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Editor’s note

In this first edition of the Reserve Bank Bulletin for 2010, we present a number of articles, most of which are directly concerned about the fallout from the global financial crisis and the implications for policy, both in New Zealand and across the globe.

In our lead article, Bevan Cook and Felix Delbrück examine the role of stabilisation policy in the light of the global financial crisis. They note that the crisis has demonstrated the huge costs financial imbalances can wreak on an economy at times of economic stress. While inflation targeting has been successful in reducing the level and volatility in inflation, thus removing a source of macroeconomic volatility, inflation targeting has been clearly shown to not guarantee financial stability or macroeconomic stability more broadly. The article notes that the financial crisis was in a large part, a function of specific vulnerabilities in the financial sector. Accordingly, reform is primarily aimed at ensuring financial system risk is adequately managed. The article also discusses prudential policies that not only aim at promoting a sound and efficient financial system, but also dampen the credit cycle and hence play a role in reducing broader macroeconomic volatility.

The second article by David Baqaee and Christie Smith summarises some of the issues discussed at a monetary policy conference jointly organised with Northwestern University’s Center for International Economics and Development in December 2009. The conference marked the 20th anniversary of the Reserve Bank of New Zealand Act, which was a seminal event in the development of inflation targeting. The stresses that the global financial crisis has placed on the global economy and policy frameworks made the timing of the conference an apt one. One of the themes of the conference was the role that credit frictions played in amplifying and propagating volatility in the housing market to the rest of the economy. While global interaction of financial markets has facilitated risk-sharing across and between nations, this has opened up an additional channel through which shocks can be propagated.

As part of the conference, Mark Gertler, Professor of Economics at New York University and the author of a key paper on the crisis, visited the Reserve Bank of New Zealand. In an interview with Özer Karagedikli, Mark Gertler offered his thoughts on a variety of topics, including inflation targeting, the global financial crisis and macroeconomics in general. The third article in the bulletin is a record of this interview.

In a continuation of the theme of visitors, Professor Charles Goodhart, from the London School of Economics and previously an external advisor to the Bank of England’s Monetary Policy Committee, visited the Reserve Bank of New Zealand as a Professorial Fellow. His talk at Victoria University in Wellington detailed his thoughts on “How may the new architecture of financial regulations may develop?” A lightly edited transcript of that talk forms the fourth article for this edition. His comments are wide ranging and touch on a variety of issues associated with the global financial crisis and the appropriate policy response. Audio of the speech is available within the seminar and workshops section on the Reserve Bank of New Zealand’s website.

The fifth article, by Satish Ranchhod, details lessons from past US recessions and recoveries. Examination of the depth and duration of past recessions, in addition to a range of factors around the extent of financial disruptions and the strength of household balance sheets, can help draw implications for how the US economy might recover out of the current recession.

The sixth article in the Bulletin is a background paper to an address given by Governor Alan Bollard to the Canterbury Employer’s Chamber of Commerce in late January. The Governor covers the crisis and monetary policy, focusing on the lessons to be learned from the crisis.

The final article by Kristin Langwasser details recent trends in currency, our notes and coins in circulation, over the past year. Interestingly, New Zealanders used constant amounts of currency in proportion to their purchasing power and their income until late 2008, but since then people have decided to hold larger sums of currency. The article also documents the low level of counterfeits with New Zealand’s polymer notes.

I know our readers have competitors for their attention but I trust the articles in this edition are found to be both interesting and useful.

Kirdan Lees
Editor
ARTICLES
The crisis and the Reserve Bank’s stabilisation role
Bevan Cook and Felix Delbrück

1 Introduction
The global financial crisis and subsequent recession have highlighted the huge costs that financial imbalances can impose on an economy. Because the financial crisis was in large part the result of specific vulnerabilities in the banking sector, reform proposals are accordingly focused on improving the resilience of the global financial system by ensuring that financial institutions’ risk management adequately takes account of systemic risks. While our banks have emerged relatively unscathed from the crisis, New Zealand has suffered a long recession. The fact that sizeable imbalances in asset prices and unsustainable increases in debt levels accumulated in the context of overall price stability has also led to renewed debates around whether monetary policy should have leaned more strongly against those imbalances, and whether the policy toolkit for macroeconomic stabilisation needs to be expanded.

This article discusses these debates in both the global and New Zealand context. The crisis has arguably strengthened the case for policymakers to err on the side of a more proactive response to asset price movements and increases in leverage across the economy. At the same time, the recent cycle has shown that the impact of policy rate increases on lending and housing market activity can be limited, particularly in the context of small open economies such as New Zealand. Furthermore, the recent cycle has demonstrated the important stabilisation role of fiscal policy to provide a stable and sound environment for firms and households, and future work needs to enhance our understanding of the role of fiscal policy for stabilisation purposes. Much work remains to be done before it will be clearer what policy measures are best placed to supplement policy interest rates, and how the resulting set of policy tools should be operated. Existing research suggests that the impact of prudential measures on the supply of credit (as opposed to the risk exposure of financial institutions) may be modest. Significant measurement, calibration and operational challenges would also need to be met in order to use such measures successfully to assist stabilisation policy in addition to their financial and prudential purposes.

Section 2 of the article reviews the origins, characteristics and performance of monetary policy in New Zealand and elsewhere over the past 20 years. Section 3 discusses the policy debates. Section 4 concludes.

2 Twenty years of monetary policy under inflation targeting
The monetary policy framework in place in New Zealand and most industrialised countries today has its origins in lessons learned during the high inflation of the 1970s and 1980s. It is now widely accepted that the high inflation of the 1970s was due to monetary policy errors.1 By the early 1980s, there was a growing public consensus that this high inflation was unacceptably costly, distorting economic decisions and leading to inequitable redistributions of wealth. For their part, economists had become increasingly conscious that persistent attempts to push output above the economy’s underlying productive potential, while tempting in the short term, would eventually lead to higher rates of inflation as inflation expectations adjusted upward, without any clear long-run benefits for economic growth.2 Restoring price stability therefore depended on successfully managing the public’s inflation expectations, and this in turn required a disciplining framework for monetary policy.

These insights initially led to attempts to find hard ‘anchors’ for monetary policy. Some economies chose to peg their exchange rate to a currency perceived to be governed by relatively ‘good’ monetary policy, notably the German mark; others targeted measures of the money supply. However, each of those intermediate targets turned out

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1 See Clarida, Gali and Gertler (2000), for example. A number of reasons have been proposed for policy decisions at the time, including an over-estimation of the sustainable level of output (Orphanides 2001), and a tendency to attribute high inflation outcomes to non-monetary factors (Nelson and Nikolov 2004).

2 See Friedman (1968) and Barro and Gordon (1982) for the seminal arguments.
to have a weak link to inflation outcomes, and tended to contribute to macroeconomic instability more generally. In particular, exchange rate pegs led to persistent inflationary or recessionary pressures if economic conditions in the two countries differed. Furthermore, if this led the market to expect the currency peg to be realigned, currencies were left vulnerable to speculative attack. Monetary targets turned out to be highly unreliable in a period where financial deregulation and innovation led to unstable relationships between monetary aggregates, economic activity and inflation.

Inflation targeting, introduced in New Zealand in 1989 and in many other economies in the course of the 1990s, was a way of providing the policy discipline needed to restore public confidence in price stability, while still allowing policy to respond flexibly to evolving economic conditions. The framework has the following key features:

- a public commitment to price stability defined in terms of a measure of the price level (in New Zealand, via the Reserve Bank Act 1989 and the Policy Targets Agreement (PTA) between the Minister of Finance and the Reserve Bank Governor);
- operational independence granted to the monetary authority to achieve that goal;
- specific monitoring mechanisms to ensure accountability (in New Zealand, through reports to the Reserve Bank Board and Parliament’s Finance and Expenditure Committee, and regular Monetary Policy Statements).

This framework purposely does not specify how day-to-day policy should be conducted. In practice, inflation-targeting central banks have generally operated by moving a short-term interest rate to ‘lean against’ forecasts of persistent deviations of inflation from target, relying on the financial transmission mechanism via the yield curve and the exchange rate to influence economic activity and price setting. This always left considerable room for judgement regarding the speed with which to return inflation to target and guide economic activity back to sustainable levels – and the latitude was felt to increase as central banks developed a reputation for running policy consistent with medium-term price stability. As a result, modern monetary policy can more accurately be termed ‘flexible inflation targeting’.

The desire for macroeconomic stabilisation in the context of a longer-term inflation target is reflected in the language of the current PTA, notably in clause 2(b), which specifies the inflation target as a ‘medium-term’ goal, and in clause 4(b), which instructs the Reserve Bank to avoid unnecessary instability in output and other macroeconomic variables.

Inflation-targeting regimes have been adopted by over 20 countries since 1989. How has flexible inflation-targeting monetary policy performed over the past 20 years? In terms of restoring price stability, it can broadly be said to have been a success. In New Zealand, the initial (March 1990) PTA specified that inflation should be within the target band by December 1992. In the event, inflation fell unexpectedly quickly, to 2 percent by the end of 1991 (figure 1) and has been broadly stable since then. Surveyed inflation expectations have remained within the target range (figure 2). Similar patterns can be seen in other industrialised economies.

When it comes to macroeconomic stability in a broader sense, the record has been more mixed. In New Zealand and internationally, the return to low and stable inflation did coincide with a stabilisation in output growth and other measures of the business cycle. There is an ongoing debate...
about the extent to which this ‘Great Moderation’ was due to a change in monetary policy regime, as opposed to changes in the economy’s structure (such as improvements in inventory management) or simple good luck (in particular, the low oil prices, rapid global economic integration, and technological improvements of the 1990s, which led to subdued inflation amid strong growth). On balance, monetary policy probably played a significant, though not an exclusive role. While statistical studies have generally concluded that good luck was the dominant factor, others (e.g. Bernanke, 2004 and Benati and Surico, 2009) have pointed out that these studies may well have misinterpreted as a reduction in unexplained ‘shocks’ what was in fact a stabilisation in the public’s inflation expectations, thanks to a change in monetary policy. Consistent with this, Gürkaynak et al. (2006) show that the ‘inflation premium’ on long-term bond yields has remained less responsive to economic surprises in countries with an explicit inflation target than in the US, and became more stable in the UK after independence was granted to the Bank of England in 1997. This suggests that it is likely that the return to an environment of price stability, and relative certainty about future inflation, removed a source of economic volatility.

However, the past two decades also saw large swings in asset prices, including the dot-com boom in the 1990s and real-estate booms in the US and many other OECD countries in the 2000s. Meanwhile, household debt in many countries rose sharply and external imbalances grew, with growing current account surpluses in emerging market economies funding growing current account deficits in the US and other Western economies. Beginning in 2003, New Zealand saw its largest house price cycle since the 1970s, along with large movements in the exchange rate, record current account deficits, and growing household and external debt.

At the time, there was considerable argument about the extent to which these asset price movements and credit flows reflected fundamental economic developments, such as the impact of lower inflation on borrowing costs, the implications of demographic trends for current account balances in Asia, and the growth opportunities afforded by the IT revolution. With hindsight, however, and looking back from the financial crisis in particular, it is clear that by the late 2000s financial markets and many economies were in the grip of a classic financial or credit cycle, as described by the Bank for International Settlements in 2001:

“At the root of ‘financial’ cycles typically lies a wave of optimism generated by favourable developments in the real economy. This optimism contributes to the underestimation of risk, overextension of credit, excessive increases in asset prices, overinvestment in physical capital and, in some cases, overly buoyant consumer expenditures. Eventually, when more realistic expectations emerge, the imbalances built up in the boom need to be unwound, sometimes causing significant disruption to both the financial system and the real economy.”


Hunt (2006) explores the nature of these international imbalances.

BIS Annual Report, 2001, p. 123. This narrative of financial cycles goes back to the economist Hyman Minsky (see Kindleberger, 1996 for a fuller treatment).
The monetary policy regimes in place over the past 20 years did not prevent this cycle, and the resulting financial crisis, from occurring. What policy shortcomings has the financial crisis revealed, and what changes are likely to be made?

3 Policy lessons

With the financial crisis bringing to light a range of vulnerabilities and shortcomings in financial systems, particularly within banking sectors, international reform efforts in prudential supervision are currently focused on making the financial system more resilient to shocks. The reform proposals include measures to improve the quality and risk coverage of Basel II capital requirements, improving global liquidity standards to make financial institutions less vulnerable to fluctuations in short-term wholesale funding, and reducing the build-up of financial system leverage.9 The new architecture for supervision and regulation has been labelled ‘macro-prudential’ in nature – that is, the focus is on maintaining the soundness and resilience of the financial system as a whole and its interconnecting parts rather than just the solvency of individual financial institutions. Much effort is also being focused on managing the inherently ‘pro-cyclical’ nature of the financial system – the tendency for changes in risk appetite on the part of financial institutions to amplify the business cycle.10

The simplest way of accounting for these systemic risks would be to strengthen regulatory requirements across the board. More ambitiously, regulatory requirements would be calibrated to reflect the greater systemic risk arising from particular institutions and during particular periods. For example, a large systemically important bank may need more stringent regulatory buffers than a smaller player. Similarly, larger buffers may need to be built up in boom times in order to offset a greater tendency for banks collectively to take on risk.

In New Zealand, while the major banks have not been as badly affected as elsewhere and remain well-capitalised, the crisis exposed a vulnerability to global liquidity shocks. In response the Reserve Bank introduced a liquidity policy for banks in October 2009, building on work in train prior to this point that implied the Reserve Bank was well-positioned to introduce this policy. The policy requirements include a minimum core-funding ratio which will require banks to hold the bulk of their funding in the form of retail deposits or longer-dated wholesale funds. As explained in Hoskin and Irvine (2009), the Reserve Bank has taken steps to ensure that the risk models used by the major New Zealand banks to assess their capital requirements for the purposes of Basel II are based on long-run, ‘through-the-cycle’ assumptions about risks and losses in the key areas of home mortgage and farm lending.

Even in the absence of disruption to the provision of financial services, however, debt-fuelled asset price cycles can contribute to economic volatility: asset prices, economic activity and the supply of credit are often mutually reinforcing, on both the upswing of the cycle and in downturns (box 1 outlines a number of reasons for the procyclicality of credit creation). Furthermore, if burst asset bubbles leave behind a legacy of debt on household and corporate balance sheets, they can depress economic activity for years. The experience of the past two years has therefore revived two debates that simmered over the past decade: should monetary policy expand its focus to respond more strongly to asset price rises and credit creation, and are short-term interest rates an adequate tool for doing so?

Should the focus of monetary policy be expanded?

Through the past decade there was a debate whether inflation-targeting monetary policy makers should respond more strongly to asset price movements and, in particular, ‘lean against’ signs of incipient asset bubbles and other

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9 See Bank for International Settlements (2009). Reform proposals have also been issued by national institutions such as the Bank of England and the UK FSA (see Reserve Bank of New Zealand (2009), p 41-43 for a summary).

10 While the impetus for a macro-financial approach to prudential supervision already began in the aftermath of the Asian financial crisis in the late 1990s (as witnessed by the widespread publication of financial stability reports and organisational changes within central banks, such as the establishment of financial stability departments), much work still needs to be done to find an agreed conceptual basis for measuring systemic risks, and workable macro-prudential policies. Bank of England (2009) provides an assessment of how operation of such policies might work in practice.
financial misalignments, over and above the immediate implications for output and inflation. The debate was also framed in terms of the appropriate horizon for monetary policy accountability (e.g., Bean 2003): should it be the standard ‘medium term’ of one to three years, or should the inflation-targeting horizon be extended to allow policy to take into account longer-term inflation risks resulting from unwinding financial excesses?

An influential position, associated particularly with the US Federal Reserve, has been that monetary policy should only respond to asset price movements in so far as they signal changes in expected inflation.11 This approach was based on three main considerations:

- The difficulty of identifying misalignments: It would be prohibitively difficult to distinguish asset price bubbles from sustainable booms (i.e. price movements reflecting genuine profit opportunities) sufficiently early for policymakers to respond effectively.

- The costs of leaning against a potential misalignment: In the context of low risk perceptions and large expected capital gains, it was argued that significant policy tightening would be required to dampen an asset boom, with deleterious effects on the non-bubble sectors of the economy. This would be very difficult to defend in view of the uncertainty of any benefits further down the track. There was also the risk of eroding public confidence in the inflation target.

- Ease of ‘cleaning up’ a burst bubble: By contrast, the fall-out from a burst bubble could always be ‘mopped up’ by cutting interest rates and providing the financial system with adequate liquidity.

Others (the Bank for International Settlements for example) acknowledged the practical difficulties, and accepted that it was most probably unwise for policy to ‘target’ specific asset prices, but argued that future asset price busts were nevertheless sufficiently predictable for monetary policy occasionally to lean against signs of misalignment.12 The difficulties of identifying financial imbalances were, in this view, not different in kind from those of identifying output gaps. There was also concern that the asymmetry of a policy approach that responded to asset busts more aggressively than to the preceding booms would encourage risk-taking by market participants. A systematic tendency to ‘lean against the wind’ of financial imbalances could reduce these incentives and therefore have a dampening effect on the build-up of financial imbalances, over and above the direct effect of any particular policy tightening. New Zealand was broadly in this camp, with the Reserve Bank expressing the view that tightening policy to insure against future asset price busts would be difficult, but occasionally appropriate (see Bollard, 2004).

Over the past two decades, support for the Federal Reserve’s approach appeared to come from relatively swift recoveries in the United States from periods of speculative excess, including the late 1990s dot-com boom. The experience of Japan was also interpreted in this light: it was argued that the Japanese ‘lost decade’ was largely due to attempts by monetary policymakers to burst an established bubble in 1989, and their failure to respond sufficiently aggressively to deflationary pressures after the bubble had burst (Bernanke and Gertler, 1999). Following the financial crisis, however, a somewhat more proactive approach is likely to gain force. Certainly the option of ‘cleaning up afterwards’ now looks considerably less attractive.

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12 Research suggests that indicators such as credit growth and the ratio of residential investment to GDP have some predictive power for future asset price busts (Borio and Lowe, 2002 and IMF, 2009).
Does stabilisation policy need more instruments?

Even if policy might want to lean against strong signs of overheating in asset markets, this leaves the question whether adjustments to short-term interest rates are the best way of doing so. In practice, the Reserve Bank has always given consideration to housing market developments in its monetary policy deliberations, reflecting a strong empirical association between New Zealand house prices, and consumption and domestic inflation pressures more broadly. However, over the tightening cycle beginning in 2004, rising policy interest rates took a long time to feed into longer-term mortgage rates and affect housing market activity, whereas the New Zealand dollar rose rapidly, putting pressure on the traded goods sector and sharpening external imbalances (figure 3).

