng for valuable comments on an earlier draft of this article.

² Though the transmission mechanism of New Zealand monetary policy has been widely studied using a range of economic models, there is a paucity of prior research that addresses changes in the mechanism over time.

Figure 1

Changes in the transmission mechanism of New Zealand monetary policy
(elements not examined in this article are not shown)



that a link is broadly unchanged over time, unless the bulk of evidence suggests otherwise.

To set the context, we briefly review the transmission mechanism in section 2, together with an overview of the major public causes for concern about the efficacy of recent monetary policy. In section 3, we present evidence on the changing influence of monetary policy on market wholesale and retail interest rates, and on the exchange rate. Section 4 looks at the impact of these financial prices on real activity. Section 5 documents changes in the relationship between aggregate activity and inflation, a link commonly known as the Phillips Curve.

2 A brief review of the transmission mechanism of New Zealand monetary policy

In this section, we review the transmission mechanism using the example of a monetary tightening (an increase in the OCR) that is aimed at dampening projected future inflationary pressure, as in Drew and Sethi (2007). Opposing effects may generally be expected in the event of a decrease in the OCR, though there is likely to be significant variation in timing and magnitude.

An unanticipated increase in the OCR tends to result in increases in other wholesale and retail interest rates for both short- and long-term maturities. These interest rate increases reduce the present values of income streams from a variety of assets such as bonds, equities and real estate,

and lead to lower prices for these assets. Debt servicing costs and rewards to saving increase on the back of higher interest rates, and combine with lower asset values to limit credit available to households and firms. Higher interest rates, being an increase in the 'price' of using money now rather than later, effectively increase the current price of any dollar-denominated expenditure relative to its future cost. Consequently, households and firms face incentives to postpone current consumption and investment, reducing current aggregate demand for goods and services. Finally, if this new level of aggregate demand declines relative to the economy's supply capacities, inflation pressures may be expected to ease.

The second major channel for the transmission of monetary policy is through the exchange rate. An unanticipated increase in the OCR immediately appreciates the New Zealand dollar, as higher domestic interest rates attract foreign capital. In theory, the foreign currency price of New Zealand dollars should be bid-up to a level such that the expected depreciation from that point on is just sufficient to leave an investor indifferent between holding assets denominated in New Zealand dollars and in the foreign currency.

A higher exchange rate implies a lower New Zealand dollar price for foreign-produced goods and services. These lower prices are normally passed on through the supply chain, lowering prices of both intermediate goods and final goods such as those measured in the Consumers Price Index (CPI). A higher exchange rate also renders export-oriented and import-competing firms less competitive, reducing their earnings and again dampening overall domestic activity and inflation pressures.

The final channel through which monetary policy influences prices is through inflation expectations. If households and firms are convinced of a central bank's commitment to an inflation target, and of its ability to meet this target, then they are likely to respond to a change in monetary policy by adjusting their own expectations of future activity and inflation. On anticipating changed economic conditions in the future, they are likely to modify current levels of consumption and investment, and their strategies for setting prices and bargaining for wages.

These three channels – interest rates, exchange rates and inflation expectations – comprise the transmission mechanism of monetary policy. Drew and Sethi (2007) detail the role played by several intermediate variables along each channel.³

Major features of the current business cycle, and the role of monetary policy

Since emerging from a brief recession in the late 1990s, New Zealand has enjoyed both the longest and strongest uninterrupted expansion in aggregate economic activity in the post-war period. In recent years, the strong growth has been accompanied by an unemployment rate low by historical and international standards, inflationary pressures stemming from private domestic demand and capacity constraints, and increasing rates of public and private investment. There have been large increases in asset prices, especially for real estate between 2001 and 2007. These domestic drivers of growth have been supported by international factors such as increasing commodity export prices, low costs of capital, and, until relatively recently, a substantial and increasing appetite for risk. The primary response of monetary policy to elevated inflationary pressures is seen in an OCR that is now, at 8.25 percent, 3.25 percent higher than it was at the start of the tightening cycle in March 2004.⁴

Large macroeconomic imbalances have accompanied the expansion in the form of record current account deficits, substantial declines in the household saving rate, an exchange rate that has been widely considered to be exceptionally and unjustifiably overvalued, and a concentration of growth in sectors of the economy relatively sheltered from international competition.

These patterns in New Zealand's recent economic performance have prompted public concern about the role

³ Some authors have described a fourth channel in the transmission mechanism relating to credit creation by banks and financial intermediaries in response to changes in monetary policy settings. See Bernanke *et al.* (1999).

⁴ Note that real interest rates, measured as the excess of the overnight interbank cash rate over annual CPI inflation, ranged between 3.6 and 3.9 percent between March 2004 and September 2006, and peaked at 6.4 percent in September 2007.

Table 1

The changing transmission mechanism: a summary of findings comparing the strength and timing of intermediate links in the 2000s with the 1990s.

No.	Link	Strength	Timing
1	From monetary policy to short-term wholesale rates	Unchanged	Slightly longer
2	From monetary policy to long-term wholesale rates	Unchanged	Longer
3	From monetary policy to effective mortgage rates	Somewhat stronger	Longer
4	From monetary policy to the exchange rate	Likely stronger	More persistent
5	From interest rates to the output gap	Stronger	Slightly longer
6	From the exchange rate to the output gap	Unchanged	–
7	From the exchange rate to CPI inflation	Weaker	Slightly quicker
8	From inflation expectations to inflation	Stronger	–
9	From the output gap to inflation	Possibly stronger	–

of monetary policy and its recent conduct. Our study of changes in the transmission mechanism specifically addresses two of these concerns. First, changes in the OCR are thought to have provoked disproportionately large changes in the exchange rate in recent years, a claim based principally on the low levels of international risk aversion that have been observed since 2002. There is a risk premium associated with investments in NZD-denominated assets, representing the additional payment required to compensate investors for possible future exchange rate depreciations.⁵ With reduced aversion to bearing risk, investors pay less regard to the possibility of future depreciations, and face added incentives to engage in ‘carry trades’ wherein they borrow in currencies with low financing costs to purchase NZD-denominated assets that offer higher yields.

Some observers have raised another important concern about the recent effects of monetary policy. They perceive that the transmission of monetary policy from changes in the OCR to changes in domestic activity and inflation has weakened as a whole. Several reasons have been proposed in support of this conjecture. For example, low international interest rates and increasing capital markets integration may each have limited the ability of the Reserve Bank to independently influence longer-term domestic interest rates. Also, there has been a growing substitution away from floating rate mortgages to longer-term fixed rate

products, owing both to lower longer-term wholesale rates and to margin compression amongst mortgage lenders on fixed mortgage rates. Some commentary also suggests the Reserve Bank was unable to convince market participants of the underlying strength of inflation pressures in the early part of the current tightening cycle, and consequently changes in the OCR had less influence on longer-term rates than usual.⁶

The remainder of this article presents evidence to show that the overall impact of policy on activity and inflation has not obviously weakened, and in some ways, has strengthened over the past decade relative to the 1990s. Table 1 presents a summary of results discussed below.

There is one important caveat to the exercise: the changing transmission mechanism is likely to be due not just to the changing impact of one intermediate variable on another, but also to the changing nature of the random fluctuations (or shocks) that buffet an economy over time.⁷ It can be difficult to perfectly account for the relative contributions to changes in the mechanism from these two causes.

⁵ Major reasons for this currency risk premium include: the relatively small and relatively undiversified nature of the New Zealand economy, and the persistent macroeconomic imbalances and low national saving rate noted above.

⁶ The other major concern about the recent impact of monetary policy is not addressed in this article. This relates to the observation that, in a cycle where the bulk of inflationary pressure has been sourced in the domestic economy, monetary policy has been poorly targeted, with sectors exposed to the exchange rate bearing the brunt of the burden of reducing inflation.

⁷ For example, some economists attribute the ‘Great Moderation’ – the period of relatively high growth and low inflation in the US since the mid-1980s – to a sequence of beneficial supply shocks (such as improved productivity from increased use of computers or the rise of China as an efficient manufacturing base) rather than to better monetary management.

Box 1

The economic models in Drew *et al.* (2008)

Many of the conclusions in this paper are based on the findings of Drew *et al.* (2008), a recent Reserve Bank Discussion Paper. Here, we summarise the main features of the three economic models used by the authors to study the transmission mechanism.

The Reserve Bank's Forecasting and Policy System (FPS) has been used as the primary tool for producing the Bank's published forecasts since 1997. It features a dynamic adjustment process that determines how inflation and other variables return to their long-run equilibrium values following an economic shock, and is calibrated to match certain characteristics of the New Zealand business cycle.⁸ In turn, the long-run equilibrium is based on a framework of utility-maximising consumers and profit-maximising firms. Although the underlying structure is largely unchanged since the inception of FPS, the dynamic adjustment paths have been heavily adjusted over time. These adjustments, or recalibrations of the model, are prompted by evidence from both sectoral and aggregate-level research, and by judgement on changes in economic structure, and on the propagation of economic shocks. As such, the comparison of different calibrations of FPS over time offers a very convenient synthesis of the Reserve Bank's changing views on various macroeconomic relationships.

The second model used to study the transmission mechanism in Drew *et al.* is a vector auto-regression, or VAR. The defining characteristic of a standard VAR is that it presupposes little formal theory for specifying relationships between variables. Instead, it is assumed that the future path for a variable depends simply on its own history and that of other variables in the model.⁹ The VAR in Drew *et al.* features core macroeconomic variables such as

inflation, output, interest and exchange rates, and others such as indices of climatic conditions.

The third model considered in Drew *et al.* is small, featuring only five variables. This 'New Keynesian' model is a variant of a type widely used in academic research for assessing monetary policy, as it captures many features of the macroeconomic data in a reasonably parsimonious manner. The relationships between variables are motivated by general equilibrium (or whole-economy) theory, and are internally consistent, allowing the authors to form tentative conclusions about why the transmission mechanism may have changed over time. New Keynesian models can feature one or more different sources of inflexibility that cause variables to adjust slowly in response to an economic shock, and motivate an important role for expectations of future inflation and output in determining the dynamic behaviour of the economy.

Assessing change

The three models in Drew *et al.* use different methods to assess changes in the transmission mechanism. Results from FPS rely on comparing properties of the different vintages of the model from 1997, 2002 and 2007. In contrast, the VAR and New Keynesian models are estimated on New Zealand data, and the changing intensities of the relationships between variables are captured in the changing magnitudes of the estimated parameters in the model equations. Specifically, the VAR uses the method of rolling regressions wherein the model is initially estimated on data from 1989 (September quarter) to 1996 (June quarter). Data from additional quarters until the end of the available sample are successively added, and the model is re-estimated on each successively larger sub-sample. Though rolling regressions yield continuous estimates of changes in economic relationships, these estimates can be volatile, as they are sensitive to individual observations that may or may not be in a given sub-sample. More importantly, the method is backward-looking in that it relies solely on past observations and ignores the information content of future data in estimating a model at a given point in time.

⁸ See Black *et al.* (1997) for detail on the structure of the FPS.

⁹ The precise assumed dependencies between variables will vary from one VAR model to another. Some extensions, known as structural VARs, motivate contemporaneous relationships from economic theory. See Hamilton (1994) for more on these models.

A technique known as the Kalman filter provides an elegant solution to the problem of estimating relationships that may change over time. It yields smooth estimates of parameter changes, makes use of the full available

sample of data, and is relatively insensitive to individual observations.¹⁰ Drew *et al.* use this method to estimate their New Keynesian model.

Accordingly, we base our conclusions on evidence from multiple sources, including from economic models that make different assumptions about the structure of the New Zealand economy and the nature of these shocks.

3 Changes in monetary policy and the effect on financial prices

Following an actual or expected change in the OCR, financial asset prices, such as interest and exchange rates, are first to respond. It is important that these prices respond suitably as they, in turn, affect other asset prices, and real activity and inflation at later stages in the monetary transmission process. As a recent example, rapidly increasing house prices contributed to strong growth in household consumption in the five years to the end of 2007, and were considered to be important contributors to inflationary pressure over the period. As such, in a series of *Monetary Policy Statements* beginning in December 2005, the Reserve Bank was increasingly pointed in noting that a slowdown in house price growth was needed to weaken the case for further interest rate increases. In this section, we look at whether the effect of OCR increases on wholesale and mortgage interest rates was smaller over this period than previously observed, and so failed to contribute to an easing of the rapid increase in house prices in a timely fashion. We also consider the changing impact of monetary policy on the exchange rate.

Interest rates

1 **2** Schmidt-Hebbel (2006) looks at monetary policy transmission in New Zealand over the period 1990 to 2005. He focuses on a sub-sample from 1998 to 2005 to determine whether monetary policy and its effects display similar characteristics in this period as in the full sample. In response to a change in monetary policy, Schmidt-Hebbel finds that though monetary policy has significant bearing on 10-year government bond rates in both the full- and the sub-sample, the differences between the samples are small.

Recent 'event analysis' at the RBNZ suggests that since the start of the decade, changes in the OCR have had a significant impact on wholesale interest rates.¹¹ A hypothetical monetary policy surprise of 1 percent is estimated to prompt one-year forward swap rates to increase by 0.9 percent for settlement one year ahead and by 0.3 percent for settlement five years

¹⁰ Originally devised for applications such as tracking spacecraft in the 1960s, the Kalman filter is widely used in engineering, aeronautics and communications. Since the mid-1990s, it has also become an essential tool in economic research for retrieving information from noisy or even partially missing data, for estimating economic models, and for smoothing time series by incorporating information from past as well as future data.

¹¹ See Drew and Karagedikli (2008) and Karagedikli and Siklos (2008). An event analysis, which attempts to isolate the impact of the surprise component of an economic event, is thought to be a more robust way of identifying the impact of monetary policy and other economic developments on financial market prices than the traditional time-series approaches above, and has become an increasingly popular tool in international research.

¹² Swaps are financial instruments that allow counterparties to manage risk, usually by achieving a better match between their assets and liabilities. A forward swap is an instrument that is negotiated at the present juncture, for settlement at a point in the future, and which matures several periods further into the future. The interest rates on these instruments are benchmark wholesale interest rates.

ahead.¹² Event analysis studies require very high frequency data; the required intra-day daily data used in the Bank's research is only available from around 2001. However, in formal robustness checks, the authors of these studies do not find evidence of instabilities in their regressions, as might have been the case if the impact of monetary policy had changed materially since 2001.

For additional perspective over a longer period, we estimate some simple regressions linking changes in monetary policy and short- and long-term wholesale interest rates. As these regressions are estimated over a long sample from 1992, we use changes in interest rates on 90-day bank bills as a proxy for changes in monetary policy settings.¹³ Generally, we find that volatility in wholesale interest rates has decreased since about 2000, and that there has been no systematic decline in the total impact of changes in monetary policy on these interest rates. However, comparing estimates from the past five years with those from 1992 to 2002, it appears that more distant changes in monetary policy settings have exercised greater influence on long-term wholesale interest rates relative to more recent changes. In other words, changes in policy settings now take a little longer to flow through to these wholesale interest rates.

3 Liu *et al.* (2007) estimate the degree and speed of response of retail interest rates to changes in policy-controlled rates between 1994 and 2004. They find that, following the introduction of the OCR in 1999, floating interest rates on mortgages and deposits respond more strongly to changes in monetary policy, while fixed interest rates do so more slowly and by less. Tripe *et al.* (2005) also examine the impact of the introduction of the OCR, and reach a similar conclusion that the long-term impact of wholesale rates on floating mortgage rates increased in the post-OCR period, while the impact on fixed mortgage rates decreased slightly. Pais (2007) reaches different conclusions

using weekly data, finding that both floating and fixed mortgage interest rates adjust fully in the long run, but that floating rates do so very slowly.

Between 2005 and 2007, the share of outstanding mortgages on floating interest rate terms declined from 42 percent to 30 percent. Meanwhile, the value of outstanding mortgages on contracts fixed for two years or more increased from 11 percent to 32 percent. There seems to be little doubt that the present cycle witnessed a change in preferences for mortgage borrowing towards the fixed-rate contracts, causing the effective mortgage rate to increase more slowly in response to tighter monetary policy.

The overall assessment from this evidence is ambiguous: it seems that the response of wholesale and mortgage interest rates is more or less unchanged in recent years when compared to the 1990s, but that this response occurs more slowly.

Exchange rates

4 Drew *et al.* (2008) study changes in the transmission mechanism using FPS, the Reserve Bank's core model for producing macroeconomic forecasts. As witnessed by changing FPS calibrations, Drew *et al.* report that the Reserve Bank perceives the exchange rate response to a change in monetary policy to have been stronger and more persistent in 2007 than in 2002 or 1997. This is seen in figure 2, which documents impulse response functions from the three vintages of FPS – that is, the figure maps the changing response of the exchange rate to a unit increase (an impulse) in monetary-policy-controlled interest rates.

