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Editor's note

In this edition of the Reserve Bank *Bulletin* we present five articles covering a range of topics.

Our first article, by Mizuho Kida, discusses financial vulnerability in the household sector. Between 2001 and 2008, aggregate household debt more than doubled, alongside similarly rapid increases in house prices. Now, with house prices falling and the economy weakening, questions arise about the risk of households being unable to meet their debt obligations. The article presents evidence and modelling results suggesting that household financial vulnerability did not greatly increase during the debt build-up, though a small proportion of households remains vulnerable under certain scenarios.

Our second article is an interview with Eric Leeper, Professor of Economics at Indiana University. Professor Leeper visited New Zealand in 2008 as the Reserve Bank and Victoria University of Wellington Professorial Fellow. Eric and I chat about his work on advancing the modelling of fiscal policy and its interaction with monetary policy, how fiscal policy could be enhanced by making it more transparent, and the progress of fiscal and monetary policymakers so far in handling the current financial and economic crisis.

In our third article, Alan Boaden and Kristin Langwasser present our annual review of trends in the use of banknotes and coins. Last year, there was an unusual increase in issuance of \$50 and \$100 notes late in 2008, associated with public nervousness about the state of the financial sector. The article also discusses the physical quality of our banknotes, and the rate of counterfeiting in New Zealand.

Kirdan Lees presents in our fourth article an overview of a recent workshop held at the Reserve Bank on technical advances in the forecasting of current or near-term economic conditions. He notes some themes that emerged from the workshop, including how the combination of forecasts from different models can improve forecasts. Full papers from the workshop are available on the Reserve Bank's website.

Our fifth article is a reprint of the paper for a speech delivered by Governor Alan Bollard to the Canterbury Employers' Chamber of Commerce in January. The paper discusses how the current economic and financial crisis reflects a correction of the large economic imbalances built up over this decade,

with associated vulnerabilities in the world financial system. It puts into international context New Zealand's position and policy responses so far in this crisis, and looks at how New Zealand households, firms and banks might be expected to cope with the stresses.

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

Tim Ng

Editor



**RESERVE
BANK**
MUSEUM

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

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

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

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

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

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Photography by Stephen A'Court.

ARTICLES

Financial vulnerability of mortgage-indebted households in New Zealand – evidence from the Household Economic Survey

Mizuho Kida

Aggregate household debt more than doubled between 2001 and 2008, alongside similarly rapid increases in house prices. Aggregate data, however, cannot tell us which types of households – by income and assets – have built up the most debt over the period, which is important for assessing their financial vulnerability. This article uses information from the Household Economic Surveys (HES) for 2001, 2004 and 2007 to provide some evidence on this issue. The survey evidence suggests that, overall, financial vulnerability in the household sector did not greatly increase over the period of strong house price rises this decade. Simple modelling suggests that some households would, however, be vulnerable to simultaneous large shocks to house values, interest rates and employment.

1 Introduction

The end of the housing boom has exposed the vulnerability of the household sector in several developed countries. In the US, where the housing slowdown has been most severe, it has led to a sharp rise in mortgage default rates, a slowdown in the economy, and billions of dollars of losses for banks.

Compared to the US, New Zealand had a faster build-up of household debt as well as a sharper increase in house prices (figures 1 and 2). However, the US sub-prime crisis was precipitated by three distinct trends that were not present in the New Zealand mortgage market. The first was a marked increase in lending to 'sub-prime' borrowers – those with poor credit histories or weak documentation of income, who were traditionally shunned by 'prime' lenders. The second was an increase in the use of securitisation, which allowed banks to originate mortgages to high-risk borrowers and then distribute the risk to a large number of investors, many of whom were unaware of the true risks of the assets they held. The third was a rapid deterioration in underwriting quality, because banks no longer had the same incentives to assess properly the credit risk of borrowers.

The question therefore arises: just how different would the response of the New Zealand household sector be to falling house prices, rising unemployment, and slowing economic growth? Could such circumstances generate losses to banks substantial enough to threaten financial stability?

Figure 1
Household debt-to-disposable income ratios in selected countries

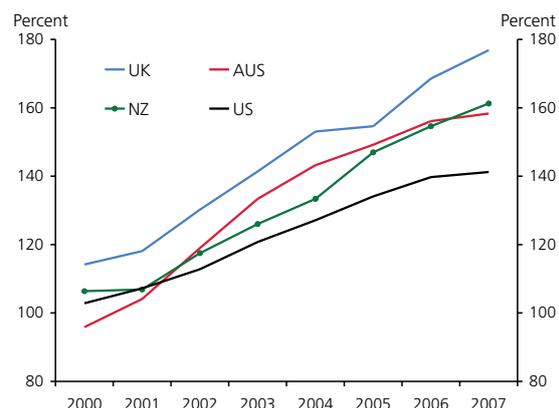
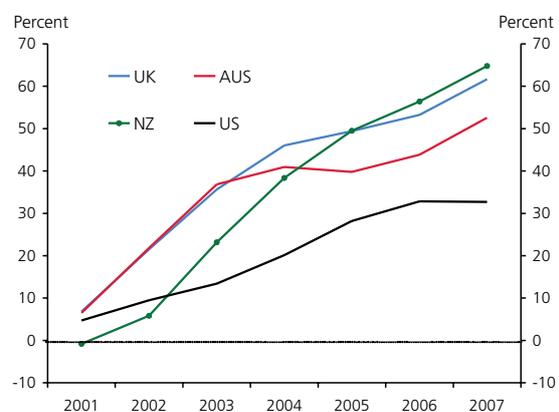


Figure 2
Cumulative growth in real house prices in selected countries



This article summarises findings from the Reserve Bank's ongoing studies of financial risks in the household sector using Statistics New Zealand's HES in 2001, 2004 and 2007. The survey allows analysis of the distribution across the population of the debt, assets, and debt-servicing capacity of individual households. Together with information on the demographic and socioeconomic characteristics of the households, the survey allows us to identify the profiles of typical mortgagors in New Zealand as well as where the financial pressures are concentrated. However, it is important to note that because the HES is not designed specifically for collecting information on households' balance sheets, it has some important gaps (summarised in box 1).

The findings from the HES suggest that financial vulnerability of New Zealand households did not greatly increase over the period from 2001 to 2007. Most households remain mortgage-free, and most debt is held by high-income households. Loan-to-value ratios on housing debt are generally quite manageable and debt-service ratios have actually fallen among lower-income households, who traditionally have high debt-service ratios (both in absolute terms and relative to other income groups).

Also, there is little overlap between the households most exposed to negative shocks to house prices (ie, those with high loan-to-value ratios) and the households most exposed to negative shocks to income or interest rates (ie, those with high debt-service to income ratios). This provides a further margin of comfort, by making it less likely that servicing capacity and collateral value will simultaneously become inadequate. However, there is a small minority of households who remain exposed to the combination of a housing market correction, a spell of unemployment, and an unexpected rise in interest rates. For most, debt remains manageable, but weaker economic growth and falling house prices would still require adjustments that, for some, would be painful.

The article is organised as follows. The remainder of this section briefly reviews related studies. Section 2 describes the distribution of mortgage debt among New Zealand households. Section 3 describes how household indebtedness and debt-servicing ability have evolved over the period from 2001 to 2007. Section 4 describes a simple exercise in which

we tested the debt-servicing ability of mortgage-holding households under hypothetical stress scenarios. Section 5 summarises the key findings and concludes.

Related work

The Reserve Bank of New Zealand has previously published research on the financial position of households using household-level data. Smith (2006), for example, explores the importance of housing equity withdrawal – a process of turning housing equity into cash by selling properties or borrowing more – using both household-level and aggregate data. Smith (2007) uses the HES to illustrate different channels through which house prices can influence household consumption behaviour depending on their age, homeownership status, and other socioeconomic characteristics.

The work presented in this article most closely relates to the analysis presented in the Reserve Bank's *Financial Stability Report* in May 2006. That analysis examined the distribution of mortgage debt and debt-service ability of households in different income groups based on HES 2004. This article updates the earlier analysis by using data from HES 2007 and from HES 2001 so that we can see how household finances have evolved during the unprecedented build-up of household mortgage debt. This article also includes a simple model-based exercise to test the robustness of households' debt-servicing capacity to large shocks in house prices, unemployment and interest rates.¹

2 Distribution of mortgage debt

Mortgage debt is unevenly distributed among New Zealand households. The majority (65 percent) do not have a mortgage on their homes, and among those who do, there

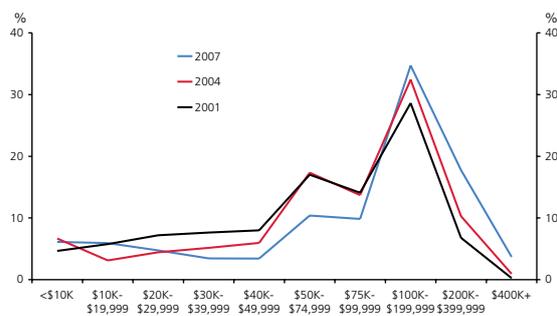
¹ Similar analyses were reported in the Swedish Riksbank's *Financial Stability Review* (June 2004) and the Bank of England's *Financial Stability Report* (October 2007). Hampton and Harrison (2006) describe similar work at the Reserve Bank of New Zealand to develop a model of credit loss for a representative bank, assuming a structure for the bank's mortgage book similar to the distribution of loan-to-value ratios and debt-service ratios in the economy (estimated using the HES 2004). The model used in this article is, however, more similar to the Bank of England's (October 2007).

is a large variation in size.² Over 40 percent of outstanding mortgages are less than \$100,000, and another 40 percent are between \$100,000 and \$200,000. Only about 4 percent are larger than \$400,000.

The size distribution of mortgages has become more uneven since 2001 (figure 3). The proportion of small- to medium-sized mortgages has fallen, while the proportion of very large mortgages has risen. This result is consistent with the common observation that home ownership has become more expensive and new home buyers have had to take out larger mortgages.

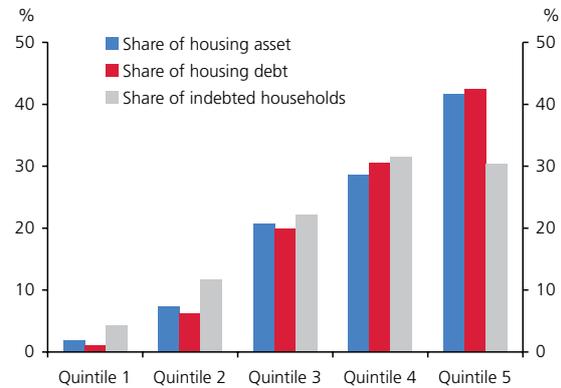
Most debt is held by higher-income households (figure 4). Households in the top two income groups (quintiles 4 and 5) account for over 70 percent of total debt. Households in the lowest income group (quintile 1) account for only 1 percent of the debt, down from around 3 percent in 2001. Households in the middle income group (quintile 3) have had the largest increase in mortgage debt since 2001, followed by those in the higher income groups (quintiles 4 and 5, respectively).

Figure 3
Distribution of mortgages by size in 2001, 2004 and 2007



² Of the 65 percent of households without mortgage on their homes, about half are renters and about half are mortgage-free owners.

Figure 4
Distribution of housing debt, assets and indebted households in 2007



3 Indicators of mortgage stress

Two common indicators of mortgage repayment risk are the loan-to-value ratio (the size of the loan relative to the value of housing collateral) and the debt-service ratio (the size of mortgage repayments relative to household income). The higher these ratios, the higher the risk.

Loan-to-value ratios

Most mortgage-holding households own housing with a value greater than their outstanding mortgage debt (figure 5).³ The median loan-to-value ratio (LVR) has fallen since 2001 in all income groups, suggesting that the increase in housing values has more than offset the increase in the level of debt over this period.

³ The loan-to-value ratio is defined here as the current estimated value of the outstanding mortgage to the current estimated value of the housing asset. The current value of outstanding mortgage is estimated using the information in the HES regarding the original value of the mortgage and the date of origination, the mortgage type, and the interest rate applying to the latest mortgage payment. The estimated mortgage balance will over- or underestimate the actual principal outstanding depending on the level of interest rates compared to its average over the years for which the mortgage has existed. The current value of the housing asset is estimated by updating the reported property value using Quotable Value's quarterly house price index by territorial authority, from June of the year of latest valuation to the quarter and year in which the survey was completed.

The median LVR tends to rise with income. In other words, higher-income households tend to be more highly geared.⁴ The distribution of LVR by income group (figure 6) also shows that highly geared households (LVRs above 80 percent) tend to have high incomes. The LVR indicator therefore suggests that high-income households are most exposed to risk from falling house prices.

Figure 5
Median LVRs in 2001 and 2007

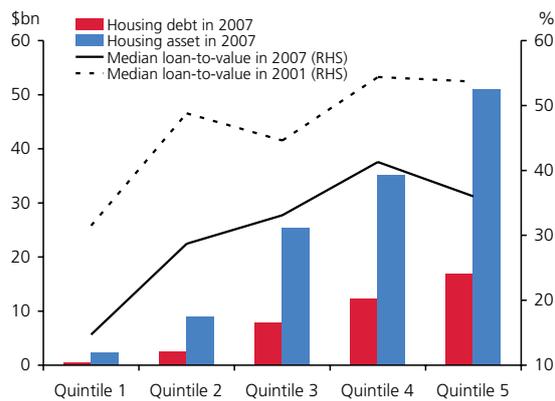
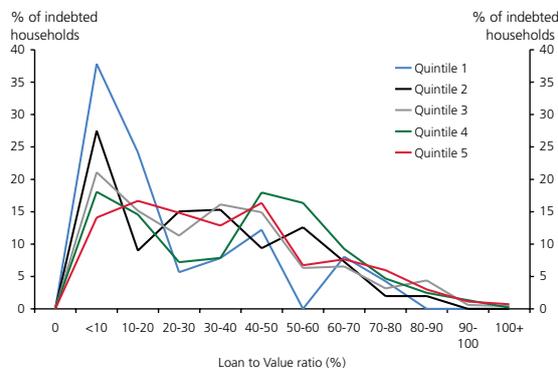


Figure 6
Distribution of LVRs within income quintile in 2007



Debt-service ratios

In contrast, the debt-service ratio (DSR) indicator suggests that lower-income indebted households are more vulnerable.⁵ The median DSR falls as income rises (figure 7). The proportion of households with a DSR above 50 percent

is highest among the lowest-income quartile and lowest among the highest-income quartile (figure 8). This pattern has not changed since 2001, despite large increases in debt among the higher-income groups.