One reason for this was increased competition for mortgage loans among New Zealand banks, with the margin of mortgage rates over 2-year wholesale funding rates dropping noticeably in 2004-2005 and widespread reports of a ‘mortgage war’. In addition, however, global wholesale interest rates were themselves unusually low. Some (e.g., Taylor, 2009) have argued that this was due to overly expansionary monetary policy in the US, but risk premia were also at very low levels, and it is also likely that global interest rates were kept low by high savings and a fall in domestic investment in Asian economies following the collapse of the Japanese bubble and the 1998 East Asian Crisis (figures 4 and 5). Whatever the cause, for small open economies such as New Zealand, this meant that policy interest rate increases tended to attract capital inflows, and that tightening monetary conditions were reflected in a rising exchange rate, while the impact on lending rates was much more muted.

This limited apparent impact of monetary policy tightening on the housing market led to calls for additional tools that might more directly affect the housing and credit market. A joint report by the New Zealand Treasury and the Reserve Bank explored a range of relevant measures, including policies affecting the demand and supply for housing (such as the tax treatment of housing), a better tailoring of prudential bank capital requirements to cyclical risks, and measures designed to directly influence credit supply, such as discretionary loan-to-value ratio limits (see Blackmore et al., 2006).

The general conclusion of the report and follow-up research (e.g., Ng 2009) was that there were no ‘silver bullets’, and that...
any measure by itself was unlikely to eliminate credit cycles without causing significant adverse side-effects. However, the state of knowledge is still very limited. International research and debate on such measures is likely to grow as a result of the financial crisis and many countries’ experiences with housing booms that turned out to be unsustainable. The remainder of this article canvases what we know about some specific policies and discusses the main operational issues that their use would raise.

Prudential policies as stabilisation tools

The Reserve Bank Act requires the Bank to exercise its prudential powers with the objective of promoting a sound and efficient financial system and avoid significant damage to the financial system that can result from the failure of a registered bank. However, some prudential policy tools might also have the effect of dampening the credit cycle in addition to promoting soundness and efficiency within the financial sector. If this were so, such tools could potentially have a role to play in broader macro-economic stabilisation. This would depend on the strength of the link between changes in prudential requirements and credit creation and/or other macro-economic variables such as activity or asset prices. Although international interest in this field is growing, research to date on the viability of such instruments as macro-stabilisation tools has been mixed. Nevertheless, work in this area is continuing apace.

Most existing research is in the realm of time-varying capital requirements. This would involve raising bank capital requirements as signs of excessive credit creation mount, and relaxing them in order to free up lending in a downturn. These time-varying capital requirements could be tailored to particular risk classes; for example, by varying Basel II risk weights over the cycle (the risk weight applied to residential mortgages could be raised during a boom, for instance). Such counter-cyclical capital buffers are being recommended as part of a macro-prudential framework that would reduce the risk exposure of the banking system (e.g., Bank for International Settlements, 2009, Bank of England, 2009). How strongly they would affect the lending behaviour of banks is a separate question.

Finance theory says that under certain conditions (perfect information and capital markets, and no distortionary taxes), a corporation's funding structure should not impact upon its cost of capital, and hence its business decisions. In practice, of course, these conditions are not met and so the cost of raising capital tends to be significantly higher than the cost of raising debt. Most notably in the case of banks, deposit insurance or perceived implicit government guarantees of bank debt would make it costly for banks to hold more capital, other things being equal. The transactions costs of issuing capital also tend to be higher than those of raising debt or deposits.

However, the shifts in bank capital ratios required to achieve a given change in bank lending costs might be large. To illustrate this, Ng (2008) assumes that debt costs 8 percent per annum and equity 20 percent per annum, and calculates that an increase in funding costs of about 25 basis points would then require a shift of 2 percent of each housing loan from debt funding to equity funding. To put this in perspective, banks are currently required to hold about 2 percent of a normal housing loan as equity capital. Furthermore, the impact of changes in regulatory minimum capital requirements on banks' actual capital holdings might be quite muted, given that banks' capital ratios are typically well above Basel II minima (the major New Zealand banks hold Tier One capital of about 8 percent of total risk-weighted assets, as against the current regulatory requirement of about 4 percent). International studies do find an association between capital requirements and banks' actual capital ratios, but it may not be very large. For example, looking at a sample of UK banks and building societies, Alfon et al. (2004) estimate that only about half of the change in capital requirements is translated into changes in the actual ratio – and that the effect becomes smaller the larger the bank's initial capital buffer. Reducing capital requirements in a severe downturn may also lack bite if nervous financial markets demand higher capital levels, or if doing so is seen to communicate a heightened level of financial system risk.
Another example of a potentially counter-cyclical prudential policy is the ‘dynamic provisioning’ accounting method used by Spanish regulators. This requires banks to provision against expected losses through the cycle, rather than as they occur. Dynamic provisioning has potential financial stability benefits, as loans written during the peak of the cycle may have a much higher probability of default, even though actual loss rates may be low. In addition, dynamic provisioning may smooth profits and hence bank lending policies through the cycle. However, as noted in Bank of England (2009), the dynamic provisioning policies introduced in Spain in 2000 did not prevent a doubling in the ratio of Spanish private credit to GDP, or a very large housing and construction cycle, although they may have increased the resilience of Spanish banks to the downturn and hence limited the scale of the recession.

While minimum capital requirements are an integral part of the Basel II framework, and dynamic provisioning methods have been used in a range of jurisdictions, liquidity requirements are a recent response to vulnerabilities revealed during the financial crisis, when banks in many countries, including New Zealand, faced a protracted period of liquidity stress following the failure of the investment bank Lehman Brothers. This liquidity stress forced banks to reduce credit supply, thereby intensifying the economic downturn. The core funding ratio requirements introduced by the Reserve Bank to strengthen banks’ liquidity buffers may limit excessive credit growth during cyclical upswings, by constraining banks’ ability to borrow in short-term wholesale markets.  

## Other stabilisation tools

Blackmore et al. (2006) discuss a range of other possible policy options to affect housing and credit more directly, including tax policy in so far as it interacts with the demand for housing and measures to reduce frictions in housing supply. On the credit front, measures they examine include discretionary loan-to-value ratio (LVR) limits and a levy imposed on interest paid on mortgage loans. An LVR limit would place a cap on the leverage taken on by mortgage borrowers (some countries require the purchase of mortgage insurance when the LVR exceeds a certain value). This would limit the funding available to finance a housing boom and also limit the financial exposure of households to a downturn in house prices. A mortgage levy would raise domestic borrowing costs (or reduce bank profits) for given wholesale interest rates, and thereby potentially take pressure off the exchange rate during a housing boom.

These measures may well have a bigger impact on the cycle than capital based prudential measures (and as a side-effect they would also tend to reduce the risk exposure of banks).

Restrictions on LVRs for residential mortgages are used in a range of countries, predominantly in Asia, and Blackmore et al. (2006) report that average LVRs do appear to be lower in countries with restrictions. To date, the discretionary adjustment of measures such as LVR limits during a housing boom has been most common in countries with managed or fixed exchange rates such as Singapore and Hong Kong, and may have played a role in limiting the peak of the boom. In considering the possible use of these tools in New Zealand, Blackmore et al. (2006) concluded that the impact of these measures on the cycle could be material, but noted substantial administrative hurdles and enforcement challenges for implementation.

## Operational issues

Introducing additional tools for cycle stabilisation, and using them specifically to dampen the credit cycle and associated asset misalignments, would raise a number of operational challenges. Some of these challenges are similar in kind to those facing monetary policy currently, but others would be new.

In particular, attempting to influence the credit cycle would require gauging whether credit and asset price imbalances were emerging, and measures would need to be timed and
Box 1
Market failures that cause credit conditions to be procyclical

The Financial Stability Forum (now the Financial Stability Board) gives two fundamental reasons why the supply of credit may fluctuate in a procyclical way: limitations in risk measurement and distortions in incentives (see Financial Stability Forum, 2009). The former source refers to the tendency for risk measures and risk perceptions to move in a procyclical manner:

- Lenders’ hubris may cause them to become overconfident during prolonged periods of economic stability. Similarly, if quantitative estimates of the risk of default and losses given default are based on limited data spans, they will tend to be highly procyclical. This may affect market and regulatory discipline as well as lenders’ own risk assessments. For example, concern has been expressed regarding the potential interaction of procyclical risk assessments with Basel II capital requirements, through risk weights. As noted earlier, the Reserve Bank has put in place measures to ensure adequate ‘through-the-cycle’ assessments of risk are used for Basel II purposes.

The second source (distortions in incentives) refers to conflicts of interest involving asymmetric information, and to incentives that may be rational from the point of view of an individual lender but result in sub-optimal outcomes when undertaken by banks collectively. These distortions lead to a number of sources of procyclicality:

- Financial accelerator and collateral effects. Bernanke and Gertler (1989) show that asymmetric information between borrowers and lenders can result in procyclical lending to corporates because a firm’s net worth, which increases during economic upswings and falls during downturns, reduces agency costs and therefore the cost of external (bank) financing relative to internal funding costs. Similarly, Kiyotaki and Moore (1997) show that in an environment of asymmetric information, changing asset prices affect the amount of secured credit that lenders provide. In other words, more collateralised borrowing is possible as asset prices rise. To the extent that asset prices move positively with the economic cycle, this induces procyclicality in lending (particularly mortgage lending for housing).

- Short horizons in incentive contracts. Performance evaluation based on recent past performance may incentivise managers in lending institutions to focus on near-term risks, rather than risks over the full credit cycle.

- Competitive-strategic effects. Mandelman (2006) finds that the countercyclical nature of bank margins impacts the economy in a procyclical way. He explains this with strategic behaviour by oligopolistic banks: during upswings, banks cut margins to deter new entrants and maintain market share. During downswings, there is less pressure on margins because the cost to entry is higher.

On the other hand, total policy discretion would be undesirable, as it would both potentially cause uncertainty among market participants and risk an inadequate policy response to the build-up of imbalances in good times due to political pressures. However, constraining that discretion through a system of accountability measures – similar to that currently used to constrain monetary policy – would present special challenges. This is because the goal is less clearly defined than the price stability goal under inflation targeting (there is no agreed numerical target corresponding to ‘an absence of housing market imbalances’, for example), calibrated appropriately. Even among those commentators who believe this is feasible, there is an unresolved debate whether the process for doing so should rest on simple rules, or whether a system of ‘constrained discretion’ akin to inflation targeting would be more appropriate. The main problem with a rule-based approach is that, at best, simple indicators such as aggregate credit growth are only partially successful in predicting emerging bubbles (just as indicators such as money growth will only sometimes be harbingers of inflation pressures), and good policy decisions will therefore depend on judgments based on a much wider set of information.
and because the time horizon over which credit cycles tend to play out is much longer than the horizon over which inflation pressures normally build.

The discretionary control of multiple instruments would give rise to added policy coordination and communication difficulties. Because a discretionary prudential stabilisation policy would be expected to influence the economic cycle, monetary policy settings would need to take it into account. Furthermore, potential conflicts between price stability and macro-stabilisation goals would not disappear. Typically inflation and credit cycles move together and so policy responses are unlikely to clash. But this may not always be the case. For example, the bursting of an asset price bubble could coincide with a positive inflation shock. Indeed, this is what happened in 2008, when rising oil prices led to elevated inflation pressures just as sub-prime mortgage delinquencies in the US were beginning to lead to broader financial stability concerns. If prudential measures were used for stabilisation purposes, conflicts might also arise between macro-stabilisation policy and micro-prudential objectives. An example would be at the peak of the cycle when credit growth should ideally be reined in. If any individual bank at this time was already in a stressed state, tighter macro-prudential policy could aggravate that stress.

4 Conclusion

Monetary policy over the past 20 years has been remarkably successful in taming the inflation of the previous two decades. That has removed a major source of macroeconomic volatility. Inflation targeting has also proven to be a framework that combines the discipline needed to ensure long-term price stability with considerable operational flexibility in the near term. However, as the events of recent years have shown, it has not ensured financial stability or, ultimately, macroeconomic stability.

In part, this was because of deficiencies in the global financial regulatory framework. In future, monetary policy may also occasionally take the risk of future financial bubbles into account to a greater degree than in the past. Central banks and other international agencies are continuing to look into the properties of a variety of instruments that might assist in this task, and while there are practical challenges to be overcome, it is possible that some could be found to have a role to play in the future. However, the deeper lesson from recent experience may turn out to be that those who expected monetary policy – or any other policy – to guarantee stability were expecting too much. If this is so, the best outcome will be an environment in which lenders, borrowers and economies are better able to bear the brunt of shocks. If policies that improve their ability to do so also improve macroeconomic stability, so much the better.

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Twenty years of inflation targeting
David Baqaee and Christie Smith

1 Introduction

In December 2009 the Reserve Bank of New Zealand, in conjunction with Northwestern University’s Centre for International Economics and Development (CIED), hosted a monetary policy conference to mark the 20th anniversary of the Reserve Bank of New Zealand Act. Passed in December 1989, the Act was one of the seminal events in the development of inflation targeting as a monetary policy regime.

Inflation targeting, with its emphasis on price stability, policymaker independence, and communication to influence expectations, has become hugely influential internationally as a monetary policy framework. As of 2009, 26 countries have explicitly adopted inflation targeting, including Canada, the UK, Australia, Sweden and Norway.\(^1\) Even in countries and regions that do not have an explicit inflation targeting framework, such as the euro area and the US, the ideas underpinning inflation targeting and the methods used to implement policy in an inflation targeting regime have become increasingly influential.\(^2\) It is therefore fitting that the Reserve Bank and the CIED chose to celebrate this historic, 20-year milestone.

A conference on monetary policy was particularly apt for 2009 because macroeconomic developments over the last two years have created the largest stresses for the global economy, the global financial system, and policy frameworks since the Great Depression of the 1930s. The decline in global economic activity in 2009 – now being termed ‘the Great Recession’ in the US – has prompted renewed scrutiny of macroeconomic stabilisation policy, financial systems, and the regulatory frameworks within which financial institutions operate.\(^3\)

Policy questions are among the pre-eminent concerns that have arisen from the Great Recession. For example: Should one seek to stabilise the economy through fiscal or monetary policy? How effective is fiscal policy in times of crisis? What kind of ‘unconventional’ monetary policies are available, and how (and why) might they work? What kinds of credit frictions are operational, and how do they influence the propagation of shocks? How should policy be operated in the context of a small open economy? What sort of financial regulation should be implemented and what consequences does regulation have for long-run optimality?

At the December conference, leading academics and staff from the Reserve Bank came together to address these and related questions.

2 Backdrop – the Great Recession

In this section we briefly describe elements of the global macroeconomic crisis that serve to motivate many of the papers presented at the Reserve Bank-CIED conference.

One of the key events widely identified as contributing to the global macroeconomic crisis was the boom and subsequent bust of the US housing market. The boom was associated with the development of new financial securities often backed by housing mortgages. These securities facilitated an increase in mortgage debt by US households, and enabled financial institutions around the world to obtain an exposure to the debt via the purchase of those securities. As the US housing market reversed, the value of the securities fell. The decline in security values resulted in direct losses to some institutions (eg, Washington Mutual), indirect losses to others with exposure to those institutions (eg, American International Group), and liquidity issues (eg,
an unwillingness to lend to Lehman Brothers) in response to a lack of transparency about the value of impaired securities, and a lack of information about who owned such assets. Policy interventions were required to assist many financial institutions affected by the reduction in their capital base (due to lower security values) and/or liquidity problems, and to maintain confidence in the financial system as a whole. Investment banks in the US transformed themselves into generic commercial banking entities (e.g., Goldman Sachs) to access liquidity through the Federal Reserve’s discount window, or simply merged with stronger entities (e.g., Merrill Lynch with Bank of America).

Financial and private-sector firms’ ability to borrow became a key concern during the crisis. As a result, the spread between non-government and government interest rates increased substantially. (See figure 1.) Global inter-linkages also meant that banks such as Northern Rock in the UK and Hypo Group Alpe Adria in Austria, and institutions elsewhere, were subject to the same liquidity and solvency pressures, and were essentially nationalised or were shepherded into mergers with banks with stronger balance sheets.

Figure 1

US interest spread

These developments were part of a broad global phenomenon. (See figure 2.) Easy monetary policy (via lower interest rates and quantitative easing) and fiscal stimulus (in the form of increased government expenditure and resultant increases in fiscal deficits and debt, see figure 3) became the global norm in an effort to offset the decline in private sector activity.

Figure 2

Annual GDP growth rates

Figure 3

Government deficits

The developments described above form the macroeconomic backdrop to many of the papers presented at the conference, some of which are described below.

3 Credit frictions in the Great Recession

One of the themes in the conference was the role that credit frictions played in amplifying and propagating shocks in the housing market to the rest of the economy. The consensus view is that financial frictions and imperfections, either in

The real economy—so-called ‘Main Street’ in the US—was not left unscathed by financial developments on Wall Street. Given concerns about solvency and liquidity, banks became less willing to lend to businesses and households for investment and consumption purposes, so those quantities dropped sharply. International trade dropped substantially as demand declined, and unemployment increased as businesses required less labour.

Source: US Federal Reserve.


the form of credit constraints, sunspots in behaviour, or principal-agent problems involving financial intermediaries, can be powerful determinants of economic activity.

Liu et al investigate the extent to which credit constraints on consumers and firms amplify macroeconomic fluctuations using a dynamic stochastic general equilibrium (DSGE) framework. Traditionally, there has been little success in modelling the empirical significance of credit constraints for macroeconomic fluctuations. Liu et al argue that the muted effect of credit constraints stems from the absence of a mechanism connecting house price movements and business investment. The authors reason that in a world with limited contract enforcement, borrowing is limited by the need to secure contracts with collateral assets. The need to collateralise debt provides a mechanism through which fluctuations in asset prices can affect business investment, since an increase in asset prices relaxes the credit constraints faced by firms. This link between liquidity constraints and asset prices can amplify and propagate small shocks in asset markets into large and persistent business cycle fluctuations. Liu et al find that, in general, credit constraints do not amplify nonfinancial shocks or financial shocks that shift the supply of an asset. However, a shock that shifts the demand for collateral assets, such as land or housing, generates a two-way feedback between the asset price and business investment, which can ultimately cause large macroeconomic fluctuations. Crucially, their model explains the observed positive and persistent co-movements between US housing prices and business investment.

Harrison and Weder examine how business cycles can be driven by self-fulfilling expectations. Their model shows that speculative asset price movements, driven by increasing debt, lead to a credit crisis. Harrison and Weder find evidence that sustained pessimism may have been a leading ingredient in turning what might have been an ordinary slump into the Great Depression. They find evidence that the financial crisis of late 2008 was also driven, at least in part, by self-fulfilling pessimism and sunspot equilibria.