Two smaller models considered by Drew *et al.* offer conflicting evidence on changes in this relationship, with the VAR finding support for an unchanged link, and the New Keynesian model suggesting that the impact of a policy tightening on the exchange rate declined over the 1990s, but has increased since 2002.¹⁴ Exchange rate behaviour is notoriously difficult to pin down accurately, and we are inclined to favour evidence from the changing

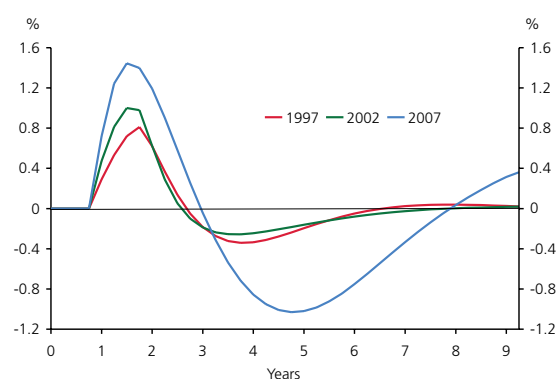
¹³ The dependent variable in the regressions is the monthly change in the interest rate on one-year forward swaps for settlement one year ahead (a proxy for short-term wholesale interest rates), and the comparably transformed interest rate on one-year forward swaps for settlement five years ahead (as a proxy for long-term) wholesale interest rates. The regressions are estimated using a Kalman filter with time-varying parameters, and simple diagnostics indicate that the residuals are well behaved.

¹⁴ Results from the events analysis research cited earlier indicate that an (unanticipated) 1 percent increase in the OCR leads to a 3.5 percent increase in the NZD-USD exchange rate.

FPS calibrations, which aggregates information from a wide range of internal Bank research and from staff judgement as the economy evolves.

Figure 2

According to FPS, the response of the exchange rate to changes in monetary-policy-controlled interest rates has increased over time.



4 The changing impact on real activity

As wholesale and retail interest rates increase in response to tighter monetary policy, they prompt households and firms into reassessing their consumption and investment decisions, reducing aggregate demand. In this section, we look at how links from the exchange rate to real activity and from wholesale and retail interest rates to real activity have changed over time.

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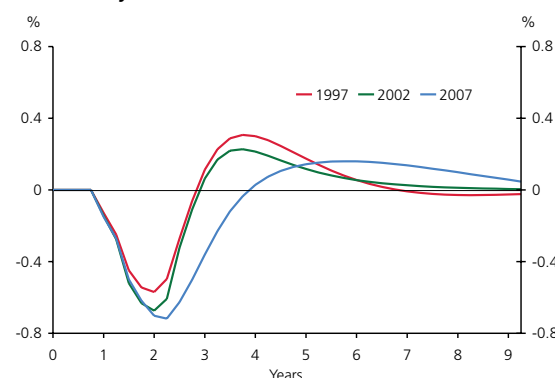
Studying the characteristics of a medium-sized model of the New Zealand economy, Schmidt-Hebbel (2006) finds that the output gap – a measure of excess demand – declines in response to higher short-term interest rates. Interestingly, this decline is small and not statistically different from zero when the model is estimated on a sample from 1992 to 2005, but does become larger and statistically significant when the sample is restricted to the period 1998-2005.

From figure 3, we see that successive recalibrations of FPS have increased the restraint that interest rates exercise on aggregate demand, with much of the increase coming from greater sensitivity of business investment to interest rates. The two smaller models in Drew *et al.* are again in

some disagreement on changes in this relationship, with the VAR suggesting that the response of the output gap is mildly weaker, and the New Keynesian model favouring the interpretation that the impact of interest rates on output growth is significant across the entire sample period (between 1992 and 2007), but strongest towards the end both in terms of the initial response and the persistence of this response.¹⁵

Figure 3

According to FPS, the impact of interest rates on output has become somewhat stronger and a little delayed over time.



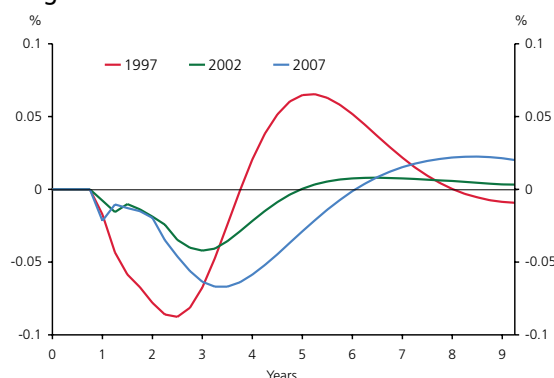
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Comparing FPS calibrations over time, Drew *et al.* report that a temporary exchange rate appreciation was thought to have had a large and rapid impact on export and import demand in 1997, causing overall demand pressures to decline quickly too. In the 2002 vintage of FPS, these effects are muted and delayed, becoming somewhat stronger again, though further delayed, in 2007 (as seen in figure 4). On the other hand, estimates from the two smaller models suggest that the output response to changes in the exchange rate has been small across the entire sample. Though the effect is estimated to be small by both models, they do differ in that the VAR model indicates that a stronger exchange rate actually generates a very mild positive impact in output from about 2001, while the New Keynesian model reports a more conventional negative response, and one that becomes only marginally stronger over time.

¹⁵ According to this model, a 1 percent increase in the real interest rate now reduces the output gap by around 0.4 percent in the long-term.

Figure 4

FPS suggests output now responds more slowly to changes in the exchange rate than previously. The effect is small and is mostly unchanged in magnitude since 1997.



5 The changing Phillips curve

The Reserve Bank's view of the inflation process can be represented by a Phillips curve – inflation arises when aggregate output increases beyond an economy's supply capacities. Modern versions of the Phillips curve also postulate an important role for expectations of future inflation in determining current inflation.¹⁶ More elaborate formulations include dependencies on exchange rates, oil and commodity prices, and trading partner inflation.

7 FPS recalibrations suggest that the total impact of the exchange rate on CPI inflation, also called exchange rate pass-through, declined between 1997 and 2002, and has remained largely unchanged since. This total impact can be decomposed into two sub-effects: the impact of the exchange rate on import prices and the subsequent pass-through from import prices to CPI inflation. Comparing the responses of CPI and non-tradable inflation from FPS, it appears that the latter effect has been dominant. For example, the CPI inflation responses are fairly similar in the 2002 and 2007 vintages of FPS, yet non-tradable inflation troughs lower in the 2007 vintage. Hence, the second sub-effect, from import prices to CPI inflation, is likely to have been the dominant contributor to the overall decline in pass-through.

¹⁶ Given that true expectations cannot be observed, modern Phillips curves can be cast in several different forms. Some include past inflation as a proxy for expected inflation, others include survey measures and many macroeconomic models assume that households and firms form rational expectations that fully incorporate all available information.

Figure 5

FPS suggests pass-through of the exchange rate to CPI inflation declined between 1997 and 2002, remaining largely unchanged since.

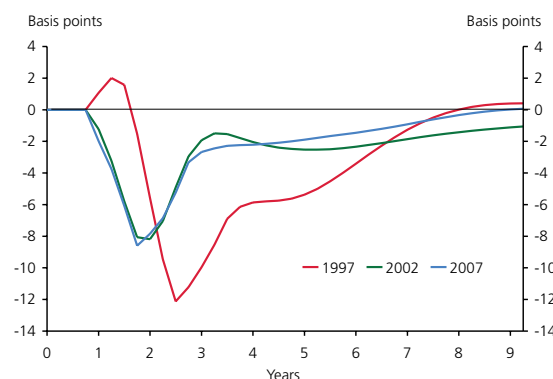
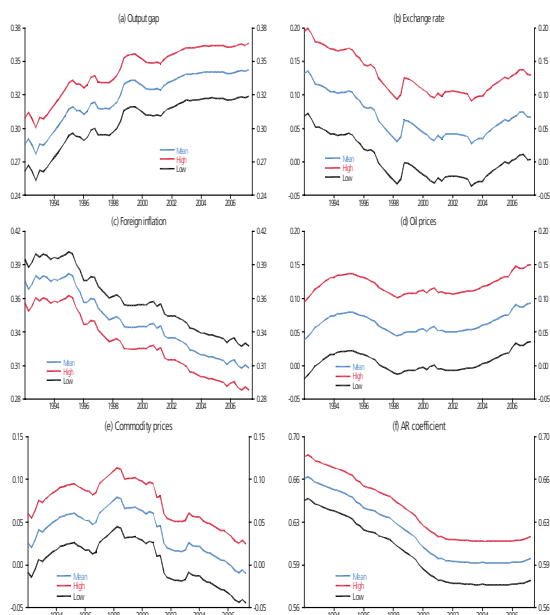


Figure 6 documents some estimates of long-run responses, and essentially captures the changing magnitude of the coefficients in the Phillips curve. These long-run responses are calculated conditional on the assumption that there is no change in monetary policy settings that aims to offset these effects. We see that the New Keynesian model also reports lower overall pass-through for the most part, except in very recent years when it finds for increased pass-through (panel (b) of figure 6). According to this model, in the absence of a monetary policy response, a 10 percent depreciation in the exchange rate today eventually leads to a long-term increase in inflation of around 0.6 percent, compared with an increase of 1.2 percent in the early 1990s.¹⁷

8 Another major conclusion that we can draw from the New Keynesian model in Drew *et al.* is that inflation became increasingly forward-looking over the sample period. The decline in inflation persistence was steady over the 1990s and has levelled off since 2001. Overall, these results are fairly consistent with FPS recalibrations, and, all else equal, imply an increase in the effectiveness of monetary policy.

¹⁷ Researchers report the stylised facts that countries with credible anti-inflationary policies experience lower pass-through to CPI inflation, that pass-through is associated with lower inflation expectations, and that it increases with volatility in inflation and exchange rates (see Campa and Goldberg (2002) and Engel (2002)). Possible microeconomic reasons for declining pass-through include: a change toward invoicing trade in goods and services in New Zealand dollars; increased shares of distribution costs in the price of imports, which provide for greater opportunities for margin compression; a changing mix of goods and services imported into New Zealand over time; and increasing use of sophisticated exchange rate hedging arrangements.

Figure 6
The changing Phillips curve



Note: In the New Keynesian model in Drew *et al.*, inflation is specified as a function of the variables in this figure, and we see the changing long-run impact on CPI inflation (assuming that there is no monetary policy response) of (a) the output gap, (b) the exchange rate, (c) trading partner inflation, (d) oil prices, and (e) commodity prices. Panel (f) shows the coefficient on lagged inflation.

9

The model also indicates that the relationship between excess demand and inflation became a little stronger over the 1990s and has stabilised since 2002. Assuming no further response from monetary policy, a 1 percent decrease in the output gap today eventually leads to a decrease in inflation of around 0.35 percent. The rise in this long-term effect is due to an increasing coefficient on the output gap in the Phillips curve, which has been tempered somewhat by the decline in inflation persistence.

In summary, the most important development in the Phillips curve over the past 15 years appears to be the increasing importance of expectations in determining current inflation. To translate this observation into a well-known 'lesson' for monetary policy: though the increasingly dominant role of expectations means that policy can accomplish more with smaller changes to interest rates, it remains crucial to ensure that these expectations remain well anchored to the inflation target.

6 Conclusion

Some concern has been raised about the effectiveness of recent monetary policy in relation to its influence on the exchange rate, and with respect to the overall impact on activity and inflation. On the basis of evidence presented in this article, especially that from the analysis of three different models of the New Zealand economy, we find that there has been no discernible change in the overall influence of monetary policy on inflation in the present economic cycle. However, we find some evidence of changes over time in the strength and timing of the various relationships that are intermediate in the transmission of the OCR to inflation.

First, changes in monetary-policy-linked interest rates are reflected in wholesale interest rates to at least the same degree as in the 1990s, though perhaps with increased delay. Second, even though the exchange rate is estimated to respond more to changes in monetary policy settings, it is also estimated to have become a somewhat less consequential determinant of output and inflation in itself. In other words, much larger changes in the exchange rate are now required to effect a given change in output and inflation, and it appears that monetary policy settings are indeed prompting these larger changes in the exchange rate. Meanwhile, the inflation process has become more forward-looking, with expectations of future inflation becoming more important in determining current inflation.

In summary, we conclude that there has been some re-weighting in the relative burden of macroeconomic adjustment borne by the different channels of the transmission mechanism. Transmission through interest rates remains vital and effective, but eventuates with longer lags. The exchange rate channel has become more important over time: the exchange rate itself responds to a greater degree but, for a given unit of change, generates smaller responses in output and inflation than previously. Overall, the transmission mechanism remains effective, and monetary policy continues to eventually influence the general level of prices.

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The relationship between monetary and financial stability

Leni Hunter¹

The Reserve Bank of New Zealand takes distinct actions in order to pursue its goals of monetary and financial stability. However, it is necessary to have coordination between actions taken towards each goal, as the achievement of each depends on the other – inappropriate monetary policy can threaten financial stability, and the maintenance of price stability requires a stable financial environment. Policy actions taken for both goals should be consistent and mutually reinforcing where possible. For example, in some circumstances monetary policy may be used to proactively counter potential asset bubbles, and the use of financial stability tools may lend support to monetary policy's function of stabilising the business cycle.

1 Introduction

The Reserve Bank's recent *Financial Stability Reports* have documented the dislocation that has arisen in the global financial environment following the crisis in the US sub-prime mortgage market.² In line with other central banks, the Reserve Bank of New Zealand has responded with extended arrangements for providing liquidity to the financial system.³ Other countries, more directly affected by the crisis, have also loosened monetary policy settings for interest rates.

The current episode presents the latest demonstration of interactions that arise between monetary and financial stability. These interactions have of course been demonstrated many times before, as financial crises have typically had severe macroeconomic consequences. With this backdrop, we clarify what the Reserve Bank means by monetary and financial stability, and discuss the overlap between the analyses that the Reserve Bank takes for monetary policy and financial stability purposes. We consider situations where monetary policy might respond to an episode of financial instability, and the extent to which tools to promote financial stability might contribute towards achievement of the central bank's monetary policy goals.

Characterising monetary and financial stability

The Reserve Bank of New Zealand Act 1989 (the Act) states that the Reserve Bank shall act as the central bank for New Zealand (section 7), and accordingly gives the Reserve Bank specific powers and functions.⁴ Two broad functions are:

- to formulate and implement monetary policy to maintain price stability (section 8); and
- to promote the "maintenance of the soundness and efficiency of the financial system" (sections 10, 68, 156B, 156K).

Price stability is defined in the Policy Targets Agreement (PTA). This is an agreement signed by the Governor and the Minister of Finance that documents how price stability is defined and, in broad terms, how the Reserve Bank should go about achieving price stability.

The Reserve Bank's financial stability objectives are set by the Act without a supplementary agreement comparable to the PTA. The Act requires the Governor-General, the Minister, and the Reserve Bank all to exercise their powers for the purposes of promoting the maintenance of a sound and efficient financial system, and avoiding the significant damage to the financial system that could result from the failure of a registered bank.

The Reserve Bank has stated its conceptual understanding of financial stability in a previous *Bulletin* article: the financial

¹ This article has benefited from comments from many Reserve Bank colleagues, including Michael Reddell, Ian Nield, Grant Spencer, Willy Chetwin, Alistair Henry, and Tim Ng.

² <http://www.rbnz.govt.nz/finstab/fsreport/>

³ <http://www.rbnz.govt.nz/news/2008/3330850.html>

⁴ For example, including the sole right to issue bank notes and coins in New Zealand.

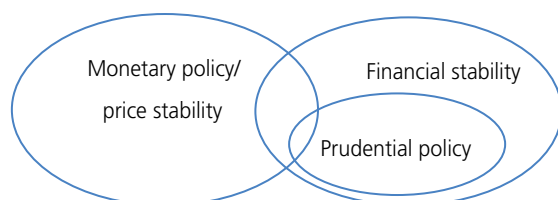
system is stable when financial system risks are adequately identified, allocated, priced and managed.⁵ We view these conditions as necessary to ensure that the financial system is resilient to a wide range of economic and financial shocks and is able to absorb financial crisis losses with least disruption.

Assessment of financial system stability uses both quantitative and qualitative methods. Quantitative assessment of risks to financial stability employs numerous indicators, discussed below. It is possible to combine indicators into a single model such as an 'early warning system'.⁶ However, at present there is no single numerical measure of financial stability that central banks typically use to state when a financial system is, and is likely to remain, stable.