Figure 7
Median DSRs in 2001 and 2007

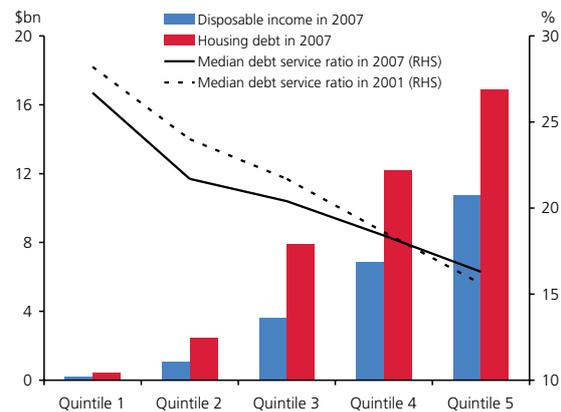
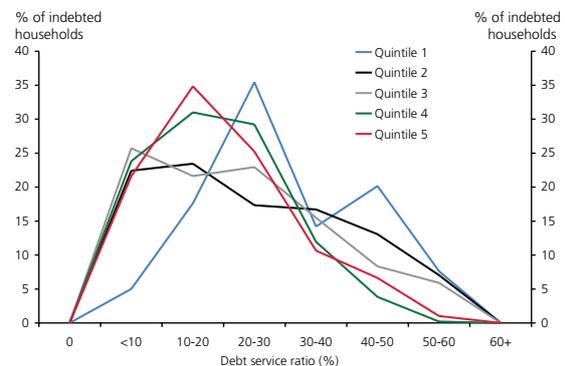


Figure 8
Distribution of DSRs by income quintile in 2007



Households with both high LVR and high DSR

There appears to be very little overlap between the segment of households most exposed to negative shocks to house prices (those with high LVRs, who tend to have high income) and the segment most exposed to negative shocks to income or interest rates (those with high DSRs, who tend to have lower income). Relatively few households fall into both the high-LVR and high-DSR camps. Households with high LVRs (over 80 percent) and high DSRs (over 55 percent) represent just 0.1 percent of mortgage-holding households and about

⁴ The evidence may also reflect the fact that households who have been active in the housing market in recent years (including new entrants to the housing market) tended to be in the high income segment of the household sector.

⁵ The debt-service ratio is defined here as annual mortgage payments (interest and principal) to annual household disposable income.

0.2 percent of total debt.⁶ It should be noted that, because the size of the underlying sample for this sub-group is small, the estimate is subject to a large margin of error.⁷

The limited overlap between high-LVR and high-DSR households means there is only a small chance of both debt-servicing capacity and collateral value becoming simultaneously inadequate for households, lowering the default risk for the banks, as well as for the household sector as a whole.

4 The impact of macroeconomic shocks on the proportion of vulnerable households

The relatively benign picture emerging from the HES evidence may reflect the favourable economic conditions prevailing at the time of the 2007 survey. In order to get an idea of households' vulnerability to adverse changes in macroeconomic conditions, we studied the impact of shocks to house prices, unemployment and interest rates on households' DSRs and LVRs.⁸ Specifically, we calculated the proportion of indebted households who will be 'vulnerable'

– characterised by LVR above 80 percent and DSR above 55 percent – after large but plausible shocks to house prices, unemployment and interest rates.⁹ Box 2 briefly explains the model used for this exercise.

When shocks are considered individually, our analysis shows that the proportion of vulnerable households would remain relatively small – below 1 percent of indebted households (table 1). This is explained by the small overlap between the segment of households most exposed to negative shocks to house prices (ie, high LVR) and the segment most exposed to negative shocks to income or interest rates (ie, high DSR). House price shocks would increase the number of households with little or no equity in their homes, but those affected most by the shocks tend to have a comfortable income buffer. Similarly, shocks to unemployment or interest rates would increase the number of households with high debt-service burden, but those who become more stressed in this respect would tend to have a large equity buffer in their homes. Consequently, there is only a marginal increase in the number of households that will become 'vulnerable' from both collateral-value and debt-servicing perspectives, in the scenarios with individual shocks.

Table 1
Proportion of indebted households with both LVR over 80% and DSR over 55% after assumed shocks in house prices, unemployment and interest rates

	Pre-shock	House price shock		Unemployment shock		Interest rate shock		Combination of shocks	
		-15%	-30%	6%	9%	+100bpts	+300bpts	smaller	larger
Percent of indebted households	0.1	0.1	0.5	0.2	0.3	0.5	0.7	0.9	3.6
Percent of debt	0.2	0.2	0.7	0.6	0.7	0.8	1.3	1.8	6.9

⁶ The DSR of 55 percent as a ratio of disposable income roughly corresponds to the DSR of 38.5 percent as a ratio of gross income for households with disposable income of around \$65,000. The average disposable income of the sample of indebted households in the 2007 survey was about \$68,000 and the median was about \$63,000. The wedge between gross and disposable income, of course, varies by income.

⁷ Less than five respondents in the 2007 survey are found in the sub-sample of mortgage-holding households with LVR over 80 percent and DSR over 55 percent.

⁸ A similar exercise was performed in the Bank of England *Financial Stability Report* (October 2007) and Riksbank *Financial Stability Review* (June 2004). An appendix in the data file available online outlines the framework used.

⁹ Although these ratios are chosen somewhat arbitrarily, households that fall simultaneously into both of these categories will tend to be more likely to experience financial distress, and to be more susceptible to default on servicing their loan in the event of a shock to income or interest costs. Moreover, in the event of default, it would be more likely that the lender would not be able to fully recover the value of the loan for these households (given the high LVR).

However, if multiple shocks hit the household sector simultaneously, the model suggests that the proportion of vulnerable households and the banks' exposures to these households would rise quickly. We considered two scenarios, one with simultaneous small shocks and one with simultaneous large shocks. Under the combination of simultaneous smaller shocks (a fall in house prices of 15 percent, a rise in interest rate of 100 basis points, and a rise in unemployment to 6 percent), the proportion of vulnerable households increased to 0.9 percent (representing 1.8 percent of total debt).¹⁰ Under the combination of simultaneous larger shocks (a fall in house prices of 30 percent, a rise in interest rate of 300 basis points, and a rise in unemployment to 9 percent), the proportion of vulnerable households increased to 3.6 percent (representing 6.9 percent of total debt).¹¹

5 Conclusion

This simple analysis suggests that the overall conclusion from the survey evidence remains fairly robust to adverse changes in macroeconomic conditions. A relatively small proportion of mortgage-holding households is currently close to a stressed position. Independent shocks to house

prices, unemployment or interest rates, even if they are large, would not result in a large proportion of indebted households becoming vulnerable. Only under a severe stress scenario – when three large shocks occur at the same time – would we expect to see a substantial proportion of households become vulnerable.

However, more work is needed to gain a fuller picture of the vulnerability of the household sector and the risk it might pose to financial stability. First, the survey does not cover the full extent of the increase in mortgage debt. Household debt in the HES primarily relates to owner-occupied dwellings. Debt secured on other property, including investment property, is not systematically captured by the survey. Second, the credit quality of mortgage loans issued recently could have deteriorated in more subtle ways than are revealed by loan-to-value and debt-service ratios. For example, increases in second-lien mortgages or mortgages with non-traditional amortisation schedules (eg interest-only loans) can signal greater credit risk for a given level of gearing.¹² We will continue to analyse available data and explore new sources of information to better gauge the state of household finances and the risk it poses to the financial system and economy in New Zealand.

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¹⁰ How likely are these combined shocks? The smaller of the assumed shocks in house prices and unemployment were similar to the troughs projected for the 2009-11 horizons in the RBNZ's September 2008 *Monetary Policy Statement*, although the latter projected a gradual fall in interest rates. The larger of the assumed shocks (considered below) were double the projected fall in house price and more than double the projected rise in unemployment rate. Note that the shocks have been defined relative to the situation prevailing in early 2007 – at the time of the survey. Since then, house prices have already fallen by 5 percent (or 8 percent relative to the peak in early 2008) and unemployment has risen to 4.6 percent. Conversely, mortgage interest rates have fallen by 200 basis points. The expected continued reduction in interest rates should also help ease pressure on many homeowners.

¹¹ Note that the proportion of debt held by vulnerable households is not the same as the expected default rate. Models for estimating the probability of mortgage default require not only information on LVR and DSR but a number of other factors such as age of the mortgage ('seasoning'), origination date ('vintage'), personal characteristics of borrowers (eg, age, occupation, marital status), and credit and financial history of borrowers (eg, personal bankruptcy record, ownership of financial assets).

¹² See Gerardi *et al.* (2008).

Riksbank (2004) 'Swedish households' debt-servicing ability 2000-02', *Financial Stability Report 2004* (2), pp. 33-35.

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Box 1

Household debt covered in the HES

The HES is a rich source of information about income and expenditure patterns of households in New Zealand. But because the survey is not designed to collect information on household balance sheets, it has some important gaps.

First, it does not collect information on unsecured debt. There are more households with unsecured debt than secured debt, although in terms of dollar amounts, secured debt constitutes the bulk of total household debt. By focusing on those households with mortgages on owner-occupied dwellings, we are focusing on a relatively small, albeit the most indebted, segment of the New Zealand household sector.¹³

Second, the HES does not capture systematically the information on the mortgages relating to second or holiday homes (so-called "other property").¹⁴ Although some debt associated with the purchase of these properties

is covered, the value of these properties is not recorded in the survey. We are therefore unable to examine the balance-sheet implications of this portion of debt and it is excluded from the analysis in this paper. In the HES 2007, less than one-fifth of total reported debt was secured on second or holiday homes, with four-fifths secured on owner-occupied homes.

Third, the HES does not collect information on mortgages relating to investment properties. Mortgages relating to investment properties appear to have contributed substantially to the growth in household demand for mortgages in recent years. There is no formal estimate of mortgages relating to investment property. Informal estimates for 2007 suggest that as much as a third of aggregate household mortgage debt might be related to investment properties. Evidence from other countries suggests that mortgages relating to investment properties could be potentially associated with riskier forms of mortgage finance such as interest-only or no-deposit loans. By relying on the HES for information on household balance sheets, we are excluding this potentially sizeable and important portion of household debt from our analysis.

¹³ According to the Families Commission and Retirement Commission (2008), 64 percent of single- and 82 percent of couple-households had unsecured debt, compared to 26 percent and 55 percent, respectively, for secured debt. However, in terms of dollar amount, secured debt accounted for 69 and 82 percent of total debt owed by the single- and couple-households, respectively. The corresponding figures for the household sector as a whole (ie single- and couple-households combined) were not discussed in the report.

¹⁴ HES defines "other property" as "any property (such as a holiday bach) that is owned by and used by the household, but that is occasionally rented out by the household to others. Also include properties not used by this household but for which rates, insurance or mortgage repayments are paid by a member of this household on behalf of the occupants of the other properties. An

example is an ex-husband in this household who pays one or more of those items for the property occupied by his ex-wife. Do not include properties used for mainly business or investment purposes" (<http://www.stats.govt.nz/NR/rdonlyres/C292868E-108F-4BC7-8B49-4A05CE5288FE/0/ExpenditureQuestionnaireHES200304.pdf>).

Box 2

Model for analysing potential impact of macroeconomic shocks on the proportion of vulnerable households¹⁵

We use a simple framework to determine the proportion of households who would fall into the vulnerable pool (LVR>80 percent and DSR>55 percent) after hypothetical shocks.

House price shocks

Negative shocks to house prices would raise the LVR of households with debt secured on housing. The growth rate of house prices is defined at the national level (-15 percent and -30 percent as the two scenarios). The effect of the national house price scenario on each household depends on random regional variation in house prices, which is modelled as a draw from a normal distribution as follows.

$$LVR_i = \frac{D_i}{(1 + hp_i) \times V_i}$$
$$hp_i \sim N(hp_t, \sigma_R^2)$$

D_i outstanding mortgage of household i
 V_i value of house of household i
 hp_i house price shock for household i (in annual percentage change)
 hp_t economy-wide house price shock (in annual percentage change)
 σ_R^2 variance in house price growth rate from economy-wide growth rate for region R (average, 1991-2007)

Unemployment shocks

Negative shocks to unemployment would raise the DSR of all indebted households. The rate of unemployment is defined at the national level (6 percent and 9 percent as the two scenarios). Each household in the survey is assigned an equal chance of falling into unemployment, and if the head of the household becomes unemployed

the household's disposable income is assumed to fall to a fraction of pre-shock household income. For the results reported here, we set α to 0.5.

$$DSR_i = \frac{R_t \times D_i}{Y_i}$$
$$Y_i = (1 - I_U \cdot \alpha) Y_i \quad \text{where}$$
$$I_U = 1 \quad \text{if } u_i > (1 - u_t) \text{ and } u_i \sim U(0, 1)$$

R_t economy-wide mortgage interest rate
 Y_i disposable income of household i
 I_U indicator variable which takes values 1 or 0, and = 1 if household is unemployed
 u_i household i 's draw of unemployment
 u_t economy-wide unemployment rate

Interest rate shocks

Negative shocks to interest rates would raise the DSR of all indebted households. The interest rate shock is defined at the national level (+100 basis points and +300 basis points as the two scenarios).

$$\Delta DSR_i = \frac{\Delta R_t \times D_i}{Y_i}$$

This way of calculating the impact of interest rate changes on DSRs implies that mortgage payments are affected by interest rate changes in the same manner as credit card payments. It exaggerates the impact on DSR for table mortgages (which represents about 50 percent of all mortgages in the sample) if the remaining life of the mortgage is greater than one year, and the bias is larger the longer the remaining life of the mortgage.