Hall defines financial frictions as divergences between returns received by providers of financial capital and the cost of capital paid by businesses and consumers – which he also terms a financial wedge. Hall finds that an increase in financial frictions can be a potent driver of macroeconomic fluctuations in output and employment.

Hall argues that the spread between commercial and government debt reflects 1) expected default rates; 2) differences in financial risk (reflecting the covariance of the asset return with the risk-free return); and 3) financial frictions. In the crisis, all three are presumed to have increased, so the spread itself is an upper bound on the importance of the financial friction. In Hall’s model, an increase of six percentage points in the financial wedge (see figure 1) causes reductions in output and investment comparable to those that occurred in the US following the crisis.

4 Policy responses to the Great Recession

The second area of discussion at the conference concerned policy responses to the crisis, including optimal fiscal, monetary and regulatory policy. Many of the papers focused on the effects of fiscal stimulus and monetary policy when nominal interest rates are close to or at the zero lower bound.

Christiano et al argue that the size of the government-spending multiplier depends greatly on the nominal interest rate. In their model, the government-spending multiplier is small if the nominal interest rate is positive and governed by a Taylor rule: usually increases in government expenditure require offsetting monetary policy actions to stabilise aggregate demand and hence inflationary pressures. However, if the nominal interest rate has reached its lower bound of zero, and hence there is substantial spare capacity in the economy, then increases in government expenditure do not require offsetting monetary policy actions, and so the fiscal multiplier can be much larger, exactly when fiscal actions are most required.

Gertler and Karadi develop a quantitative DSGE model for studying ‘unconventional’ monetary policy in the same manner that existing DSGE models are used to study ‘conventional’ monetary policy. In their model, financial intermediaries face endogenously determined balance sheet constraints, which
tighten during financial crises. In contrast, the central bank is not affected by the same constraints and can readily expand its balance sheet during crisis times, increasing the supply of central bank credit. (See figure 4.) Gertler and Karadi use this model to investigate the welfare benefits from central bank intervention and find that the benefits are substantial. These benefits are significantly enhanced in the case where the zero lower bound on nominal interest rates is binding. In Gertler and Karadi’s model, central bank intermediation can take the form of either direct credit interventions or equity injections. The authors argue that the key factor in choosing between these alternatives is their relative efficiency cost. For example, direct central bank intermediation may be justified in fostering mortgage-backed securities or commercial paper markets, but such intermediation may be highly inefficient in the case of commercial and industrial loans that require constant monitoring of borrowers. In the latter case, capital injections into financial institutions may be preferred, since commercial institutions have specific expertise in such monitoring.

Figure 4

Federal Reserve: Supply of reserve balances

Chari and Kehoe presented their work on optimal regulation of the financial sector, focusing on the ‘time inconsistency’ problems of bailing out failing banks. *Ex ante*, governments desire a commitment to a policy that lets banks fail, to ensure that private sector agents properly account for the risks of failure. However, governments will typically want to renege on this commitment *ex post* to mitigate bad macroeconomic outcomes. In turn, private sector agents – *i.e.*, banks – will anticipate that the government will renege on its commitment, and this knowledge will adversely affect their behaviour in response to risk. Chari and Kehoe therefore suggest that the government’s inability to commit to not bailing out financial firms provides a rationale for financial regulation, to moderate the likelihood and magnitude of bank failure. In Chari and Kehoe’s model, reducing the incentive to bail out banks can be achieved by imposing a cap on the quantity of assets used by each firm and a cap on the probability of bankruptcy. The latter can be implemented via a cap on the debt-to-value ratio of the firm (increased equity relative to debt reduces the probability of bankruptcy).

Alonso-Carrera and Kam investigate fairly conventional monetary policy in a tractable, small open economy DSGE model with incomplete financial markets. Unlike previous models, Alonso-Carrera and Kam’s model does not exhibit the same structure as a closed-economy model (technically, it is not ‘isomorphic’ to similar closed economy variants). This paper is of interest because it provides a theoretical foundation for the belief that monetary policy in small open economies should respond to inflation, the output gap and the real exchange rate, compared to closed-economy models where it suffices to respond just to the domestic output gap and domestic inflation.

5 Concluding remarks

The RBNZ/CIED monetary policy conference canvassed a wide array of perspectives about recent macroeconomic and financial developments, and their implications for policies. While global interaction of financial markets has clearly facilitated risk-sharing across and between nations, it has also introduced an additional channel through which shocks can be propagated. The Reserve Bank-CIED conference did much to highlight understanding of the key shocks of the recent financial crisis, the transmission of these shocks to the real economy, and appropriate policies to mitigate their effects. The conference has also motivated further research at the Reserve Bank in areas such as the design of macro-prudential policies, financial market frictions, optimal monetary policy, and the role of housing markets in the business cycle.
6 Monetary policy conference programme

More information and the papers from the conference are available at: http://www.rbnz.govt.nz/research/workshops/MonetaryPolicyDec09/index.html

Thursday 17 December, 2009

“When is the government spending multiplier large”, Lawrence Christiano (Northwestern University), Martin Eichenbaum (Northwestern University, and Sergio Rebelo (Northwestern University)

“A defence of the Federal Reserve Open Market Committee (FOMC)*”, Martin Ellison (University of Oxford) and Thomas Sargent (New York University)

“A model of unconventional monetary policy”, Mark Gertler (New York University) and Peter Karadi (New York University)

“Do credit constraints amplify macroeconomic fluctuations?”, Zheng Liu (Federal Reserve Bank of San Francisco), Pengfei Wang (Hong Kong University of Science and Technology), and Tao Zha (Federal Reserve Bank of Atlanta)

“On a tractable small open economy model with endogenous monetary-policy trade-offs”, Jaime Alonso-Carrera (Universidade de Vigo) and Timothy Kam (Australian National University).

“Long and short interest rate targets”, Bernardino Adao (Banco de Portugal), Isabel Correia (Banco de Portugal) and Pedro Teles (Banco de Portugal).

Friday 18 December, 2009

“Bailouts, time inconsistency and optimal regulation”, V V Chari (Federal Reserve Bank of Minneapolis) and Patrick Kehoe (Federal Reserve Bank of Minneapolis).

“The high sensitivity of economic activity to financial frictions”, Robert Hall (Stanford University).

“Sunspots and credit frictions”, Sharon Harrison (Columbia University) and Mark Weder (University of Adelaide).

“Inflation and the natural rate of unemployment in US business cycles”, Nicolas Groshenny (Reserve Bank of New Zealand).
Inflation targeting, the financial crisis and macroeconomics: an interview with Mark Gertler

Few people have had such strong influence on macroeconomics in general and on the New Keynesian School of macroeconomics as Mark Gertler has. His work with Ben Bernanke and Simon Gilchrist on the role of credit and financial conditions on business cycles, and with Ben Bernanke on whether the central banks should respond to asset price bubbles, are some examples of his influential work. Mark Gertler is the Henry and Lucy Moses Professor of Economics at New York University, and visited the Reserve Bank of New Zealand for the Monetary Policy conference held in Wellington on 17-18 December 2009. The conference was organised jointly by the Reserve Bank of New Zealand and the Center for International Economic Development to mark the 20th anniversary of inflation targeting in New Zealand. Özer Karagedikli from the Economics Department of the Reserve Bank interviewed him.1

Özer Karagedikli

Professor Gertler, welcome to New Zealand and thank you for taking time for this interview. I understand this is your first time in this part of the world and it is a pleasure having you here at the Reserve Bank. You are here for a conference to mark the 20th anniversary of inflation targeting in New Zealand. Twenty years ago New Zealand passed the Reserve Bank of New Zealand Act (1989), which gave the Reserve Bank the price stability role and independence “to achieve and maintain price stability”, which became known as inflation targeting. Do you think the inflation targeting framework has served us, ie, New Zealand and the twenty odd other countries that are using the same framework, well?

Mark Gertler

I think one of the remarkable achievements of central banks over the last several decades has been price stability. And I think a central factor in that has been inflation targeting: either of the explicit kind that New Zealand and other countries have adopted or of the implicit kind that the Federal Reserve has been following over roughly the same period. We have seen the benefits of price stability during the ‘great moderation’ era. There was a period of very robust growth and central banks didn’t have any reason to have to derail the growth because we had price stability. And I think the inflation targeting framework has helped in

the current crisis because things would have even got worse, had deflation took hold. But I think that for many countries the public are of the mind that central banks are committed to two percent inflation over the long term and that seems to have served us well in this crisis to help prevent deflation – so far.

ÖK

You said either explicit or implicit inflation targeting. I assume you see no difference between the two?

1 Thanks go to Sophie Robins for the transcription of this interview.
Well, it’s hard to say. In the US, it seems to have worked thus far. Implicitly, it was very clear to anyone following the Federal Reserve that they had a goal of long-term inflation of two percent. If you look at the history of interest rates setting, you know any signs of inflation typically led to an increase in interest rates. I think the Fed has established a reputation. From an institutional perspective, it has come a little closer to formal inflation targeting in the sense that it now announces an inflation forecast for three years down the road. This forecast is effectively the target. It does remain that there is an open question as to how much difference going all the way to formal inflation targeting would make. Maybe there are some scenarios where it could make a difference. But this is probably less true for a country like the US which has built up credibility over a long period. It may be different for a central bank that has not had this long experience with price stability. It may be more important in that kind of situation.

Coming back to the great moderation; do you think the great moderation was entirely, or at least mainly, due to better monetary policy? Or did other factors, such as better fiscal policy, inventory management or good luck play a role as well? I wonder whether you think the central bankers were too strong in arguing it was all monetary policy (inflation targeting)?

For output stability, my back of the envelope calculation is 1/3, 1/3, 1/3 (policy, good luck, structural). For price stability, monetary policy deserves the lion’s share of credit. It is true that we were probably too optimistic about the resilience of the economy and about what policymakers could accomplish.

There is a belief in at least some part of New Zealand society and economic community that inflation targeting has led to large asset price cycles, especially in house prices and the exchange rate. In New Zealand recently, we experienced two large house price cycles, with the second one being a rather large one. We also experienced large swings in the exchange rate. Do you think these large swings in asset prices are the by-products of inflation targeting?

Well, I’m not sure that there is any kind of definitive evidence for that point of view. When I look at the asset price bubbles over the last decade, the first thing that comes to mind is low long-term interest rates and I think that has more to do with the global saving and investment in the world economy than the setting of short-term interest rates. The second factor, at least in the case of the US, was a general relaxation of lending standards, in particular sub-prime lending. At the peak of the housing boom, about 40 percent of new mortgages were non-prime loans. This undoubtedly played a factor in the run-up. I would think there was also complacency about risk – a sort of perverse effect of the great moderation. So credit-risk spreads across the board were much lower than they would have been otherwise. I think these factors were more important than short-term interest rates. Indeed, if you look carefully at the data, there is not a tight connection between short-term interest rates and bubbles. For example, the UK had a housing bubble roughly the same size as the US. But they did not have unusually low interest rates in the early 2000s. So if you look at the data very, very carefully, the evidence for that position is not so clear.

And of course during the 1970s, real interest rates were negative.

True, the real interest rates were negative back then. Also, the stock market bubble in the late 1990s was not precipitated by unusually low interest rates. The reality is that there is no simple way to contain a bubble with conventional monetary policy. The second reality is that the effects of bubbles really
depend upon the leverage and the sector the bubble collapse hits. So going forward, I think the best strategy is to regulate ahead of the game to prevent the kind of risk exposure that happened in the past crisis.

ÖK
You have touched on this previously, but I would like to ask you if you think that the inflation targeting framework in this crisis has worked well?

MG
Well again, it is important to keep in mind that an inflation target has symmetric implications for movement of inflation above and below target. The goal in each case is to require that policy adjust to return inflation back to target. The announcement of such a target further helps anchor inflation expectations. In the current crisis, this was definitely a factor in keeping deflation from taking hold.

ÖK
You mentioned the symmetry in our inflation targets that implies we do not like high inflation and we do not like deflation either. However, it has been a long time since, apart from Japan, a developed economy, including New Zealand, experienced deflation. People and central bankers have seen high inflation in the recent past, and they have had to deal with it. But they have not had to deal with deflation. Given that central banks have symmetric inflation targets and given not many people remember it, do you think central banks should communicate the problems associated with deflation more with the public? I think economists have communicated the costs of inflation very well but perhaps not the costs of deflation. Perhaps as a consequence, the US economy experienced two scares of deflation inside a decade.

MG
I think we have a good idea of how to address the problem of stagflation that ravaged the economies of the 1970s and early 1980s. Now the problem of financial crises and deflation has moved centre-stage and is likely to be with us for some time to come. So, yes, communication on this issue is important.

ÖK
I want to read out the beginning sentence of one of Ben Bernanke’s American Economic Review articles from the 1980s: “Seismologists learn more from one large earthquake than from a dozen small tremors. On the same principle, the Great Depression of the 1930s would appear to present an important opportunity for the study of the effects of business cycles.” Do you think the profession could have learnt more from events like the Great Depression or the ‘lost decade’ of Japan?

MG
Well, actually I had the privilege of hearing him say that in person. And, in fact, I asked him that very question – why he studied the Great Depression – and that was his answer. And that really kind of made a light go on in my head. I never really thought about that. I think as we look back, the answer is obviously – yes. I think maybe we had become too complacent about our ability to keep the economy stable. Certainly there is much to be learned from studying these episodes. And as everyone knows by now, it was Bernanke’s knowledge of the relevant history that dictated his aggressive policy response.

ÖK
I want to talk to you about credit and its role in the business cycle. These things were studied in Gurley and Shaw (1960), for example. But I believe your paper with Ben Bernanke was the first one in the more modern era to address the role of credit and financial frictions and do you think this is another thing the profession missed?

MG
Well, I think these ideas kind of go back to the Great
Depression and Irving Fisher’s theory of the Great Depression, which involved the debt deflation. There were others who worked on these ideas informally, like Shaw and Minsky. Even some of the early macro models included some balance sheet variables. I think we were the first, within modern literature, to incorporate balance sheet variables as factors in cyclical fluctuations.

**OK**

What is the message of these models? And do they explain phenomena like the Great Depression, the Japanese case and the current crisis?

**MG**

Imbalances in the financial sector (high leverage, etc.) can make the economy highly vulnerable to disturbances that might have only a modest effect on the economy. In these ways, the models help account for phenomena like Great Depressions and Lost Decades that might otherwise be very difficult to explain with conventional frameworks.

**OK**

I want to come to the current crisis. You noted that the run-up to the current crisis had more to do with the global savings and investment “imbalances” than the low short-term interest rates. What was the one thing monetary policymakers got wrong, if anything, prior to the crisis?

**MG**

I think nobody, monetary policymakers included, appreciated the risks of the banking system. I think nobody understood or anticipated the way the dynamics could play out. Take, for example, securitised mortgages. Nobody really appreciated that these mortgages couldn’t be renegotiated in the event of default. Nobody appreciated these defaults would lead to foreclosures that would lead to further declines in house prices. And nobody appreciated how sensitive these securities were to falling house prices. So that is something that the profession missed, but I would say most everyone else missed it as well. There were a number of people who predicted the crisis, but I don’t think there was anybody who put their fingers on this mechanism. I’d say that not seeing this mechanism was the greatest lapse. In terms of policy mistakes, if I could pick one, it was allowing sub-prime lending.

**OK**

I want to come back to the current crisis which started with the burst of an asset price bubble. Your 1999 article with Ben Bernanke on whether or not central banks should respond to asset prices, at least in my opinion, was a very influential piece for central bankers. Are you still of the view that central banks should not lean against asset prices with interest rates?

**MG**

Well, I think I can still stand by what we said in that paper and I actually went back and looked at it, because I had a similar request from a reporter. We didn’t say that central bankers shouldn’t pay attention to asset price bubbles. We said that the interest rate was a poor tool for dealing with them. It is not the case that you can adjust interest rates and have no other effects on the economy. That’s even before you get to the issues of identifying asset price bubbles. But what we did say is that the effects of bubbles depend upon leverage and it may be that the best way to deal with a crisis is to prevent excessive leverage through regulation.

**OK**

When it comes to regulation, do you think central banks should also be regulators, or should have a say in the actions of regulators? What kind of regulation do you foresee from this point on?

**MG**

Since central banks are responsible for containing the effects of financial crises, they need to have a seat at the regulatory table. The key regulatory problem to deal with is too-big-to-fail. Having some kind of resolution authority that would
permit a federal regulator to take a large financial institution in distress and liquidate its assets in an orderly manner would certainly help. It may also be necessary to extend capital requirements to all financial institutions that pose a systemic threat. Finally, we cannot tolerate the same kind of relaxation of lending standards as took place with sub-prime lending.

ÖK

I want to talk to you about another issue that you have recently worked on with Comin and Santacreu – productivity. There are different schools of thoughts about long-run growth, often centring on the role of institutions and geography. What is your take on the issue? What are good policies for a more productive economy and higher long-run growth?

MG

Well, I don’t think that there is any simple answer other than to say a country’s institutions should be strong and the education system should be strong as well. I think where we came into the literature is related to the following: If you look after big recessions – I have in mind the crises in emerging market countries – it seems like there is a persistent period of lower productivity growth, and also, countries do not revert back to trend quickly. The loss of output seems persistent. And to us it seems it is hard to account for that unless there is some dimension of endogenous productivity in it. So our interest in the area was more about linking business cycles and productivity growth.

ÖK

There has been something of a debate in the profession, and as far as I remember, you haven’t entered into that debate, about how useful the models we have been using are and so on. In your 2007 Journal of Economic Perspectives article with Jordi Gali you say: ‘The models we have described are still works in progress. Despite the recent successes, we cannot be certain without further experience how resilient these frameworks will prove as new kinds of disturbances hit the economy. Indeed, we fully expect these models to continue to evolve as we accumulate more data, and experience more economic shocks.’ What do you think the verdict is on our models?

MG

Well, actually it is nice to know that I said something that I can still stand by. But let’s compare this to the 1970s, where the models were broken down and they had to be reinvented. I don’t think that that is the case this time. I think that there is a pretty good basis on which we could build. It is more or less the need to modify these models. So it is not like we had to practically start from scratch, which is what we had to do in the 1970s. And again I think there is a lot of confusion in the public at large: A failure to forecast a crisis is not the same thing as a failure to have the working knowledge of what was going on and how to deal with it. What I mean is that it is certainly true that the crisis caught central bankers and everybody else off guard. But I can say certainly that Chairman Bernanke, based on his own life’s work, saw what was happening as the crisis started to take hold and then used this knowledge to design the policy response. And in all of this, he also made extensive use of what was going on in the profession. He was not operating completely out of thin air.