Monetary and financial stability analysis

Figure 1 provides a simple depiction of the relationship between the analyses of monetary policy and of financial stability. Monetary policy and targeting price stability are shown as not necessarily involving financial stability concerns, just as many aspects of financial stability are shown as not affecting the maintenance of price stability.⁷ Prudential policy is shown as a subset of financial stability with some, but not most, matters in common with monetary policy. The area where monetary policy and financial stability (including prudential policy) overlap identifies matters of concern to all three. It is in this space that the worst downturns in the economy are prone to occur.

Figure 1
Monetary policy and financial stability



Outside of the prudential policy area, figure 1 also provides for risks from the financial system that may not involve the failure of a financial institution or pose risks to inflation. An example here could be volatility in equity markets. However, if prolonged and excessive, volatility would be likely to impact on the stability of the macroeconomy and financial institutions.

The Reserve Bank, in common with other central banks, carries out quantitative assessment of the state and robustness of the financial system and its institutions – eg, through supervisory assessments and stress-testing, and through work on financial stability indicators. Financial crises come in many different forms, with different triggers. Because of this, researchers often emphasise the use of indicators that have been common to different crises when attempting to forecast future crises. Common indicators may be either symptoms or underlying causes of crises, and often include macroeconomic indicators. Macroeconomic variables such as those that form part of the International Monetary Fund (IMF)'s Financial Soundness Indicators list, are routinely monitored for monetary policy analysis.⁸ Variables used in IMF early warning systems have included real exchange rate overvaluation, the current account balance, reserve losses, export growth, and the ratio of short term debt to reserves.⁹

In a general sense, we could think of the business cycle as an indicator. Demand-driven inflation pressure rises during expansions and falls in contractions, and is therefore procyclical (by definition). Financial crises are also procyclical; for example, strong credit growth can amplify a business cycle upswing and create conditions for a crisis, and a crisis can be triggered by or precipitate a business cycle contraction.

Development of early warning systems for financial crises has been hindered by having only limited data on crisis episodes, and is complicated by differing definitions of what constitutes a 'financial crisis'. Assessments of early warning system models have yielded mixed results regarding their ability to add to more comprehensive, but perhaps less structured, analysis.¹⁰

⁵ Hunter, Orr and White (2006).

⁶ As in, for example, Davis and Karim (2008).

⁷ See also discussion of how asset bubbles can coincide with low inflation in Borio and Lowe (2002), and Borio and White (2004).

⁸ <http://www.imf.org/external/np/sta/fsi/eng/fsi.htm>.

⁹ Kaminsky, Lizondo, Reinhart (1998).

¹⁰ For example, see Berg, Borensztein and Pattilo (2005).

Figure 2
Monetary policy and financial stability¹²

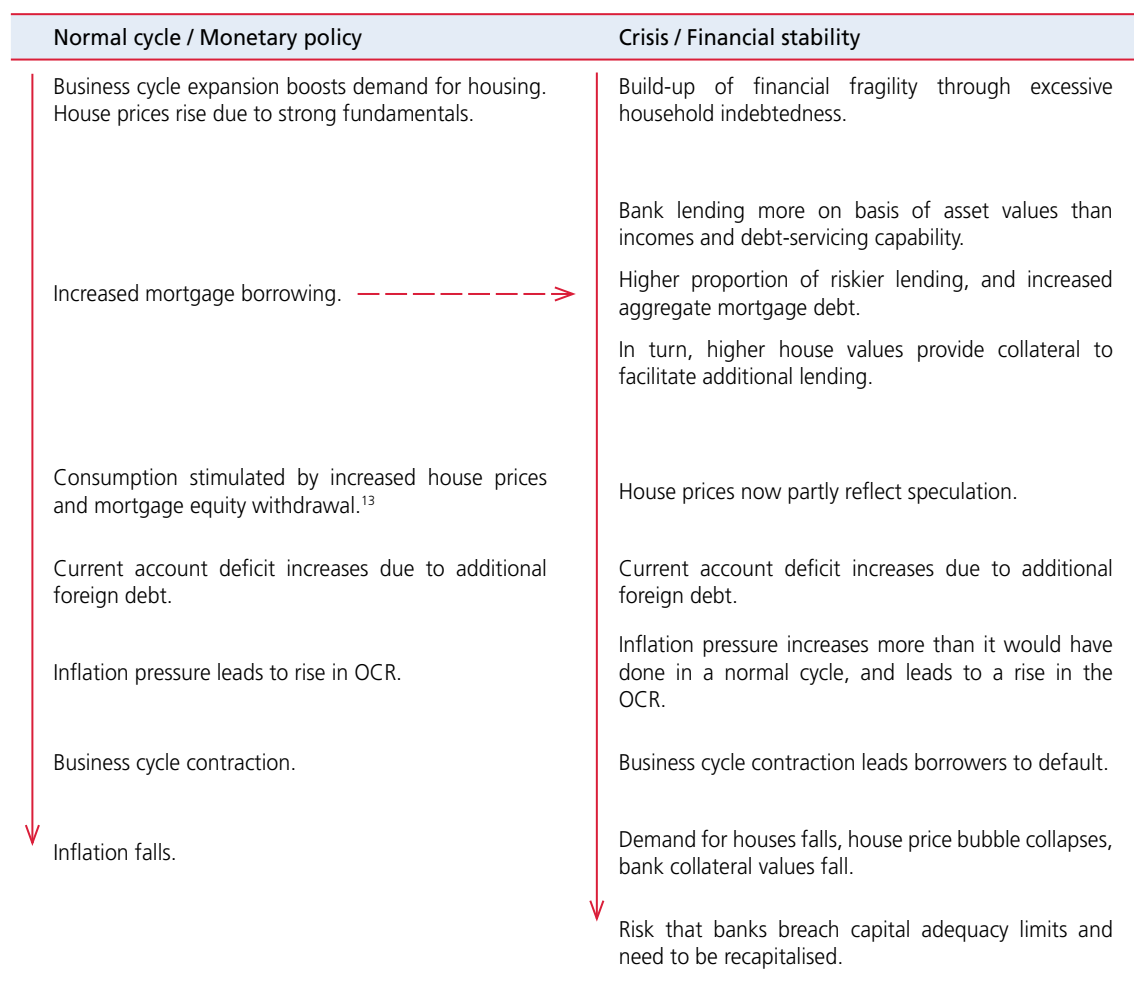
Monetary policy			Financial stability	
Monetary policy target	Indicators 'more for' monetary policy	Common indicators ~ Macroeconomy	Indicators 'more for' financial stability	Financial stability target
Policy Targets Agreement: future CPI inflation between 1 and 3 percent on average over the medium term	Eg, Inflation measures, CPI components, inflation expectations, core inflation measures Labour market Business monitoring Fiscal policy External trade Commodity and factor markets Terms of trade	Eg, Balance between aggregate demand and supply Interest rates Aggregate saving-investment balances Credit growth Credit spreads Exchange rate levels and volatility Equity and other asset prices	Eg, Capital adequacy ratios Asset quality Earnings and profitability Liquidity ratios Financial institution balances and risk indicators Credit ratings Financial market positioning / liquidity	Avoid financial system instability/ stress Objective not quantified
Monetary policy instruments		Debt distribution, debt servicing ratios. Sectoral balances:		Financial stability instruments
Official Cash Rate (OCR)		<ul style="list-style-type: none"> household sector business sector agricultural sector 		Reserve Bank actions aimed at prevention or correction of instability (footnote 12)
Publication	<i>Focus on forecasting the mean, and describing the range of uncertainty around the forecast</i>	External debt Hedging and risk management practices Global economic and financial conditions	<i>Focus on risk assessment – eg, tail events, volatility, thresholds that may indicate financial system stress</i>	Publication
Quarterly Monetary Policy Statement (MPS)				Semi-annual Financial Stability Report (FSR)
(appendix A1)				(appendix A1)

However, positive results have been attained by authors regarding the use of credit growth to predict banking crises. For example, using the deviation of credit growth from trend, Borio and Lowe (2002) were able to predict 80 percent of crises that occurred in a set of 34 countries between 1960 and 1999.¹¹

¹¹ In addition, Borio and Lowe (2002) found that adding asset prices as an indicator reduced the likelihood of mistakenly predicting a crisis, but also reduced the probability of predicting a crisis.

¹² Preventative actions include: prudential regulation (bank registration and supervision), oversight of payment and settlement systems, provision of liquidity to the banking sector, holding a portfolio of foreign reserves for intervention purposes, publishing the *Financial Stability Report* and *Monetary Policy Statement*. Corrective actions include: foreign exchange intervention, maintaining price stability, imposing prudential requirements on banks and ability to alter conditions of registration. Crisis management actions include: acting as lender of last resort, statutory management, foreign exchange intervention.

Figure 3
Stylised timeline: House price cycle



While financial and monetary stability analyses share many indicators, some indicators are more specific to each objective. For example, monetary policy aims to forecast future inflation using more detailed analysis of the economy than would typically be used for financial stability analysis. In contrast, financial stability policy involves close analysis of financial market data, and sectoral and institutional balance sheets. Overlap and differences are drawn out in figure 2, which anticipates the discussion of tools in the following section. In addition to indicator variables, respective targets and instruments are included in this figure and appear in the extreme left and right side boxes.

There is also differentiation in how variables are used. Monetary policy is more concerned with using indicators to make statements about events that could occur with relatively high probability and regularity. By contrast, in detecting crises, financial stability policy is concerned with low probability, irregular events. Financial stability analysis uses volatility or threshold measures – as is done using the types of early warning systems mentioned above. For example, we use exchange rate forecasts for inflation forecasting and monetary policy, but for financial stability purposes we would be particularly interested in the probability of sudden and significant change in the exchange rate.

The stylised timeline in figure 3 shows an example of how an episode of financial instability could develop from an event that, in times of lesser stress, would only have monetary policy implications. While the example considers household indebtedness, excessive debt in any part of the

¹³ Rising house prices redistribute wealth such that house owners become relatively wealthier while others become relatively less wealthy. This means that in the long term, consumption should not be affected by rising house prices. However, rising house prices facilitate mortgage equity withdrawal, which stimulates consumption in the short term.

financial system may result in a similar chain of events. The timeline reflects that crises do not usually appear out of the blue. There is typically a period over which imbalances and fragilities build up, during which agents adjust their assessment of risk and eventually learn that risk is mis-priced. There is no discrete point in time at which the system 'becomes' unstable; incremental shifts in stability are difficult to assess in real time.

As agents come to the realisation that the financial system is in a period of instability or crisis, the way they respond is crucial. The actions of market participants as they attempt to protect themselves have often resulted in asset fire-sales, contagion and bank runs, all of which spread and magnify the effects of the original crisis.

To summarise, while crises are procyclical, fortunately they do not appear in every cycle. However, the irregularity in their timing and nature means that identifying when crises will appear is difficult. Whether a given cycle will evolve into a financial and economic crisis depends on the shocks that the system is exposed to, and the underlying system stability. The latter will be determined in part by existing financial balances, regulatory practices and policies, and the behavioural responses of market participants and policymakers. Needless to say, shocks and behavioural responses are difficult to predict. Hence central banks typically focus on identifying sources of risk that may be building in the system, and types of shocks to which the financial system may be particularly vulnerable.

2 Policy tools and approaches

The purpose of monetary policy tools is to maintain price stability, and the purpose of financial stability tools is to ensure financial stability. Nonetheless, irrespective of the intention with which an instrument is used, it is artificial to partition that instrument's effect to the respective spheres of either monetary or financial stability. Households and firms draw no partition between the effects of central bank policy actions on their activities. Hence, monetary policy actions affect the financial system and its stability; financial stability actions have consequences for macroeconomic cycles and monetary policy.

This section considers how monetary and financial stability instruments can work together for cyclical stabilisation purposes. The section outlines some of the current policies and options as examples and as suggestions for further in-depth analysis. Extensive coverage of all options has not been attempted. The discussion takes as given that policies are more effective when simple and hence more easily understood, and when applied in advance rather than reactively.

While the Reserve Bank of New Zealand has responsibility for both monetary and financial stability, different arrangements exist in other countries. Irrespective of the specific institutional arrangements, it is vital to have coordination between regulators and clarity regarding exactly who has authority and responsibility to exercise particular legislative powers.¹⁴

Monetary policy tools to assist financial stability: leaning against asset price bubbles

The Reserve Bank takes a flexible and forward-looking approach to inflation targeting. In accordance with this approach, monetary policy responds to future inflation risks, including risks created by events that threaten financial stability. For example, an asset price cycle that creates financial instability can create longer-term risks to inflation that the central bank will need to respond to. Hence, precautionary adjustments to monetary policy settings occur from time to time as a normal part of a flexible approach to inflation targeting.¹⁵

A long-running debate has considered how central banks can respond to asset price cycles, but as yet there is no agreement on best practice due to several unresolved issues. The main difficulty lies in discerning whether asset prices are driven by fundamentals or bubble behaviour. If monetary policy attempts to correct an asset price cycle that has been wrongly diagnosed as a bubble, overly-tight monetary policy can slow the economy unnecessarily and prevent the efficient allocation of resources.

¹⁴ See also Appendix A2.

¹⁵ At times precautionary adjustments may be sudden and unscheduled. While not taken in response to asset prices, an example of this in New Zealand was the cut in the OCR that followed the events of September 11, 2001.

Worse, the attempt could prove counter-productive if mistimed. Attempting to prick an asset price bubble could leave monetary policy excessively tight at the time when the bubble bursts. On the other hand, a central bank that anticipates a bubble collapse would find it difficult to proactively ease at the right time, without further fuelling the bubble. A further complication arises if the bubble collapse coincides with a period of positive shocks to inflation, creating conflict between financial stability and monetary policy objectives.

Even if the asset price cycle is correctly diagnosed and the central bank's timing is correct, monetary policy actions can still be rendered ineffective. This can happen, for example, by market participants taking a strong contrary view in support of further asset price rises – perhaps due to a belief that the cycle is driven by economic fundamentals. Such beliefs may cause agents to be unresponsive to monetary tightening.

Even more simply, there is a risk that during an episode of financial fragility, adjustments in the OCR may not readily transmit to retail interest rates. While cuts to the US Federal Funds Rate have positively impacted on confidence measures and equity prices in the US, they have been slow to pass through to mortgage rates. In a similar way, New Zealand mortgage rates have been significantly affected by higher funding costs faced by banks in offshore markets.

Compounding all of the above is the political difficulty involved in leaning against an asset cycle – especially under conditions of disagreement about whether the cycle has become a bubble or not. These difficulties are perhaps more pronounced during a period of low and stable CPI inflation, which ensures transparency in downward adjustments of relative prices. Ineffectiveness in leaning against an asset cycle also carries the risk of erosion in central bank credibility, which could make central bank actions less effective in future.

Some commentators have suggested that due to these issues, central banks should focus on responding when an asset bubble collapses, rather than on preventing the bubble in the first place. While this avoids the problem of distinguishing a normal asset cycle from a bubble, it can also encourage risk-taking on the expectation that easy monetary policy settings will cushion investor losses when the asset bubble bursts.¹⁶

Essentially, monetary policy becomes predictably reactive and asymmetric: it accommodates the development of the bubble but leans against the consequences of the collapse.

There is also the risk that supportive policy actions that respond to downside risk may compound longer-term problems. For example, stimulatory monetary policy in the wake of the 'tech wreck' is thought to have contributed to the boom in the US housing market.¹⁷ Low interest rates, coupled with large global imbalances, sparked a 'search for yield' that resulted in investment demand and high prices for relatively more risky classes of assets. Low borrowing costs, and 'teaser' mortgage interest rates encouraged increases in sub-prime mortgage borrowing. These issues combined with regulatory arbitrage, agency and moral hazard issues.¹⁸ However, together these factors set the conditions under which innovations in financial products spread problems in the US sub-prime market to global financial institutions and investors.

The likelihood of moral hazard and asymmetric policy effects argue in favour of a more proactive and symmetric monetary policy approach to asset price cycles. The proactive approach should not be overstated: given difficulties involved in attempting to 'pop' an asset bubble that is well under way with monetary policy, it seems that this will rarely be an advisable course of action. But it is possible to explicitly adjust monetary policy settings to take 'insurance' by leaning against asset price cycles that may become bubbles. This could involve marginal adjustments to policy settings, and would clearly communicate the central bank's view of the risks inherent in the cycle to market participants.¹⁹

Different types of asset bubbles can have different impacts on the economy depending on, for example, how widely the asset is held, how liquid the asset is, and whether debt has been used to buy the asset. Taking these points into consideration, housing busts may have greater and broader impact on the economy than busts in markets for other,

¹⁶ The usual term for this is moral hazard, which refers to the prospect that when a person or institution is insulated from risk, they may behave less carefully.

¹⁷ Borio and McGuire (2004) have looked at this issue in the context of industrialised countries.