¹⁵ Further detail on the model and assumptions used to generate the results reported in Table 1 is available from the author upon request.

Thinking about more than one thing at a time: Eric Leeper on monetary and fiscal policy interactions

Interview conducted by Tim Ng

Eric Leeper, Professor of Economics at Indiana University, visited New Zealand in October and November 2008 as part of the Professorial Fellowship in Monetary and Financial Economics sponsored by the Reserve Bank of New Zealand and Victoria University of Wellington.¹ Professor Leeper is also a director of the Centre for Applied Economics and Policy Research at Indiana University, a Research Associate at the US National Bureau of Economic Research, and an External Advisor to the Sveriges Riksbank (the Swedish central bank), and has been a visiting scholar at the Federal Reserve Board. His extensive publications and expertise cover monetary theory and policy, and interactions between monetary and fiscal policy. In this interview, he talks about how fiscal policy could be improved, the roles of fiscal and monetary policy in stabilising the economy, and some current challenges for fiscal and monetary policy-makers.

Why did you become an economist, and what led you to the research topics you've chosen?

I had an early interest in politics and in public policy issues, dating back to when I was in high school. I got involved in my first political campaign in 1976. I had this naive view – I remember telling people this – that I was going to go into economics, because I wanted to go into politics and politicians need to understand the budget. The irony here is that I haven't gone much beyond that. I'm still trying to understand the government's budget. It's a major focus of my research.

More generally, I think that economics is at its best when it's useful. It doesn't have to be just about macroeconomic policy. There are very interesting microeconomic papers trying to explain phenomena we observe in the world. Like anybody, I admire the beauty of an elegant proof – there may be something perverse about economists in that there's a part of us that really likes clean logical arguments – but at the same time, I also want to be saying something about the world. Not all economists have that little extra burden to carry, perhaps, but it's true for me. Good research has to have very rigorous thinking involved, but primarily I'm interested in that middle ground between research and



Professor Eric Leeper enjoying the Wellington sun.

(Tim Ng/RBNZ)

“ I’m still trying to understand the government’s budget. It’s a major focus of my research. ”

¹ Details about the Professorial Fellowship programme, including past and future fellows, may be found on the Reserve Bank’s website at www.rbnz.govt.nz/research/fellowship/fellowship.html. Materials from Eric Leeper’s public lecture delivered as part of the programme are also available at links from that web page.

practice. The middle ground often ends up being quite a lot dirtier than the pure research part.

“ There may be something perverse about economists... there’s a part of us that really likes clean logical arguments. ”

How should one deal with the communication and perhaps political issues that can arise in the middle ground – the emotional content of the ideas; the risk of oversimplification?

Use the example of monetary policy. As a profession, we’ve made tremendous progress in thinking about monetary policy, talking about monetary policy and executing monetary policy. It wasn’t that long ago that people were using metaphors to talk about monetary policy, like Friedman’s famous “one foot on the accelerator, one foot on the brake”, “pushing on a string” – all these vague metaphors.

Since then we’ve made tremendous progress in communicating clearly, but also rigorously, about monetary policy. We talk about expectations formation, we talk about dynamics. These are pretty complicated concepts. It’s not just “the demand for some good has gone up, therefore the price rises”.

I see no reason why we can’t make similar progress with fiscal policy. Now, fiscal policy, almost by construction, is more complicated than monetary policy simply because there are so many more instruments. You have all the different components of government spending and transfers, you have lots of different kinds of taxes. They are emotion-laden. I care a lot more about the taxes I pay than about the price that somebody else is getting. But that doesn’t mean we can’t talk clearly about this stuff.

There is another issue here. Somehow, we have agreed as a society that we would take day-to-day monetary policy out of the hands of politicians. Obviously, monetary policy is ultimately still in the hands of politicians, but not at high frequency. We haven’t done that at all with fiscal policy – it’s still very much controlled by the whims of elected officials.

Now, I don’t actually think we should take fiscal policy out of the hands of elected officials, but the fact that it is in their hands means that often the arguments for taking certain fiscal actions are more politically driven than economically driven. There often aren’t clear economic arguments for the decisions that get made about fiscal policy, whereas there almost always are regarding monetary policy. There’s still room for disagreement, but that doesn’t mean the decisions aren’t economically driven.

One could attribute the strong economic basis of contemporary monetary policy – which I presume you view positively – to the devolution to technocrats of day-to-day monetary policy. So why don’t you think that the administration of fiscal policy should be similarly devolved?

For democratic reasons, I’m actually still torn about the idea of taking monetary policy out of the hands of the electorate. And so I’m not comfortable with taking tax and spending decisions out of the hands of elected officials. I can’t really articulate why.

I do think that we could, as a society, come up with broad guidelines for fiscal decisions. We haven’t done nearly enough of that. Fiscal policy tends to get jerked around a lot. You go through periods where there’s lots of government spending and low taxes, then we see government debt build up, so we reverse ourselves to get debt back down again.

New Zealand has made some headway through the Fiscal Responsibility Act and other legislation, but it still has quite some way that it could go. As an electorate, we could come up with some guidelines that could reduce how much fiscal policy fluctuates at low frequencies. However, society as a whole still ought to make the decisions about how much we value education, how much we value healthcare,

how much we want to redistribute income. I think those decisions belong in the hands of the public, not in the hands of technocrats.

Now we could, as a public, agree on some broad principles. Just as an example – this is not necessarily my view – a broad principle could be, “the role of tax policy is to maximise the revenue that can be raised while minimising the deadweight loss or the inefficiencies associated with the policy”. End of story. Then it becomes a technical issue – you could hand the broad principle to the technocrats and say, okay, estimate the elasticities, design a tax code that will achieve this.

“ There often aren’t clear economic arguments for the decisions that get made about fiscal policy, whereas there almost always are regarding monetary policy. ”

But then you’ve taken a lot of discretion out of the hands of policy-makers, because you have stated there is a single objective of tax policy. Now I’m not sure any society is going to buy that, but it is an example of something that society could agree on. Of course, society could change its mind down the road and decide no, we want tax policy to do more things. But, the day-to-day stuff, the high-frequency stuff, would get driven by the technical considerations.

Nobody has seriously proposed that we should be holding referenda on what the setting of the interest rate should be. And yet in effect we do that with tax and spending policies. Every time we vote for a new government, we’re voting for a new tax and spending policy. And it’s a bit odd that we do that with fiscal policy, but we do.

So we need a way to ensure that the fiscal authorities commit in a better way to fiscal sustainability?

Exactly. There’s a fundamental tension stemming from the fact that governments are quite short-lived. The public is, in effect, infinitely lived. I care about my children, and my children’s children, and so as a public we should take a long view, but governments never have long views. So the fundamental question is, how do you reconcile this tension?

People tell me “Oh, it’s hopeless, because you can’t force future governments to commit”, but I don’t see why we can’t. We’ve chosen not to, but that doesn’t mean we can’t. You could impose whatever constraints you want on future governments, because it’s society doing it. And if people don’t like it, then they shouldn’t become a government!

There’s a lot of room for us to try to reconcile this tension, which is really a principal-agent problem. The principals have an infinite horizon perspective and the agents don’t. How do we force the agents to have that long view? You have the same issues with corporate control. The stockholders have an infinite horizon perspective, whereas the CEO is looking at the next profit statement.

We have established ways of trying to reconcile that principal-agent problem in that case. We create contracts and incentives for CEOs to take the long view. Not always successfully, but we try.

So I think that there are things we could do on the fiscal front.

Can we turn now to current circumstances. Countercyclical fiscal policy is now clearly back on the table, as a response to the financial crisis and global recession, in a manner it hasn’t been for decades. What does your research tell us about how fiscal policy should be conducted in circumstances like this?

The main message of my research is that if a government tries to offset an economic downturn by increasing spending or reducing taxes and then borrowing to finance it, fiscal policy will have to adjust in the future. There will be more

debt to service and so either revenue will have to be raised, or some form of spending cut, in the future to ensure that policy is sustainable.

Now, the effects today of the countercyclical fiscal policy depend critically on how people believe policy will adjust in the future. It's easy to show theoretically that when you do a fiscal expansion – let's say an increase in government spending – that increases the demand for goods today, people will work harder and output will go up.

“ The effects today of a countercyclical fiscal policy [stimulus] depend critically on how people believe policy will adjust in the future. ”

The ultimate effect of that stimulus on, say, GDP will depend very strongly on how policy will adjust in the future. There is a scam usually used in theory where we assume that something very neutral does the adjusting, like a rise in lump sum transfers in the future, as opposed to, say, changing a margin through a distorting tax on capital or labour. With that scam, then sure enough, you get the predicted effects that the increase in government spending will raise GDP.

But there's essentially no evidence, at least in US data (and we don't really have evidence from other countries), that higher government spending is typically met by lower lump sum transfers in the future. Instead, higher government spending tends to be met by higher taxes in the future.

Well, if everyone knows taxes are going to rise in the future, then that will reduce the incentive to work, because people will expect the after-tax wage to be lower. That will ultimately offset the beneficial output effects of the initial expansion in government spending.

So the point is that a complete specification of fiscal policy, if you really want to stimulate the economy, is not “let's

increase government spending today”, it is “we're going to increase government spending today, we're going to finance it by borrowing from the public, and then we're going to adjust some other policy in the future in order to ensure that it's a sustainable policy”. Well, we never do that future part.

Individuals in the economy, because they're forward-looking, will form expectations about the future part. The question is whether governments are going to help us form those expectations or not. And the answer in every country, as far as I can tell, is that they typically are not going to help us with that.

By what means could governments help form those expectations?

Governments sometimes have targets for the level of debt in the economy. For example, New Zealand informally has a 20 percent debt-to-GDP target. That at least tells you that some adjustment will occur to bring debt back down if it goes beyond 20 percent, but it doesn't tell you what adjustment. What adjustment is the critical question.

This goes back to the principal-agent problem. We, as the principals, want to know how policies will adjust in the future. Agents – the current government – have no mechanism for forcing future governments to adjust in certain ways. There's a fundamental problem there. If you really want to try to achieve transparency in fiscal policy, you have to solve that problem. And I don't even hear people talking about this as if it's a problem!

The Obama Administration has announced very dramatic fiscal actions that they would like to take. There has been absolutely no discussion about the long-run adjustments that will have to occur. So we're left as ignorant as ever about future fiscal policy.

In New Zealand, we managed to achieve fairly broad-based agreement that the fiscal accounts had to be brought and kept under control. Given what you said about a lack of transparency in fiscal policy, at least compared to monetary policy, should we be surprised that that happened?

I'm really asking for more than the kind of minimalist approach where we say that fiscal policy should not be completely irresponsible. It's not hard to get agreement that we ought to have responsible fiscal policy. I think it's much harder to get agreement on how are we going to achieve it.

Even in New Zealand it's not completely obvious that, ultimately, there's any reason the government has to come back to the 20 percent debt-to-GDP target. The Treasury is now projecting debt to rise from 20 percent of GDP to 30 percent over the next decade. Well, what about after that? If you look at the long-term projections, the debt-to-GDP ratio grows exponentially.

It's one thing to get the broad-based support for the concept for having fiscal policy be sustainable. It's quite another thing to get agreement on what that means, and how you're going to achieve it.

“ It’s not hard to get agreement that we ought to have responsible fiscal policy. I think it’s much harder to agree on how we are going to achieve it. ”

Is a 30 percent debt-to-GDP ratio a lot worse than 20 percent, or just a little bit worse?

I think the research is almost silent on this question. What happened when New Zealand was at 50 or 60 percent was that you had to start to pay a premium for borrowing from abroad. So there's a risk element that kicks in. But you know that risk premium is something that's endogenous. With other kinds of reforms to fiscal policy in New Zealand you could well be at 50 percent, but not have a premium to pay.

I don't think we understand this element very well. If you look at the Treasury's long-term projections, you're on an exploding debt path right now, and yet you're not paying that risk premium.

This is where I think academics have really dropped the ball in the optimal fiscal policy literature. The message of that literature is keep tax rates smooth, and that taxes on capital should go to zero asymptotically. Therefore, tax rates on labour should be smooth. Well, how do you achieve that? You do it by allowing government debt to be a buffer.

In simple models, that implies that government debt becomes a unit root process. So with positive probability, it can grow infinitely large. That completely contradicts the idea that it's a good idea to have a debt-to-GDP target. Reconciling all these issues is something that the research hasn't done.

Even if you have a smoothing objective on tax rates, why can't you let them wobble around a bit, provided you stabilise debt over the medium term?

But then tax rates won't be smooth – they'll have to move around a lot if government spending is a given. Either debt has to move around a lot or taxes have to move around a lot. There is a government budget constraint that is binding period by period.

If you consciously stabilise debt, that produces more volatility in tax rates than is "optimal", in this literature.

So there's a lot of loopy stuff that comes out of the optimal fiscal policy literature. The other big result is that if something is inelastically supplied, then you should tax the hell out of it. At the beginning of time, government should tax the hell

out of everything that is being inelastically supplied, run a massive surplus, use it to lend to the private sector, and then live off the interest proceeds for the rest of eternity.

Well, gee, that's not terribly useful advice to give a government, but that's what comes out of some of this literature.

I think we're only now beginning to make real progress in thinking about fiscal issues. The unfortunate thing is that most of this is being done in isolation from monetary policy. We still aren't really fully integrating monetary and fiscal policy analysis.

“ We still aren't fully integrating monetary and fiscal policy analysis. ”

Does the optimal fiscal policy literature say anything about stabilisation policy?

It's actually pretty hard in these formal models to find a rationale for countercyclical fiscal policy. I think part of the reason for that is that we're using models where, basically, fiscal policy is bad, in the sense that it's sucking resources from the economy, it's distorting margins... this kind of thing. In modern models, the old Keynesian argument that you're operating well below potential and there's a need for fiscal policy to stimulate demand – that role isn't very strong, and it gets swamped by the distortions. You can put certain kinds of imperfections like monopolistic competition and so forth into these models, but you still end up finding that the distortions swamp things.