ÖK

And where do you see the literature going in that direction?

MG

What I have always liked about macroeconomics is that it responds to real-world events. Since the late 1980s, there had not been any kind of financial crisis in the US of significance. There were some that erupted but didn’t have significant effects on the economy, like LTCM and the Russian bond default. But the recent crisis has exposed all sorts of new phenomena, like the shadow banking system and problems with securitisation markets. So there are all sorts of new
stuff to work on. And there is lots of work that is currently being undertaken.

MG
I liked math and I liked studying real world problems. Economics is a nice mix of the two.

ÖK
Do you see this in graduate classes? As you had put it elsewhere, is the new macro “pre-and-post August 2007”

MG
You certainly see it in PhD theses. There is now a lot of work on financial crises. Let me also say that I did not make that distinction to demean old macro. I think old macro was quite successful for the objective it took on hand, which was maintaining price stability in the face of supply shocks and other inflation pressures of the type that hit during the 1970s.

ÖK
What is your view on the future of the profession?

MG
I am optimistic. Yes, there are some issues we need to rethink and some priorities we need to reset. But we have a good base of work we can build off to understand this crisis and help avoid a repeat. It’s not like the 70s where we had to start from scratch and build a completely new paradigm. As I suggested earlier, a failure to foresee the crisis is not the same as a failure to have the tools to comprehend it and make sure that it does not happen again. One other reason for my optimism: I was asked recently by a reporter who I thought were the top young economists. It was not hard to come up with the names of a number of young macroeconomists who fit the bill. And that may not have been the case a few years ago.

ÖK
How about non-economists?

MG
I think my father Coleman; I guess I would say that.

ÖK
Great, thank you and enjoy your stay in New Zealand and hope to see you again.

MG
Okay, absolutely.

ÖK
My final two questions are going to be slightly different than the others. How did you decide to study economics? What influenced your decision?
The global financial crisis
What I want to talk about is the regulatory response to the crisis that we have had. And, in particular, one of the set of buzz words nowadays is the need to move on from micro-prudential supervision, which is really the way in which the authorities look after the individual institutions, to be much more concerned with macro-prudential supervision; that is, trying to see how robust and resilient the system as a whole might be. These are very different.

If you cast your mind back to mid-2007, at that stage, the capital ratios and the profitability of banks of virtually all countries was at an all-time high. It was thought that the condition of individual banks was so strong that a relatively minor shock to a small section of the mortgage market, admittedly in the biggest country in the world, shouldn’t be capable of having the effects that it turned out to have. One of the reasons that it turned out to have such a large effect was that the system as a whole was subject to severe pressures. These pressures were interactive, as a result of the fact that everybody was over-extended in leverage, with the effect that when things started to go wrong, individual banks had to lighten their positions and sell assets, lowering prices and worsening the position of everybody else. Effectively, you got a self-amplifying spiral.

One of the things that we have learnt in the course of this crisis is that the achievement of price stability doesn’t guarantee financial stability. Until the crisis struck – and I want to give it a specific date, 9 August 2007 – the central banks had been remarkably successful over the previous 15 or so years in maintaining price stability, in maintaining inflation at low and stable rates, without having much volatility in output. Indeed, in my own country, output growth had been positive in every quarter since the end of 1992 until early 2008.

Not only is it now clear that the maintenance of price stability does not carry through to financial stability, you can even argue that they run counter to each other. The reason why they run counter to each other was effectively explained by an under-appreciated American economist called Hyman Minsky, who in many ways produced some of the most insightful writing on financial cycles in recent years. He argued that stability generates instability. Effectively, what he meant was that if you have a very stable period, and particularly if you think that the authorities can maintain that stability indefinitely, it then becomes your view that risk is reduced. We have had a generalised view throughout almost the whole of the developed world that risk had been contained. In part, there was this expectation that central bankers had become so good that they were able to counter any significant crack or collapse in financial markets. What was known as the Greenspan put – which effectively meant that if the markets collapsed, the authorities could and would...
lower interest rates sufficiently quickly and sufficiently far to restore the situation and bring about recovery in the markets – had become credible because, after all, it had effectively worked. It had worked on Black Monday, on 19 October 1987. It worked again in the South East Asian crisis of 1997 and 1998. It worked in the LTCM crisis and it worked again at the time of the NASDAQ bubble and bust in 2000 to 2001. In each case, Greenspan and the Federal Reserve held interest rates sufficiently low in order to bring about recovery pretty quickly, and the developed world never really suffered a severe crisis during these times. So there was a belief that Alan Greenspan in particular, and central bankers as a generality, were almost walking on water. They had the ability now to make the system safe.

If the system is safe, particularly when interest rates are low, and particularly when you are promised that interest rates will remain low for any extended period of time, it is more or less an incentive, a signal, to commercial bankers and financiers around the world to go out and put on leverage. Anyone who didn’t put on massive leverage was regarded as a wimp! As Hyman Minsky effectively said, “as people believe the risk is being removed from the system, they expand their position, taking on more and more leverage, to a point where a relatively small shock can knock over the whole house of cards”. And that effectively was what happened.

Inflation, deflation and the role of the monetary policy regime

Now, one of the implications and results of that has been that a number of people have argued that the inflation-targeting regime (which the Reserve Bank of New Zealand initiated back in 1988-89) was flawed because it concentrated too much on price stability (at least goods and services price stability) and didn’t take enough account of asset price stability. I don’t think that is correct because the attempt to achieve both of these targets with a single instrument, which is of course the official interest rate, causes a variety of problems.

Let me tell you about one particular problem at the moment. Just now, there is a great deal of uncertainty about where the world is going. Half the people I talk to are frightened that there may be massive great inflation. Huge increases in liquidity are being injected into the financial system by the world’s central banks over the last nine months to 12 months. The reserve base of the commercial banking system is being expanded explosively. Asset prices have been recovering. It seems clear that, for political reasons, the Americans are going to go on expanding pretty rapidly for quite a time. And that is potentially inflationary.

At the same time, we are having huge increases in spare capacity, massive unemployment, and although asset prices have increased, the monetary aggregates are still very sluggish. Bank lending is going down in most countries, so there is a whole other group of people who are terrified about deflation. In fact, some of the people I talked to are terrified about both happening – usually deflation followed by inflation! Under these circumstances, where people are very frightened about the possibility of our economic system and our price developments getting out of hand, what you need to be able to do is to reassure people that the authorities are not going to allow either inflation or deflation to take over strongly. In my view, that means that, more than ever, it is necessary to hold on to the straight inflation target and to dedicate effectively the official instrument rate to that particular objective.

There is also the point which has been made by Alan Greenspan and others, which I think is correct, that if you do get an asset price bubble and there is a lot of optimism about developments in the particular sector where the asset price bubble takes hold (whether it be housing, commodity prices or anything else), an interest rate increase that is sufficient to deal with the asset price bubble would probably knock the economy on its head. It is extraordinarily difficult for a central banker – consciously – to raise interest rates sufficiently to actually drive the economy into recession, purely in order to deal with an asset price development which you are never absolutely sure is unsustainable, and you cannot be sure is a bubble. Indeed, there is no decent definition of the word ‘bubble’, or the only definition of the word ‘bubble’ that
actually holds water requires conditions which have never ever effectively been seen in modern markets.

So, if you want to leave the inflation target more or less untouched, as I do, then what you need to do, recognising that the authorities in general, and central banks in particular, also have responsibility for financial stability, is to collect or provide a set of further instruments to achieve this second target. It is this second set of instruments that should provide the basis for what is known as macro-prudential regulation.

Differences in approach to regulatory instruments

Now, the discussions on such a set of second instruments have actually rather differed between Europe and the United States, although I am exaggerating this differentiation between the European approach and the American approach somewhat, for reasons of trying to make a point. Essentially, what has happened is that the Europeans have focused on trying to develop counter-cyclical regulations which should be adjusted by the relevant authorities. In other words, what they are looking for is greater powers to be given to the regulatory authorities, and in particular the central banks, to try and control the banking developments in a way that will prevent these crises from recurring, or at least recurring in the same way. The Americans have tended very much more towards a market-based insurance mechanism, and here I think there is a difference in underlying philosophy. The Americans see the situation as changing, in the sense that, following Lehmans, there is a view that no set of authorities in any major country, for the foreseeable future, is actually ever going to allow any of its systemic major institutions to close. Whatever happens to the shareholders and managers, the big systemic institutions will from now on be supported. In other words, what we can say is that the authorities are moving from the banking principle to the insurance principle, in which, effectively, the authorities are now insuring both the solvency and the liquidity of all the major systemic institutions. This means that instead of worrying too much about regulation (since in any case the Americans have a tendency to believe that government officials, including central bankers, are always relatively incompetent at setting prices and that the banks will always run rings around them), the Americans are looking to try and use market mechanisms to encourage systemic financial institutions, and banks in particular, to self-insure, and where self-insurance is not possible, to try and price the insurance mechanism in such a way that it accords reasonably closely with market mechanisms. In contrast, the Europeans have much less faith in market mechanisms, and do not share the general American view that regulation is always a losing game. The American view is that regulation is static, by which I mean it takes a long time to introduce regulation and, when it is there, it remains in place for a long time, whereas markets are dynamic. This means that when the regulation comes out, the clever people working at the banks will already have worked out ways to get round it. The loopholes become bigger and bigger and, even at the outset, may be large enough to render the regulation ineffective.

What are the instruments?

Amongst the European-style counter-cyclical mechanisms that have been suggested are, first of all, that the very process of trying to introduce systemic regulation and supervision, via the European Systemic Risk Board (ESRB), will help by itself. Now, the European Systemic Risk Board actually has no powers, because the power to implement regulations remains with the nation state. However, the
European Systemic Risk Board, which would be largely dominated and run and managed by the European Central Bank, will examine all potential systemic risks. When they see a systemic risk developing, they have the right to go to the relevant national authorities and ask the national authorities to do something about it and require the national authorities to report back within a space of time what they have done. The very exercise of being told to do something by the ESRB and having to report back will help by itself.

In addition, the kind of mechanisms that are available are capital requirements, which would be raised particularly on the riskier proprietary desk, market-related and shadow-banking aspects of the system. The capital requirements may be time-varying, in the sense that you raise capital requirements during booms and lower them during busts. This may or may not include the Spanish-type dynamic pre-provision, which in effect meant that when lending was going ahead very rapidly during a credit boom, the banks were required to provision on a generalised expectation that there would be a lot of bad debt developing. Think what is going to happen in China in terms of the increase in their non-performing loans in a year or two. When you get bank lending growing at 30 percent per annum, the number of bad loans that you could expect is quite large. But under pre-provisioning, then when bank lending hits bad times, you can release the provisions because they then become useful.

One of the problems here is that the Spanish dynamic pre-provision exercise runs entirely counter to all the instincts of an accountant. An accountant doesn't like measuring anything that he cannot touch or see. The accountants are rather like doubting Thomas, saying, “show me your wounds”! And the idea that you can estimate the future likelihood of being wounded by non-performing lenders, simply as a function of the fact that credit is growing far too fast, is something that is completely averse to every instinct of an accountant. But maybe policy-makers and economists can overcome the accountants’ concerns.

There are also time- and state-varying liquidity requirements, which may well include not only liquidity requirements in terms of requiring differing asset ratios, but also time- and state-varying requirements on the ratio of core funding to loans. And then, in addition, there are margining requirements in other markets, particularly in the housing market, with the possibility of introducing time- and state-varying housing requirements. So as housing prices rise, relative to the norm of the level and speed of increase of housing and property prices, you would lower the loan-to-value ratio.

And there are a number of more fundamental suggestions, which are unlikely to occur. For example, a lot of problems arose because of the advantages and subsidies on debt finance, that is, fixed interest finance rather than equity finance. Accordingly, there have been various proposals to try and remove or reduce the tax allowance on interest rates. That is not likely to get anywhere because, to be effective, these regulations would need to be introduced internationally. An additional idea is to restrict limited liability in some ways. In particular, there was rather a nice idea that was floated in the pages of the Financial Times, that bankers and maybe other financiers should find that their accumulated bonuses during the period in which they had been with a particular bank, and for so many years after they left that bank, would be subject to unlimited liability, net of course of the tax that they had already paid. So, let's say that a particular bank chief had developed, shall we say, $10 million worth of bonuses (a relatively small amount these days), and the bank then ran into difficulties. The $10 million, net of any tax that he or she already paid, would be subject to complete and full clawback. There are a number of ideas along those lines.

Now, what are the problems with these kinds of measures? First of all, how do you measure and apply them? How do you make them counter-cyclical? What is systemic? What is a systemic institution? Again, the American government’s proposals, and Barney Frank's proposals in the House Bill, are actually quite in line with most of the European proposals. They talk confidently about a set of systemic financial intermediaries. But what is systemic? Is it fixed? According to the conjuncture, barely. When people are frightened, a lot of very small institutions can be systemic. When there is a lot of confidence and markets are going up, you can absorb
the loss of quite a large financial intermediary without necessarily having any contagion at all. So what is systemic is not a fixed feature; it varies.

And then the whole of this area is made vastly more difficult by the fact that any institution which is systemic is almost always, almost by definition, at the same time cross-border. Of the 19 banks that were subject to this credit crisis in the US – I haven’t actually checked them out – I reckon that all bar one or two at most will have a significant part of their operations in other countries as well as in the United States. It is certainly true of every European country I know that all the systemic institutions, not only banks but insurance companies, the lot, have had major cross-border subsidiaries and also branches. Now, this raises huge difficulties because it means that, first of all, you have got to have international agreements on all your regulatory measures, and beyond that, the legal basis of dealing with the bank getting into difficulty differs from country to country. The bankruptcy laws, the whole mechanisms of insolvency, are enormously different from one country to another, and that means that dealing with the resolution of a failing bank and all your systemic institutions will entail dealing with the cross-border problems. And we have got no good way of doing that at the moment. It is a huge gap.

Counter-cyclical regulation

The whole basis of this counter-cyclical approach runs contrary to market forces. And inevitably so – that is the purpose of regulation. What you are doing as a regulator, when the market gets overly optimistic and when asset prices are going up, when bank profitability seems to be jumping ahead, when everyone is feeling terribly confident, over-confident – what you are doing is (in McC Chesney Martin’s phrase) trying to take away the punch bowl just when the party gets going! For those of you with teenage children, the idea of taking away the punch bowl when your teenage children’s parties get going implies you are not the most popular person in the world.

You are not popular with the politicians. You will remember sub-prime. Sub-prime, although it is now almost demonised, and I think almost unduly demonised, was, during its glory years of 2004–2006, the apple of the eye of the American politicians. Part of the reason everything went screwy was because the American politicians actually pressurised the main GSEs (Government Sponsored Enterprises) Fanny Mae and Freddie Mac to extend their ability to introduce guarantees to cover this wider range of sub-prime at work. So the politicians are against you. Inevitably, during the upturn of the boom, the financial intermediaries who are making a mint will be against you, and so of course will the borrowers and the people who are borrowing on sub-prime and think they are getting their foot up on the housing ladder. Had Alan Greenspan wanted to do it, trying to intervene against the run of the market to tone down the sub-prime exercise would have been quite extraordinarily difficult.

One of the great battles between regulators and academics is that regulators, particularly central bankers, tend to argue that conditions are always changing. Then, if you introduce a rule whereby you are required to make countercyclical variations in regulation, then the rule will never fit the particular events that happened to be developing. The central bankers say, “Trust me! Let me have discretion. I will deal with it.”. Well, there are actually few central bankers out there, Paul Volcker and of course Alan [Bollard], who would take a sufficiently strong stand under these circumstances, and are brave enough to take on the wrath of the politicians, the media, the major banks and the borrowers and would really be prepared to stand up against the market and say: “To hell with it, I can’t prove it, I think that this is wrong and I am going to try and stop it.” But the number of central bankers who actually are prepared to do that in reality is small. Stopping what the market wants to do under these circumstances is extraordinarily difficult.

And so, what the academics want to do is introduce rules that actually require central banks to have to take steps, when bank lending, possibly in aggregate or maybe just to individual sectors, starts growing too fast, particularly when prices in these sectors start rising too fast. Now again, we understand that there can be occasions when the rules will self-evidently seem a bit silly and so most of us academics would actually suggest that what you want to have is a rule, but you either comply with it or explain why you do not
comply with it. And complying or explaining on the basis of the rule is, I think, an exceedingly good approach.

Another of the arguments against counter-cyclical regulations is a question which largely comes from the commercial private sector, which is that you say that you will raise the regulation during booms, but can you reduce them in busts? Well you can, but it looks a bit odd. Just when banks are getting fragile, you say, well we are going to put down the capital requirements; we are going to put down the liquidity requirement. And then the argument comes that, well, you may do that as a regulator, but the market isn’t going to accept it.

When you get a crisis, the market actually then goes into reverse and favours institutions which have higher capital and liquidity requirements. So the constraint doesn’t become the regulator, it becomes the market. Under those circumstances, the bankers argue that what appears to be a countercyclical regulation, would just be higher regulation, more regulation throughout. And if it is more regulation throughout, and that is where we are getting to, will it restrict the size of the controlled banking system too much? There is always a border problem. You control and regulate one set, banks and systemic financial intermediaries, and you neglect the rest, the market for smaller, non-bank financial intermediaries, leading to a much easier system for them.

Inevitably under those circumstances, business will shift from the regulated across the border into the unregulated. You haven’t, under those circumstances, necessarily reduced risk; you simply shifted it from one sector to another. And, what is more you may have handicapped your most efficient, most effective part of the financial system, and indeed the only part of the financial system, at the moment, which is capable of dealing with the financial requirements of persons, particularly through mortgages and small and medium enterprises. The large corporates, of course, can go to the market, so they’re not as affected by this.

And then, there is finally the argument which I mentioned before, about whether the regulators can effectively do this or whether the financial intermediaries will all run rings around the regulators. And, in particular, a final point is that the international regulations done by the Basel Committee on Banking Supervision have always had one major failing, and that is the Basel Committee has never been set up by treaty – there is no legal basis whatsoever. Under those circumstances, the Basel Committee feel that they cannot talk about sanctions and penalties because that is a matter for the individual nation state and its legal system. They don’t have, in their view, the locus to concern themselves with penalties and sanctions. Now, the problem with that is when the Basel Committee says what we want is 4 percent tier one or 8 percent tier two here and a particular liquidity ratio, this then becomes in fact a minimum and, if it is a minimum, it provides no flexibility or buffering at all. If you are required to hold at all times 8 percent of either liquidity or capital or whatever, then that liquidity in effect becomes totally and utterly sterilised. It becomes useless. The buffer that all the banks have was not the 8 percent tier two capital requirement, it was the margin above that, and that margin was actually very small indeed.