¹⁸ IMF Global Financial Stability Reports provide detailed discussion of these issues. See www.imf.org

¹⁹ See Bollard (2004).

more narrowly-held, assets. Housing differs from other assets due to the use of real estate as collateral for bank lending. Housing is typically at least, if not more, important as a consumption good than as an investment asset. Also, in practice, the inability to short-sell housing hinders the operation of arbitrage in the housing market.

Given the potential for house prices to affect the cost of living, it has been argued that house prices should be included more directly in the CPI. However, a review of the CPI undertaken in 2004 found that the CPI should be prioritised to measure 'inflation' in the prices of acquired goods, above functioning as an index of the cost of living.²⁰ New Zealand's CPI is measured using an 'acquisition' approach, as opposed to a payments-based approach that would record monetary outlays on owner-occupied housing. A feature of the chosen price measurement framework for the CPI is that it curtails the extent to which the effects of a housing bubble on household expenditure can show up in CPI inflation. Hence, in the case of a house price bubble, inflation may arise in the prices paid for goods consumed that have not been recorded in the CPI.

Leaning against a broader concept of inflation that included the cost of housing in a more direct way could require slightly different monetary policy choices. But even without shifting our definition of inflation, a proactive monetary policy approach to house price cycles has been supported by recent research. The IMF recently reported that "innovations in housing finance systems have increased the scale of spillovers from the housing sector to the general economy". The IMF work used high loan-to-value ratios (LVR) to represent more developed mortgage markets. High LVRs were found to amplify the effects of financial shocks, as they facilitate the ability of house owners to borrow against collateral for any level of house prices. Hence, "a positive housing demand shock would require a larger increase in the policy rate of interest in an economy with a higher LVR than an economy with a low LVR".²¹

Regarding identification, a common argument is that central banks cannot diagnose bubbles because they have no informational advantage over market participants – if market participants think prices are justified by fundamentals, then what information does the central bank have to say otherwise? Of course, participants do not need to decide whether prices are justified by fundamentals – they only need to consider whether they will be able to on-sell the asset to other market participants at a higher price.²² Also, the central bank does not need to be certain that a bubble exists when it takes insurance by leaning against the cycle. And, additionally, there has been some empirical success in using credit expansion as a signal of potential crises. As noted by others, the 'efficient markets hypothesis' is less likely to apply to housing than to equities (Cecchetti, 2006).

The premium for this insurance is slower growth, and the potential consequences of policy errors resulting from misdiagnosed bubbles – leaning against a misdiagnosed asset price cycle will slow resource allocation. However, if demand for the asset is well supported by economic fundamentals, gradual monetary policy will only slow the cycle, and is unlikely to prevent the efficient allocation of resource over the long term.

Timing problems still present difficulties, and on balance suggest avoidance of pre-emptive easing and readiness to act quickly once the negative consequences of a bust become clear. Again, this can only be symmetric if coupled with monetary policy tightening during the upswing.

New Zealand's inflation targeting arrangements include safeguards in the form of transparency and accountability. The rationale for changes to policy settings need to be clearly explained in the *Monetary Policy Statement*, and monetary policy must be formulated in accordance with the PTA, which dictates that in pursuing its price stability objective the Reserve Bank should not cause "unnecessary" volatility. This aspect of the PTA raises the burden of proof required for monetary actions, putting the onus on the Reserve Bank to explain why it has deemed it necessary to lean against an asset cycle. The Board of the Reserve Bank

²⁰ The review committee repeated a recommendation from the 1997 review, that a cost of living index be developed. This recommendation has not been carried out, due to resource constraints.

²¹ International Monetary Fund (2008).

²² Those buying assets could be 'outsiders' who trade on less understanding of the market's dynamics than better-informed 'insiders'. See Kindleberger's discussion of Hyman Minsky's model.

has the function of monitoring the Governor's performance against the requirements of the PTA. Central banks are in general incentivised to avoid costly errors, due to credibility concerns noted above.

Financial stability tools with counter-cyclical properties

Promoting and maintaining financial stability requires tools that lean against the precursors to crises in expansions, and provide support during crises to mitigate an accompanying contraction. In this way, financial stability tools can have beneficial counter-cyclical effects that assist monetary policy.

The Reserve Bank has tools and systems in place for responding to banking crises, and exchange rate intervention capacity to draw on in a currency crisis. Tools to lean against the development of potential crises include monitoring, supervision and prudential requirements. These last tools are applied in the same way through both business cycle expansions and contractions, and provide a base level of regulatory risk management for financial institutions.

In general, the application of policy tools need not adjust over the course of an economic cycle for the tools to be counter-cyclical in effect. To take an example from fiscal policy, automatic stabilisers such as income tax have counter-cyclical effects while remaining fixed over the business cycle. Nor is it necessary for an instrument to be individually counter-cyclical; a counter-cyclical impact may be achieved by a combination of separate instruments. A conservative liquidity policy for bank funding could, for example, be combined with a safety net in the form of ability to raise short-term cash with the central bank if money markets become illiquid, with the ultimate safety net being provision of lender-of-last-resort facilities.

In some areas, care needs to be taken to reduce the potential for financial stability tools to be procyclical. An example is the effects of the "Basel II" bank capital requirements. While Basel II is intended to improve bank risk management,

it may have a procyclical impact because the framework may inadvertently encourage banks to hold more capital during an economic downturn, and less capital during an upturn.²³ However, bank practices of holding excess capital buffers are likely to reduce the procyclical impact of Basel II. Basel II-induced procyclical impact may also be attenuated if risk is measured over complete economic cycles as opposed to at each point in time.

Additionally, in New Zealand the practice of linking LVRs to risk weights will introduce an element of counter-cyclicality into Basel II. By increasing the risk weight on high-LVR mortgages, these mortgages attract a relatively higher capital charge. Banks may be particularly likely to extend high LVR lending during periods of strong house price inflation – due to increased borrower demand, and the likelihood that capital gain will assist in the building of equity. To the extent that this occurs, as house prices and LVRs rise, the capital charge on banks also increases and hence has a counter-cyclical effect.

Most financial stability tools are fixed through time; central banks generally do not adjust financial stability tools in a counter-cyclical manner, although much attention is being given to doing so. Attempts are being made to formulate the lessons learned from the sub-prime crisis into policies that will improve the regulatory environment. Many commentators and institutions have already put forward thoughts on changes, including calls to create and actively use counter-cyclical financial stability stabilisation tools. As risks materialise in downturns but can build during upswings, some proposals for counter-cyclical measures have included increasing capital requirements (or provisioning) in upswings, and reducing them in downturns.

Ng (2008) considered this type of counter-cyclical implementation of capital-to-asset requirements in the New Zealand context.²⁴ Following Borio and Lowe (2004), Ng used housing lending and house prices as cyclical indicators. However, Ng suggests that very large changes in capital requirements would be needed to offset the procyclical component of changes in bank margins over the cycle "...probably to levels where disintermediation would be

²³ Some authors have also expressed concern that new international accounting standards will have a procyclical impact by reducing firms' ability to provision against expected future losses. See discussion in Viñals (2004).

²⁴ <http://www.rbnz.govt.nz/research/workshops/10dec2007/index.html>

encouraged. In New Zealand, branches of offshore parent banks could quite easily take over the New Zealand lending business...escaping local capital requirements altogether.” As a rough estimate, Ng finds that 100 percent increases in capital could be required. While this seems large, the case is being made for increases in capital requirements, and in some cases, large increases have been argued for.²⁵

The Reserve Bank’s work on ‘supplementary stabilisation instruments’ (SSI) reported on the use of financial stability tools for macroeconomic and monetary stabilisation purposes.²⁶ Amongst other options considered, the report suggested a discretionary and temporary maximum LVR for bank mortgage lending. That is, a temporary limit would be placed on the size of mortgage loan a bank can extend in comparison to the value of the house that the mortgage is taken out for. The SSI report noted several implementation issues with a cap on LVR, including the need for legislation. The application of a temporary cap could result in some borrowing and house purchases “brought forward (perhaps irrationally so) to avoid being caught if and when the LVR limit power was invoked”. The SSI report also noted the difficulty of judging the cycle so as to appropriately choose when to impose a temporary LVR limit.

Many factors require careful consideration when implementing a policy measure such as a fixed LVR cap. We use the example of an LVR cap to outline some of the main factors in the following paragraphs. A fundamental consideration is that an efficient market should be able to allocate resources to their optimal uses, and governments should accordingly minimise interventions in the private sector. This is an important principle. Policy over-reaction, for example to the current sub-prime situation in the form of overly rigid regulations, could stifle financial innovation and the financial system, with seriously negative implications for resource allocation and economic growth.

However, banks have special status within the financial system and the economy, due to their provision of transaction

and intermediation services. These services mean that if a bank fails, the impacts are felt far more widely than the failure of other types of firms. The importance of banks to the financial system means that public resource is devoted to avoiding their failure. Therefore, banks are regulated and supervised differently to other firms, and the inevitable externalities involved in banking justifies the limits on banks’ activities that are already in place. The broad parameters of those limits are for governments to decide.

A second consideration is the cost of preventing potential disintermediation and avoidance. For example, an LVR cap could be avoided by borrowing from a foreign lender of a jurisdiction without an LVR cap, or by using borrowed funds from a second mortgage as a deposit. However, disintermediation may be less of a problem as the use of second mortgages is likely to involve additional cost to the borrower. New Zealand’s historical experience has shown that these costs can be significant. The increased borrowing cost would still provide a counter-cyclical effect.

Third is the potential for unintended negative consequences for parties either directly or indirectly affected by the policy. For example, an LVR cap could result in banks taking more risk in other parts of their portfolios.²⁷ Policymakers would need to ensure that the regulatory and supervisory framework was sufficiently coherent to manage these risks.

There is also a potential negative impact on first-time buyers. Without an LVR cap, first-time buyers can choose to take high-LVR loans offered by banks. During an upswing in house prices, there may be an expectation that capital gain will reduce initially-high LVRs. As these buyers enter the housing market, demand pressure on house prices makes the assumption of capital gain self-fulfilling. This is undoubtedly good for some, but aggregate debt is increased through higher house prices. Also, the interest repayment over the life of the loan increases, with lower-income borrowers extending mortgage duration. While house prices remain high, the increase in aggregate liabilities is offset by higher-valued housing assets. But if the house price undergoes a sharp downward adjustment, some borrowers – in particular

²⁵ King (2008) notes that “requiring financial institutions to hold more capital to act as a shock absorber, while reducing the procyclical nature of existing capital requirements, may offer a balance between excessively burdensome regulation and risk-taking”. Smithers and Wood (2007) have suggested a 40 percent increase.

²⁶ <http://www.rbnz.govt.nz/monpol/about/2505127.html>

²⁷ Another simple example is the idea of restrictions on credit growth. If such a policy were applied in a blanket fashion, it could disadvantage new-entrant banks with relatively smaller balance sheets.

first-time buyers – could find themselves in a negative equity position.

On the lenders' side, banks can manage credit risk resulting from low-equity lending through lenders' mortgage insurance. However, banks may waive low-equity insurance fees. On the borrowers' side, low-equity borrowers have no instruments with which to hedge against the risk of a fall in the value of their house. Basel II will link risk assessment to LVR ratios but, as noted in the SSI report, the counter-cyclical effect may be quite limited.

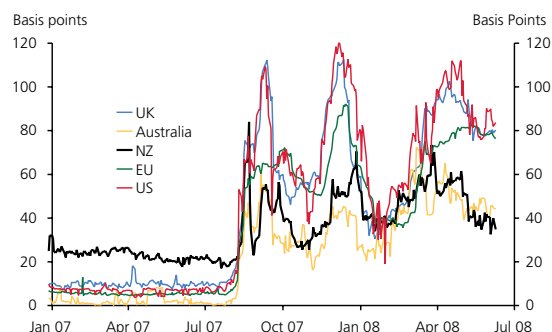
A simple way to reduce these risks could be to impose a fixed LVR cap. The SSI report notes that restrictions on LVRs for residential mortgages are relatively common in OECD and other developed countries. New Zealand banks effectively imposed an LVR cap of approximately 75 percent in the early 1990s. A fixed LVR cap could have prudential benefits by lowering the cost to banks in the event of default, and would avoid some of the difficulties of a temporary cap that were discussed in the SSI report. Prima facie, an LVR cap could have stabilising effects on the housing cycle.

The Reserve Bank is also working on a liquidity policy for banks that will cover the maturity and diversity of their funding sources. A liquidity policy can be counter-cyclical in its effect by causing banks to manage their liquidity and funding risk more conservatively. More conservative risk management would act as a constraint on banks during times when funding markets are operating normally, but it would also reduce the potential for macroeconomic spillovers from liquidity or funding crises.

The liquidity policy for banks needs to be seen in conjunction with the Reserve Bank's liquidity management operations. This has been an area in which financial stability tools have been successfully lending support to monetary policy. As noted earlier, New Zealand banks have faced illiquidity in the short-term money market. Figure 4 shows how the cost of short-term debt has been pushed higher, and out of line with expectations for the cash rates set by central banks. Recent changes to the bank's liquidity management operations aim to improve the effectiveness of the OCR as the instrument of monetary policy by tightening the link between the OCR and market interest rates.

Figure 4

Spread between the interbank LIBOR and OIS rates (bank bill rates in the case of New Zealand and Australia)



Changes to domestic market operations were summarised in the November 2007 *Financial Stability Report*, with further measures announced in the May 2008 *Report*. The main change announced in May was that the Reserve Bank has extended the range of securities that it will accept as collateral when it lends cash to the commercial banks. These securities now include AAA-rated Residential Mortgage Backed Securities (RMBS), and securities issued by New Zealand government agencies, state-owned enterprises and New Zealand local authorities that are rated AA- or higher.²⁸

Liquidity support from central banks has been a key factor in alleviating money market pressures and has assisted in providing financial markets with sufficient confidence to continue operations in a relatively normal fashion, albeit with elevated prices for risk. However, these actions transfer a greater degree of risk to central bank balance sheets, and in the process a clear 'moral hazard' issue arises. Goodhart (2008) points out that by providing assistance to commercial banks, the central bank lessens the impetus on commercial banks to bear the costs of managing their risk independently – though this comes down to appropriately pricing the facilities. Over the longer term, short-term policy responses will need to be balanced by measures aimed at resolving the underlying issues of credit and liquidity risk management.

²⁸ For a detailed list of eligible securities for domestic market operations see <http://www.rbnz.govt.nz/finmarkets/domesticmarkets/index.html>

3 Summary

This article has touched on aspects of the Reserve Bank's thinking regarding how financial stability and monetary policy work together. In particular, we have noted overlap in the analyses used for financial system and monetary stability purposes, and considered the extent to which tools used for both purposes could be mutually reinforcing.

The discussion in the article includes implications for monetary policy. As noted by others, there are reasons why cycles in house prices may have a particularly broad impact on the economy. Given the potential importance of housing cycles to the economy, there are good reasons for monetary policy to lean against housing cycles in order to manage the risk of a bubble/bust cycle.

Regarding financial stability – financial stability tools should be applied primarily for financial stability purposes, but cyclical stabilisation properties in these tools should be recognised and used where possible. While counter-cyclical application of capital-to-asset ratios and liquidity policy may prove useful, more work on these is required. A fixed cap on the LVR has been briefly discussed as an example of a prudential tool that could potentially contribute to reduced risk of bubbles in housing.

The main point of this article is the importance of a unified conception of different aspects of central banking. By being responsible for both monetary and financial stability, the Reserve Bank is well positioned to ensure that appropriate coordination takes place in working towards both its monetary and financial system stability objectives.

Appendices

A1: The *Financial Stability Report* and the *Monetary Policy Statement*

Discussion of financial system risks is presented in the six-monthly *Financial Stability Report* (FSR). The FSR also aims to explain how the Reserve Bank is responding to these risks, in the same way that the *Monetary Policy Statement* (MPS) explains policy actions taken in order to maintain price stability. Overlap between the FSR and the MPS arises particularly through discussion of macroeconomic developments. The FSR discussion focuses on the vulnerability (or resilience) of the macroeconomy to economic/financial shocks, and the likelihood for shocks to arise from the economic and financial environment. The MPS focus would be the likely inflationary consequences of shocks and the possible implication for future monetary policy decisions and the OCR.

A2: Operational independence

Many central banks, including the Reserve Bank of New Zealand, are independent when it comes to making decisions regarding monetary policy actions. The Reserve Bank of New Zealand does not have independence to choose its own goal, but rather has 'operational independence', which means that the Reserve Bank Governor decides how to set the monetary policy instrument (the OCR) in order to achieve the inflation target specified in the PTA.