Now, if we had a serious model that could address the current financial crisis, you might find that there's a substantial role for fiscal policy. In an environment where, say, monetary policy has lost its effectiveness, or is less effective than usual, then maybe there is a role for fiscal policy. But we don't have any models like that, so this is conjecture.

There is the argument that, in the Great Depression with the liquidity trap, that's when fiscal policy really comes into its own. And maybe that's the situation that's going on now.

There are really two components to this issue. The first component, which I've talked about, is that you can put certain kinds of imperfections into your models, which fiscal policy could help to offset by taking countercyclical actions. But it ends up doing that by creating distortions. Then there's the second component, which is the inter-temporal aspect. I have a paper making the point that counter-cyclical fiscal policy could actually be counter-productive.

Here's the scenario. The economy goes into an economic downturn. Government spending as a share of the economy rises, maybe because the level of government spending is acyclical. You have transfer payments that also tend to rise during an economic downturn; you have progressive taxation so tax revenues tend to fall and so forth. The consequence is that you have to borrow when you go into a downturn.

Well, suppose that borrowing creates the expectation that taxes on capital are going to be higher in the future. That tells me that today, even though there's an economic downturn, I want to invest even less than I would otherwise. So I shift out of investment into consumption today, and that makes the capital stock still lower than it would otherwise be, so the recession becomes deeper and more prolonged than it would be otherwise.

“ Countercyclical fiscal policy could actually be counter-productive. ”

So what we typically think of as automatic stabilisers might actually be automatic destabilisers?

They could be. We don't have a very good understanding of it. There's been very little good research done, that tries to separate these different components out. So we know theoretically that the inter-temporal element could be important. We don't know empirically that it actually is

important. I think this is a huge area that needs to be delved into much more deeply.

You know, I was worried about this when the initial discussions about European Monetary Union evolved into talking about inflation targeting, and the idea was that we would have fiscal policy to take care of all the countercyclical stuff, while also taking care of the long-run sustainability stuff. Well this is going to create the tension I was just describing, and I don't think it's a tension that we understand very well. We don't really know how big the inter-temporal component is relative to the short-run component.

So, lots of work to be done there. What other major challenges for macroeconomic policy management spring to mind for you?

(laughs) Well, look out the window! Theoretically integrating the macroeconomy with financial markets is first order. We have no models that help us understand what's going on now. Central banks and treasuries all around the world are just flying by the seat of their pants, making what they think are kind of sensible decisions, but without any kind of model-based rationale. That worries me quite a lot. We don't really know what the incentive effects of these bail-outs will be. In the US, it seems like anyone that is running into problems can go to the government and ask for money. We know there are going to be serious long-run consequences from that, but in our rush to deal with the crisis, we're ignoring it.

“ Central banks and treasuries all around the world are just flying by the seat of their pants. ”

The finance literature tends to focus on whether macro variables help predict financial variables, but we need to understand that these are being determined simultaneously.

As a central banker, what's really important is whether you read anything at all about the macroeconomy from financial variables. That's something we have very little understanding of. Then I think integrating fiscal policy in a serious way into our models and getting the dynamics right is another high priority.

If policy-makers haven't got a good model of financial system dysfunction, or a good framework to anchor their decisions, how should we behave in terms of policy strategy or tactics?

The way central banks have been behaving is probably sensible in these circumstances. They've been taking bold moves, moving interest rates by quite a lot more than they would usually. If this were a 'normal' recession, they surely would not be moving interest rates by 100 or 150 basis points. It's not that we know nothing about what's going on out there, it's that we don't have good formal models of what's going on out there.

“ We're going to have a lot to mop up after we're all done. ”

We have models in our heads about what's going on. Those models are telling us that probably interest rate moves aren't as effective as they would normally be if financial markets were working well. So, we're going to move interest rates by a lot. Will this do the trick? We don't know, but under the circumstances it's the natural thing to do. It's the same thing with fiscal actions. We don't know if fiscal actions will have their usual effects, so we're going to be bold there.

The consequences are that we're going to have a lot to mop up after we're all done. If you look at what's happened to, say, the Federal Reserve's balance sheet, with its dramatic growth, the question is how that's going to get unwound. Is there a way of unwinding it without there being some massive expansion of base money? You know, some people are worried about deflation, but in a few years it's going to

be inflation that we're all sweating about. I'm not sure that there's any alternative at this point, because our models are so inadequate.

The other big issue that actually has hit me during my time here is that we really need better ways of understanding uncertainty and of quantifying our uncertainty. You know, there are methods like robust control that help us think about this. At policy organisations, this should be a very high priority. Looking at projections that have plausible uncertainty bands around them is really, really important because so much of the discussion at policy tables is about relatively small differences in projections, two years out. If we had plausible measures of our uncertainty, we would probably realise that there isn't anything to discuss, that the different projections are pretty much equally likely events.

The uncertainty now is not just about sampling error or estimation error or what have you. It's a profound kind of uncertainty about what the nature of the right model is. If I were a central banker right now, I would be asking my staff to produce projections that tell me something about the kind of uncertainty that is really out there – meaning, gee, what if markets don't work? What's your projection then?

You can show me the projection based on historical correlations, but help me think about what the worst case scenario might be. What if I move the interest rate by 150 basis points and nothing happens to the real economy? How would the projections look in that case?

So I think this should be a very high priority. Even before we get to the point of knowing how to model financial markets and integrate them into our general equilibrium macroeconomic models, which could be 20 years down the road, we need to be thinking, what do we do in the interim? How do we take the knowledge that we have and formulate it in a way that's more useful?

When things return to normal, should we just dust off the old macro models and say we're now back to 25, 50 basis point moves?

I'm guessing that we will get back to using these linear approximations around some steady state, and hoping that

for small perturbations they work well. But there will still be the mopping up of all the liquidity that's been injected. There's going to be quite a lot of cleaning up that will need to be done with fiscal policy.

In the US alone, the debt-to-GDP ratio out of this crisis could easily grow by 10 percentage points or more. If you look at what's happened over the last decade in Japan, the debt-to-GDP ratio is over 100 percent and it's entirely been a response to this chronic recession they've been in. If we have a few years of the Japanese experience, the fiscal situation's going to be much worse. Remember that in the case of Japan, they're going into the bad long-run fiscal scenario with a much worse fiscal state now, so this could have very long-run repercussions. There will be lots of issues surrounding fiscal policy in the near future.

“ If we have a few years of the Japanese experience, the fiscal situation's going to be much worse. ”

What has surprised you most about developments in macroeconomic theory and policy over the past couple of decades?

How ideological people can be. I mean, I've been talking about fiscal and monetary interactions since I came out of graduate school – almost 20 years. And even now, there's tremendous resistance to talking about this.

Very smart people have said, and I'm quoting here from somebody who I think is smart and ought to know better, “I don't want to think about fiscal policy, I just want to think about monetary policy”. My response to that is, that's fine, as long as you make certain assumptions about fiscal behaviour. “But I don't want to make any assumptions about fiscal behaviour. I just want to focus on monetary behaviour.”

It sounds ridiculous when you put it in those terms, but if you look through the literature on monetary policy in the last 20 years, people have made extremely strong assumptions about fiscal behaviour. The reason they do that is so they can sweep it under the rug and focus on what's important to them.

“ Economists seem to have a hard time thinking about more than one thing at a time. ”

There's never any discussion of whether those assumptions are valid, or what happens if they break down. It turns out that very dramatic things happen. The whole nature of the equilibrium changes when those assumptions about fiscal policy break down.

I find it odd that economists seem to have a hard time thinking about more than one thing at a time. At the same time that they insist on using these general equilibrium models, they want to make these extreme simplifying assumptions about some big component of macro policy and act as though this is without loss of generality.

So that has surprised me. And some of it is ideological, I think. That's the only explanation I can come up with. Maybe Milton Friedman at times felt this way – you know, 'I try to get them to talk about monetary policy and all they can talk about is fiscal policy!' Friedman has this wonderful paper, back in the forties in the *American Economic Review* about the need to think about a monetary and fiscal policy framework for stabilisation. It's remarkable how easily we forget something that is 60 years old.

With all the reforms that have taken place in countries with regard to monetary policy, I think they're just crossing their fingers and hoping that fiscal policy will cooperate. Sargent and Wallace described that as a game of chicken, in their famous paper about unpleasant monetarist arithmetic. Perhaps unwittingly, many countries that have gone down

the inflation targeting path are playing a game of chicken. They're saying that, well, fiscal policy is just going to have to adjust, because monetary policy has a mandate that it's got to target inflation.

Well, maybe they do, and maybe they don't. It might be a better strategy to think about monetary and fiscal frameworks from the get-go.

One can argue that there wasn't really a consensus, either professional or political, to keep inflation under control until countries went through the sixties and seventies, and in some cases the early eighties, and had very bad experiences with inflation. Not hyperinflation, but just bad moderate inflation. Maybe it's going to take something like that with fiscal policy.

I think the real problem with fiscal policy is that it's so hard to figure out what it's doing in the economy. Whereas with monetary policy, you can look at the inflation record and say, 'OK, monetary policy was poor'. With fiscal policy, what are you supposed to look at? The empirical work in fiscal policy does not lead to any clear message about what the effects are.

“ Perhaps unwittingly, many [inflation-targeting] countries are playing a game of chicken. ”

What insights from the profession do you think policy-makers have failed most to grasp?

I sound like a broken record, but I would go back to the fiscal policy issue that we're not talking about the future enough. It's a political failing more than anything else. And it's ironic because policy-makers have bought into the idea that expectations play a critical role in making effective monetary policy. Why they haven't been able to make the wild generalisation to expectations playing a critical role in effective fiscal policy, I don't know.

The expectational effects with fiscal policy are first order. They just hit you over the head. I think it's actually harder with monetary policy to find those effects. But we went through and reformed monetary policy without any real evidence that those effects were there or that credibility or transparency were good things. We all believed somehow in our heart of hearts that they would be important.

All of those same arguments apply to fiscal policy, and maybe even more forcefully.

Thanks very much for chatting with me today.

Groovy.

Recent trends and developments in currency

Alan Boaden and Kristin Langwasser

This article reviews trends in the use of currency in New Zealand and reports developments of particular interest. The value of currency in circulation continues to grow, but there was an unusual increase in high-denomination notes late in 2008, associated with public nervousness about the state of the financial sector. Our review of the quality of one denomination of banknotes in circulation suggests that they meet our high quality standards, and our checking of the authenticity of bank notes indicates that the rate of counterfeiting is very low by international standards. Finally, coin issuance continues at high rates, most likely as the public are still filling stores of coins at home.

1 Introduction

The Reserve Bank has the sole right to issue currency – bank notes and coins – in New Zealand. Maintaining the supply, quality and integrity of the currency is one of the Reserve Bank's core functions. To fulfil this function, the Reserve Bank closely monitors trends in the demand for notes and coins, and undertakes bank note processing operations to maintain the quality, and to check the authenticity, of notes in circulation. Box 1 describes the Reserve Bank's currency function objectives in more detail.

In the rest of this article, we look at trends in the use of currency in New Zealand, and discuss developments of interest relating to our currency function objectives.¹ We look at growth in the value of currency in circulation (section 2), bank note processing and the quality of bank notes (section 3), the rate of counterfeiting (section 4), and coin issuance (section 5). Section 6 concludes.

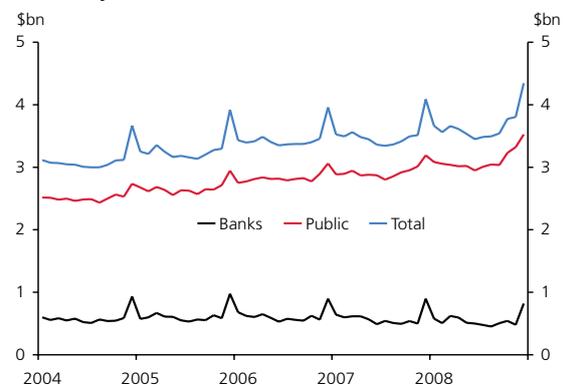
2 Currency in circulation

Currency in circulation comprises notes and coins held by the general public, ie, businesses and households, and that held by banks and other financial institutions. Figure 1 shows that currency in circulation has generally grown steadily over the last several years. The figure also illustrates the marked peak at Christmas each year when banks order additional cash from the Reserve Bank to meet their customers' needs. There was an unusually large increase in currency in circulation in late 2008, which we discuss later in this article.

¹ This article is the second of our annual reviews of trends and developments in currency. The first review is Boaden (2008).

Figure 1

Currency in circulation



Source: RBNZ

Table 1, overleaf, shows that over the last five years, the value of currency in circulation has risen from about \$3.5 billion to over \$4.3 billion, or by 24 percent. Cash held by the general public has risen by over 35 percent, while that held by banks has declined by almost 10 percent.

At the end of 2008, there were 146 million bank notes with a total value of \$4 billion in circulation in New Zealand. By comparison, the value of coins in circulation was about \$300 million.

Currency in the hands of the public – adjusting for inflation and real growth

Over the previous decade, currency held by the general public has doubled from just over \$1.5 billion (annual average for 1998) to slightly over \$3.1 billion (average for 2008). Assuming that the general public's demand for holding cash grows with increasing prices (inflation) and growing real income (real GDP growth), correcting for those

Table 1

Value of currency in circulation (\$m) and annual growth

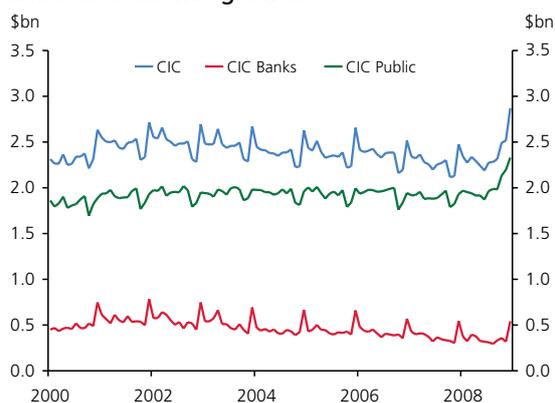
	General public	Banks	Total	Annual growth
Dec 2003	2,597	908	3,505	-
Dec 2004	2,737	930	3,666	4.6%
Dec 2005	2,946	974	3,920	6.9%
Dec 2006	3,061	896	3,958	1.0%
Dec 2007	3,190	896	4,087	3.3%
Dec 2008	3,525	819	4,345	6.3%
5-year growth	35.7%	(-9.8%)	24.0%	-

factors indicates the growth-adjusted real demand for cash as a means of making transactions.