What is needed is a totally different approach whereby the international regulators actually get over their self-imposed denial of actually talking about sanctions and penalties and have a consciously determined ladder of sanctions and penalties, along the route that the FDIC Improvement Act of 1991 actually introduced. So that I would then start with a much higher, well-capitalised, or strong liquidity bank, and as the bank actually lowers liquidity, if you allow it to do, it then runs into increasing penalties, such as you cannot provide dividends or you are not allowed to have remunerational bonuses greater than a certain percent. And you can think of this as a kind of sanction, which in fact the Americans under the FDIC Improvement Act have already implemented.

The insurance approach
Now let me turn quite rapidly to the American-style insurance approaches. Here, one of the approaches is by Acharya and Richardson (2009), in a book called *Restoring Financial Stability*, who say there should be prefunded levies on riskier portfolios. In some sense, the points Obama raised, I think it was last week, goes along that route. It didn’t hit all the bases, in part because it was ex-post rather than ex-ante,
in part because of the riskiness of wholesale funding, which it was meant to attack, is related not just to the fact that it doesn’t come from core retail deposits, but it is related to the maturity of that wholesale funding.

Wholesale funding, which is, say, for two years’ duration, is relatively safe. A bank which doesn’t have to repay borrowing from the wholesale markets for two years is in a fairly strong liquidity position. But the problems that we faced was that the major banks, and particularly the investment houses, were borrowing from the wholesale markets effectively overnight, and rolling over the wholesale funding at an extraordinary rate, which meant that if there was ever a loss of confidence, it then became self-reinforcing and the banks were forced very quickly to close. So that one of the areas here should have been that the penalties should not have been just on wholesale funding, but on wholesale funding interacted with the maturity of that funding.

Then again, there is the proposal (being suggested by some economists, Mark Flannery and others) for contingent capital, which is now known as CoCos or conditional convertibles. This kind of insurance mechanism is one whereby the banks are either encouraged or required to issue debt. A function of which is that, under crisis conditions, debt automatically transforms into equity. We will talk about the conditions under which it transforms fairly soon.

Then again, there are a whole series of other suggestions. The FDIC Improvement Act, which I have already talked about, tried to do prompt corrective action on the basis of capital. Others suggest that what you should do is watch banks’ credit default swap (CDS) risk premiums, and when the risk of default is too high, you either close the bank or require it to raise more capital.

Some of these ideas are rather nutty. The reason is that CDS spreads tend to rise, just at the moment when the market is very weak. It then becomes extremely difficult for a bank under these pressures to raise new capital. Furthermore, the very sight of a bank being forced by an increase in CDS swap, to have to go to raise new equity in the market under very unfavourable conditions, would lead to an increase in the CDS rates of virtually every other bank in the system. And, if you could imagine every bank in a major economy being forced to go to a reluctant market simultaneously, it is actually a clear recipe for total disaster. And there are a whole other series of measures to try and prevent too-big-to-fail, including various proposals for limiting the size of the bank, and we have a very unclear example of that in the measures that were announced by Obama earlier this week.

And there are a whole series of other ideas. There is a splendid exercise by the economist Ricardo Caballero, which was presented at the Jackson Hole Conference this August, where I was also present. It was suggested that the banks should be required to take out what he called ‘tradable insurance contracts’. So that, depending on the asset that the Bank held, the bank should actually be required to purchase insurance contracts, which the central bank could intervene in the market, in order to change their price.

One of the problems of this was, clearly, the amount of insurance depended on the riskiness of the asset. The central bank was actually required under that scheme to suggest the relativity between the riskiness of different assets, which effectively made the central bank into the credit-rating agency for the economy as a whole. Now, no central bank would want to be in the situation of trying to assess the relative riskiness and credit rating of the different banks.

There are a number of problems with the American proposals. First of all, most of these insurance contracts depend on various triggers with regard to whether a crisis has occurred. Who pulls the trigger? And can you imagine the Governor, the President, or the Chairman of the Federal Reserve standing up before the television cameras and actually saying, “Now I declare there is a crisis”? You could imagine what would happen to the markets the day after. And this, more or less, occurred when President George Bush stood up before the cameras and said, “We are now facing a crisis”. So, given the likely market reaction, the trigger would probably never be pulled or pulled far too late.

Then most of these insurance products effectively require the asset you hold to become much less valuable under really bad conditions. In other words, these conditional convertible bonds, transform into equity just when the bank is doing disastrously, the precise point when it needs a lot
more equity. That effectively means that you lose a massive amount of money on your CoCos just at the very moment when all your other assets are going south at the same time.

It is a kind of catastrophe bond which hits you in the face just when the rest of your portfolio is getting into catastrophe at the same time. Now, anyone who has got any sense in terms of portfolio management will realise that this is the kind of asset that no fund manager in their right mind would ever want to hold, particularly not another financial intermediary. Because credit default swaps (CDS) were a form of insurance. That’s what CDS was.

And when the CDS were effectively held in excessive volumes by AIG, it meant that the crisis went from Lehmans to AIG and you have a problem. So any sensible regulator would ensure that the CoCos are not held by leveraged financial intermediaries. That means that, effectively, their buyer base is going to be fairly limited.

Under these circumstances, what is the price and the cost for the banks of issuing these kinds of instruments and actually trying to get this kind of insurance? Again, this insurance only kicks in when things are really going badly. Will this insurance prove time consistent, in the sense that when things have just been going very badly, everybody is aware that the insurance payout can be very expensive? So what you do, and what is happening now, is you put a huge charge in your banking system, just when it is weak. Just when it is already risk-averse.

So, under these circumstances, you are putting your banking system actually into a position where its practices will cause the recovery to be delayed and put back even further. But as time passes, and the financial crisis goes into distant memory and nothing is happening, people will say, “Well, why do we have to pay all these heavy levies?” and “We are safe, after all nothing has happened for 15 years”. So that in the run-up to 2007, the FDIC was actually reducing the levies that it was imposing on the American banking system, because they reckoned they didn’t need it. What you will find with this kind of insurance system is that the levies are much too heavy in the immediate aftermath of the crisis and much too light just when everyone is becoming too confident. So there are plenty of problems with these as well.

Conclusion
So what is going to happen? Well, we obviously don’t know. The European and the American proposals are not mutually exclusive and actually overlap. In fact, the first CoCos were introduced in the UK rather than the US. What the balance will be between them, nobody knows. A number of complaints about the procedure of trying to introduce better regulation have been that the authorities have lost their momentum. I don’t think that is true in the very slightest.

Indeed, the fact that the Americans have taken quite dramatic steps to increase (or introduce) new measures of regulation over the last few weeks, I think, indicates that this argument that you mustn’t waste a good crisis, and that we all should start introducing much tougher regulations much earlier, is without any foundation.

Indeed, I would argue rather the reverse, if anything: there is a tenancy to try and regulate too far. Indeed, one could argue that for the next five to ten years, the regulators and supervisors could all go home. The banks are now sufficiently risk-averse, aware of the problems, aware of how horrible the effects were and are likely to behave themselves for the next five years or so without any regulation at all. It is really after about 20 to 25 years, when memories dim and things become better again, that you need your regulation – just at the point of time where the private sector and everybody else would say it is unnecessary. Indeed, I think there is really quite a severe likelihood that the extent of regulation on our banking systems will be sufficiently tough to mean that the recovery from the current crisis and recession is going to be elongated and extended to a far greater extent than is desirable. But we will see.

And that brings me six minutes beyond the time that I was told that AC/DC was going to start, but I am glad to say that I haven’t heard any music impinging, so if there is some time for questions, should anyone would like to ask.
References
Lessons from previous US recessions and recoveries

Satish Ranchhod

The US economy is emerging from a period of significant weakness. This article examines how US economic activity evolved during previous post-WWII recessions and recoveries, and considers what this indicates for the current period.

Recoveries following previous US recessions have tended to be rapid and primarily a result of strength in the household sector. However, previous US recessions have not been associated with the significant financial disruptions that occurred during the global financial crisis. Recoveries in other economies following financial crises have tended to be protracted, especially when associated with synchronised global slowdowns.

Given current economic conditions, particularly the weakness in the household sector, the current US recovery is likely to be quite gradual. Consequently, recovery is likely to be more akin to the protracted recoveries seen in other economies following financial crises, rather than the rapid recoveries that have typically followed other post-WWII recessions in the US.

1 Introduction

The global financial crisis, which began in mid-2007 and continued through to mid-2009, had its origins in the US sub-prime mortgage market. Developments in this market resulted in significant and unexpected disruptions to both real activity and financial conditions in many economies. The US continues to play a central role in global financial markets and accounts for a significant proportion of global demand. As a result, it is likely that developments in the US will play a central role in determining how global activity evolves during the recovery period that has now begun. Consequently, it is useful to understand how the US economy has tended to behave during periods of recovery.

This paper compares the recent US downturn to earlier post-WWII recessions and examines how US activity evolved during previous periods of recovery. It then considers what this may indicate for the current period and whether the current recovery will differ from previous periods as a result of the significant financial stress that contributed to the downturn. It finds that:

- The current US recession has been particularly severe, with very large contractions in business and residential investment. It has also resulted in a significant deterioration in the health of the household sector.
- Previous US recessions have been rapid, irrespective of the depth or duration of the preceding recession.

This has primarily been a result of rapid and sustained growth in household spending. However, these periods have not been associated with the significant financial stress that contributed to the recent downturn in US activity.

- Given current economic conditions, particularly the weakness in the household sector, the current US recovery may be quite gradual. Such a recovery would be more akin to the protracted recoveries seen in other economies following financial crises, rather than the rapid recoveries that have followed other post-WWII recessions in the US.

The paper is structured as follows: Section 2 briefly summarizes the causes of the current recession. Section 3 describes how developments during the current recession compared to previous recessions. Section 4 describes how economic activity evolved during previous recoveries. Section five concludes by considering what previous periods may indicate for the current period.

2 Causes of the recession

The recent US recession was contributed to by a range of factors including a pronounced housing market downturn,
significant financial stress, high real oil prices and a synchronised slowdown in global activity. Additionally, during this period, household and business confidence fell to extremely low levels.

2.1 Housing market and financial conditions
Weakness in the housing market and tight financial conditions were important catalysts for the recent period of weakness in US activity. Much of the strength in housing market activity that preceded the recent recession was a result of unusually low interest rates and relaxed lending standards. These conditions contributed to increased lending to less credit-worthy borrowers. There was also a significant increase in household debt levels reflecting the increased use of credit to fund consumption spending and residential investment (figure 2.1).

Official interest rates increased steadily in the two years prior to the crisis. As significant proportions of less credit-worthy borrowers entered into distress, a number of financial institutions experienced a marked deterioration in their financial positions (Bordo 2008). This prompted a significant tightening in global lending conditions and a marked decline in asset markets.

2.2 Real oil prices
The IMF (2009) has shown that contractions in output during recessions associated with oil price shocks tend to be particularly large (larger than during recessions associated with financial crises – see figure 3.4) but are generally not long-lasting. In real terms, oil prices climbed steadily for much of the previous decade with prices reaching record levels in 2007. While oil prices have now fallen significantly, they remain elevated in real terms (figure 2.2).

2.3 Synchronised global slowdown
The deterioration in financial and real conditions during the global financial crisis was highly synchronised. Weakness in credit and asset markets were transmitted rapidly thought the global economy. The related falls in confidence and demand (particularly in the US and other Western economies) contributed to a marked deterioration in global trade, with particular weakness in Asian economies. The weakness in real activity and in financial conditions reinforced each other for some time.

2.4 Comparison to previous periods
In the post-WWII period, there have been nine other US recessions. While these have been contributed to by a range of factors, previous post-WWII recessions in the US have not been associated with the significant financial stress that was seen during the most recent recession. Additionally, the number of factors contributing to the most recent slowdown was greater than usual (table 2.1).
The only other US recession to be associated with significant financial stress and a synchronised global slowdown was the Great Depression of the 1930s. The appendix of this paper provides a brief comparison of conditions during that period to the recent downturn. However, the Great Depression has been excluded from this analysis due to data limitations.

3 How does the current recession compare to previous recessions?2

The findings from this section are summarised in table 3.1 and figure 3.1.

Compared to previous post-WWII recessions, the most recent US recession has been particularly deep and protracted. Significant weakness was evident in most GDP components, with particular weakness in business and residential investment. Additionally, the most recent recession has contributed to a significant deterioration in the financial health of households.

---

2 This work uses data up to the end of 2009.
Table 3.1
Contributors to previous recession and recoveries

<table>
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<tr>
<th>Period</th>
<th>Fall in GDP (peak to trough)</th>
<th>Duration of contraction (quarters)</th>
<th>PCE</th>
<th>Residential investment</th>
<th>Business investment</th>
<th>Exports</th>
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Notes: * NBER’s data procedure indicates that the most recent US recession began in December 2008. However, US GDP expanded in 2008 Q2. Hence, the peak-to-trough period for the current recession is 2008 Q2 to 2009 Q2 (four quarters).

Sources: Haver, RBNZ estimates.
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<th>Quarters to recover pre-recession level</th>
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Figure 3.1
Evolution of main economic variables during recessions and recoveries

GDP
July 53 to May 54
Index (Start of downturn = 100)
Aug 57 to Apr 58
Index (Start of downturn = 100)
Apr 60 to Feb 61
Index (Start of downturn = 100)
Dec 69 to Nov 70
Index (Start of downturn = 100)
Nov 73 to Mar 75
Index (Start of downturn = 100)

Private consumption spending
July 53 to May 54
Index (Start of downturn = 100)
Aug 57 to Apr 58
Index (Start of downturn = 100)
Apr 60 to Feb 61
Index (Start of downturn = 100)
Dec 69 to Nov 70
Index (Start of downturn = 100)
Nov 73 to Mar 75
Index (Start of downturn = 100)

Residential investment
July 53 to May 54
Index (Start of downturn = 100)
Aug 57 to Apr 58
Index (Start of downturn = 100)
Apr 60 to Feb 61
Index (Start of downturn = 100)
Dec 69 to Nov 70
Index (Start of downturn = 100)
Nov 73 to Mar 75
Index (Start of downturn = 100)

Business (non-residential) investment
July 53 to May 54
Index (Start of downturn = 100)
Aug 57 to Apr 58
Index (Start of downturn = 100)
Apr 60 to Feb 61
Index (Start of downturn = 100)
Dec 69 to Nov 70
Index (Start of downturn = 100)
Nov 73 to Mar 75
Index (Start of downturn = 100)
The following graphs show how major US activity measures evolved during previous recessions and recoveries. To allow for comparability, all series have been indexed to 100 at the start of each downturn and the troughs in GDP have been aligned.
Sources: Haver, RBNZ estimates.
3.1 Depth and duration

The recent US recession was particularly severe compared to previous periods. The 3.6 percent peak-to-trough fall in GDP was well in excess of the average decline seen during earlier recessions and the largest decline since WWII. The associated 5.2 percent decline in non-farm payrolls since December 2007 was also the largest since WWII, resulting in the unemployment rate rising to its highest level since 1983.

As well as being particularly deep, the recession was more protracted than usual, lasting for six quarters (compared to an average of three quarters). Such an extended period of weakness potentially exacerbated the severity of the downturn due to the very high degree of uncertainty and reduced opportunities to delay spending.

3.2 Behaviour of GDP components

During the recession there were falls in all expenditure GDP components except for government consumption and government investment. Compared to previous periods, the extent of the declines in each component was large, particularly in the case of business investment and residential investment.

- Business investment declined by 20 percent and was the major contributor to the contraction in GDP. Even accounting for the length of the recession, the degree of weakness in business investment has been unusual compared with previous periods. Hooper and Slok (2009) show that, relative to depreciation, business investment has not been this weak at any point over the past 50 years. Such weakness was likely contributed to by the impairment of credit conditions, as well as continued downside surprises in economic activity, which resulted in high levels of uncertainty and low levels of confidence.

- As with many US recessions, the recent downturn was associated with weakness in residential investment. Residential investment fell by a massive 56 percent since its peak in 2005. And, although most of this weakness preceded the start of the recession, it undoubtedly contributed to the more general deterioration in economic and financial conditions. Compared to previous recessions, the weakness in residential investment was unusual, as it was related to the bursting of a significant housing bubble.

- Both consumption spending and exports experienced falls that were very large by historical standards. The pronounced weakness in exports was a result of the highly synchronised nature of the downturn.

- The drag from inventories was only slightly larger than average.

3.3 Additional characteristics

As well as the large contraction in GDP, the recent US recession had a number of defining characteristics. Most notable was the significant deterioration in the health of the household sector (table 3.2). In addition to the aforementioned falls in employment, the decline in real wealth (down by around 17 percent) was more than three times that seen during the most severe of the other post-WWII recessions. This was a result of both declines in the value of real assets such as housing and declines in financial wealth.

The response of fiscal and monetary authorities to the crisis has also been historically unusual. The American Recovery and Reinvestment Act (2009) introduced nearly US$800 billion in fiscal stimulus for the economy in the form of tax cuts, direct government spending and government aid to states and individuals. This is equivalent to around 3 percent of US GDP in each of 2009 and 2010 (Romer 2009). Additionally, nominal official interest rates have been cut to record low levels (figure 3.2) and a number of measures have been put in place to ensure the functioning of financial markets.

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3 Output contracted during five of the six quarters that NBER lists the US economy as being in recession.
Table 3.2
Household characteristics

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<td>Decline in payrolls during recession</td>
<td>-3.1%</td>
<td>-4.0%</td>
<td>-2.3%</td>
<td>-1.2%</td>
<td>-1.8%</td>
<td>-1.1%</td>
<td>-3.1%</td>
<td>-1.1%</td>
<td>-1.2%</td>
<td>-5.2%</td>
<td>-2.0%</td>
</tr>
<tr>
<td>Change in real wealth during recession</td>
<td>2.2%</td>
<td>2.0%</td>
<td>2.5%</td>
<td>-1.4%</td>
<td>1.7%</td>
<td>3.9%</td>
<td>-3.3%</td>
<td>3.3%</td>
<td>-3.5%</td>
<td>-17.6%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Debt levels (% of household incomes, average during recession)</td>
<td>-</td>
<td>-</td>
<td>60%</td>
<td>64%</td>
<td>63%</td>
<td>70%</td>
<td>66%</td>
<td>85%</td>
<td>101%</td>
<td>132%</td>
<td>72.7%</td>
</tr>
<tr>
<td>Savings rates (% of household incomes, average during recession)</td>
<td>-</td>
<td>-</td>
<td>7.3%</td>
<td>9.4%</td>
<td>10.6%</td>
<td>9.4%</td>
<td>11.2%</td>
<td>6.6%</td>
<td>2.7%</td>
<td>3.2%</td>
<td>8.2%</td>
</tr>
</tbody>
</table>

Notes: For the most recent period, the decline in payrolls until the end for 2009 has been used.
Sources: Haver, Federal Reserve Bank of St Louis, RBNZ estimates.