The Reserve Bank of New Zealand does not have complete operational independence when it comes to decision-making for financial stability purposes. In practice, the Reserve Bank independently operates liquidity management, oversees the payment system, and carries out day-to-day supervision of banks. However, the Reserve Bank is currently working with other government agencies such as the Ministry of Economic Development and the Securities Commission on changes to regulatory and supervisory arrangements for non-bank deposit-takers and insurers. And in the event of an institutional failure, while the Reserve Bank provides advice on failure resolution, the government has a key role in decisions taken.

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The themes and thinking behind New Zealand's 1967 decimal coin designs

by Matthew Wright¹

New Zealand's switch to decimal currency in July 1967 concluded around three years' continuous and, at times, controversial work by officials from the Decimal Currency Board, The Treasury and the Reserve Bank, among others. Those directly involved with production of the decimal coins included a Coinage Design Advisory Committee, artists, designers, officials at the Royal Mint and even HRH The Duke of Edinburgh. This article reviews the thinking behind the themes and general imagery picked for New Zealand's original decimal coins. Today, four of the five circulating coins use themes either applied in the original 1967 decimal release, or directly considered at that time.

1 Introduction

The change to decimal currency in 1967 was the most fundamental shift in New Zealand's currency since the first national notes and coins were issued in the early 1930s by the Reserve Bank and The Treasury respectively. It was not an overnight decision; the first call for decimalisation came as early as 1908, the idea gained momentum during the 1930s and the formal process was initiated in 1957 after a series of private members' bills, culminating in the April 1963 decision to make the change in July 1967.²

The cultural context within which decimalisation took place shaped the thinking behind the coin designs and helped define the themes explored during the drafting and design process. Curiously, the final designs did not use many of the iconic images of New Zealand's mid-century culture in favour of more traditional New Zealand iconography, such as the kiwi, albeit still framed by mid-century thinking.

The whole process was handled by the Decimal Currency Board, a statutory body set up for the task, which stood apart from both the Reserve Bank and The Treasury. The Board began its work in 1964, in a New Zealand that was culturally different from that of the early twenty-first century. Some historians have argued that in the 1960s, New Zealand was exploring an emerging nationhood, but much was still framed around a focus on Britain – then



A few of New Zealand's first national coins of 1933 (top) and the last pre-decimal issues of 1965 (bottom).

The imagery and style provided a starting point, and the kiwi was ultimately adopted for two of New Zealand's decimal coins, though not before other ideas had been explored.

Images not to scale

our major export market. Local culture was largely pakeha and male-oriented, exalting national sports such as rugby and racing. In this mono-cultural world Maori were usually symbolised, for pakeha, through stylised imagery, including carvings, artefacts and occasional cultural displays.³

Social ideals of the day were conservative and built around what one historian has called the 'tight society' that emerged during the First World War, a culture that exalted

¹ I wish to thank Michael Reddell, Alan Boaden and Tim Ng for their comments on drafts of this article; and the Reserve Bank Knowledge Centre for assistance with source material.

² R P Hargreaves (1972) *From Beads to Banknotes*, John McIndoe, Dunedin, pp 172-73, 179.

³ James Belich (2002) *Paradise Reforged*, Allen Lane, Auckland, pp. 307-316, 346-352, 378-388; Matthew Wright (2004) *The Reed Illustrated History of New Zealand*, Reed, Auckland, pp 384-401; see also Michael King (2003) *The Penguin History of New Zealand*, Penguin, Auckland, pp 411-413, 429-432, 510-513.



Decimal promotions of the mid-1960s; our 'Mr Dollar' echoed the Australian 'Dollar Bill'. In the New Zealand version, Maori were specifically catered for.



and demanded conformity to a narrow set of social values designed to exalt the nuclear family and regulate society.⁴ By the 1950s this had evolved into the 'suburban' world of mid-century New Zealand, which another historian has dubbed our 'pavlova society'; less restrictive but still conformist.⁵ It has been argued that a good deal of New Zealand's self-image of the day reflected the 'cultural cringe', the notion that New Zealand lagged behind the wider world. This was matched against an image of New Zealanders as extraordinarily capable – a duality that found one resolution in the 'overseas experience', principally a pilgrimage to Britain. By this thinking, only Kiwis who had earned credibility there had much worth at home, though there were exceptions.⁶

This was the intellectual and social framework within which our first decimal currency was designed. The Decimal Currency Board handed coin development to a Coinage Design Advisory Committee, which began meeting in 1964. Members included J. N. Searle (divisional director of The Treasury); S. B. MacLennan (director of the National Art

Gallery), parliamentary historian Dr A. H. McLintock, A. Sutherland (past president of the Numismatic Society), E. J. Walker (chief accountant, National Bank of New Zealand) and P. J. Wilkinson (secretary). Their brief was simple; they had to come up with a series of decimal coins. Their terms of reference required them to find designs:

...of an attractive and pleasing nature which will appeal to the public of New Zealand and will, at the same time, be helpful in educating the public in the use of the decimal system of currency, as well as being of a standard recognised as satisfactory for coinage purposes.

Design content that the committee were required to consider included "native or national emblems, features, flora, fauna, historical or geographical subjects and the like".⁷ They did not have to start with *carte blanche*; the old coins could be modified. In the end, the committee retained some sizes and even wording from the pre-decimal set. The word 'shilling' appeared on the 10 cent piece, and the 20 cent was identically sized to the old florin. But it was a long and often rocky road. The committee spent the better part of three years working their way to the final designs. Along the way they conducted a remarkable exploration of the popular iconography of the day.

2 Developing the decimal coin iconography

The design committee had to consider both sides of the coins. The obverse ('heads') was relatively easy. By tradition this always featured the reigning monarch; the only issues revolved around technical matters such as selecting the specific portrait and fitting the lettering and detail into the available space. For technical reasons associated with the way coins were stamped and the 'relief' thickness of the metal, it was problematic to put a New Zealand 'head' on the reverse side. Although traditional, the use of the monarch's portrait gained additional context locally from New Zealand's strong pro-British mind-set of the day, and

⁴ Belich, pp 159-170.

⁵ Wright, pp 367-368.

⁶ Wright, pp 300-303; see also King, pp 317-320; Belich, pp 332-335.

⁷ Decimal Currency Board papers (DCB), 'Coinage design advisory committee minutes' T12/54/15, Coinage Design Advisory Committee – Terms of Reference.



the final design featuring a portrait by Arnold Machin was approved by Cabinet in 1965.

The real issue was what to put on the reverse ('tails'). The question was complex; whatever was chosen had to be locally relevant, and the brief threw focus on the ways in which New Zealanders saw themselves. Although, as the committee eventually put it to the Minister of Finance, "no other country" had "ever chosen coin designs by public selection",⁸ the committee was aware that ordinary New Zealanders would have an opinion. The design process began with a public competition that generated 624 designs submitted by 156 individuals.⁹

Most of these ideas reflected prevailing popular icons, notably New Zealand native birds such as the fantail; kowhais, mountains, Maori images such as the tiki, the dolphin Pelorus Jack, swordfish, stags, trout, the "new Parliament building" – the Beehive, then in sketch design – along with "crops, stock, industry", a "map of the world with New Zealand possessions", Napier foreshore icon Pania of the Reef, cows and sheep.¹⁰

The nature of these ideas provides a window into New Zealand's popular self-image of the day, framed by the original terms of reference; an emerging nation whose



Images not to scale

Above: Different ways of handling lettering and the portrait of HM Queen Elizabeth II on the 'heads' side were investigated, along with optional treatments for the edges. A 'double header' coin with Maori on the reverse, proposed by Professor Paul Beadle, was among the final proposals put forward to the Royal Mint in early 1966, but ruled out at the eleventh hour for technical reasons.

Below: Sports fishing became the theme for this 10 cent proposal by J. Churchward.



Image not to scale

⁸ DCB, 'Treasury memos and DC coin designs', memo to Minister of Finance, 1 June 1966.

⁹ DCB, T.10/71 CDAC Agenda Paper 5/1, 20 November 1964.

¹⁰ DCB, 'Coinage design advisory committee minutes', Second Meeting of Coinage Design Advisory Committee, Wednesday 24 June 1964, agenda and attachments.

Classical images of money



One of the aspects perhaps lost during the initial design phases was the need for the coins to not only carry New Zealand icons – but also reflect the dignity and sobriety demanded of money. Some of the designs that emerged reflected mid-century aesthetics and in some respects lacked the older visual styles traditionally associated with money. Others harked back to that formality. The designs here include two of British designer William Gardner’s proposals (top). They did not make the final selection. British designer Eric Fraser (left) took a more contemporary approach with his ‘geyser’ five cent, one of the designs made public in early 1966; but his neo-classical images for a commemorative dollar (bottom left and centre) were less favoured. Milner Gray’s ‘heraldic ship’ (below) was very much a classical coin; and a similar image appeared on one of his 20 cent pieces, but the Decimal Coin Committee felt it was not “truly representative of New Zealand”.

Images not to scale

wealth was based on pastoral prosperity, and whose people retained close ties with their rugged colonial past, notably expressed through hunting and fishing. Although birds and native flora also featured, as they had on earlier coins, these ideas became a framing force that helped guide the committee into the next stages of the design process.

Three designers, J. Churchward, L. C. Mitchell and G. Norfolk, produced initial concepts; but these were not enough for an informed decision. The committee then approached 14 professional designers to produce detailed proposals, finally commissioning 11 of them for the job.¹¹ The brief included finding themes that embodied major aspects of New Zealand life, broadly framed around the fundamental ideas of pastoralism, tourism, nationalism, exploration, flora, fauna and Maori.

The selection of designers added another dimension to the thinking behind the images and themes of the currency. Some, such as James Berry, Frank Shurrock and Paul Beadle, were New Zealanders – presenting New Zealand images as New Zealanders saw them. Others, such as Eric Fraser, M. Rizzello and Milner Gray, were British. Inevitably, their coins were New Zealand imagery as seen from a British cultural perspective. This subtly different angle had its effects on the nature of the images they came up with. All the designers overlaid their broad themes with detailed currency-specific styles varying from starker modern patterns to more traditional elaborations, as is evident from the range of different drawings and sketches eventually produced.

3 Developmental process and controversies

The process of sifting the multitude of coin designs and reaching a consensus on the final selection can best be described as tortuous. It is not the aim of this article to review the detailed mechanics of the process or chronicle the creative paths taken by individual designers; however, from the viewpoint of the design themes, much boiled down to aesthetic taste and efforts to judge public mood. There

¹¹ DCB, *Clippings and Photos*, *Wairarapa Times-Age*, 9 February 1966.

Down on the farm



Images not to scale

New Zealand's pastoral activity featured on a wide range of proposals by different designers. British designer M. Rizzello (10 and 50 cent, top) featured a ram that was more reflective of a British pastoral show than a Kiwi back-block, differing sharply from Eileen May's more realistic shearing sketch (centre), Joseph Churchward's five cent sheep (centre left) and Frank Shurrock's 50 cent musterer (centre right). James Berry took the concepts a step further as part of a sequence exploring our pastoral life (above). Shurrock's musterer was approved by Cabinet for submission to the Royal Mint Advisory Committee (RMAC).

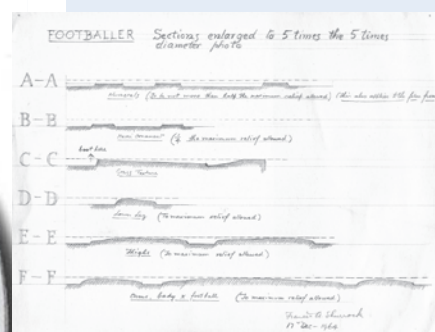
Frank Shurrock's footballer

The first set of New Zealand coin designs met a mixed reception when considered by the RMAC in December 1965. Frank Shurrock's football player, described as a "vigorous conception of a typical New Zealand club footballer" was accepted by Cabinet as a contender for the 20 cent piece, but the idea met little favour when passed on to the RMAC.

This rebuff did not go down well in New Zealand, but in fact the proposals were heavily framed by the national self-conception and the iconography of the young nation, and the designers responded to the requested specification professionally. But currency needed something more than their brief implied; it also demanded a redolence of money. The dissonance between New Zealand's concepts and the expectations of more traditional monetary designs did not reduce the quality or quantity of work, as surviving sketches of the controversial rugby coin reveal.



Images not to scale



were elimination rounds and iterative consultation with the designers, and it was November 1965 before several sets were approved by the Cabinet for submission to the British-based Royal Mint. This step was partly a function of practicality; the coins were likely to be struck by the Royal Mint, and the Mint also carried a body of long-standing expertise in regard to designs. This expertise did not exist in New Zealand in the 1960s. But, like the coin images themselves, the process also reflected the New Zealand mind-set of the day. Even in the 1960s, New Zealand continued to look to the mother country for guidance and advice.

The sets submitted for the Mint's comments were a mix-and-match of designs by four individuals: two London

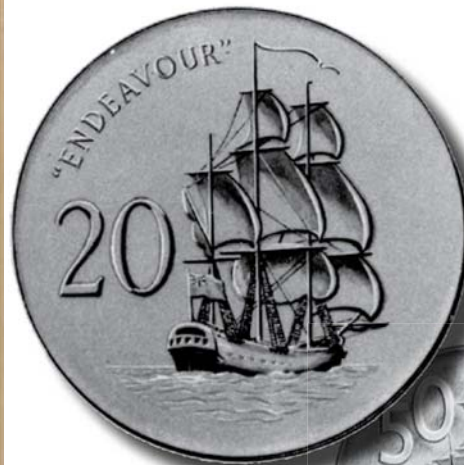
designers, Milner Gray and Eric Fraser; and two Christchurch designers, Francis (Frank) Shurrock and Eileen Mayo.¹² Content included New Zealand images such as the rifleman, tuatara, athletes and fernleaf, to more abstracted images such as a "heraldic ship".¹³

Their designs were not well received. Shurrock's football player came in for particular criticism.¹⁴ In response the New Zealand committee asked for fresh designs, incorporating

¹² DCB, "Coinage advisory committee notes", "Proposed press statement, new coins".

¹³ DCB, "Memos, press releases", Statement: Parliamentary Under-Secretary to the Minister of Finance.

¹⁴ DCB, "Coinage design advisory committee minutes", Minutes of the Thirteenth Meeting of the Coinage Design Advisory Committee, 23 December 1965.



Explorers and their ships featured on a number of coin designs; this sequence, above, traces part of the evolution of James Berry's thinking towards the eventual 50 cent piece, above right. Other proposed coin designs featured agricultural or national themes. The difference between New Zealand and British perceptions was clear; one of British designer Milner Gray's two cent ideas involved a sheaf of corn, below, which the New Zealand committee rejected because New Zealand was a net importer of wheat, "notwithstanding that agriculture is a prime source of wealth". Designs released for public comment in March 1966 included a one cent featuring mountain daisies, right. Maurice Conly favoured historical ideas, bottom.

Images not to scale

the mint's suggestions, from Eileen Mayo, Juliet Cowen, T. V. Johnston, T. J. Taylor and James Berry.¹⁵ However, the rejected designs shortly leaked out to the media, creating a brief storm that swiftly embroiled the politician in charge, Robert Muldoon, then under-secretary for Finance. There was a public outcry; Invercargill residents, for instance, described the proposed designs as everything from "all right" to "terrible", even "mad".¹⁶ It had been an unfortunate *faux pas*, but as at least one paper observed, it did create an opportunity to debate the issue.¹⁷ The media approached the designers for comment; 78-year old Shurrock declared that he was not worried.¹⁸

¹⁵ DCB, 'Memos, press releases', Press Statement, 8 February 1966.

¹⁶ *Southland Daily News*, 9 February 1966, clipping in DCB Box 10 "Clippings and photos".

¹⁷ See, eg *Timaru Herald*, 9 February 1966, clipping in DCB, "Clippings and photos".

¹⁸ *Weekly News*, 9 February 1966, clipping in DCB "Clippings and photos".



James Berry: chosen designer

James Berry got involved with the coin design process early, competing with the other designers to produce a variety of proposals. His 'Southern Cross' one cent piece (centre) was accepted by Cabinet. In 1966, in wake of the Royal Mint comments and other feedback, Berry was picked as the main designer, coming up with specific ideas that were honed into a definitive set.