The adjusted series in figure 2 show that, apart from the unusual increase in late 2008, currency held by the public has been almost constant over the previous decade in growth-adjusted real terms, while currency held by banks has decreased slightly in those terms. Overall, there was a slight downward trend in currency in circulation in those terms, visible for most of the decade.

Figure 2

Currency in circulation, corrected for inflation and real economic growth²



Source: RBNZ

The slight decline in the growth-adjusted real value of currency in circulation over most of the current decade is probably due to greater use of debit and credit card payment methods. In other words, the demand for holding cash as a means of making transactions relative to real income and

the price level is declining. The value of EFTPOS transactions grew from \$484 million in 2000 to almost \$1 billion in 2008.³ Had the value of transactions grown with the rate of inflation and economic growth since 2000, it would have reached only \$650 million by 2008. Another indicator for the wider use of electronic payments is the number of EFTPOS terminals, which grew from 84,000 to 131,000 in the same period. The rise of online banking and internet shopping might have also contributed to a reduced use of cash relative to the size of the economy.

Composition of currency in circulation

Table 2 and figure 3, opposite, show that \$20 notes make up half the bank notes in circulation. However, the number of \$50 and \$100 notes in circulation (NIC) increased significantly during 2008, while there was little or only moderate change in the numbers of other denominations. The rise in \$50 notes can probably be attributed to their increasing use in ATMs by some banks.

A more detailed illustration of the recent increase in higher denomination notes in circulation is shown in figure 4. Currency in circulation increases every year towards the end of the year – due to higher demand for cash in the Christmas period. However, the increase in demand for the higher denominations was unusually large in 2008.

² Calculation for the December quarter 2008 based on Reserve Bank estimate of real growth for the quarter.

³ Source: New Zealand Bankers' Association.

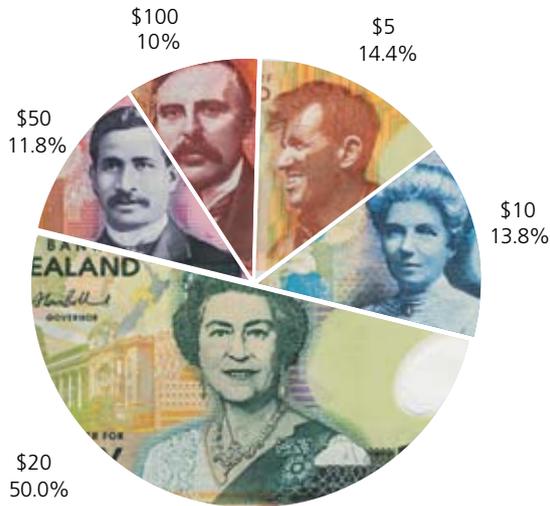
Table 2

Bank notes in circulation as at 31 December 2008

Bank notes	Number (000)	Value (\$000)	Annual growth in value over 2007
\$5	20,957	104,785	4.8%
\$10	20,167	201,674	(-5.3%)
\$20	72,948	1,458,964	(-0.1%)
\$50	17,223	861,165	15.0%
\$100	14,461	1,446,095	10.5%
Total	145,757	4,072,683	6.4%

Figure 3

Number of bank notes in circulation – December 2008 as percent of total



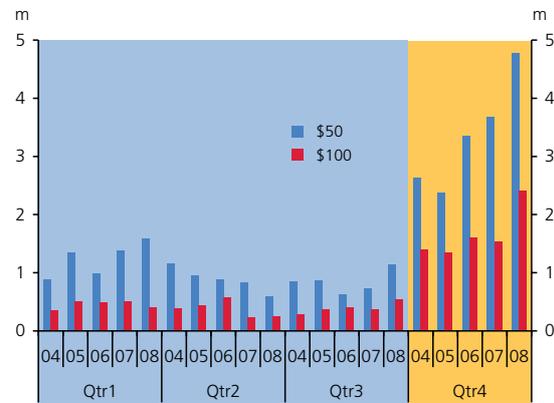
Source: RBNZ

Figure 4 clearly illustrates how, in the December quarter each year, more currency is issued than in other quarters. In October 2008, the crisis hitting financial markets was associated with an increased demand for cash as a store of value. Although there has been an underlying growth trend for the last few years in issuance of the \$50 note due to the shift away from \$20 notes towards \$50 notes in ATMs, comparing the 2008 and 2007 December quarter figures shows what appears to be a jump relative to the trend. The sharp rise in the number of \$100 notes issued in the last quarter of 2008 is more clearly obvious in figure 4.

The issuance of higher denomination notes returned to normal levels shortly after the government announced the Retail Deposit Guarantee Scheme. This suggests that the public had regained some confidence. However, repatriation

Figure 4

\$50 and \$100 notes issued (2004 to 2008)



Source: RBNZ

data does not show a return of the 'extra' \$50 and \$100 notes issued above normal levels in December quarter 2008. This could be partly due to a continuing adverse effect on confidence from the stream of bad news from overseas. It may also be the case, though, that the repatriation of these notes will happen gradually over a longer period.

3 Bank note processing and the quality of bank notes

Note processing

As discussed in box 1, a key function of the Reserve Bank's currency operations is to maintain the quality and integrity of New Zealand bank notes. The principal method for doing this is by the machine processing of notes returned by banks. Notes are counted and checked for quality and authenticity. 'Unfit' notes, which do not meet specified quality standards, are destroyed. This helps to maintain good quality among the notes in circulation. It is also important to destroy unfit

notes because large numbers of old and faded notes in circulation would make it easier to distribute counterfeits, which tend to have a poor appearance.

Banks and Cash in Transit (CIT) companies return notes to the Reserve Bank that are surplus to requirements, particularly after Easter and Christmas. The banks and CIT companies also return notes that their machines or bank staff have identified as damaged or heavily worn.

The Reserve Bank processed about 36 million bank notes in 2008 (of which about 25 million notes were machine processed). The volume of note processing at the Reserve Bank has steadily increased in recent years. This has been due to a number of factors, including the growth in the number of notes in circulation, and the Reserve Bank's purchase of a new note processing machine with more advanced detectors and greater processing capacity.

Table 3 below shows that in 2008, a total of 20 million bank notes were destroyed. This accounted for about 16 percent of notes in circulation. Before polymer notes were introduced in New Zealand, cotton-based paper notes were used. They were less durable and about 60 percent of notes in circulation were destroyed each year. Polymer notes were first issued in New Zealand in 1999. For a number of years, most notes were quite new. Most of the unfit notes returned to the Reserve Bank were those that had suffered damage in some way. Now, however, the Reserve Bank is receiving more notes that, through regular handling, have suffered a degree of ink fade or some other form of gradual wear and tear.

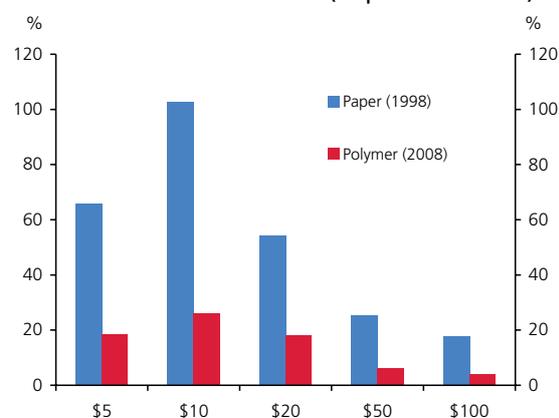
Figure 5 below shows that for each denomination, the rate of paper note destruction greatly exceeded the current rate

of polymer note destruction. Figure 5 also shows that lower denomination notes are the most commonly destroyed as they are used and handled most frequently while in circulation.

Quality of bank notes

An indication of the quality of notes in circulation has been provided by a recent analysis by the Reserve Bank of 400 \$10 notes collected from various places around New Zealand. One of the most important features in the public's perception of a bank note's quality is the note's ink wear. The ink on older notes becomes faded due to repeated handling. The quality of a bank note, in terms of ink wear, can be differentiated into three categories. A 'very good' note shows almost no ink wear, hence is new or almost new. A 'good' note shows very minor ink wear, while the ink on a 'poor' note has moderate to considerable fading.

Figure 5
Bank note destruction rates (as percent of NIC)



Source: RBNZ

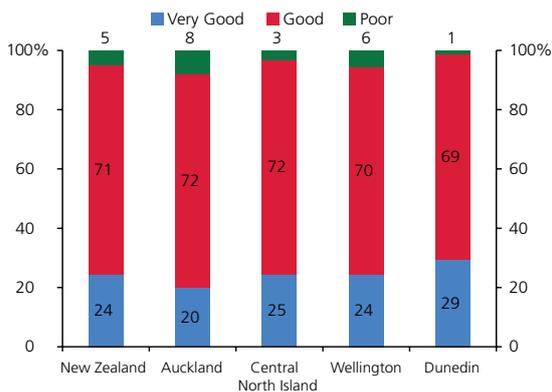
Table 3
Destruction of polymer notes in 2008, and paper notes in 1998

(000)	\$5	\$10	\$20	\$50	\$100	Total
Polymer notes destroyed (2008)	3,515	4,738	10,560	847	482	20,142
Average polymer notes in circulation	19,235	18,265	58,461	13,542	12,498	122,001
as % of all notes in circulation	18.3%	25.9%	18.1%	6.3%	3.9%	16.5%
Paper notes destroyed (1998)	7,712	12,650	17,744	1,853	835	40,794
Average paper notes in circulation	11,742	12,300	32,742	7,300	4,733	68,817
as % of all notes in circulation	65.7%	102.8%	54.2%	25.4%	17.6%	59.3%

Source: RBNZ

Figure 6 displays the findings of the survey of \$10 notes. Overall, poor notes accounted for only 5 percent of the sample. Although regional differences are visible, nowhere in the country were more than 10 percent of poor quality notes found. Interestingly, more poor quality notes were found in Auckland and Wellington than in Dunedin and in more rural areas. One might have expected that in the larger cities notes would be more regularly sorted by banks and CIT companies, with poor notes being withdrawn from circulation more quickly. It is possible, though, that bank notes are used more frequently in larger cities and thus suffer more wear and tear.

Figure 6
\$10 note quality by ink wear – regional differences



Source: RBNZ

The Reserve Bank has also collected \$5 and \$20 notes (400 notes of each denomination) from around New Zealand. These are currently being analysed. Broader measures of quality, incorporating factors such as structural damage (holes and tears), loss of tactility or stains, are also being investigated.

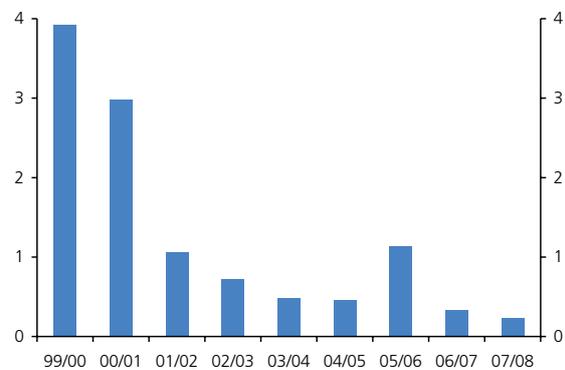
4 Counterfeiting

Another key objective of the Reserve Bank is to ensure that the rate of counterfeiting is as low as possible. The number of forgeries of New Zealand bank notes is, fortunately, very low by international standards.

The Reserve Bank monitors the number of counterfeits it finds in its note processing operations each year. Dividing

this number by the number of notes processed provides an estimate of the number of counterfeits in general circulation.⁴ It is normal practice to express the rate of counterfeiting as the number of counterfeits per million notes in circulation. Rates of 40 or 50 per million are found in some advanced countries, and rates have risen as high as 200 to 300 per million in some countries in some years. Figure 7 below shows that the counterfeit rate in New Zealand (measured as described above) was 3 to 4 per million ten years ago, but more recently has generally been less than 1 per million.

Figure 7
Counterfeits detected per million notes processed



Source: RBNZ

Note: The counterfeits detected in 2000 and 2001 were virtually all from the paper series.

The introduction of polymer bank notes in 1999 has contributed significantly to the decline in counterfeits. One of the prime motivations for the Reserve Bank's change to polymer notes was to take advantage of the security features offered by the new technology – especially the use of transparent windows. The New Zealand polymer notes have two clear windows, one of which has the denomination of the note embossed on it (see figure 8). This feature is designed to be easily seen by the public and cash handlers without the need to hold the note to the light.

⁴ The Reserve Bank is currently undertaking some work to check that this measure is an accurate indicator of the number of counterfeits in general circulation.

Figure 8
New Zealand \$50 polymer note with embossed window



Photo: Securrency Pty Ltd

The polymer substrate itself has also proved to be a significant deterrent to counterfeiting, as it is difficult, particularly for amateurs, to produce a copy of a bank note on plastic. To date, all counterfeit New Zealand notes detected have been produced on paper and have generally been relatively poor reproductions.

5 Coins

The number and value of coins in circulation at the end of December 2008 is shown in table 4 below. The total value of coins in circulation was \$275 million. This represented 6.3 percent of the value of currency in circulation as at 31 December 2008.