Figure 3.2
Effective Federal Funds rate

Notes: Recessions shaded.
Source: Federal Reserve Bank of St Louis.

Figure 3.3
Real effective Federal Funds rate

Notes: Deflated using CPI excluding food and fuel prices. Recessions shaded.
Sources: Federal Reserve Bank of St Louis, RBNZ estimates.
3.4 Recession associated with banking crises

As noted earlier, previous post-WWII recessions in the US have not been associated with significant financial stress as seen during the most recent recession. Dell’Ariccia et al (2005) show that banking crises tend to have a significant negative impact on output. And in other economies, recessions associated with such financial stress have tended to be deeper and more protracted than during other periods. The IMF (2009) estimates that contractions associated with financial crises tend to last for around six quarters, with an output loss of around 3.5 percent (figure 3.4). Compared to other recessions, such periods have also tended to be associated with employment continuing to decline for substantially longer than GDP (Reinhart and Rogoff, 2008).

Recessions associated with significant financial stress and synchronised global downturns have tended to be particularly severe. The IMF (2009) highlights six occasions when economies in Europe experienced such conditions. These downturns were long-lasting and resulted in large falls in GDP (more than 4.5 percent).

Figure 3.4
Summary statistics on the depth and duration of recessions


4 Characterising previous periods of recovery

The findings from this section are summarised in table 3.1 and figure 3.1.

The US economy has now entered a period of recovery, with growth returning to positive rates in 2009 Q3. Following previous downturns, the time taken for US GDP to recover its pre-recession levels has been relatively short, with rapid growth in personal consumption spending the main contributor to the recovery in activity. However, previous post-WWII recessions in the US were not associated with the significant financial stress seen during the most recent recession. In other economies, the recovery from such periods of financial stress has tended to be more gradual than following other recessions.

4.1 Speed of recovery

In previous periods, deeper recessions have tended to be associated with stronger recoveries. Consequently, the time taken to recover the decline in output following previous recessions has been relatively short (between two to three quarters), irrespective of the depth or duration of the contraction in GDP.

4.2 Contributions to growth

In all of the previous periods, the main contributor to the recovery in US GDP has been strong growth in private consumption spending, which has tended to lead the more general recovery in activity. Inventories have also tended to make a large contribution to the recovery in output.

The contribution from other expenditure components to recoveries has been varied:

- Business investment tends to lag the more general recovery in output, typically contracting for one quarter more than GDP and taking longer to recover its pre-recession level.
- The performance of residential investment spending during recoveries has been mixed – lagging the more general recovery in activity in some periods, leading it in
4.3 How has growth evolved during recovery periods?

Growth in the second two quarters following a recession has tended to be stronger than in the first two (figure 4.1). Contributing to this pattern has been accelerating consumption spending growth, combined with the more gradual pick-up in business and residential investment. Such a pattern was observed following seven of the nine post-WWII recessions. The periods where this pattern did not occur were 1980 (when the economy recovered only briefly before slipping back into recession) and 2001, when GDP actually increased over the recession period.4

4.4 The behaviour of other economic variables during recoveries

The recovery in labour market conditions tends to lag the recovery in GDP. Employment often continues to decline for a short period after GDP ceases contracting and tends to recover its pre-recession level only after GDP has recovered. Additionally, structural changes in the US labour market have meant that jobs growth following the previous two US recessions was very modest, resulting in ‘jobless’ GDP recoveries (this can be seen from the 1991 and 2001 panels in the final row of figure 3.1). The reasons for this change include a shift towards ‘just in time employment’ (such as the use of temporary workers and increased use of overtime hours) as well as a shift toward permanent, rather than temporary layoffs (Kontek II and Terry 2009). Similar trends

While GDP increased during the 2001 recession, growth was negative in two of the five quarters during this period. The period was also associated with rising unemployment.

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4. Reserve Bank of New Zealand: Bulletin, Vol. 73, No. 1, March 2010
in employment and job losses have been seen during the early stages of the current period.

In terms of the impact of policy during recoveries, the IMF (2009) finds that monetary policy can assist the speed of recovery but tends to be less effective following periods of financial stress. This is because following such periods, both credit demand and supply can be impaired. The IMF also finds that expansionary fiscal policy tends to shorten the duration of recessions (even during periods of financial stress) but is more effective when public debt levels are low.

4.5 Recoveries and financial crises

In other economies, recoveries associated with significant financial stress have tended to be relatively gradual (figure 4.2). Such periods have been associated with weak growth in consumption spending and continued contractions in residential and business investment following the trough in GDP. Adding to the weakness in activity during these periods has been tightness in credit conditions and reduced demand for credit, limiting the effectiveness of monetary policy.\(^5\)

Figure 4.2

Summary statistics on the strength and speed of recoveries


The IMF (2009) notes that recoveries from periods of financial stress have often been related to strength in external demand that has offset weakness in domestic demand. However, at times when financial crises have been associated with synchronised slowdowns in activity, recoveries have tended to be weak.

5 Conclusion: What do previous periods indicate for the current recovery?

The US economy has now entered a period of recovery. While growth thus far has been relatively firm, this is in large part a result of fiscal stimulus and the turn in the inventory cycle, the impacts of which will fade over the coming quarters. Further ahead, the recovery for US activity remains subject to high levels of uncertainty.

Recoveries following previous US recessions have tended to be rapid and primarily a result of strength in the household sector. However, current economic conditions indicate that this recovery may differ from earlier post-WWII recoveries. The US household sector, which was the major contributor to previous recoveries, is entering the current recovery in a particularly weak state. Additionally, the US continues to face substantial financial headwinds, activity in many of the US’s trading partners remains soft, and elevated private and public debt positions are likely to pose significant challenges over the coming years.

These conditions suggest that the current recovery in US activity may be quite gradual. This would be more akin to the recoveries seen in other economies following periods of significant financial stress, rather than the rapid recoveries that have typically followed other post-WWII recessions in the US. However, a gradual recovery in activity does not necessarily mean that growth will be below trend. Instead, it means that growth is unlikely to rebound to the very elevated rates seen following previous recoveries (as shown in figure 4.1).

References


IMF (2009), based on recessions in New Zealand (1986 Q4 to 1987 Q4), Australia, Japan and several European economies.
IMF (2009) *From recession to recovery: how soon and how strong?*, IMF World Economic Outlook (Chapter 3), April 2009


**Appendix**

Comparing the 2008-09 recession to the Great Depression

As with the most recent US recession, the Great Depression was associated with significant financial stress, including bank failures and sharp declines in asset markets. It was also associated with a synchronised global slowdown.

The Great Depression saw much deeper and more protracted deterioration in US activity than any other US recession on record, including the most recent one.

- According to the NBER, the US economy was in recession for 15 quarters, between August 1929 and March 1933 (the most recent recession lasted for six quarters) and tightening in policy saw the economy slipping back into recession in 1937.

- During this period there was an extremely sharp deterioration in US activity. GDP declined by 27 percent, unemployment rose to nearly 25 percent and there was a cumulative loss in industrial production of 52 percent. In the current period, GDP has declined by a total of 3.9 percent and unemployment has risen to 9.8 percent – (figure A1).

- Compared to the most recent period, global economic conditions were also weaker at the start of the Great Depression, with Germany already in a recession and price declines in Germany, the UK and US (IMF 2009).

As during the current period, there were also significant responses by monetary and fiscal authorities, though the fiscal response was relatively small compared to the response during the current period. Fiscal stimulus during the Great Depression was equivalent to around 1 percent of US GDP.

**Figure A1**

US GDP and industrial production

Notes: Annual GDP data are used prior to 1948. Recessions shaded.
Sources: Federal Reserve Bank of St Louis, Haver.
The crisis and monetary policy: what we learned and where we are going

An address by Dr Alan Bollard to the Canterbury Employers’ Chamber of Commerce
Christchurch, 29 January 2010

Dr Alan Bollard, Governor, and Felix Delbruck, Economics Department

1 Introduction
Inflation targeting is a monetary policy framework that was developed in response to the high inflation and macroeconomic instability of the 1970s and 1980s. Twenty years ago, New Zealand was the first country to formally adopt key elements of this approach – such as an explicit inflation target and various accountability and monitoring structures – in the Reserve Bank Act 1989. The framework has been durable, even as we’ve continued to learn how the economy works and continued to adapt and refine the way we do monetary policy.

The past two decades have included one of the longest periods of growth that New Zealand has seen in decades, as well as droughts, migration shocks, terms of trade changes, an Asian crisis, a dot com boom and bust, and, most recently, the worst global economic and financial crisis seen in generations. This speech looks back over those two decades of inflation targeting to see what lessons we can draw from these experiences, as well as outlining some of the challenges ahead.

2 Assessing two decades of learning
The framework we put in place in 1989 and refined in the following two decades has now been adopted in its main features by over 20 countries. In looking back, I will focus on the New Zealand experience, but the main conclusions I draw are not unique to New Zealand. I will argue that inflation targeting has done well on the price stability front, and has given central banks a lot of flexibility in helping steer the economy through turbulent waters. However, in itself, it has not guaranteed balanced growth or macroeconomic stability. Other factors matter: neutral fiscal policies, monetary settings in the major global economies, and a stable financial system. It is in the interplay of the financial system and macroeconomic stability that most learning will need to be done in the coming years.

Price stability has been broadly achieved
In terms of what it was directly designed to achieve, namely price stability, inflation targeting has been a success. Consider the range of conditions under which inflation has been contained within a fairly narrow range. These include an early period of restructuring, a ‘benign’ period of rising global integration and rapid growth in information technology, where energy prices were low and the costs of a wide range of manufactured goods were falling rapidly; a challenging period of sharply rising commodity and asset prices in the past few years; and the extreme ructions of the global financial crisis. This can be seen from figure 1, which shows New Zealand CPI inflation since 1980, as well as a survey measure of 2-year-ahead inflation expectations. In particular, while inflation expectations crept up in the boom years, and fell back sharply in late 2008 as the financial crisis hit, they have remained well anchored across that time period.

Figure 1
New Zealand inflation and surveyed inflation expectations

Source: Statistics NZ, RBNZ.
Inflation targeting has supported, but not guaranteed, macroeconomic stability

In taming inflation expectations, the inflation targeting framework has removed a major source of economic volatility. It has also allowed for active macroeconomic stabilisation in a broader sense. Most notably, once the global financial crisis hit, we were able to respond with significant policy easing swiftly, cutting the OCR by more than 5 percentage points and providing banks with emergency liquidity at rates consistent with the OCR, at a time when the international wholesale funding markets were severely impaired. We were able to provide this degree of support because the inflation targeting framework allowed for a flexible response, and inflation expectations were well anchored.

However, the extent of the financial crisis makes it clear that inflation targeting monetary policy has not been sufficient to guarantee comprehensive macroeconomic stability. Recall the decade or so from the second half of the 1990s to the late 2000s that many commentators called the ‘Great Moderation’ or the ‘Goldilocks’ economy, when many economies experienced an extraordinarily long stretch of unbroken strong growth. Even then, we continued to see large movements in commodity prices, house prices, interest rates and exchange rates. There were also significant shifts in the composition of growth, from the traded to the non-traded sector, and big increases in household and external indebtedness.

Some of these changes were structural, such as the rise in the global demand for agricultural and other commodities from the late 1990s onward, or the surge in migration to New Zealand in the early 2000s. Some of the price movements were beneficial in helping the New Zealand economy adjust to those changing conditions. But we also saw growing economic imbalances, and the commodity and asset price rises in the years leading up to the financial crisis were among the hardest challenges faced by central banks over the past 20 years.

From 2004 to 2008, international oil prices quadrupled in US dollar terms. What was the best way to respond to this development? Should we continue to let the direct inflation consequences of the shock pass through (as we would do with a more temporary price shock), or should we try to offset them with higher policy rates? This was a very delicate balancing act, made more difficult by uncertainty around what level of oil prices was ultimately sustainable. In the event, we monitored a wide range of indicators, including ‘core’ inflation measures and inflation expectations. Despite significant rises in short-term CPI forecasts, these underlying inflation trends remained relatively stable, so that we were largely able to ‘look through’ the oil price spike and set policy appropriately for a changing growth outlook in 2008.

The rise in house prices posed an even greater challenge. When any asset price rises sharply in the context of subdued overall inflation, monetary policy needs to decide whether to raise interest rates now – even though inflation pressures are subdued – to prevent potential asset bubbles that might have deleterious consequences later. In New Zealand, while we do not ‘target’ house prices, we have been able to identify a clear link between the housing market and broader household spending, and have therefore always monitored the housing market as an important indicator for the inflation outlook. However, in an environment of low perceived risk, willing capital markets; and widespread expectations of capital gains, short-term interest rates turned out to have only limited leverage over housing activity. The difficulty was exacerbated by a tax system that favoured investment in housing, and by expansionary monetary and exchange rate policies in the major global economies which fuelled a global carry trade. Thus the New Zealand dollar appreciated while mortgage rates remained relatively low until quite late in the piece (figure 2).

Figure 2
OCR and effective mortgage rate

Source: RBNZ.
The grass is not always greener

For all the difficulties we faced, as we look back, we can see that alternative monetary policy frameworks would not have provided the flexibility that we had to navigate these waters, and may in fact have made it harder to maintain price stability while avoiding unnecessary volatility in the wider economy. This is particularly clear if we think about policy approaches that target the exchange rate in one way or another.

Consider an ANZAC dollar. The New Zealand dollar has fallen by over 10 percent against the AU dollar since 2006, a period in which Australia experienced an unprecedented minerals boom and very strong growth. If our currency had been pegged to the AU dollar, New Zealand’s exchange rate to the rest of the world would have been higher, interest rates would have risen three times already, and our recession would probably have been deeper. The argument is even stronger for other currencies, such as the US dollar. Australia and New Zealand are not the same, but we are far more similar to each other than to Europe or the US. If our currency had been pegged to the US dollar over the past decade, interest rates would have been lower for longer in 2003 and 2004, exacerbating the housing boom (figure 3).

Some of the challenges of a currency union can now be seen in Euro area economies such as Ireland, Greece and Spain, where monetary policy settings have been unable to lean against unsustainable domestic booms, or against the deep recessions that followed.

Singapore’s monetary policy regime is sometimes pointed to as an alternative to inflation targeting that has maintained stability in the currency while achieving a track record of low and stable inflation. Over the past two years, of course, this has not been the case, with inflation approaching 8 percent in 2008 and prices falling in 2009. Over a longer period, it does appear that Singapore has generally managed to guide its exchange rate to keep inflation stable. But a range of special factors made this possible – Singapore’s extraordinarily high trade ratio, its large stock of domestic savings and foreign exchange reserves, and a range of supplementary stabilisation instruments and capital controls. In particular, in New Zealand, with its much larger non-traded sector, a Singaporean regime might potentially have required greater swings in the exchange rate than we actually saw to achieve similar inflation outcomes.

Global policies, the tax system and financial stability also matter

A lesson from this period is that while monetary policy can always achieve price stability, whether this occurs in the context of balanced growth also depends on other factors. As the housing boom has shown, these factors include global policy settings and the structure of the tax system.

Looking back over two years of crisis, perhaps the key lesson is that financial stability cannot be ignored when thinking about macroeconomic stability and the conduct of monetary policy. We’ve been reminded that financial system developments have the potential to complicate monetary policy enormously, and that stable prices do not guarantee a sound and efficient financial system – well-functioning financial markets and soundly managed institutions, which
make decisions based on a long-term outlook for earnings. In some economies, such as the US, financial system dysfunction during the crisis rendered the standard monetary policy tool partially or wholly ineffective, as spreads blew out and policy rates hit the zero lower bound. We, too, have had to take into account movements in financial market spreads and credit rationing in our policy deliberations over the past year, to an extent we would not have envisaged a decade ago. And the crisis has shown what enormous macroeconomic damage can result if financial market participants do not adequately price and manage financial system risks.

3 Stabilising the economy in the future

Inflation targeting has proven to be a monetary policy framework that combines the discipline of focus that is needed to ensure a stable level of prices, with an operational flexibility that enables the economy to better cope with a wide range of shocks. But as we have seen, it has not eliminated economic imbalances or liberated central banks from difficult tradeoffs. Can we do better and can those tradeoffs be made easier in future?

We know that the difficulty of our job ahead will in part depend on policy choices made by the major global players as they exit from current stimulatory policy settings. As the world emerges from recession, central bankers around the world are weighing the need to provide ongoing support for a very fragile recovery against the need to be ready for more normal conditions. This will be yet another delicate balancing act, made more complex in economies like the US by the need to unwind ‘quantitative easing’, and other unconventional policy support measures. At the same time, choices will need to be made about when to withdraw fiscal stimulus. Unlike the synchronised policy easing that we saw in late 2008, the removal of stimulus will occur at different times in different parts of the world, reflecting different recovery paths. Australia has already embarked on the exit road; the US and Europe are still at the door.

How deftly this process of normalisation is handled will be crucial to whether the global economy recovers in a balanced way, and how stable recovery is likely to be in New Zealand. If US monetary policy settings remain too easy for too long, and if exchange rates in China and the big surplus economies remain low even in the face of a dramatically improved economic outlook, we will risk facing conditions similar to those during the years leading up to the crisis: abundant global liquidity searching for returns in the wrong places, feeding unsustainable asset booms and growing economic imbalances. Against this is the risk of a slower, more fragile recovery. It will be some years before we can judge how appropriate this normalisation has been.

The difficulty of our job will also depend on the wider domestic policy context. In particular, achieving both low inflation and balanced growth is considerably easier in an environment of fiscal discipline, and where the tax system is neutral with respect to households’ and firms’ investment decisions. In this respect, a failure to gradually remove the recent fiscal stimulus would put added pressure on monetary policy over the coming period. We are also hopeful that the recently released report of the Tax Working Group will lead to a more efficient and even-handed tax system. Tax policy is complex and needs to meet multiple objectives. Our concerns are to minimise tax-fuelled property investment and consumption that might detract from more balanced savings and growth.