Images not to scale

Much of the public comment that followed was framed by the published design concepts, but new suggestions retained mid-twentieth century New Zealand imagery. One correspondent suggested “national birds”, tourist attractions such as Mitre Peak, export themes, and a “Maori carving”. Even those wanting something “more inspiring and modern” than existing coins framed their ideas around these images. Only a few were more abstract; one Invercargill resident submitted an embroidery pattern intended to symbolise “closer co-operation of pakeha and Maori”.¹⁹

Any popular idea that this public debate might decide the content of the coins was, however, misplaced. A public petition pushing for the Beadle designs was rejected. The Minister of Finance publicly agreed to change four of the six initially approved designs in early February;²⁰ but by the time the argument brewed up, the committee had already commissioned fresh professional input, and the new proposals were submitted to the Royal Mint in March. Twenty six of them were made public for comment, but in a practical sense, this was largely to inform. The more influential remarks from the committee’s perspective were those of the RMAC, who reported back in May largely favouring Berry’s designs.²¹

Even these assessments, however, were taken with some caution; the difference between the British and New Zealand perception of what was most socially relevant remained clear, and the New Zealand coinage committee concluded that the Mint committee might have been “handicapped by having limited familiarity with the New Zealand scene”. The result was that the New Zealand committee did not have a particularly clear consensus to work from, and when it came down to the final decision the coinage committee initially put forward “majority” and “minority” lists. All reflected the existing iconography – Maori motifs, classic New Zealand scenery such as geysers and mountains, pastoralism, the kiwi, and the colonial process represented by HMS *Endeavour*.²²

¹⁹ DCB, T10/70, ‘Correspondence’, various letters.

²⁰ DCB, ‘Clippings and photos’, *Auckland Star*, 8 February 1966.

²¹ DCB, “Memos, press releases”, Searle to Minister of Finance, 30 May 1966.

²² DCB, “Coinage design advisory minutes 1964-66”, Minutes of the 16th Meeting of the Coinage Design Advisory Committee, 31 May 1966.

The commemorative dollar

The social themes running through New Zealand's decimal coin design process in the mid-1960s were particularly evident in the dollar coin. This was produced as a commemorative coin and apparently not intended to go into circulation, but a very wide range of design themes were explored. The contrast between 1960s thinking and that of even a few years later was made particularly clear by one of James Berry's designs, proposing a 'nuclear' dollar. Others featured landscapes, explorers, birds and the range of themes in vogue at the time.



Images not to scale



Almost ran: at the penultimate moment, the "Maori mask or Tekoteko" design that James Berry proposed for the five cent piece (right, below) was substituted for the Shurrock-derived 10 cent Maori motif (bottom); and Berry's 10-cent Tuatara motif (right) was adopted for the five cent (centre right).

Images not to scale

A final decision still had to be made; and after a series of to-and-fro discussions, the committee finally plumped for Berry's artwork, which had been prepared through an iterative process in consultation with the committee, and which was built on the directions, design work and decisions of the previous 18 months. The ultimate choices were thematically more conservative than some of the ideas explored up to that point, an angle that was informed in part by similarly styled approaches taken not only to the decimal notes but also to the postage stamps of the day. Themes included the fernleaf (one cent), kowhai flower (two cent), Kiwi (20 cent) and *Endeavour* (50 cent). The committee



The 1967 decimal coins

(uncirculated proof set, images not to scale)



reserved judgement on the five cent, thinking it might feature Berry's 10 cent Tuatara, and thought that a Berry-developed modification of one of Shurrock's Maori motifs – called a tekoteko in some reports, but actually a koruru²³ – could be used for the 10 cent, basing the decision in part on technical issues associated with the spread of metal across the coin.²⁴ These recommendations were adopted. The only non-Berry design was the commemorative dollar by William Gardner.

The decisions were announced in mid-June 1966, barely a year before the coins had to be in circulation – in the wider scheme of things, not a great deal of time to finalise, develop and mint them.

4 An enduring selection

The process of developing the decimal designs was unquestionably difficult, spanning the better part of three years. The final consensus offered designs that were very different from many of the drafts and that, in many respects, harked back to more traditional New Zealand themes. In some respects it belied the enthusiasm with which the committee had explored populist mid-century imagery along the way. The final images selected for the coins also had significant public support. An informal survey in 1966, when the ideas were still being bandied about, revealed that over half of those who responded were in favour of the fernleaf motif; around two thirds liked the kowhai; similar figures the tuatara; and more than two thirds liked the kiwi.²⁵

From the wider perspective, the final imagery transcended the immediate social priorities of any particular decade or generation, a point underscored by the evolution of the coin designs over the next 40-odd years. The Reserve Bank acquired authority over New Zealand's coinage in 1989, amalgamating all national currency operations with the Bank. By this time inflation had reduced the value of the dollar to about a tenth of its 1967 value in real terms. The

²³ The error was apparently picked up by J. M. McEwan, Secretary to the Department of Maori Affairs, see DCB, "Treasury Memos, DC Coin designs", Memo to Cabinet, H. R. Lake, and attachments.

²⁴ DCB, "Memos, press releases", Decimal Coinage Designs, 30 May 1966.

²⁵ DCB, "Treasury memos DC coin design", memo to Cabinet, n.d.



The one and two dollar coins introduced in February 1991 (top left and above left); new designs by Maurice Conly reflecting 1967 themes (top centre, top right and above right).

Images not to scale

one and two cent pieces were dropped, and the decision was taken to 'coin' the one and two dollar notes.

Artist and designer Maurice Conly produced designs that took the kiwi and white heron as subjects for the new one and two dollar coins. The kiwi – used on the pre-decimal florin and selected in 1967 as a subject for the 20 cent piece – was consciously used in an effort to bring to reality the colloquial term 'Kiwi dollar'. The heron used on the two dollar coin had been raised as a possible idea in Beadle's design proposals during the 1964-67 evaluation process.

There was further change in the following decade. The size of the decimal coins had been picked, in part, to match familiar pre-decimal currency such as the florin and the shilling. By the twenty-first century these were markedly larger than the coins of most other nations. Smaller and more practical



The 2006 plated steel edition of the 'Pukaki' 20 cent piece with Spanish Flower edging. The 'Pukaki' 20 cent theme, first introduced when the kiwi was transferred to the dollar, was also the first materially new theme for a New Zealand circulating coin since the advent of decimalisation.

Photograph by Stephen A'Court

plated-steel coins were introduced in 2006 – and the 10 and 50 cent pieces retained the original 1967 Berry designs. It was a significant endorsement of the decisions made around 40 years earlier. The result was that, of the five coins in circulation in 2008, four featured general visual themes – the Koruru, the *Endeavour*, the kiwi and the heron – that had their origins in the process of decimalisation.

5 Conclusion

Between 1964 and 1967, the Coinage Design Advisory Committee exhaustively considered a wide range of possible decimal coin designs. Consultation extended to seeking public submissions, a means of gauging opinion, as well as more conventional formal contributions from commissioned designers and official comment from the Royal Mint. The scale of the process was significant, and the iconography explored along the way allows us to gain a particular insight into the New Zealand mind-set of the period. This reflected a young nation that was in the process of emerging from its colonial origins and exploring its identity. The imagery considered for the coins reflected this style of thinking. The need to refine this down into half a dozen coins, in many respects, rendered and simplified the whole mid-twentieth century mind-set into a few iconic themes.

In this respect it is perhaps a testament to the care and thoroughness of the design committee that, while mid-century icons such as the atomic symbol, shearers, a rugby player and horse racing were considered, the themes finally selected – including the kiwi, ferns, tuatara and Maori icons – were more timeless, and retain a cultural relevance in the somewhat different New Zealand society of the early twenty-first century.

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Establishing technical specifications for New Zealand's new 10 cent, 20 cent and 50 cent coins

by Don Oliver

This article explains the analytical process through which the Reserve Bank established technical specifications for New Zealand's recently issued silver- and copper-coloured coins. The new coins are smaller and are constructed using metal plating rather than solid alloy. Both these innovations reduced the cost of manufacturing New Zealand's coins, but also required extensive testing and analysis to meet the needs of the vending machine industry and the general public. In particular, the Reserve Bank needed to be satisfied that the coins could work reliably in vending machines, yet also be hard to fake. The coins also had to withstand the wear they would be likely to receive in circulation.

1 Introduction

In late 2004, the Reserve Bank sought public submissions on a proposal to reduce the size of New Zealand's 10 cent, 20 cent and 50 cent coins (commonly called 'silver' coins) and to change their construction from solid alloy to metal plating. Surveys had shown that the general public and retailers tended to favour smaller, lighter coins. Compared to the international trend, the then-present New Zealand silver-coloured coins were large, with the 50 cent piece being above the internationally recommended maximum diameter of 30mm. Also, the cost of the solid-alloy coins' metal content was rising, leading us to consider the plated coin option.

During the public consultation and tender process, submissions from the vending machine industry and from coin mints raised concerns about both the durability and the functionality of plated coin. If the proposed coins were to deteriorate in circulation, or the coins could not be used in vending machines, the public would be most unlikely to view them favourably. This would clearly be an unacceptable outcome.

The Reserve Bank therefore needed firm evidence that plated coin was a workable option. Analytical work indicated that plated coin could work as long as certain rules were followed relating to the coins' durability and to their Electro Magnetic Signature (EMS), which combines the inductance and conductance properties of the metals making up the coin. The final specifications for the coins were confirmed

after extensive testing in vending machines, using EMS tolerances as tight as current plating technology allows.

The rest of this article explains these aspects of the specification process in more detail. Section 2 discusses the submission process and how the technical problems to be overcome were identified. Section 3 sets out the different elements of the specification, focusing on the role of the EMS. Section 4 explains how the specification options were narrowed down to a final choice. Section 5 concludes.

2 Why review the 'silver' coins?

The Reserve Bank's main motivation for the review was to introduce smaller coins that would be more convenient for the general public and for cash-handling businesses. We also needed to reduce the cost of manufacturing the coins to keep it below the coins' face value. The difference in value is called 'seigniorage'. In some countries, the value of coins' metal content exceeds their face value ('negative seigniorage'), and the public consequently keeps them for resale to scrap metal dealers. Although this situation had not arisen in New Zealand at the time of the review in 2004, we were coming very close for some coins, due to the increase in prices of the metals on world markets.

Consultation with other mints and central banks suggested that plated coin, instead of solid alloy as in the existing coins, would be one approach to reducing the manufacturing cost, as plated coin does not require as much high-cost metal.

Box 1

Metal plating options

This box briefly explains the broad options the Reserve Bank considered for the new plated coins, compared to their alloy predecessors.

Alloy

The old 'silver' coins were made of a 75% copper, 25% nickel alloy; and the current one and two dollar coins are made of an aluminium-bronze alloy, illustrated right.

Mono-plated

A low-cost metal core is electroplated with another metal. In the Reserve Bank's tender we specified either copper or nickel over an iron core. This was not adopted for New Zealand.

Bi-plated

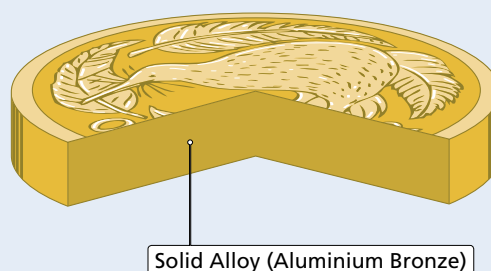
A low-cost metal core is electroplated with two layers of different metals. We specified nickel over copper, or copper over nickel, over an iron core. The 10 cent piece uses this method, illustrated right.

Tri-plated

A low-cost metal core is electroplated with three layers of different metals. Although the extra level of plating was not strictly necessary to achieve the Reserve Bank's objective of exploiting plating technology to reduce cost, one of the tendering mints offered an electroplating process that does not rely on the use of cyanide, and hence would be more environmentally friendly, while still being cost-competitive. If a copper layer is used in this process, then a thin layer of nickel is required between the iron core and copper plating to ensure that the copper adheres to the iron core. The result would then be nickel over copper over nickel, over an iron core. The 20 and 50 cent pieces use this method, illustrated right.

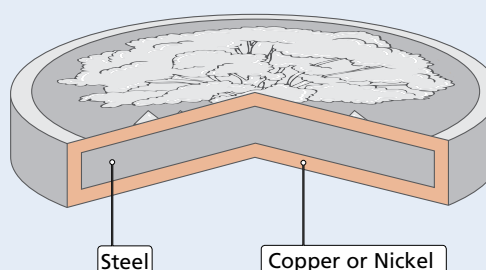
\$1 AND \$2 COINS

Not to scale



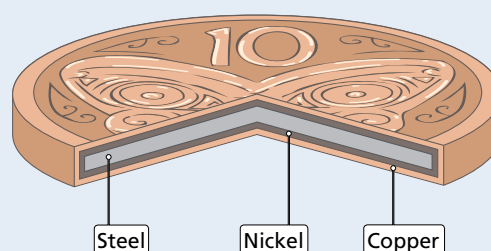
MONO-PLATED

*Not used in New Zealand, indicative coin only.
Not to scale*



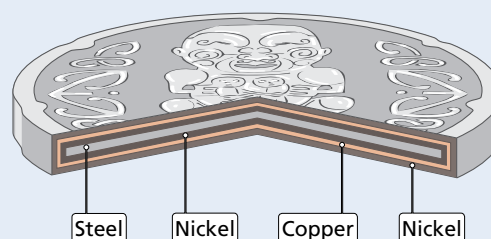
10c PIECE BI-PLATED

Not to scale



20c AND 50c PIECES TRI-PLATED

Not to scale



In late 2004, the Reserve Bank asked for public submissions on a proposal to replace the then-present solid alloy coins with nickel- and copper-plated coins, and to remove the five cent piece.¹ Box 1 shows these options. Then, in early 2005, the Reserve Bank sought tenders for the supply of new nickel-plated coins, and announced the removal of the five cent piece.

Some submissions during the public consultation and tendering process pointed to a tendency for defects in plated coins in countries that had issued them. In particular, submissions from some mints raised concerns about the durability of coins, noting instances where the outer layer of nickel had failed and exposed the layer below. Most of the vending machine industry's submissions related to problems in distinguishing genuine coins from 'slugs' (an industry term for false coins) and from genuine coins of different value. The problem here was the proposed core of iron, which is a metal that is commonly available. This had allowed common metal washers or similar items (slugs) to be accepted by vending machines in some countries.

The Reserve Bank conducted extensive investigative work on these issues, given their apparent seriousness. It had been over 37 years since the decimalisation of New Zealand's notes and coin, so a technical team had to be assembled comprising an electronics expert, a metallurgist who would assess the electroplating technology, and a specialist in sensor technologies who would assess the vending machine industry's needs. This team conducted in-depth consultations with vending machine manufacturers and mints to assess whether plating technology could work acceptably, and what the necessary specifications would be.

3 Elements of the specification and the role of the electromagnetic signature

Prior to seeking submissions on the proposal, the Reserve Bank had already decided that the 20 cent and 50 cent coins would have an outer layer of nickel, and the 10 cent coin would have an outer layer of copper, to produce the silver

and copper colours respectively. Based on this composition, the tenders confirmed that plated coin would be less costly than alloy coins, but as noted above, the issues raised in the submissions and tenders meant that the team had to satisfy itself that plated coin would satisfy both durability and vending machine requirements.

Durability

Nickel was in the then-present coins, and these had been in circulation for 38 years so they could be used as a reference for wear over the life of the coin. The Reserve Bank's target was to achieve a 25-year life. Various coins that had been in circulation up to the 25-year period were tested to measure the wear pattern. This wear was then compared to the wear on test versions of the new coins.

Sample coins of nickel-plated steel were tested using three methods, all involving tumbling in a barrel:

- (1) with soft cloth to simulate wear in people's pockets;
- (2) with other coins to simulate what they would experience during normal circulation in cash-handling, cash tills and coin vending machines; and
- (3) with other coins and an added abrasive to simulate 'extreme' wear.

New alloy coins were included in initial tests to determine the barrel time required to produce an appearance comparable to the existing worn coins. Then the nickel-plated steel coins were run for the same length of time.

In the worst case, the wear on the nickel-plated steel coins came to 5 microns over a simulated 25-year period. To be on the safe side, the Reserve Bank decided on a specification of 10 microns of nickel. The manufacturing tolerance was +/- 3 microns, producing a minimum thickness of 7 microns. This would give coins an expected life well in excess of the 25-year target.

The specification for the 10 cent coin's copper-plated outer layer is 30 microns. The 10 cent coin, being the lowest-value coin, has a historically shorter circulating life than the other two coins. Although copper is a softer metal than nickel and will wear faster in circulation, this thickness would be sufficient to give the coin the required life.

¹ Boaden (2008) reviews the experience of removing the five cent piece from circulation.

The vending machine industry's requirements

Our investigations indicated that plated coins could work in vending machines, as long as certain rules were followed. These related to the coins' physical sizes, and to the differences between their EMS relative both to commonly available metals and to each other. The major part of our investigations focused on these aspects, due to the critical importance of the public being able to use the new coins in vending machines.

Choosing the size of the new coins was relatively straightforward. Thickness and diameter are two size properties of coins that the vending machine industry uses to identify and separate coins. The larger the difference between coins along these dimensions, the more likely they are to be distinguished. However, size properties, without additional EMS checks, provide only a low comfort level for authentication, with risks of fraud from other materials of the same size. This is especially the case given the reduction in the internationally conventional size of coins, because of cost benefits and convenience of use.