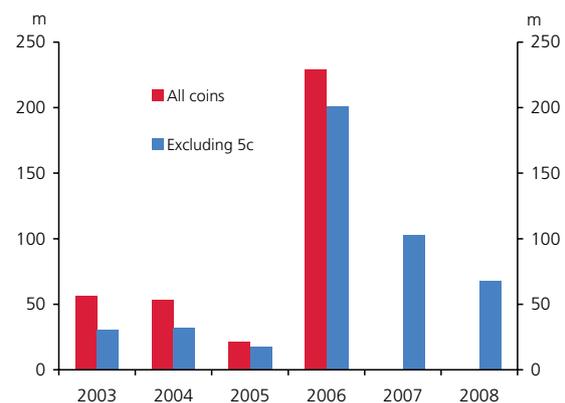
Table 4
Coins in circulation

	Number of coins (000)	Face value (\$000)
10 cent	130,407	13,041
20 cent	121,803	24,361
50 cent	56,659	28,329
1 dollar	73,833	73,833
2 dollar	67,476	134,952
TOTAL	450,177	274,516

Source: RBNZ

The demand for coins of all denominations has changed markedly since the introduction of the new copper- and nickel-plated steel 10, 20 and 50 cent coins in July 2006 and the demonetisation of the old cupronickel coins that they replaced.⁵ A high level of demand was expected in the second half of 2006 when the Reserve Bank replaced the working balances of banks, retailers, other businesses and households. However, strong demand continued all through 2007. Demand declined in 2008, but is still significantly higher than prior to the 'silver coin' changeover, particularly considering the withdrawal of the 5 cent coin, which accounted for about half of all coin issues prior to July 2006. Figure 9 below shows the total number of coins issued each year from 2003 to 2008.

Figure 9
Number of coins issued



Source: RBNZ

⁵ Boaden (2008) provides a detailed discussion of issuance of new coins and repatriation of old ones in the months following the Reserve Bank's 'silver' coin review in 2006. Oliver (2008) discusses the technical aspects we considered in the decision to move to copper- and nickel-plated steel coins.

The main reason why demand has remained so high appears to be that many households emptied large hoards of coins in 2006 and these emptied stores are still being refilled. Research undertaken by ACNielsen on behalf of the Reserve Bank suggested that the average New Zealand household in 2005 had about 200 coins stored in various places at home. This was two or three times the number of coins in active circulation; ie, being frequently used to make transactions. Even if all coins issued in 2007 and 2008 have found their way into these stores, they would represent only about 50 percent of the level in stores prior to the withdrawal of the old coins. The demand for new coins may therefore remain above pre-2006 levels for some years yet. To improve the efficiency of New Zealand's currency system, the Reserve Bank encourages all households to bring these coins out of store and use them again for purchasing goods and services.

Box 1

Currency function objectives

The Reserve Bank has the sole right under the Reserve Bank Act (1989) to issue currency – bank notes and coins – in New Zealand. The Reserve Bank's Statement of Intent (SOI) for 2008–11 sets out the specific objectives and Key Performance Indicators (KPIs) for its currency function. This box describes the objectives and KPIs in more detail and explains how the Reserve Bank intends to achieve them.

The Reserve Bank's fundamental objective, or mission, for the currency function is "to meet the currency needs of the public, as the sole issuer of currency, by ensuring the supply and integrity of bank notes and coins". As the diagram illustrates, there are three distinct components, or measures, to this objective. These relate to the quantity, quality and integrity (authenticity) of currency. For each measure the Reserve Bank has a specific KPI that it aims to achieve. These are set out and explained below.

1. Quantity (supply)

KPI #1: All orders for notes and coins from banks that meet the Reserve Bank's guidelines are supplied within agreed times.

5 Conclusion

Currency (bank notes and coin) remains an important means of settling transactions in New Zealand. The Reserve Bank will continue to ensure that the public's needs for cash are met by maintaining the supply and quality of legal tender currency.

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The Reserve Bank has a 'wholesale' role in the supply of currency. It supplies cash on demand to trading banks. Orders for cash must be in multiples of fixed 'wholesale' quantities and must conform to scheduling guidelines. The Reserve Bank also accepts 'repatriations' of currency from banks. These include 'fit' bank notes that are surplus to industry requirements and 'unfit' notes for destruction. It also accepts surplus and damaged coins on a similar basis.

The demand for currency in New Zealand has a strong seasonal element with peaks at Christmas, Easter and, to a lesser extent, other public holidays. The Reserve Bank holds reserves of currency so that it can meet the strong demand for cash at Christmas and other times of higher demand.

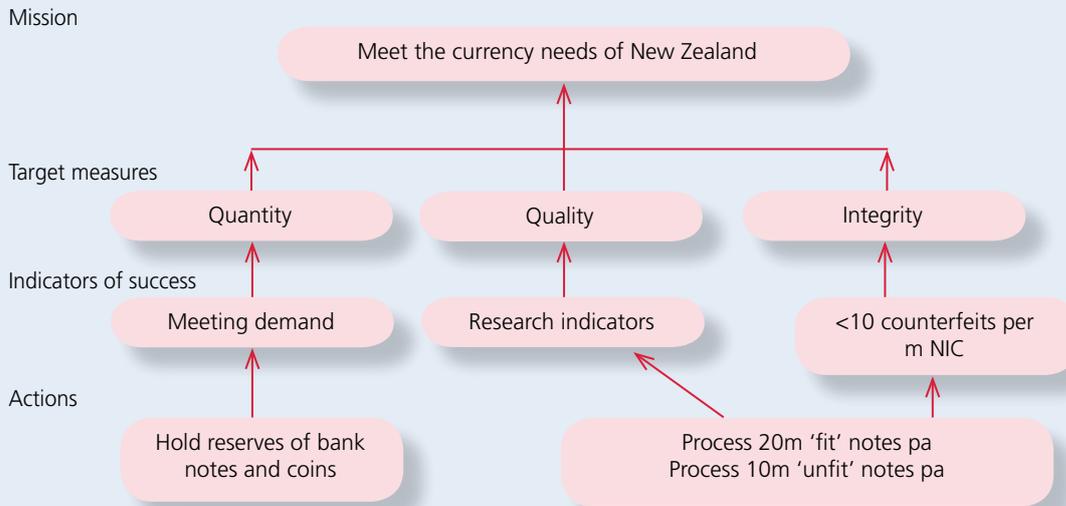
The Reserve Bank also holds currency reserves as a contingency for any crisis that might cause increased demand for cash. Such a crisis might be a major earthquake, a pandemic or a serious breakdown in electronic transaction systems.

The Reserve Bank's measure for its success (or otherwise) in achieving this objective is that it always meets orders for cash from banks that meet specified guidelines.

(continued overleaf)

Chart 1

Currency function objectives



2 Quality

KPI #2: Notes and coins in general circulation are of a good quality as indicated by planned biennial surveys of the condition of currency in circulation.

The Reserve Bank aims to ensure that notes and coins in general circulation are of a good standard. This is important so that the general public finds them suitable for use in making transactions. It also helps users to more readily identify counterfeit notes, which often tend to look like old worn notes.

The Reserve Bank's chief mechanism for maintaining the quality of notes in circulation is the machine processing of notes repatriated by banks (as described in section 3 of this article). Notes that do not meet a set quality standard are destroyed. Banks and security companies provide valuable assistance by sending the Reserve Bank unfit notes that they find as they handle and process notes for their customers.

The Reserve Bank will assess its success in achieving this objective by carrying out biennial surveys of notes in circulation. In late 2008, the Reserve Bank – working with Securrency, the manufacturer of the Guardian polymer used in our bank notes – collected 400 \$10 notes from around the country and evaluated their quality according

to several criteria. Some results are reported in section 3 of this article. A further 400 \$20 and 400 \$5 notes have also been collected and are currently being evaluated.

3 Integrity

KPI #3: The number of counterfeit notes in circulation should be fewer than 10 per million notes in circulation for each denomination.

The number of counterfeit bank notes found in New Zealand is very low by international standards. It is very important that the incidence of counterfeit notes be kept as low as possible so that the New Zealand public can have confidence in New Zealand's currency.

As described in sections 3 and 4 of this article, the Reserve Bank processes bank notes repatriated by banks. It checks the authenticity of these notes, as well their value and fitness. This is the Reserve Bank's principal method for monitoring the level of counterfeiting in New Zealand.

The Reserve Bank's KPI specifies that the number of counterfeits be less than 10 per million notes in circulation. As reported in section 4 of this article, the current rate of counterfeiting is well below this level.

Overview of a recent Reserve Bank workshop: nowcasting with model combination

Kirdan Lees

In December 2008, jointly with the Bank for International Settlements, the Reserve Bank hosted a workshop entitled “Nowcasting with Model Combination”. This workshop was an opportunity for central bank practitioners and local and offshore academics to discuss recent technical advances in how to combine models for ‘nowcasting’ – the forecasting of current or near-term economic conditions. This note provides an overview of some themes that emerged from the workshop. Full papers are available from <http://www.rbnz.govt.nz/research/workshops/december2008/3421588.html>

1 Nowcasting

In some ways, meteorologists have it easy. Despite the difficulties in predicting the vagaries of future weather conditions, they can at least be completely confident about current conditions simply by looking out the window. In contrast, key macroeconomic data are only available with a lag of some months. Macroeconomists must therefore produce ‘nowcasts’ of the current situation.¹

The term ‘nowcasting’ refers to the forecasting of current economic conditions for which data are not immediately available, although the term is often loosely used to describe short-term forecasting one or two quarters ahead. An ability to accurately estimate the current situation is important because it influences future economic outcomes, and hence the appropriate monetary policy response.

Macroeconomists have constructed a number of ways to deal with the nowcasting problem. One approach is to use large sets of macroeconomic indicators, such as surveys of business confidence, to help infer what GDP might look like.² Other researchers have shown that simpler approaches that use lags of GDP only can produce reasonable nowcasts for GDP. In one paper from the workshop, Lee, Olekalns and Shields (2008) show that modelling the properties of data revisions can help improve nowcasts.

¹ For example, the Reserve Bank *Monetary Policy Statement* released on 12 March 2009 was predicated on nowcasts of New Zealand GDP for the first quarter of 2009, since the official figures (that will still be subject to revision) will be released by Statistics New Zealand on 12 June, 2009.

² See Matheson, Mitchell and Silverstone (2007), for example, who use firms’ responses to the New Zealand Quarterly Survey of Business Opinion as macroeconomic indicators.

2 Model combination

A strong theme that came through in the workshop was that nowcasting performance can often be improved by combining forecasts from a suite of models. Model combination entails constructing forecasts from a number of statistical models and combining them to give a single estimate. This approach produces better forecasts than simply including everything in one single model. The latter approach tends to produce a model that fits historical data very well, but fails to adapt to new data, producing poor forecasts.

In the paper titled “Improving and evaluating short term forecasts at the Norges Bank” (Björnland *et al.*, 2008), Leif Anders Thorsrud shows how the Norges Bank weights forecasts from a very large number of alternative models using their forecasting performance, such that models with smaller errors take a higher weight in the averaging scheme. Other papers applied the same principle to alternative sets of models. For example, Shaun Vahey presented a paper (Jore *et al.* 2008) “Combining forecast densities from VARs with uncertain instabilities” that looked at averaging forecasts from variants of vector autoregressive (VAR) models.

Model combination is also an important component of weather forecasting, where the technique is known as ensemble forecasting. Two papers from the conference (Galbraith and van Norden, 2008 and Mitchell and Wallis, 2008) explore some of the overlap and connections between economics and the weather forecasting literature.

3 Structural change

A second theme that came through in several of the conference sessions was the issue of how to detect structural change in our models of the economy, and how to sensibly adjust our forecasts when we know structural change is present. This theme was particularly relevant given the current financial crisis, which challenges the use of fixed-parameter statistical models estimated on recent historical data.

The first paper in the conference, "Has models' forecasting performance for US output and growth and inflation changed over time and when?" (Rossi and Sekhposyan, 2008), shows that most variables lose their information content for forecasting US output growth around the mid-1970s. For the US, very few variables actually help improve the forecasting performance over simple statistical models that only use previous values of inflation to predict inflation and previous values of output growth to predict output growth. The ability to predict US inflation has decreased, with general moderation in macroeconomic volatility.

Later in the workshop, Simon Price presented some simple methods for detecting structural change. In a companion paper, Eklund, Kapetanios and Price (2008) show that combining forecasts from models both with and without breaks, and employing rolling regressions, can help improve forecasting performance.

4 Density forecasts

The final area of discussion was the use of 'density' forecasts or fancharts to portray the full balance of risks for a specific event, such as the probability of recession, or the probability of inflation moving above three percent over the medium term. Densities and fancharts show the full range of possible events and the likelihood of each event. The Bank of England has produced forecasts for a number of years to show the probability of different inflation outcomes. Many of the papers in the conference (for example, Gerard and Kristoffer, 2008) apply model combination techniques to density forecasts, rather than to simple point forecasts, to improve forecasting results.

5 Concluding comments

At the workshop, participants learnt about a range of developments in the recent forecasting literature. The Reserve Bank will continue to keep abreast of developments. In particular, producing density forecasts is an appealing method for presenting the full range of risks around forecasts, and is an area the Reserve Bank will pursue in the future.

The success of the Nowcasting workshop can be directly attributed to the willingness of a wide range of academics and policymakers, from both New Zealand and offshore, to come together and engage in productive debate about the issues.

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Matheson, T, J Mitchell and B Silverstone (2007) 'Nowcasting and predicting data revisions in real time using qualitative panel survey data', Reserve Bank of New Zealand *Discussion Paper* 2007/02.

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Rossi, B and T Sekhposyan (2008) 'Has models' forecasting performance for US output growth and inflation changed over time and when?', conference paper.

Nowcasting with model combination: conference programme

Thursday, 11 December 2008

Has models' forecasting performance for US output growth and inflation changed over time, and when?