Another important part of the domestic policy context is our financial policy framework. A lot of work is being done in this space internationally. Central banks, financial regulatory bodies, the Basel Committee on Banking Supervision and the Financial Stability Board are working out ways to strengthen and improve the prudential supervision of financial institutions. This includes raising the quantity and quality of minimum capital buffers held by banks, and improving the resilience of banks to liquidity shocks. It includes measures to make banks easier to restructure and unwind should they become insolvent. Financial regulators are also working on designing a ‘macro-prudential’ architecture for bank regulation. This essentially means taking into account the impact of individual banks on the riskiness of the financial system as a whole. For example, a large systemically important bank needs larger capital buffers than a smaller
player. Similarly, larger buffers may need to be built up in boom times, when banks are more vulnerable to a systemic downturn.

In New Zealand, the financial system is a lot simpler than in other parts of the OECD, and has not seen the same types of excesses. Nevertheless, we have taken steps to make our banks more resilient to financial system shocks. In implementing the Basel II capital framework, we have ensured that banks’ assessment of risk is based on a ‘through-the-cycle’ approach rather than just on the period of recent growth. We have also put in place a new prudential liquidity policy for banks, which is intended to make the system less vulnerable to a drying up of international funding markets, such as we saw in late 2008 and early 2009.

Can prudential instruments such as minimum capital and liquidity requirements also help monetary policy? This depends on the link between those instruments and bank funding and lending, and also between bank lending and the behaviour of housing and other asset prices. In the case of housing, the link between mortgage lending and market prices is fairly clear. What is less clear is the extent to which the instruments themselves may constrain bank lending and housing demand in an emerging boom.

At this stage, we believe that the new liquidity policy and, in particular, the Core Funding Ratio could usefully contribute to the monetary policy task by limiting the banks’ ability to fuel credit growth using cheap and plentiful short-term wholesale funding during boom periods, as was the case from 2003 to 2007. In this respect, the Core Funding Ratio could potentially act as an automatic stabiliser and reduce the required hikes in the OCR during economic upturns. The role for a macro-oriented minimum capital requirement in promoting macro-financial stability (as opposed to individual bank resilience), and also assisting monetary policy, is less clear. The relationship between capital requirements and loan pricing is highly uncertain, particularly as the large lenders in New Zealand (as elsewhere) target capital holdings well in excess of current regulatory minima.

At best, these instruments could supplement the role of the OCR, but will not fundamentally alter it. Ideally, they would change the mix of monetary conditions and take some pressure off the exchange rate. Overall monetary conditions would still need to be set appropriately to keep inflation stable.

We must also be realistic about the learning that still needs to be done in the macro-financial area. Central banks do not yet understand enough about the properties of prudential instruments to use them as an adjustable policy lever, and doing so could raise coordination issues between monetary policy and prudential policy decisions. More broadly, economists have a relatively good understanding of inflation and the real economy, but the unknowns are much greater when we try to model macro-financial variables. We still have much to learn about how price stability and financial stability outcomes move together, about the relationship of CPI and asset price inflation, and about the interplay of credit and economic activity.

As a small, flexible and full-service central bank, the Reserve Bank is in a good position to be at the forefront of progress in integrated macro-financial policy design. We have joint price and financial stability objectives and joint powers to achieve these objectives. Our prudential supervision, financial market and payments system functions provide us with useful skills and information to draw on. But we need to be cautious about what we claim to understand and what we can influence.

4 Conclusions

The inflation targeting framework has performed its primary task reasonably well over two decades, achieving price stability through both good and bad times. While it has been in place, inflation expectations have remained anchored, and it has proven flexible in responding to rapidly changing economic conditions. Major alternatives that dilute the focus on medium-term inflation and target other macroeconomic outcomes would risk reducing confidence in the future level of prices and would have led to worse overall outcomes at key points over the past 20 years.

Nevertheless, price stability alone is not sufficient to ensure a stable and balanced economy. For that to work best, we need to maintain a flexible approach to monetary policy. But we also need a conducive global financial environment, and
support from other domestic economic and financial policies that have a bearing on asset markets and financial leverage. We need to be realistic. The world is not ours to influence, and it is unlikely to offer us perfect conditions. But in New Zealand, we will be seeking less distortion from future tax policy, and an increased macro-orientation of prudential policy.
Recent trends and developments in currency – 2009
Kristin Langwasser

1 Introduction
The Reserve Bank has the sole right to issue New Zealand’s currency, that is, the bank notes and coins we use every day. Maintaining the supply, quality, and integrity of the currency is one of the Reserve Bank’s core functions. To do this, the Reserve Bank closely monitors trends in the demand for notes and coins. We undertake banknote processing both to maintain the quality and to check the authenticity of notes in circulation. This article describes the recent trends and developments in New Zealand’s currency.

In particular, the article reports on trends in the use of currency in connection with the Reserve Bank’s currency function and goals. Section 2 shows that currency in circulation has been steadily growing. Section 3 reports on the Reserve Bank’s note processing activity and bank note quality while section 4 takes an in-depth look at counterfeiting activity in New Zealand and the different ways of measuring counterfeiting. Coin issuance and the return of obsolete currency held by the New Zealand public are discussed in section 5, and summarising comments are made in section 6. The appendix at the end of the article describes New Zealand’s out-dated currency.

2 Our notes and coins in circulation
To understand the quality and quantity of currency in circulation it is important to know the goals the Reserve Bank sets for its currency function. The first goal is to meet the public’s currency demand in a timely manner such that private households, retailers, other businesses, and banks are always able to hold and use desired quantities of currency for transactions. As the sole issuing authority of legal tender, it is the Reserve Bank’s objective to supply currency when demanded.

Figure 1 shows that currency held by the general public is steadily growing. Within this trend, the chart shows clear spikes each year during the Christmas holidays. Currency held by households and retailers had risen to be around $3.2 billion by December 2007. However, towards the end of 2008, currency held by the public lifted to $3.5 billion. This was due to the global crisis damaging some New Zealanders’ confidence. Some of the cash that was demanded in the last quarter of 2008 was repatriated during 2009. However, the level of currency held by the public is still significantly higher in 2009 than in 2008. With real interest rates lower in 2009 than 2008, the opportunity cost of holding currency was lower and the public held more currency both for transaction purposes and as a store of value.

Table 1 shows that during 2009, total currency in circulation increased by almost 5 percent. During the last five years, total currency in circulation increased by an annual average of 4 percent. The value of currency held by banks had generally decreased over time, but actually increased significantly during the past year. While total currency in circulation rose by 24 percent during the last five years, currency held by banks and other financial institutions only grew by 6 percent. Currency held by the public increased by 31 percent between the end of 2004 and the end of 2009.

In terms of bank notes, at the end of 2009 there were 149 million notes worth $4.3 billion in circulation, whereas in 2008 there were 146 million notes worth $4.1 billion in circulation. This is a difference of 3 million bank notes or $200 million. The value of coins in circulation has also increased from December 2008 to December 2009. It grew from $276 million to $293 million.
Currency held by the public has doubled in the last ten years. It grew from an annual average of $1.7 billion in 1999 to an annual average of $3.4 billion in 2009. The growth can be attributed to both inflation and economic growth. With higher prices, people need more currency to purchase the same amount of goods. With economic growth comes higher income and increased consumption. People demand more goods and hence demand more currency to purchase these goods.

Correcting for these factors gives insight into the payment behaviour of the public. People hold cash for transaction and hoarding purposes. Are people demanding currency today in the same proportion to their purchasing power as they did ten years ago? In last year’s Bulletin article (Boaden and Langwasser 2009), we showed that currency in circulation corrected for inflation and real GDP growth was more or less constant between 2000 and 2008. In this article, I choose to look at per capita holdings of currency corrected for inflation and real per capita GDP growth. In 2001, on average, every New Zealander (including retailers) held $600. Had no inflation or economic growth occurred until now, people would roughly hold the same amount of currency. In fact, due to the increased demand for currency as value storage last year (in combination with low inflation and low economic growth), per capita currency held by the public was, on average, about $80 larger in 2009 than in 2008.

Figure 2 also shows that, per capita, currency holdings expressed in growth-adjusted real values were relatively constant until the last quarter of 2008. Bank holdings of growth-adjusted real currency per capita fell to half its level during the considered period. New Zealanders used constant amounts of currency in proportion to their purchasing power and their income until late 2008. People then decided to hold larger sums of currency, primarily as a store of value given decreases in real interest rates and increased uncertainty.

Composition of currency in circulation
Table 2 and figure 3 show the denominational composition of bank notes in New Zealand. Twenty dollar notes make up the largest share of notes in circulation with 48 percent. Interestingly, $50 notes are becoming increasingly popular. During 2009, the number of $50 notes in circulation rose by 23.7 percent and $50 notes currently account for 14.3 percent of all notes in circulation. At the end of December
2008, the share of $50 notes in circulation was only 11.8 percent. This development is due to a wider use of $50 notes rather than $20 notes in ATMs. At the end of 2008, the share of $20 notes in circulation was exactly 50 percent. Over the year 2009, its use shrank by 2.5 percentage points.

### Figure 3
Number of banknotes in circulation – December 2009 as percent of total

Source: RBNZ.

Figure 4 shows the issues of $50 and $100 notes for each quarter of the years 2005 to 2009. Each year, the last quarter shows greater issues as the public demands more currency for the Christmas holidays. In 2008, there were exceptional issues of $100 notes due to people hoarding more currency. In 2009, issues of $100 notes reverted to their previous levels. The $50 notes, however, were issued in larger amounts from the second quarter 2009 onward. Again, this is mainly due to $50 notes being dispensed from ATMs more widely throughout New Zealand.

### Figure 4
$50 and $100 notes issued (2005 to 2009)

Source: RBNZ.

### 3. Banknote processing and quality of bank notes

Another objective of the Reserve Bank’s currency function is to maintain a high-quality standard of bank notes in circulation. This is important for the practical reason of protecting against the threat of counterfeiting. If bank notes are generally of poor quality, counterfeits are less easily detected by the public. This could lead to an increase in counterfeiting activity. Apart from practical reasons, I believe the New Zealand public prefers good-quality notes. Therefore, bank note processing is not just assuring that low-quality bank notes are filtered out; but by maintaining high note quality, the risk of a counterfeiting attack is also reduced.

### Note processing

The Reserve Bank received 67.7 million bank notes in repatriations in 2009. Of these notes, 23 million were

### Table 2
Bank notes in circulation as at 31 December 2009

<table>
<thead>
<tr>
<th>Bank notes</th>
<th>Number (000)</th>
<th>Value $(000)</th>
<th>Annual growth in value over 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5</td>
<td>22,029</td>
<td>110,147</td>
<td>5.1%</td>
</tr>
<tr>
<td>$10</td>
<td>19,704</td>
<td>197,042</td>
<td>-2.3%</td>
</tr>
<tr>
<td>$20</td>
<td>71,092</td>
<td>1,421,845</td>
<td>-2.5%</td>
</tr>
<tr>
<td>$50</td>
<td>21,304</td>
<td>1,065,215</td>
<td>23.7%</td>
</tr>
<tr>
<td>$100</td>
<td>14,761</td>
<td>1,476,070</td>
<td>2.1%</td>
</tr>
<tr>
<td>Total</td>
<td>148,891</td>
<td>4,270,319</td>
<td>4.9%</td>
</tr>
</tbody>
</table>

Source: RBNZ.
Machine processing identifies low-quality bank notes and destroys them. The note-processing machine also verifies the bank notes’ authenticity. Hence, machine processing is an important instrument for the Reserve Bank to maintain high note quality as well as checking for counterfeits. Altogether, the Reserve Bank destroyed 13.7 million bank notes that were below the Reserve Bank's quality standard in 2009.

Bank notes are destroyed when they show signs of ink wear, staining, soiling, graffiti, or structural damage such as tears, holes, heat damage or missing corners. Notes made out of Polymer last a lot longer than paper notes. Table 3 shows that the Reserve Bank used to destroy over 60 percent of notes in circulation each year; while in 2009, the Reserve Bank destroyed only 11.4 percent of notes in circulation. Only 2.6 percent of $100 notes in circulation are destroyed, which makes them the least destroyed note. The $100 note is mainly used for storing value rather than for transactions and hence its quality does not deteriorate as quickly. The $10 notes are destroyed the most (23 percent of notes in circulation) as they are circulated frequently. That means they are passing through many hands and cash registers, which causes their quality to deteriorate. The $5 note is the lowest denomination note in New Zealand and is the second most-destroyed note. In 2009, 14.6 percent of $5 notes in circulation were destroyed. Typical of international experience, being the lowest-denomination note, the $5 note shows the lowest quality (see figure 5) and should represent the largest number of notes destroyed. However, as the lowest-denomination note, it circulates between members of the public and retailers, who do not return them to their banks but keep them as change. This means that they are not repatriated to the Reserve Bank as often as they should be. Thus, they are not destroyed accordingly. Some low-quality $5 notes keep circulating. Furthermore, some currency takes a long time to be returned to the Reserve Bank, and New Zealand's out-dated currency is described in the Appendix.

### Table 3

<table>
<thead>
<tr>
<th>(000)</th>
<th>$5</th>
<th>$10</th>
<th>$20</th>
<th>$50</th>
<th>$100</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polymer notes destroyed</td>
<td>2,395</td>
<td>3,494</td>
<td>6,656</td>
<td>800</td>
<td>358</td>
<td>13,702</td>
</tr>
<tr>
<td>Average Polymer notes in circulation</td>
<td>16,441</td>
<td>15,165</td>
<td>58,112</td>
<td>16,439</td>
<td>13,726</td>
<td>119,883</td>
</tr>
<tr>
<td>Notes destroyed as % in circulation</td>
<td>14.6%</td>
<td>23.0%</td>
<td>11.5%</td>
<td>4.9%</td>
<td>2.6%</td>
<td>11.4%</td>
</tr>
<tr>
<td>Paper notes destroyed (1998)</td>
<td>7,871</td>
<td>12,599</td>
<td>18,024</td>
<td>1,951</td>
<td>870</td>
<td>41,315</td>
</tr>
<tr>
<td>Average paper notes in circulation</td>
<td>11,592</td>
<td>12,300</td>
<td>32,092</td>
<td>7,275</td>
<td>4,575</td>
<td>67,834</td>
</tr>
<tr>
<td>Notes destroyed as % in circulation</td>
<td>67.9%</td>
<td>102.4%</td>
<td>56.2%</td>
<td>26.8%</td>
<td>19.0%</td>
<td>60.9%</td>
</tr>
</tbody>
</table>

Source: RBNZ.

Quality of bank notes

In 2008 and 2009, the Reserve Bank conducted quality surveys of circulating bank notes. In 2008, 400 $10 notes were collected from various places around New Zealand while in 2009, 400 $5 and an equal number of $20 notes were collected. All notes were scientifically examined with regard to security features (eg, windows, embossing and shadow image), structural damage (eg, holes, tears, and heat), tactility and ink wear. The quality of a bank note is largely determined by wearing of the ink. Paper notes are porous and therefore are stained very easily. Polymer notes, on the other hand, are not porous and are a lot more durable. However, the ink printed onto polymer notes
tends to wear off with use and circulation. Hence, the most relevant property and the best indication of the quality of bank notes in circulation is ink wear.

Figure 5 shows the quality of the examined notes by ink wear. There were no poor-quality notes found among the sample of 400 $20 notes. Only 5 percent of the $10 notes were found to be of poor quality and a large proportion of 24 percent was found to be of very good quality, indicating poor-quality $10 notes are being filtered out and replaced by new notes frequently. The $5 note shows that a large fraction of the circulating notes is of poor quality. As explained above, the $5 note is the so-called ‘change-note’ that is not very frequently repatriated to the Reserve Bank. Hence, the notes stay in circulation and their quality deteriorates further. This is a common phenomenon, experienced internationally with the lowest-denomination banknote.

In order to address this quality problem in the $5 notes, the Reserve Bank undertook a note-swapping project. Brand-new notes were introduced into circulation in exchange for circulating $5 notes. The physical act of exchanging the notes was completed by Armourguard (ADT) and Armaguard Cash Management (ACM), the two cash in transit (CIT) companies operating in New Zealand. Altogether, $13.8 million or 2.76 million $5 bank notes were swapped in the last quarter of 2009. This is equivalent to 12.2 percent of $5 notes in circulation. An equal number of banknotes were repatriated to the Reserve Bank for processing.

The repatriated $5 notes were generally not quality sorted by the CITs. At the time this article was written, the Reserve Bank had machine processed some of the 2.76 million $5 notes and destroyed 52 percent of the processed notes, which were found to be of inadequate quality. If the destruction rate is constant throughout the entire batch, 1.44 million notes will be destroyed. The amount of destroyed notes would equate to 8.7 percent of $5 notes in circulation and 35 percent of poor quality $5 notes in circulation. Under the assumption that the note quality survey reflects the real proportion of poor quality $5 notes in circulation, this share should have dropped from 25 percent to 16 percent. The Reserve Bank considers this as a success of the project. Another quality survey for the $5 notes will be held in due course to check the long-term effects of the note swap.

4 Counterfeiting

The third objective of the Reserve Bank’s currency function is to maintain the integrity of the currency. An accepted international way to measure the level of counterfeiting is to report on counterfeits found per million notes in circulation (series C below). Our target is to ensure counterfeiting is kept below ten notes per million notes in circulation. This is a low number of forgeries by international standards. Fortunately, counterfeiting has been below that number by a large margin for the last ten years.

Counterfeits are found by three different sources. Counterfeits are detected by the CITs during their note processing. The Reserve Bank also finds counterfeits during note processing. The third source is the Police, who either retrieve counterfeits in the scope of their responsibilities or are given them by members of the public.

Retrieving reliable data proves difficult sometimes, as counterfeits are not always passed on to the Reserve Bank or the Police’s headquarters. Hence, various ways of reporting are useful as a reference. Those other measures are counterfeits found by the Reserve Bank per million notes in circulation (series A) or per million notes processed (series B). These three series provide informative alternative views of counterfeiting activity in New Zealand. They are depicted in figure 6 below.

Figure 6 shows that, regardless of the measures examined, counterfeiting is very low in New Zealand. It is also worth noting that measures of counterfeits found by the Reserve Bank probably underestimate the true counterfeiting rate. Currency processed by the Reserve Bank is mostly pre-sorted
by the CITs and trading banks and counterfeits are often detected and taken out before they arrive at the Reserve Bank.

Series C (blue line in figure 6) is the most comprehensive measure as it contains all information available and it is the series used by the Reserve Bank to monitor the rate of counterfeiting in New Zealand. It is also used for international comparison. However, series A and B are faster to compile and serve as a reference and monitoring tool.