Consultations with the vending machine industry indicated that thickness was not as important as diameter, though the industry did not want any new coins to exceed the thickness of New Zealand's present one dollar coin, which is the thickest we have at 2.74mm. Thicknesses with a given diameter give the coins their weight, and the heavier the coin the easier it is for the industry to process. The industry preferred a diameter difference between the new coins of 2mm. To maximise the difference in diameters, the existing one and two dollar coins had to be included, which limited the diameters available. The industry recommended a range of 19mm to 30mm from smallest to largest coin. This restricted the Reserve Bank to offering a minimum 1.25mm diameter difference between each coin. Although this was not the preferred difference, the industry accepted that it was workable.

The role of the electromagnetic signature

The vending machine industry's submissions raised issues regarding the proposed materials in the new coin and difficulties encountered with identifying and authenticating

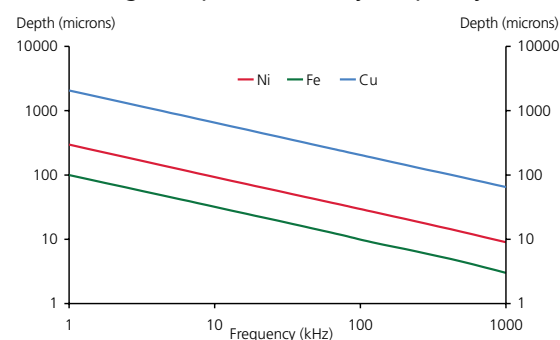
plated coin when it had been introduced into other countries. There was concern about inconsistent EMS on those coins, which forced vending machines to have a wider EMS 'acceptance window' for each coin than they were comfortable with, because of the increased risks of mix-ups with other coins and with objects of similar size but different material. As a result of this concern, the mint's quality-assurance processes and keeping manufacturing tolerances to a minimum would be an important objective.

Consultations established that vending machines typically use the 'Skin Effect' of an oscillating electromagnetic field to check and authenticate coins. The field is generated by a coil that is supplied with AC power and wound around a soft iron core. The EMS of the coin is measured through its effect on the voltage or current in the coil, and reflects the inductive and conductive properties of the target material (see Box 2 for more details).²

Skin Effect refers to the effect of the frequency of oscillation on the depth of penetration of the electromagnetic field into the material. As the frequency increases, the depth of penetration decreases. Depth of penetration also varies with the material. Figure 1 shows the difference between the three metals involved in the proposed plated coins.

The frequency of oscillation enables the vending machine to select what part of the coin it checks. Some machines have sensors on both sides of a coin to compensate for an off-centre coin. In the case of plated coins, the Skin Effect would have to be used to measure the EMS at a particular depth in

Figure 1
Electromagnetic penetration by frequency



² Some machines include the induced eddy currents in their sensing, which are also affected by conductivity and inductance.

Box 2

Conductance and inductance

This box explains the properties of conductivity and inductance, which together define a material's electromagnetic signal.

Conductivity is a material's ability to pass an electrical current, normally expressed in terms of the International Annealed Copper Standard (IACS), which compares any material to copper (which is given a figure of 100%). Inductance is the effect a material has on a changing magnetic field (usually created by an electrical coil supplied with oscillating voltage), which induces eddy currents within the material. The eddy currents produce an opposing magnetic field, which would be equal in strength to the inducing field if there were no losses. The losses characterise different materials and are measured in various ways. The two most important ones used in the vending machine industry exploit the resistivity and permeability of the material.

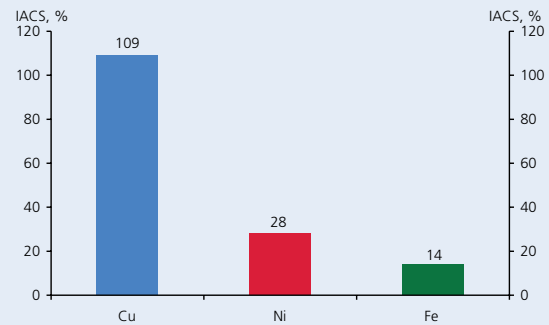
Different countries specify, by a range of different methods, conductivity or inductance (or both) for their coins, to ensure that the vending industry has a consistent product. Consultations with vending machine manufacturers indicated that they tended to use various combinations of conductivity and inductance.

The three metals involved in the Reserve Bank's tender were copper (Cu), nickel (Ni), and iron (Fe). All have different inductance and conductance properties and produce a different EMS. This is shown in the charts below. Inductance is shown using resistivity and permeability, as these are the two most common properties of inductance utilized by the vending industry.

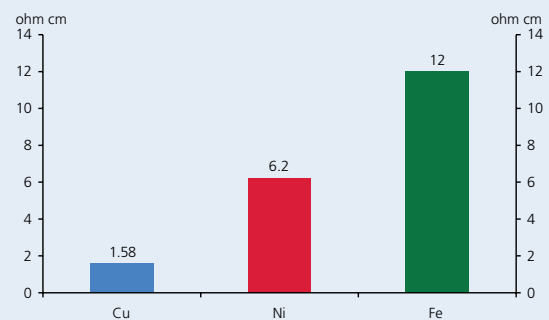
The target area of 30 to 50 microns of depth corresponds to the normal approximate thickness of plating. The issue then became one of choice of nickel and copper plate layer thicknesses to achieve sufficient separation of the EMS of genuine coins from each other and from slugs.

As shown below, nickel does not have exactly the same EMS as iron, but is much closer to iron than copper, so there would need to be much more nickel than copper to

Conductivity (IACS)

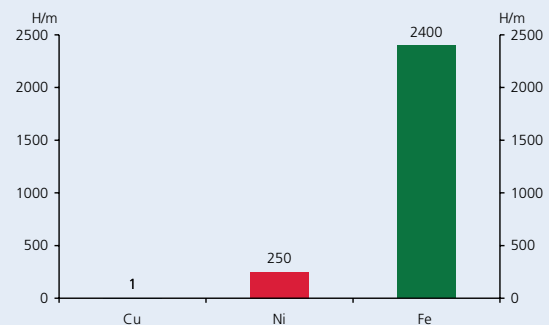


Resistivity (ohm cm)



Permeability (H/m)

(A property of magnetism)



shift a nickel-plated coin's EMS away from an iron slug. Consultations suggested that at least 40 microns of nickel would be required. 40 microns of nickel would make the coin very expensive to produce (nickel is the most costly of the three metals). Electroplating costs would also be higher with plating of this thickness.

Copper, on the other hand, has both conductive and inductive properties very different to iron. Since we had wanted a silver colour for the 20 cent and 50 cent coins, and a copper colour for the 10 cent coins, we needed nickel on the outer layer of the 20 and 50 cent pieces, and copper on the outer layer of the 10 cent coin.

(continued)

The problem then became how to minimise the amount of nickel for cost reasons, and to introduce copper for EMS reasons. As explained earlier, wear tests indicated that at least 10 microns of nickel would be required to give the coins a 25-year life. That left the choice of how much copper under the nickel would be required to produce

an EMS that vending machines could use with reasonable levels of security. We could find no information on this topic, so we decided that the winning mint would be required to make test coins with a nickel outer layer and different thicknesses of copper under it, to see how they would influence the EMS.

the coin. The issue here was that the plated coin core would be made of iron, which is a very commonly available material and thus would open up risks of fraud from steel washers and the like. This made it essential that the Skin Effect was exploited to avoid the iron layer in the plated coins, and increase the reliability of sensing and rejecting slugs.

Our consultations suggested that the most common frequency used by vending machines was 120 kHz, which tends to make the Signature more sensitive to the first 30 to 50 microns – though as noted this would depend to some degree on the metal presented to the Signature, which in the case of plated coins would be metals with different characteristics. Frequencies below 120 kHz tend to penetrate into the core and become less sensitive to the plating materials, whereas frequencies around 500 kHz and above become too sensitive to the surface shape of the coin, which would necessitate a widened acceptance window and associated reduced security.

As a result of these findings, the specification was narrowed to designs of coins that would be usable at frequencies around 120 KHz.

4 Bi-plating or tri-plating, and checking the results

The choice remained over whether the coins should be bi-plated or tri-plated. The nickel-plated coins needed to be at least bi-plated so that copper could be present for EMS reasons. Mint technology we investigated offered both bi- or tri-plating. The final selection of tri-plating was based on comparing the tenders of the mints on cost, quality control and environmental considerations – one mint offered a production process that did not rely on cyanide. Although

the non-cyanide process meant that the silver-coloured coins would be tri-plated, we were satisfied that bi-plating could also be used in the future while duplicating the EMS signature. So, the result was that the 10 cent piece would be bi-plated with a copper outside layer, and the 20 and 50 cent pieces would be tri-plated with a nickel outer layer.

Prior to our finalisation of the specification for the plating thickness, the winning mint manufactured some test coins of all intended designs, with copper of varying thickness. These were then sent to a vending machine manufacturer to check which combination would enable separation by the vending machines from each other and from slugs. This manufacturer had expressed difficulty with identifying plated coin in the past.

These tests clearly indicated which specification of the copper layer gave the best separation of EMS. The final specification was now completed.

As noted, keeping manufacturing tolerances to a minimum was identified as one of the areas where the vending machine industry had experienced difficulties in the past. The winning mint's quality assurance procedures thus needed to demonstrate tight control of manufacturing tolerances at each step, with minimum variation in core and plating layer thickness to ensure the variation of the EMS would be minimised. We thus required that the mint produce a volume of coins so that their EMS could be checked.

A coin-sorting machine manufactured by Scan Coin was able to process the volume of coin required, and check their EMS. For future production, a master set of coins of each denomination was created. Scan Coin's machines are calibrated to these master coins. This ensures that the machines are checking to known reference coins, preventing any variation of the EMS in future production runs.

5 Conclusions

The information collected by the Reserve Bank's team of technical experts in the process of establishing the new coin specification places us at the forefront in plated coin technology. Through this process we were able to reduce the cost of manufacturing New Zealand's coins, while also ensuring that we use the best of available technology to produce coins that satisfy the most demanding needs of vending machine manufacturers and the general public.

The Reserve Bank acknowledges and greatly appreciates the co-operation, assistance and support of the vending machine companies, mints and Scan Coin consulted in the course of our work introducing the new 'silver' coins. Much of the detailed information provided to us is commercially sensitive and not otherwise available. It has not been disclosed here. The individuals consulted were very open and informative, allowing the Reserve Bank to assess thoroughly the different coin technology options available and how they could work satisfactorily in practice. Their assistance has created benefits for all users of coins.

DISCUSSION PAPERS

DP2008/07

Heterogeneous expectations, adaptive learning, and forward-looking monetary policy

Martin Fukac, May 2008

In this paper, I examine the role of monetary policy in a heterogeneous expectations environment. I use a New Keynesian business cycle model as the experiment laboratory. I assume that the central bank and private economic agents (households and producing firms) have imperfect and heterogeneous information about the economy, and as a consequence, they disagree in their views on its future development. I facilitate the heterogeneous environment by assuming that all agents learn adaptively. Measured by the central bank's expected loss, the two major findings are – (i) policy that is efficient under homogeneous expectations is not efficient under heterogeneous expectations; (ii) in the short and medium run, policy that is excessively responsive to inflation increases inflation and output volatility, but in the long run such policy lowers economic volatility.

DP2008/08

A macro stress testing model with feedback effects

Mizuho Kida, May 2008

Stress testing is a tool to analyse the resilience of a financial system under extreme shocks. In contrast to single-bank stress testing models, macro stress testing models attempt to analyse risk for the system as a whole by taking into account feedback – ie, the transmission of risks – within the system or between the financial system and the real economy. This paper develops a simple model of macro stress testing, incorporating two types of feedback: one between credit and interest rate risks and another between the banking system and the real economy. The model is tested using hypothetical banking sector data. The results from the exercise highlight the importance of incorporating feedback effects for the assessment of total risks to the system, and of recognising more than one type of feedback effect in a model for a robust assessment of risks to financial stability.

DP2008/09

Analysing shock transmission in a data-rich environment: A large BVAR for New Zealand

Chris Bloor and Troy Matheson, May 2008

We analyse a large Bayesian Vector Autoregression (BVAR) containing almost 100 New Zealand macroeconomic time series. Methods for allowing multiple blocks of equations with block-specific Bayesian priors are described, and forecasting results show that our model compares favourably to a range of other time series models. Examining the impulse responses to a monetary policy shock and to two less conventional shocks – net migration and the climate – we highlight the usefulness of the large BVAR in analysing shock transmission.

NEWS RELEASES

Entries open in Reserve Bank Monetary Policy Challenge

27 March 2008

Entries have opened to the Reserve Bank of New Zealand 2008 Monetary Policy Challenge (MPC).

The MPC is open to all New Zealand senior secondary school economics students. It is designed to expand students' understanding of monetary policy and links to NCEA achievement standards.

The MPC involves students becoming, in effect, central bankers. Just like economists working in the Reserve Bank, each team analyses the economic conditions facing New Zealand and the outlook for inflation. On the basis of that analysis, they decide on an appropriate setting for the Official Cash Rate (the Reserve Bank's interest rate).

Teams present the reasons for their decision in a written submission and, if selected as a regional finalist, give an oral presentation to the competition's judges, two Reserve Bank economists. Regional finals will be held in Dunedin, Christchurch, Wellington, Hamilton and Auckland during August.

The winning team from each region will be invited to the Reserve Bank to compete in the national final, to be held on 21 August 2008. The winner of the national final will receive a cash prize and its team will be invited to attend the *Monetary Policy Statement* release in Wellington on 11 September 2008.

Past winners of the competition have included New Plymouth Girls' High School (2007) and St Kentigern College, Auckland (2006).

Reserve Bank Governor Alan Bollard commented: "This competition brings to life for students the dilemmas that central bankers face. Rather than just expecting students to learn established facts, this competition confronts students with the challenge, ambiguity and uncertainty of actual decision-making."

To help with their assessment of the economy and the outlook for inflation, participants will have access to up-to-date economic data via the Reserve Bank's website at www.rbnz.govt.nz/challenge.

Entries close on 18 April 2008 and an information pack has been sent to each secondary school. The MPC is run annually and began in 2002.

The New Zealand economic outlook

28 March 2008

Recent global financial and economic developments have underlined the policy risks facing New Zealand, Reserve Bank Governor Alan Bollard told the Euromoney Australian Financial Markets Innovation Congress in Sydney today.

In a presentation entitled *New Zealand and the World Economy*, Dr Bollard said that the Bank was projecting a moderate slowdown in economic activity over the next few years, reflecting weaker household spending, business investment, the negative effects of dry weather conditions, and the impact of the exchange rate on exporters.

"As we noted in our recent *Monetary Policy Statement*, there is a risk that the slowdown in the US economy and international financial market turbulence results in a sharper downturn than we are projecting. Much rests on the extent to which the economies of the Asia-Pacific countries, which are important trading partners for New Zealand, can remain largely de-coupled from these developments."

On the global scene, Dr Bollard said fragile risk appetite has seen ongoing turbulence in global equity, foreign exchange, bond and money markets. From their origins in the US sub-prime mortgage market, credit market problems have now spread to a vast range of financing activities around the world.

"However, despite some negative headwinds, a number of factors are likely to help sustain activity in the New Zealand economy. A strong terms of trade is expected to support export revenues while higher government spending and the prospect of personal tax cuts may limit the extent to which the domestic economy cools.

"As we discussed in our last *Financial Stability Report*, released in November, New Zealand banks have virtually no direct exposure to the US sub-prime market, and have engaged in very little securitisation," he said. "However, as is the case in Australia, conditions in global markets have

seen funding costs rise and credit conditions tighten.

"Over the past three weeks global financial markets have remained volatile, funding costs had risen and credit conditions tightened. New Zealand households and businesses are seeing the effects of this via higher interest rates," he said.

"Understandably much of the media commentary has been pessimistic, focussing on the prospects of a sharp world slowdown and financial market upheaval. Monetary policy must take these risks seriously but balance them against the inflation outlook.

"Inflation pressures in New Zealand remain relatively strong. Higher food and commodity prices are adding to inflation in New Zealand as they have in other countries, including Australia and China, which have continued tightening monetary policy in recent months. Over the next few years, the introduction of an Emissions Trading Scheme in New Zealand will also add to headline inflation.

"Monetary policy in New Zealand has been relatively tight for some time, and we think the current setting of 8.25 percent with a flat outlook remains appropriate. However, we will need to keep a close eye on global economic and financial developments for any indications that global activity is slowing by more than most forecasters are currently projecting."