Barbara Rossi, Duke University

Forecast combination and monitoring for structural change

Simon Price, Bank of England

Nowcasting, business cycle dating and the interpretation of new information when real-time data are available

Kalvinder Shields, University of Melbourne

Nowcasting the New Zealand economy with a big BVAR

Troy Matheson, Reserve Bank of New Zealand

Combining forecast densities from VARS with uncertain instabilities

Shaun Vahey, Melbourne Business School

Predicting local and national house prices

Chris Otrok, University of West Virginia

Friday, 12 December 2008

Improving and evaluating short term forecasts at the Norges Bank

Leif Anders Thorsrud, Norges Bank

Incorporating conjunctural analysis in structural models

Francesca Monti, European Center for Advanced Research in Economics and Statistics

Short run forecasting at the Federal Reserve Bank of Atlanta

John Robertson, Federal Reserve Bank of Atlanta

Combining multivariate density forecasts using predictive criteria

Hugo Gerard, Reserve Bank of Australia

Evaluating density forecasts: is sharpness needed?

James Mitchell, National Institute of Economic and Social Research

The calibration of probabilistic economic forecasts

Simon van Norden, HEC Montréal

Coping with global financial and economic stresses

Alan Bollard and Tim Ng

This article reproduces the paper for a speech given by Governor Alan Bollard on 30 January 2009 to the Canterbury Employers' Chamber of Commerce, Christchurch, New Zealand. It discusses the causes and consequences of the credit boom this decade in developed Western economies, the policy actions taken in response in New Zealand and offshore, and the road ahead.

1 The great turbulence

The period known as the Great Moderation has ended. That era, roughly dating from the mid-1980s to the mid-2000s, was characterised by strong growth, low and stable inflation, and internationalisation of trade and financial flows. By the end, it was also associated with very large imbalances of savings and investment, and a consequently very large increase in the stocks of credit outstanding. These imbalances and excessive credit stocks remain evident at the household, business and national levels.

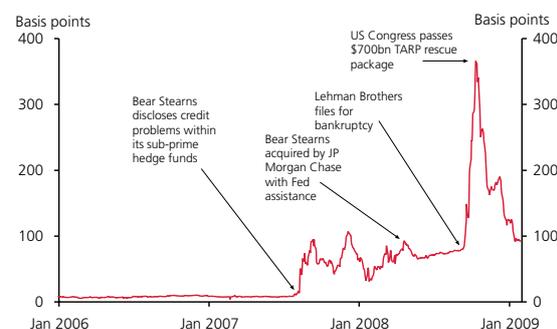
The process of correction to these imbalances has revealed vulnerabilities in the world's major financial institutions and financial systems. The supply of credit is under severe contractionary pressure, putting immense pressure on economic activity everywhere. Central banks, financial regulators and governments around the world have taken, and are continuing to take, extraordinary action to limit the damage to the financial system and global economy.

This speech looks at what the next few years may bring. I first review the story so far, in the international and domestic economies. I then look at how the correction process might play out over the coming year or so. New Zealand is better-placed than many of our trading partners to weather the crisis. This is both for structural reasons, and also because of the remedial policy actions we have already taken and are positioned to take if necessary. Finally, I discuss the road ahead. I look at how New Zealand households, firms and banks can be expected to cope with the stresses, and how we will use policy to smooth the ride where we can.

2 The story so far

Since the onset of the crisis in 2007 there has been a rapid-fire succession of extraordinary events and policy interventions. Some of the higher-profile triggers of market volatility are shown in figure 1, overlaid upon the spread between US short-term interbank interest rates and the market's expectation of future official interest rates. Normally this spread is close to zero. The difference from zero is a measure of the level of financial market dysfunction. As figure 1 shows, this measure of dysfunction waxed and waned considerably through the period, but was substantial throughout.

Figure 1
Disruptive events and the US 3-month LIBOR-OIS spread



Source: Bloomberg

This is but a small fraction of everything that has been relevant, for obvious reasons of space. In the rest of this section, I try to knit it together into a single story, probably risking oversimplification along the way. The narrative here is necessarily linear, but that obscures many important feedbacks and interactions. These feedbacks are a very real part of understanding and coping with the turmoil.

It is no accident that the massive simultaneous surges in the prices of commodities, equities, housing and other real estate around the world since the mid-2000s until 2007 match the surge in credit. In hindsight, this correlation can be explained fairly simply as the mutual reinforcement of a number of powerful factors. Emerging market countries, especially in Asia, ran high rates of national savings out of the earnings from strong export-led growth. As world oil prices surged, national savings in oil exporting countries also increased rapidly. Finally, the developed world ran fairly loose monetary policy as part of the recovery from the 2000-01 recession. In this environment, the premium charged for credit risk fell to low levels through the middle part of the decade (figure 2). The growth in asset prices in the latter part of this period increased capacity for secured borrowing, adding further stimulus for credit growth.

Figure 2
Spread between US 10-year sub-investment grade corporate bond yields and US government bond yields

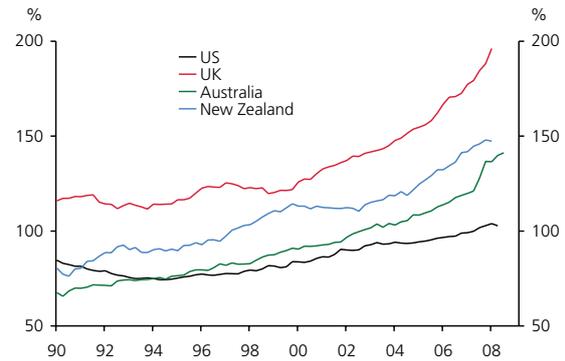


Source: Datastream

Together, these factors enabled the funding of an extraordinary rate and diversity of financial innovation and credit creation in the developed world, and very substantial increases in the ratios of credit to GDP in developed countries, particularly the UK (figure 3).

Also fuelling the credit growth through the period was a shift of the major US and European banks away from the traditional 'originate to hold' banking model towards an 'originate to distribute' model, which for a range of reasons was seen as more profitable. In 'originate to hold', mortgage and other credit originations typically stay on the

Figure 3
Credit-to-GDP ratio



Sources: IMF, Datastream

originating bank's balance sheet until maturity. In 'originate to distribute', the credit originations are securitised and sold, removing them from the originating bank's balance sheet. A typical securitisation would involve, along the way, the creation and sale of derivatives based on the securitised exposures, further increasing the fee-earning potential of the underlying origination in an environment of voracious demand for risk.

'Originate to distribute' enabled a greater amount of credit creation to be supported by the same amount of financial system capital. It also made it harder for the institutions involved in the process of credit supply and derivative creation to assess their credit risk exposure and price it, because of the greater number of independent institutions involved, and the complexity of the transactions and instruments. The institutions involved came to depend on credit-rating agencies for the apparently simple risk summary contained in a credit rating.

In the event, the rapid growth and diversity of financial institutions and products ran well ahead of the ability of financial institutions to understand their risk positions, of rating agencies to translate the new exposures that were created, and of regulators to ensure that financial institutions were managing risk prudently. Long-standing, well-conceived banking practices were abandoned as financial institutions focused on maximising short-term profitability. The mutually reinforcing strengths of real and financial demand showed up first in rising prices in the commodity and asset markets. As debt-funded consumption and investment in the developed world surged, generalised inflation pressure began rising.

As suggested in figure 1, the first obvious signs of credit over-extension appeared in mid-2007, as credit impairment on US sub-prime mortgage exposures began to surface. Money market spreads rose quickly in the US and Europe as frictions emerged in the cash markets. Soon, the credit quality and liquidity of other types of asset-backed securities and derivative instruments became subject to doubt. The frictions spread further and markets in which risk is traded away became dysfunctional. Financial institutions became increasingly unwilling to deal with each other as uncertainty about who was exposed, and how badly, became more and more enlarged.

As 2008 progressed, it became obvious that the financial dysfunction was taking a lot longer to clear than expected. Innovative products with strong credit ratings proved less than robust. Unanticipated concentrations and correlations of risk were suddenly revealed – including within the largest global banks and credit insurers. The substantial increase in the diversity and sophistication of financial products and institutions turned out not to have reduced systemic risk through diversification. The fragmentation of risk had not enabled individual institutions efficiently to isolate, hedge and transfer risk. Understanding of risk had become lost in translation as risk was traded across institutions and national borders. Measured regulatory capital that had seemed bountiful up until 2007 now looked thoroughly inadequate.

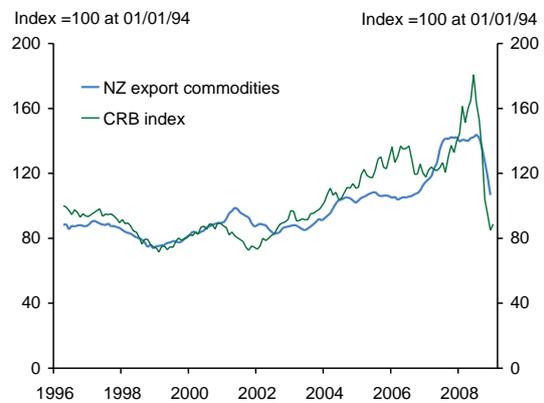
When risks began to crystallise and losses emerge, the destabilising triggers of ratings downgrades, asset price declines and market illiquidity turned out to have more viciously compounding effects on credit availability than anticipated. The willingness of financial institutions to deal with each other broke down. The continued operation of the global financial system turned out to depend on a far larger number of individual markets and institutions than had been assumed. Liquidity bottlenecks in some arcane products and markets, such as monoline bond insurance, became suddenly obvious.

US and European financial system conditions deteriorated significantly in the second half of 2008, especially following the failure of the major US investment bank, Lehman Brothers, in mid-September. Other sizeable financial institutions in the

US and Europe – including AIG, the world's largest insurance company at the time – failed or were restructured during this time. Confidence and the sense of rational discrimination by investors and depositors among Northern Hemisphere financial institutions evaporated.

The feedback between increasingly restricted credit and the slowdown in the housing market and general economic conditions became much more significant. Drastically revised prospects for world growth produced a commodity price slump (figure 4).

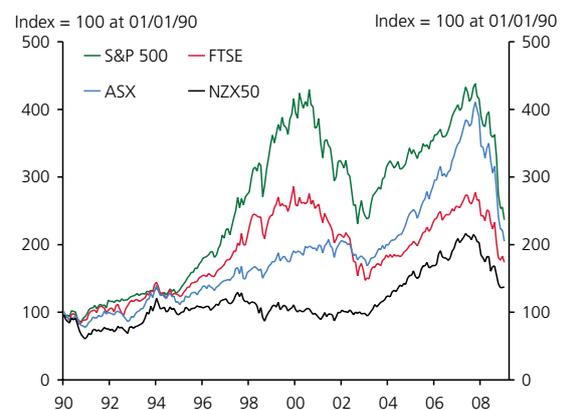
Figure 4
The cycle in international commodity prices



Sources: Bloomberg, Reuters

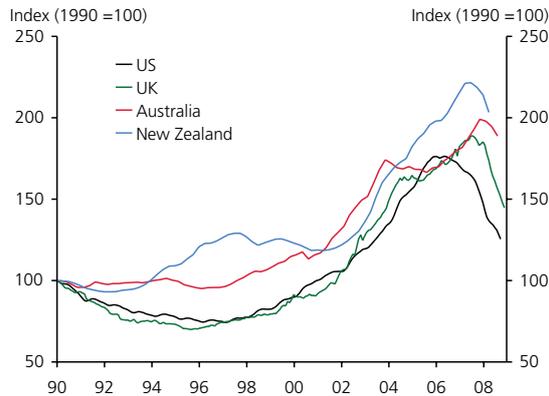
By the end of the year, world equity markets had lost in the order of US\$30 trillion – half their value (figure 5). Real house prices in the US and the UK had fallen from their peaks by a third and a quarter respectively, with still no sign of deceleration in their rates of descent (figure 6, opposite).

Figure 5
Equity prices



Source: Bloomberg

Figure 6
Real house prices



Sources: National data sources, Datastream, RBNZ estimates

The synchronisation of equity market cycles across the world has been remarkable, not least because it has included parts of the world with financial systems less directly affected by the problems in the US and Europe, such as most of Asia. The degree of synchronisation in house prices, though, is even more historically unique. It has occurred mainly, but not entirely, in the major English-speaking countries (including New Zealand and Australia), where the increase in household leverage was particularly enthusiastic.

Combining the plunges in value of these two major asset classes implies that households, businesses and sovereign wealth funds all lost massive amounts of wealth. The fall in US house prices alone suggests a typical loss of half the wealth of households in their prime earning years – more than US\$50,000 for every US homeowner, or US\$4 trillion in total.¹

The international policy response

Through the turmoil, the authorities in the major Northern Hemisphere economies escalated their responses, as it became clear that successive interventions were at best only holding back the tide.

The initial response to the deterioration in liquidity conditions in 2007 was an increase in central bank money market operations, designed to increase the volume and availability of cash in the banking system. Various, central banks

widened the range of collateral they would accept in return for cash, relaxed the conditions on which they would grant emergency lending, encouraged banks to use emergency lending facilities, and arranged swap lines with each other to ease foreign exchange shortages in offshore markets.

Troubled financial institutions had to be rescued with the use of public funds, in cases where the institution's failure was deemed to be a threat to the stability of the system. The UK government announced a blanket guarantee of all deposits of Northern Rock, the mortgage lender, in September 2007. Major US investment bank Bear Stearns was acquired by JP Morgan Chase with financial assistance from the US Federal Reserve in a deal announced in March 2008.

Subsequently, as the problem widened and developed into widespread public concern about the fundamental solvency of some major financial institutions, governments in many countries moved to restore confidence with more sweeping measures. The coverage limits under deposit insurance schemes were extended or, in some countries, removed altogether. System-wide guarantees of other bank liabilities were introduced also.

In the second half of 2008, central banks responded to the intensifying risks to the economic activity with rapid reductions in official interest rates, in some cases coordinated. Many governments announced large fiscal stimulus packages.

The large-scale nationalisations of the financial system and acquisition of financial risk in the Northern Hemisphere have distorted incentives, and this will have to be addressed in the future. More immediately, the expansion in the public balance sheet, combined with the financing burden of the fiscal stimulus packages, have reduced fiscal resilience and constrained the scope for future fiscal action. The elevated risks to fiscal and external sustainability are already being priced and watched closely by sovereign credit rating agencies. The ratings of a number of Northern Hemisphere countries have already been downgraded.