Although the counterfeiting rate is very low in New Zealand, the Reserve Bank recommends a visual inspection if a person is presented with a suspicious note. This is especially true when accepting higher-denomination notes. An indication of authenticity is the embossed window, which is easy to verify. If the note is genuine, the window should contain an embossed number of the denomination of the bank note.\(^1\)

5 Coins

The number and face value of coins in circulation at the end of December 2009 are shown in table 4. On the 31st of December 2009, there was $293 million of coins in circulation. This represents about 6.4 percent of currency in circulation on the same day.

Since the introduction of the new copper- and nickel-plated 10, 20 and 50 cent coins in July 2006, the demand for coins has been significantly above past levels. Before the introduction of the new coins, a large proportion of coin issues was made up of 5 cent pieces. In figure 7, this is shown by the red bars substantially exceeding the blue bars. In 2003 and 2004 for instance, there were almost as many 5 cent pieces issued as all other denomination coins.

The strong demand for coins experienced in 2006 was expected because banks, retailer, and the vending industry needed to replace their stocks of coins in shop tills etc. New coin issues in 2007 were still very high compared to the period from 2003 to 2005, especially considering that stock replacement by banks and shops was completed in 2006. Since 2007, issues have remained at an elevated level but show a decreasing trend.

In 2009, 56 million coins were issued. This is as high as the number of issues in 2003 and 2004, including the 5 cent coins. One reason for an extended period of higher issues is the tendency of households to hoard large amounts of coins in jars, cars or other locations.\(^2\)

Table 4

<table>
<thead>
<tr>
<th>Coins in circulation</th>
<th>Number of coins</th>
<th>Face value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(000)</td>
<td>($000)</td>
</tr>
<tr>
<td>10 cent</td>
<td>150,507</td>
<td>15,051</td>
</tr>
<tr>
<td>20 cent</td>
<td>136,553</td>
<td>27,311</td>
</tr>
<tr>
<td>50 cent</td>
<td>62,659</td>
<td>31,329</td>
</tr>
<tr>
<td>$1</td>
<td>77,944</td>
<td>77,944</td>
</tr>
<tr>
<td>$2</td>
<td>70,436</td>
<td>140,872</td>
</tr>
</tbody>
</table>

\(^{1}\) For more information on the security features of New Zealand banknotes, see www.rbnz.co.nz/currency

6 Conclusion

Banknotes and coins remain an important means for making transactions in New Zealand. From a per capita perspective, demand for real currency adjusted for economic growth does not appear to be declining. It even increased through the global recession. The Reserve Bank has satisfied all demand for currency, and note quality proves generally satisfactory.

New Zealand experiences very low levels of counterfeiting. The introduction of the new coins in 2006 still causes high volumes of coin issues.

The Reserve Bank ensures that the needs for New Zealand’s legal tender are met by supplying good-quality banknotes and coins and maintaining the currency's integrity.

References


Appendix

New Zealand’s out-dated currency

The Reserve Bank issues New Zealand banknotes and coins to satisfy the public’s demand for currency. The Reserve Bank regularly updates the design and security features of the notes and coins. The latest change was in 2006, when new coins were introduced for the denominations 10 cent, 20 cent and 50 cent. During that change, the 5 cent coins were withdrawn.

Banknotes were last updated in 1999 and 2000, when the Reserve Bank introduced the currently circulating polymer banknotes.

Outdated currency will always be accepted by the Reserve Bank – regardless of the date of issuance – providing that the currency was issued as legal tender in New Zealand. The Reserve Bank will always pay face value for outdated notes and coins.

Currency that has become obsolete has not been returned to the Reserve Bank in full after the demonetisation of the notes and coins as legal tender. Large amounts of outdated currency have never found their way back to the Reserve Bank. At the end of 2009, of the 149 million bank notes currently in circulation, 8.6 million bank notes were obsolete. Their total value was $112 million.

At the end of 1998 (the last year the Reserve Bank issued paper notes), there were almost 54 million paper bank notes in circulation. Of those, just fewer than 6 million or 11 percent of the notes had not been returned as of February 2010.

Chart 1 shows the distribution of the obsolete banknotes that are still held by the public. It is evident that the vast majority of unreturned notes of older series are $5 and $10 notes. There are proportionally more lower-denomination notes outstanding than there are now circulating. This shows how people take better care of higher-value notes, not losing or damaging them.

Further, there are $18 million $1 and $2 bank notes that were never returned to the Reserve Bank. The $1 and $2 banknotes were replaced by $1 and $2 coins in 1991, yet there are still 13.7 million $1 and $2 notes unreturned.

Boaden (2008) discussed the return of demonetised coins directly following the introduction of the new coins.
The coins issued in 2006 replaced the larger and heavier coins, of which many are still in circulation. The 5 cent piece was withdrawn altogether. The largest return of coins was in 2006. Thereafter, obsolete coins were repatriated to the Reserve Bank in much lower numbers. Until the end of 2009, a total of 358 million obsolete coins were returned. Of those, 340 million (94 percent) were returned in 2006 alone.

Chart 2 shows these developments as a share of the coins in circulation in March 2006. Chart 2 also shows that most of the higher-denomination coins were returned, while the proportion of lower-denomination coins returned was significantly less.

There are a variety of reasons for currency not being returned to the Reserve Bank. Currency might be stored and forgotten about. Sometimes these stocks emerge after the notes have become obsolete. Further, notes and coins are lost, taken overseas or destroyed. Charts 1 and 2 suggest that lower-denomination notes and coins are more affected by this behaviour.

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*The number of coins in circulation refers to the number of coins issued by the Reserve Bank since 1989 and the Treasury in earlier years.*
DISCUSSION PAPERS

DP2009/17
Global shocks, economic growth and financial crises – 120 years of New Zealand experience
Michael D. Bordo, David Hargreaves and Mizuho Kida, December 2009
We identify the timing of currency, banking crises and sudden stops in New Zealand from 1880 to 2008 using methodologies from the international literature and consider the extent to which the empirical models in that literature can explain New Zealand’s crisis history. We find that the cross country evidence on the determinants of crises fits New Zealand experience reasonably well. A number of the risk factors that correlate with crises internationally — such as domestic imbalances, external debt, and currency mismatches — were elevated for New Zealand when the country had more frequent crises and have improved in the recent (more stable) period. However, a time-series analysis of New Zealand growth over 120 years shows that global factors — such as the US growth rate and terms of trade — explain New Zealand growth fairly well, and that crisis dummy variables do not have significant additional explanatory power. This suggests that having sound institutions and policies may help avoid severe domestic crises, but will not be sufficient to avoid the domestic economic impact of the global business cycle.

DP2009/18
Forecasting New Zealand’s economic growth using yield curve information
Leo Krippner and Leif Anders Thorsrud, November 2009
We forecast economic growth in New Zealand using yield curve data within simple statistical models; i.e. typical OLS relationships that have been well-established for other countries, and related VAR specification. We find that the yield curve data has significant forecasting power in absolute terms and performs well relative to various benchmarks. Specifications including measures of the yield curve slope produce the best forecasts overall. Our results also highlight the benefits of fully exploiting the timeliness of yield curve information (i.e., it is always available and up to date).

DP2009/19
Whatever next? Export market choices of New Zealand firms
Richard Fabling, Arthur Grimes and Lynda Sanderson, December 2009
We examine product and market entry choices of New Zealand exporters, using an enterprise level dataset which links firm performance measures with detailed data on merchandise trade. We focus our enquiry not on the broad question of what determines a firm’s ability to export, but on the subsequent question: given that a firm has the ability to export, what determines the choices they make about what and where to export? We simultaneously consider firm and market level determinants of export market entry. At the firm level we find that measures of general and specific prior trade experience play an important role in determining the firm’s future export activities. That is, we find evidence of path dependence within firms. We also find evidence of path dependence across firms, with entry into new export relationships reflecting demonstration effects from the export activities of other firms in the local area. These results are robust to the inclusion of other determinants of exporting, including the macroeconomic performance of destination countries, exchange rate movements, and the past performance of the exporting firm.

DP2009/20
Measuring changes in firm-level volatility – an application to Japan
Emmanuel De Veirman and Andrew Levin, December 2009
This paper develops a new technique for estimating earnings and employment volatility at the firm level, and applies it to
Japanese firms. Unlike earlier studies for the US, we estimate instantaneous volatility for every year, rather than a rolling 10-year average of volatility. In addition, our technique allows us to estimate the firm-specific component of firm volatility separately, by controlling for variation in firms’ earnings and employment growth induced by aggregate and sectoral factors. We find that firm-specific sales volatility was substantially higher before the 1990 stock market crash than in the following fifteen years. The conditional variance of earnings and employment growth stayed relatively constant until the late 1990s, but increased substantially from 1999 onwards.

DP2010/01
Evaluating household expenditures and their relationship with house prices at the microeconomic level

Mark Smith, January 2010

Over much of the past 40 years, cycles of house price and consumption growth have been closely synchronised in New Zealand. Three main hypotheses for this co-movement have been proposed in the literature. Firstly, an increase in house prices increases homeowners’ wealth, which increases their desired level of expenditure. Secondly, rising house prices may also facilitate additional consumption by reducing credit constraints to homeowners. Finally, house prices and consumption have been influenced by common factors, including expectations of future income growth. This paper uses repeated cross-sectional analysis of household-level data over the 1984 to 2007 period to ascertain which of these hypotheses is more valid for the New Zealand case. A positive correlation between real house prices and real household expenditures is evident for most tenure and age groupings. However, findings from this paper suggest that the house price and consumption relation is predominantly driven by wealth effects.
NEWS RELEASES

Government appoints Reserve Bank directors
19 January 2010
Finance Minister Bill English has appointed two new directors to the board of the Reserve Bank.

The two Reserve Bank board appointments are Victoria University Professor of Economics, Neil Quigley, and Auckland-based consulting research economist Kerrin Vautier. Both take up their new roles early next month.

“The Government has looked for new directors with a mixture of macroeconomic and business experience,” Mr English says.

“Both appointees have a strong background in economics and are experienced directors across a range of companies and ventures. I’m confident they have the skills to help the bank meet its targets and promote and maintain a sound and efficient financial system.”

The Reserve Bank’s board reviews the performance of the governor and the bank, including whether monetary policy is meeting policy targets.

The new directors replace Alison Paterson who is leaving after completing three five-year terms and Sir John Goulter who has completed two.

Liquidity swap line to expire
28 January 2010
In coordination with other central banks, the Reserve Bank of New Zealand today confirmed its temporary liquidity swap line with the Federal Reserve will expire on 1 February, 2010.

This facility, established in October 2008 to counter pressures in global funding markets, has not been used by the Reserve Bank and is no longer needed given the improvements in financial market functioning.

OCR unchanged at 2.5 percent
28 January 2010
The Reserve Bank today left the Official Cash Rate (OCR) unchanged at 2.5 percent.

Reserve Bank Governor Alan Bollard said: “The outlook for the New Zealand economy remains consistent with the projections underlying the December Monetary Policy Statement.

“Global activity continues to recover, helping push New Zealand’s export commodity prices higher. Economic growth is most apparent in China, Australia, and emerging Asia. However, sustained growth throughout our trading partners is not assured, with many still facing impaired financial sectors and overall activity still reliant on policy support.

“Similarly, the New Zealand economy continues to recover. Policy stimulus and improving export earnings have seen a pickup in household spending. That said, households remain cautious, with credit growth subdued. Business spending remains weak.

“Annual CPI inflation is currently at the centre of the target band, and is expected to track comfortably within the band over the medium term.

“The economy is being assisted by both monetary and fiscal policy support. As growth becomes self sustaining, fiscal consolidation would help reduce the work that monetary policy might otherwise need to do.

“If the economy continues to recover in line with our December projections, we would expect to begin removing policy stimulus around the middle of 2010.”

Monetary policy worked well in crisis
29 January 2010
New Zealand’s inflation targeting monetary policy has proven flexible, durable and successful, but economic growth requires more than this, Reserve Bank Governor Alan Bollard said today.

New Zealand was the first country to formally target inflation. This was in response to the high inflation and macroeconomic instability of the 1970s and 1980s, Dr Bollard said in a speech delivered to the Canterbury Employers’ Chamber of Commerce in Christchurch.

“It has now been tested through a long period of growth, as well as droughts, migration shocks, terms of trade...
changes, an Asian crisis, a dot-com boom and bust, and, most recently, the worst global economic and financial crisis seen in generations.

“In terms of what it was directly designed to achieve, namely price stability, inflation targeting has been a relative success.”

Alternative monetary policy frameworks would not have provided the same flexibility to navigate through the crisis, and may in fact have made it harder to maintain price stability while avoiding unnecessary volatility in the wider economy.

“Our flexibility meant that, once the global financial crisis hit, we could respond swiftly, cutting the OCR by more than 5 percentage points and providing banks with emergency liquidity, when international wholesale funding markets were gridlocked.”

Dr Bollard said that inflation targeting works best in conditions where global economic conditions are stable, domestic fiscal and tax policies are neutral, and the financial system is stable.

“We know that our job will in part depend on policy choices made by the major global players as they exit from current stimulatory policy settings. Central bankers around the world are balancing the need to provide ongoing support for a very fragile recovery against the risk of keeping monetary and fiscal conditions too easy for too long.

“In New Zealand, successful removal of the recent fiscal stimulus would ease pressure on monetary policy. We are also hopeful that the recently released report of the Tax Working Group will lead to a more even-handed tax system when it comes to investment and consumption decisions.”

He said the key international lesson from the crisis was that financial instability can cause problems for the real economy. Authorities were now working out ways to strengthen and improve the prudential supervision of financial institutions.

“In New Zealand, the financial system is a lot simpler than in other parts of the OECD, and has not seen the same types of excesses. Nevertheless, we are taking steps to make our banks and finance companies more resilient to financial system shocks.

“In implementing the Basel II capital framework, we have ensured that banks’ assessment of risk is based on a ‘through-the-cycle’ approach rather than just on the most recent period of growth. We have also put in place a new prudential liquidity policy for banks to make the system less vulnerable to a drying up of international funding markets, such as we saw in late 2008 and early 2009.”

Dr Bollard said that, as a small, flexible and full-service central bank, the Reserve Bank is in a good position to be at the forefront of progress in integrated macro-financial policy design.

He concluded that, at best, new policy instruments could supplement the role of the OCR, but will not fundamentally alter it. “Ideally, such instruments might change the mix of monetary conditions and take some pressure off the exchange rate. Overall monetary conditions will still need to be set appropriately to keep inflation stable.”

**Reserve Bank issues consultation paper**

*2 February 2010*

The Reserve Bank today released a Consultation Paper (PDF 129KB) on policy options for liquidity requirements for the non-bank deposit taking (NBDT) sector. The policy options outlined are aimed at decreasing liquidity risk in the deposit-taking sector, which includes finance companies, building societies and credit unions.

Liquidity requirements (ability of an NBDT to meet its financial obligations) form part of the NBDT prudential regulatory regime that the Reserve Bank is progressively introducing to help improve the future resilience of New Zealand’s NBDT sector. The regime also includes capital adequacy requirements, related party restrictions, risk management requirements, and credit rating requirements.

Comments and responses to the questions raised in the Consultation Paper should be submitted to the Bank by 15 March 2010. The intention is to make policy recommendations to Cabinet in the second quarter of 2010.

The consultation paper and information on the NBDT prudential regulatory regime can be accessed on the Bank’s website (www.rbnz.govt.nz).
OCR unchanged at 2.5 percent

11 March 2010

The Reserve Bank today left the Official Cash Rate (OCR) unchanged at 2.5 percent.

Reserve Bank Governor Alan Bollard said: “The New Zealand economy is recovering broadly as expected and growth is predicted to pick-up further through 2010.

“Trading partner activity has recovered a little faster than expected. Currently, growth is strongest in China, Australia, and emerging Asia, but is much more muted in other trading partners. At the same time, risks around the global outlook have increased, although not to the extreme levels seen at the height of the crisis.

“We estimate the New Zealand economy grew at a stronger pace in the December and March quarters than in the prior two quarters. Looking forward, while growth is expected to increase to about 4 percent next year, this is subdued relative to previous recoveries.

“Policy stimulus and improved consumer confidence have seen a pick-up in household spending. That said, households are still cautious with house sales and credit growth remaining subdued. Business spending is weak despite much improved confidence.

“Annual CPI inflation is currently at 2 percent, and is expected to track within the target range over the medium term. In the short term, implementation of the amended Emissions Trading Scheme and increases in ACC charges will push CPI inflation toward the top of the target range.

“Higher bank funding costs have reduced the level of stimulus that would normally be associated with any given level of the OCR. We expect these costs to persist over the projection reducing the extent of future increases in the OCR. Fiscal consolidation would also help reduce the work that monetary policy might otherwise need to do.

“We continue to expect to begin removing policy stimulus around the middle of 2010.”
PUBLICATIONS

Regular publications

Annual Report Published in October each year.


Monetary Policy Statement Published quarterly. A statement from the Reserve Bank on the conduct of monetary policy.

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

Recent Reserve Bank Discussion Papers

2009

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Christie Smith

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Chris Bloor and Troy Matheson

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Mark Smith

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Sandra Eickmeier and Tim Ng

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David Baqaee

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Ashley Dunstan, Troy Matheson and Hamish Pepper

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Paul Bedford and Chris Bloor

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Viv B Hall and C John McDermott

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Richard Fabling and Arthur Grimes

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Martin Fukac

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Anthony Garratt, James Mitchell and Shaun P. Vahey

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Martin Fukac and Adrian Pagan

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Michael D Bordo, David Hargreaves and Mizuho Kida

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Leo Krippner and Leif Anders Thorsrud

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Richard Fabling, Arthur Grimes and Lynda Sanderson

DP2009/20 Measuring changes in firm-level volatility – an application to Japan
Emmanuel De Veirman and Andrew Levin

2010

DP2010/01 Evaluating household expenditures and their relationship with house prices at the microeconomic level
Mark Smith
A full list of Discussion Papers is available from Administration, Economics Department.

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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
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:
Knowledge Centre
Knowledge Services Group
Reserve Bank of New Zealand
2 The Terrace, P O Box 2498
WELLINGTON
Phone (04) 472–2029
Articles in recent issues of the Reserve Bank of New Zealand Bulletin

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Thinking about more than one thing at a time: Eric Leeper on monetary and fiscal policy interactions
Recent trends and developments in currency
Overview of a recent Reserve Bank workshop: nowcasting with model combination
Coping with global financial and economic stresses

Vol. 72, No. 2, June 2009
Forecasting the New Zealand economy
Introducing KITT: the Reserve Bank of New Zealand’s new DSGE model for forecasting and policy design
The use of statistical forecasting models at the Reserve Bank of New Zealand
The Reserve Bank’s process for forecasting business investment
The demographics of household inflation perceptions and expectations
Exchange rates and export performance: evidence from micro-data
The evaporation of trust: Prasanna Gai on financial crises

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