Dr Bollard said the Bank will be closely watching a number of factors including: Northern Hemisphere financial market turbulence; conditions in the Australasian financial sector; the extent to which East Asia growth is coupled to US and European growth, and commodity price developments; and the way in which the adjustment in the housing market and domestic spending proceeds.

No need for banks, businesses to hibernate, says RBNZ

9 April 2008

Banks should avoid overreacting to the economic downturn, Reserve Bank Governor Alan Bollard told the Marlborough Chamber of Commerce today. "The New Zealand economy remains fundamentally sound and creditworthy," he said.

Dr Bollard also suggested that wage-bargaining parties should not assume that tight labour market conditions will continue as the economy slows.

"Banks, businesses and households alike need to recognise the new external environment and adopt a cautious approach – but don't go into hibernation, the underlying economy remains robust," he said.

Dr Bollard said New Zealand has experienced a record period of uninterrupted growth that has left the economy stretched. Dairy prices have been strong and government's fiscal policy is more expansionary this year, adding to inflationary pressures from fuel and food prices. Wage pressures remain high, and in 2009 and 2010 there will be a significant boost to inflation from the emissions trading scheme.

"For these reasons monetary policy in New Zealand has been relatively tight for some time, with a current Official Cash Rate of 8.25 percent. This leaves us in a better position than some Northern Hemisphere countries that may still have to confront future inflationary pressures," he said.

The Bank expects the New Zealand economy to see a markedly weaker growth profile this year because the housing market is now softening as it needs to, the continued high New Zealand dollar is constraining export receipts, and dry weather this summer has hit dairy and meat volumes.

So far, the significant financial market disruption in the Northern Hemisphere is having only a limited effect on the economies of New Zealand's trading partners, with the exception of the US.

"This does not look like unusually weak world growth, and indeed the continued strength of Australia and Asia is an important continued growth driver for New Zealand. We will continue to monitor these economies and commodity prices closely."

However, Dr Bollard said the disruption in financial markets has seen funding costs rise and credit conditions tighten in New Zealand and Australia. New Zealanders are seeing the effects of this via effective mortgage rate rises and reduced corporate credit availability. It would be disappointing if New Zealand businesses slowed quality investment because of credit constraints.

But while there has been a lot of pessimistic commentary in the media, the Bank sees it as a cyclical adjustment.

"Because we have been so strong so long, some people have forgotten what a slower economy means," he said.

OCR unchanged at 8.25 percent

24 April 2008

The Official Cash Rate (OCR) will remain unchanged at 8.25 percent.

Reserve Bank Governor Alan Bollard said: "Economic activity has weakened more markedly than expected in the Bank's March *Monetary Policy Statement*. There have been sharp falls in consumer and business sentiment, exacerbated by tighter credit conditions, a further decline in the housing market and weaker prospects for world growth. Financial market turbulence around the world continues to add to an uncertain economic environment. Further, the very dry summer is also weakening short-term growth prospects.

"However, the labour market is still strong and New Zealand's key international commodity prices remain high. Government spending plans and the possibility of personal tax cuts can also be expected to limit the economic slowdown.

"The weaker economy will, over time, ease accumulated pressure on resources and reduce inflation pressure. However, short-term inflation is likely to remain persistently high, due in large part to repeated increases in food and energy prices. There is a risk that wage settlements respond to these short-term price shocks rather than adjusting to the changing economic conditions, thus perpetuating inflation pressures.

"We see significant downside risk to future activity but upside risks to inflation. A further risk to the outlook is the persistently strong New Zealand dollar which, while helping moderate headline CPI inflation, remains a drag on export growth.

"Given this outlook, we expect that the OCR will need to remain at current levels for a time yet to ensure inflation outcomes of 1 to 3 percent on average over the medium term."

NZ financial system withstands test, says Reserve Bank

7 May 2008

New Zealand's financial system has so far withstood a severe test of global financial markets, but it would be prudent to ensure there is adequate liquidity in case disruptions intensify, Reserve Bank Governor Alan Bollard said today, when releasing the Bank's May 2008 *Financial Stability Report*.

Dr Bollard said the system has come through a period when many overseas financial institutions, including some of the world's largest banks, have incurred substantial losses related to the US sub-prime mortgage market.

"The IMF has described recent events as the largest financial shock since the Great Depression. Adjustment could be protracted, and further volatility in world equity markets, exchange rates and debt markets looks likely," he said. The New Zealand economy looks set for a period of slower growth, already evident in the housing sector.

The New Zealand financial system has very little exposure to offshore credit risk or the structured debt products that have damaged the balance sheets of many overseas banks. "Bank balance sheets remain solid, with appropriate capital buffers," he commented.

However, Dr Bollard said New Zealand banks have been affected by the global tightening in liquidity and availability of funds. "Banks in both New Zealand and Australia source a significant amount of their funding from global financial markets. They are facing a higher cost of funds and reduced liquidity in some markets and this has flowed through to higher borrowing costs for businesses and households.

"For its part, the Reserve Bank is undertaking some further changes to its liquidity management arrangements, designed to help ensure adequate liquidity for New Zealand financial institutions in the event that global market disruptions were to intensify. These measures include expanding the range of acceptable securities for domestic market operations to include Residential Mortgage-Backed Securities."

The Reserve Bank is also reviewing its prudential liquidity policy for banks. "Part of the review is likely to be focused on

ensuring banks diversify their funding sources and lengthen the maturity structure of their debt.”

Dr Bollard noted that banks appear to be tightening the availability of credit. “A more cautious approach to lending by banks appears prudent. However, there is a risk that if credit conditions are tightened too much, the slow-down in the economy will be exacerbated, putting additional pressure on households and businesses,” he said.

Dr Bollard said the ongoing contraction in the finance company sector is being driven by domestic rather than international events and is unlikely to have widespread effects on the financial system, with effects being relatively contained.

Reserve Bank announces new liquidity measures

7 May 2008

The Reserve Bank today announced that it is adopting measures to ensure there is sufficient liquidity in the banking system in the event of further international financial market turbulence.

Deputy Governor Grant Spencer said the measures mirror similar actions by other central banks in the wake of the global financial market turmoil.

“We are confident the banking system can cope with current conditions, but we are taking steps to ensure it can handle any unforeseen pressure in the current uncertain environment,” Mr Spencer said.

The new liquidity measures, most of which will take effect from 3 June, include the following:

- Extension of the range of securities eligible for acceptance in the Reserve Bank’s domestic liquidity operations to include: NZ-registered NZ dollar AAA-rated securities, including Residential Mortgage-backed securities, and AA-rated NZ government sector debt – including Government agencies, SOEs and Local Authorities.
- The discount margin applied in the Bank’s Overnight Reverse Repo Facility will be 50 basis points for all eligible securities.
- A graduated ‘haircut’ regime will replace the existing limit structure for all securities eligible for domestic liquidity operations.
- Extension of Overnight Reverse Repo Facility from 1 day to a maximum of 30 days.

These measures will further enhance liquidity in the banking system following initial measures introduced in September last year. They are the result of a work programme over the past two months to help pre-position for unexpected liquidity pressures.

Mr Spencer emphasised these liquidity measures have no implications for the Bank’s monetary policy stance.

Further detail of the measures is available on the Bank’s website (www.rbnz.govt.nz). The Bank intends to consult with market participants before finalising the timing and detail of the measures. The changes are seen as temporary, to be kept in place while global markets remain unsettled. The Bank’s liquidity arrangements will be further reviewed in 12 months’ time.

First disclosures under Basel II for New Zealand banks

15 May 2008

In the coming weeks, New Zealand banks will release quarterly disclosure statements which will reflect the Reserve Bank’s new Basel II capital adequacy requirements for the first time.

The Reserve Bank’s disclosure requirements under Basel II include more comprehensive disclosure of risk information compared to the earlier Basel I requirements. Also banks are required to disclose high level information about their Internal Capital Adequacy Assessment Process (a process banks follow to determine the appropriate level of capital to hold taking into account all risks, not just those captured by prescribed quantitative capital requirements).

Some aspects of the Basel II regime are still in the early stages of development (such as the Internal Capital Adequacy Assessment Process described above), and some refinements can be expected as arrangements are bedded down.

Although the Reserve Bank's quarterly disclosure regime has been in place since 1996, the shift from Basel I to Basel II, and the recent introduction of the New Zealand equivalents to International Financial Reporting Standards, place extra demands on banks' systems. As noted in the May 2008 *Financial Stability Report*, the Reserve Bank is comfortable with banks managing these demands by exercising some flexibility as provided for in the disclosure Orders in Council at the initial stage of Basel II implementation.

Reserve Bank issues Insurance Consultation Paper

27 May 2008

The Reserve Bank today released a Consultation Paper seeking input on certain issues regarding the Bank's proposed new responsibilities for the prudential regulation of the insurance sector.

In November 2007 Cabinet confirmed the Bank would be the prudential regulator of the insurance sector. Legislation is being developed to give effect to this and to create the new framework for the sector.

Deputy Governor and Head of Financial Stability, Grant Spencer, said that the Consultation Paper sets out alternatives, and in some cases preferred alternatives, for the prudential regulatory approach to the following issues:

- the separation of insurance business lines within insurers;
- the treatment of foreign-owned insurers;
- effective regulatory involvement in the management of a distressed insurer;
- connected party exposures and non-insurance activities of licensed insurers;
- amalgamations, transfers and other significant corporate transactions in the insurance sector; and
- ensuring the confidentiality of prudential information supplied to the Reserve Bank by insurers.

Further details are set out in the Consultation Paper found on the Reserve Bank's website (www.rbnz.govt.nz).

The Reserve Bank invites responses to the questions raised in the Consultation Paper by 20 June 2008.

Following consultation, the Reserve Bank will in July seek agreement from Cabinet to proposals in the above areas. The legislation will be developed over the remainder of 2008.

Reserve Bank update on liquidity measures

29 May 2008

The Reserve Bank today announced further details of the new liquidity measures announced on 7 May. As announced then, these new liquidity facilities include the following:

- The extension of the range of securities eligible for acceptance in the Reserve Bank's domestic liquidity operations to include: NZ-registered NZ dollar AAA-rated securities, including Residential Mortgage-Backed Securities, and AA-rated NZ government sector debt – including Government agencies, SOEs and Local Authorities.
- The discount margin applied in the Bank's Overnight Reverse Repo Facility will be standardised at 50 basis points above the OCR for all eligible securities.
- A graduated 'haircut' regime will replace the existing limit structure for all securities eligible for domestic liquidity operations.
- The extension of the Overnight Reverse Repo Facility to allow loans to a maximum maturity of 30 days.

The Bank's liquidity arrangements will be reviewed again in around 12 months' time. The new facilities will take effect from 3 June 2008, except in the case of Residential Mortgage-Backed Securities, which will be acceptable from 31 July 2008. The Bank expects to be able to announce the final criteria for Residential Mortgage-Backed Securities within two weeks.

Full details of the Bank's liquidity facilities including applicable haircuts for eligible securities, eligibility criteria and operational guidelines are available on the Bank's website <http://www.rbnz.govt.nz/finmarkets/domesticmarkets/index.html>

These measures are aimed at bolstering the liquidity of the NZ markets in the event of further significant disruption to global markets and have no implications for the stance of monetary policy.

OCR unchanged at 8.25 percent

5 June 2008

The Official Cash Rate (OCR) remains unchanged at 8.25 percent.

Reserve Bank Governor Alan Bollard said: "The global economy is currently experiencing significant increases in oil and food prices. These price increases are occurring at the same time as activity is weakening in many economies in response to the global credit crisis and slowing housing markets. In New Zealand, this confluence of factors is producing a challenging environment of weak activity and high inflation.

"We project annual CPI inflation to peak at 4.7 percent in the September quarter of this year. Although much of this reflects higher food and energy prices, underlying inflation pressure also remains persistent. Nevertheless, we do still expect inflation to return comfortably inside the target band over the medium term. This is based on the expectation that commodity prices stop rising, inflation expectations remain anchored, and weakening economic activity contributes to an easing in non-tradable inflation.

"The outlook for economic activity is now weaker than in our previous *Statement*. We project little GDP growth over 2008, and only a modest recovery thereafter, largely reflecting a weaker household sector. Government spending and personal tax cuts will provide some offset to this lower growth but will also add to medium-term inflation pressure.

Consistent with the Policy Targets Agreement, the Bank's focus will remain on medium-term inflation. Provided the economy evolves in line with our projection, we are now likely to be in a position to lower the OCR later this year, which is sooner than previously envisaged."

Reserve Bank takes issue on settlement system claims

11 June 2008

The Reserve Bank today said it supports the moves to enhance legislation governing the designation of settlement systems, announced yesterday by Commerce Minister Lianne Dalziel.

The Bank took issue, however, with reported views attributed to the NZX regarding the current state of New Zealand's payments and settlements systems as a whole.

"It is not the case that the current system is fragmented, that New Zealand's financial system 'plumbing' is not world class, and that trading of futures is not currently possible," Deputy Governor Grant Spencer said.

"There are two main settlement systems in New Zealand: the Reserve Bank's Austraclear system, and the NZX Faster system. The Austraclear system is used by a variety of institutions including not just banks as reported, but also corporates, trustees and brokers to settle transactions in bonds, shares and cash. In May 2008, the Austraclear system handled average daily trades of \$6.7 billion. In the same month, the NZX Faster system for share trading handled average daily trades of \$125 million.

"The Reserve Bank has spent \$4.8 million over the past two years upgrading its Austraclear system. We have good reason to believe that the Reserve Bank settlement system is world class and it has the support of its users. The upgrade of the NZX Faster system will further improve the overall standard of New Zealand's payments and settlements infrastructure.

"Lastly, New Zealand companies as well as international fund managers and hedge funds have had access to futures trading for over 20 years through futures exchanges operating domestically."

Mr Spencer said the Bank welcomes competition, and the opportunity to contribute to the Government's review of settlement systems.

PUBLICATIONS

Regular publications

Annual Report

Financial Stability Report

Monetary Policy Statement

Reserve Bank of New Zealand Statement of Intent, 2007-2010

Published in October each year.

Published six-monthly. A statement from the Bank on the stability of the financial system.

Published quarterly. A statement from the Bank on the conduct of monetary policy.

Recent Reserve Bank Discussion Papers

2008

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DP2008/02	Explaining movements in the NZ dollar – central bank communication and the surprise element in monetary policy? <i>Özer Karagedikli and Pierre L Siklos, January 2008</i>
DP2008/03	Changes in the transmission mechanism of monetary policy in New Zealand <i>Aaron Drew, Özer Karagedikli, Rishab Sethi and Christie Smith, February 2008</i>
DP2008/04	'Automatic' cycle-stabilising capital requirements: what can be achieved? <i>Tim Ng, February 2008</i>
DP2008/05	How do housing wealth, financial wealth and consumption interact? Evidence from New Zealand <i>Emmanuel De Veirman and Ashley Dunstan, February 2008</i>
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DP2008/07	Heterogeneous expectations, adaptive learning, and forward-looking monetary policy <i>Martin Fukac, May 2008</i>
DP2008/08	A macro stress testing model with feedback effects <i>Mizuho Kida, May 2008</i>
DP2008/09	Analysing shock transmission in a data-rich environment: A large BVAR for New Zealand <i>Chris Bloor and Troy Matheson, May 2008</i>

A full list of Discussion Papers is available from Administration, Economics Department.

Selected other publications

Testing stabilisation policy limits in a small open economy: proceedings from a macroeconomic policy forum
Finance and expenditure select committee inquiry into the future monetary policy framework: submission by the Reserve Bank of New Zealand

Pamphlets

Explaining Currency

Explaining Monetary Policy

The Reserve Bank and New Zealand's Economic History

Central Banking in New Zealand

This is the Reserve Bank

Your Bank's Disclosure Statement – what's in it for you?

Snakes and Ladders – a guide to risk for savers and investors, by Mary Holm

For further information, go to www.rbnz.govt.nz, or contact:

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Articles in recent issues of the Reserve Bank of New Zealand *Bulletin*

Vol. 70, No. 2, June 2007

The transmission mechanism of New Zealand monetary policy

A review of the trade-weighted exchange rate index

The Reserve Bank's policy on outsourcing by banks

Financial literacy and its role in promoting a sound financial system

Vol. 70, No. 3, September 2007

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Payments and the concept of legal tender

Vol. 70, No. 4, December 2007

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Households' attitudes to savings, investment and wealth

Microeconomic analysis of household expenditures and their relationships with house prices

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Vol. 71, No. 1, March 2008

Money and credit

The use of money and credit measures in contemporary monetary policy

Recent trends and developments in currency

The Reserve Bank, private sector banks and the creation of money and credit

Future directions for Reserve Bank financial statistics

The business cycle, housing and the role of policy