The New Zealand version

The emergence of money market frictions in the US and

¹ Baker and Rosnick (2008).

Europe in the second half of 2007 spilled over onto New Zealand shores instantly. The spread between local short-term interbank interest rates and expectations of official rates rose, reflecting the increased premium on liquidity worldwide. However, although there was a degree of friction in trading conditions, money generally continued to flow.

As a precaution, the Reserve Bank introduced a range of measures to expand the scope of our money market operations, along the lines of those taken by central banks elsewhere, in order to ease the liquidity pressures that had emerged in the local interbank market. As the international turmoil continued into 2008 and deepened, we broadened our liquidity facilities further, primarily as a precaution to ensure that the banking system could handle any additional liquidity pressures were they to arise.

The international financial turmoil arrived at a time when a number of local finance companies were already under pressure, largely due to credit weaknesses specific to that sector and to particular institutions. The failure rate in the non-bank deposit-taking sector increased as funding became more difficult to obtain. However, the solvency of the core New Zealand financial system was not in doubt, and still is not. We stepped up our usual prudential supervision activities with banks, both to increase the chances of

detecting problems and to ensure that banks themselves were doing everything they could to mitigate their liquidity and other risks.

Table 1 lists the major changes to the Reserve Bank's liquidity facilities and liquidity management processes to date.²

Announcement date

The Australian and New Zealand governments also introduced guarantees of bank liabilities around the time that they were introduced offshore. In the New Zealand case, it was seen as prudent to ensure that depositors remain confident in an environment of extreme global risk aversion and uncertainty. The guarantee of wholesale liabilities was a precaution to maximise the ability of local institutions to participate in international funding markets while they remained disrupted.

In our monetary policy operations, we monitored the weakening in the domestic economy for signs of pressure coming from the international credit turmoil. Domestically, it was clear that the economy was weakening from the housing downturn, although there were offsetting factors from commodity prices remaining fairly high and the Asian and Australian economies remaining fairly robust, until quite late. The Reserve Bank began cutting the OCR in July 2008,

Table 1
Changes to New Zealand liquidity management arrangements

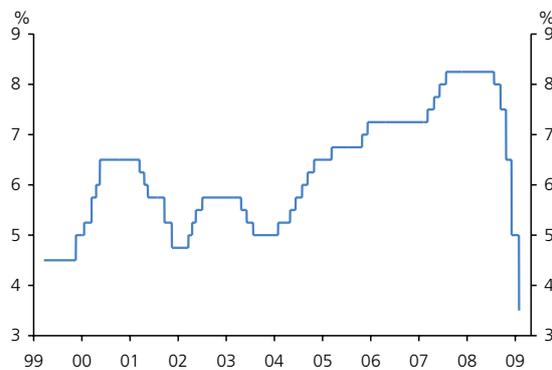
Announcement date	Measure
2007 23 Aug	Eligibility of New Zealand bank bills for acceptance in the overnight reverse-repurchase facility
2008 7 May	Eligibility of AAA-rated New Zealand residential mortgage-backed securities and New Zealand wider government sector debt for acceptance in Reserve Bank liquidity operations
	Extension of the maximum term of the overnight reverse-repurchase facility from one day to 30 days
9 Oct	Eligibility of residential mortgage-backed securities in Reserve Bank liquidity operations prior to the securities receiving formal ratings
29 Oct	Establishment of reciprocal currency swap line with US Federal Reserve
7 Nov	Introduction of Term Auction Facility for injection of cash for terms up to 12 months
	Introduction of Reserve Bank bill tender
12 Dec	Eligibility of highly rated New Zealand corporate securities and New Zealand dollar asset-backed securities in Reserve Bank liquidity operations

² See Nield (2008) for more explanation of the Reserve Bank's recent changes to liquidity management arrangements.

in response to the weight of accumulated evidence pointing to reduced need for tight monetary policy. This was despite headline CPI inflation having reached 4 percent for the year to June 2008, mainly due to the influence of record-high petrol prices.

During the worst months of 2008, as the rate of deterioration in the outlook sharply increased, we cut the OCR in steps that are very large by the usual standards of monetary policy operation (figure 7). The rapid abatement of medium-term inflation pressure in New Zealand was such that we saw, and still see, a period of monetary stimulus as now warranted to keep inflation consistent with the target.

Figure 7
New Zealand Official Cash Rate



Source: RBNZ

3 The road ahead

We are now in a period where financial, monetary and regulatory policy-makers around the world are fully occupied in understanding the mess, and in making the transition back to more normal economic conditions as orderly as possible. At the same time, underlying the cyclical volatility and noise are longer-run structural shifts and trends that policy needs to allow to come through.

Booms and busts

The extraordinary surges then collapses in global credit, asset and commodity prices all now resemble, with the benefit of hindsight, overshoots followed by undershoots. The reversal in the price of credit and tightening in credit availability has been extremely abrupt. Most countries are not yet seeing

slowing credit volume growth, due to the masking effect of drawdowns of existing credit lines. However, major international financial markets and banks are now much less willing, or completely unable, to provide new funding, even at very high spreads and with various forms of government support. Anomalous pricing and the breakdown of normal arbitrage between markets is widespread. These are not normal conditions, but an over-correction that should reverse over time as confidence and capacity to trade return.

If history is a guide, housing and equity markets will also overshoot, or may have already. Housebuilding activity in the US has essentially ground to a halt, but the US population continues to grow and needs somewhere to live. Some overshoot of house prices on the downside is probably unavoidable to restart demand for housing and, eventually, new investment. The question is how to limit the downside's extent. Similarly, while there is undoubtedly an overhang of investment at inflated asset prices to be worked off, equity price falls below fair value are how markets typically work to generate opportunities too attractive to pass up.

Finally, the commodity price rise and fall is very large. Oil prices alone quadrupled between 2004 and 2007, before crashing back to the 2004 levels where they are currently. Explaining price movements, let alone gleaning the medium-term trend in prices, is very difficult in liquid markets with limited short-run supply elasticity. On balance, the underlying trend in real commodity prices over coming decades is probably still upward. Financial market hubris during the upswing, and its opposite in the downswing, probably played a significant role in amplifying the cycle.

The fundamentals of supply and demand continue to argue compellingly for underlying strength in prices. For dairy products, for example, we still believe emerging market incomes will grow strongly over the medium term, underpinning growth in demand for protein and a more Westernised diet. For hard commodities, the physical and technological constraints on supply seem difficult to surmount. Whatever the case, large swings in commodity prices seem likely to remain with us in coming years, as supply and demand pressures lever more strongly on limited inventory buffers.

Very noisy signals in credit, asset and commodity prices have resulted in what now look like material misallocations of resources in a range of industries over the past few years. Here in New Zealand, there has been a dairy land price boom, which has spurred large amounts of investment in dairy-related industries, in some cases highly leveraged. The house price boom does not seem to have left us (or Australia) with a significant oversupply of housing (unlike the US, for example). It has, though, produced a large increase in household and developer leverage.

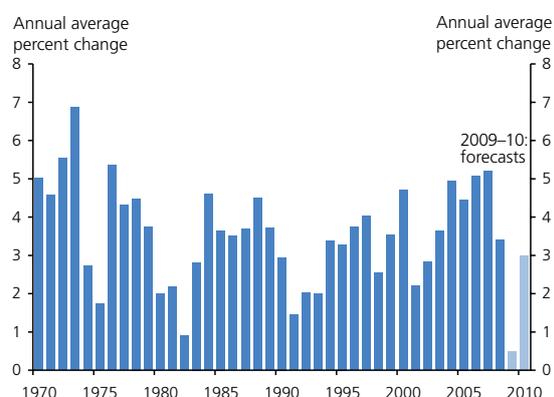
The global recession

Comparisons of the present world recession to previous recessions, and even to the Great Depression of the 1930s, are rife. To be clear, the state of the global economy and the outlook are very serious, but we are nowhere near Depression-level economic conditions. That said, we can certainly learn from the Depression experience.² Then, as now, the global financial system became seriously incapacitated. Concerns about the state of the international economy came in waves. In the present case, markets would take heart from announcements of major official intervention, such as the bailout of the major investment bank Bear Stearns in the US, to be followed by new bouts of adverse news and further reversals of confidence, such as in response to the non-bailout of Lehman Brothers.

However, in macroeconomic terms, the outlook is considerably better. In world growth terms, we are somewhat below the early 1980s recession – that is, worse than the growth troughs in the early 1990s and early 2000s (see figure 8). Unemployment rates will certainly continue to rise, but peak well short of the levels reached in the Depression. Then, unemployment rates rose well above 20 percent in many cases. Policy frameworks were much less well equipped to handle the slump. In some cases, policy responses such as tightening of some fiscal settings and trade protectionism, and prevailing macroeconomic management frameworks such as maintenance of the gold standard, seriously exacerbated the initial problems.

² See Reddell and Sleeman (2008) for an overview of economic conditions in New Zealand at the time of the Depression and other periods of major economic weakness.

Figure 8
World GDP growth since 1970, and IMF forecasts for 2009-10



Sources: IMF, Datastream

Compared to previous global recessions, the current one has some distinguishing features. It originated in the US financial system and quickly spread to the European one, eventually spreading across most regions of the world – but by different means. In the European case, the financial system vulnerabilities were both directly generated by US-originated credit exposures, as well as through a sharp reappraisal of the consequences of the credit boom and adverse relaxation of credit standards within Europe itself. Elsewhere, and especially in Asia, the transmission has been through more conventional trade and commodity price channels, as the East Asian financial systems, including the capacity of the official sector to withstand financial shocks, have remained fairly robust.

To date, Asian and many other emerging market economies have been less affected than in previous episodes. This resilience so far is very different from the crises of the past two decades. However, the adverse impact of the developed world recession on Asian exports and investment is now showing quite strongly. It is not clear how severe the impact may ultimately be.

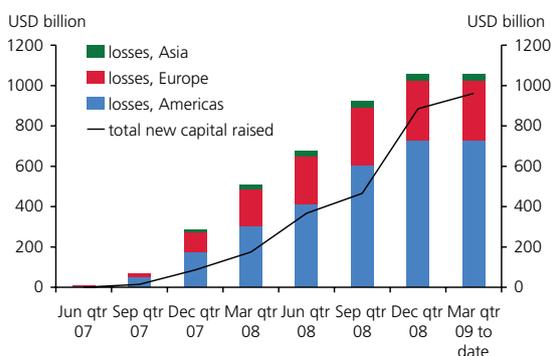
What is needed for stability to return to the world financial system?

Two fundamental conditions are needed for conditions in the global financial system to return to normal. First, housing markets in the US and UK need to stabilise. As suggested earlier, there is a natural limit to how far housing

market activity can fall. Second, sufficient capital as a buffer against risk and as a base for growth needs to be restored to Northern Hemisphere financial institutions. The sufficiency of capital then needs to be transparently observed by all in the market in order for confidence to return and normal financial trading to resume. This latter process may well drag on beyond this year.

So far, the running total of credit losses declared by US and European financial institutions since the crisis began still exceeds the amount of new capital raised (figure 9). And, there remains uncertainty about the level of losses still to be crystallised, or still to be generated as a result of the recession. Financial institutions and authorities face the formidable challenge of establishing credible estimates of the losses still to be borne and the exposures still to be covered, and then finding the new capital to get the financial system back on its feet.

Figure 9
Cumulative credit losses by region and total new capital raised



Source: Bloomberg

Meanwhile, the massive fall in household wealth since 2007, with largely unchanged household debt, means that the financial outlook for households across the developed world (especially those who 'leveraged up' in the boom phase) is now much less healthy, especially in view of the increased threat of unemployment and the reduced fiscal strength of government. Households are likely to respond to this in two ways – first, by cutting back consumption and investment and increasing savings; second, by selling assets to pay off liabilities.

Both processes will keep downward pressure on asset prices and drag on economic activity for many years, probably

beyond the return of normal financial market conditions. Much more cheap credit than was sustainable was taken up over many years, not only by the Northern Hemisphere financial sector and household sector but also certain elements of the corporate sector (the US auto industry, for example). In the early part of the process, the impairment of the financial system will actually force the household and corporate sectors to reduce debt, as the opportunities for leveraged investment in housing and other assets will be much reduced. This increased propensity to save may blunt the impact one might otherwise expect from fiscal and monetary policy stimulus.

Finally, external surplus-running emerging markets, especially in Asia, will have strategic consumption and investment choices to make. Their broad development strategy in the early-to-mid-2000s was to grow national income by exporting cheap consumer goods to developed, largely deficit-running, economies. This strategy will now be less viable given household and national financial retrenchment, and pressure on exchange rates to fall to assist in the reduction of imbalances, in the West. Asian governments will need to generate large increases in consumption and domestic investment demand, to replace the gap left by exports, if they are to continue growing at the high rates needed to meet their national and social development objectives.

The net financial flow from East to West that characterised the middle part of this decade will, as a consequence, need to fall somewhat, even if it doesn't reverse. As the large emerging markets such as China and India continue to develop amid these large shifts in global economic and financial currents, the reduced dependence of the world on consumption and investment in the West and consequent shift of political power will accelerate.

New Zealand's position

New Zealand, like the rest of the Asia-Pacific, has thus far held up better than many developed economies. The global financial crisis hit the Northern Hemisphere first, and hardest. The transmission of the shock to us through Asia and Australia – which together account for half our trade in

goods – has been slower than the transmission from the US to Europe. However, we haven't escaped unscathed either financially or economically. New Zealand investors have lost money. Sectors of the New Zealand economy exposed to external demand have weakened sharply.

A few factors count in New Zealand's favour. The parts of the US and European capital markets that have been most damaged are investment banking, hedge funds, private equity, sovereign wealth funds, and stock, bond and derivatives markets. New Zealand's direct exposure to these parts of the international capital markets, and to complex derivatives or structured credit products, is very light. Our banking system is well capitalised and vanilla, and mortgage lending is generally on good credit quality. The large Australian banking groups, of which the major New Zealand banks are a part, are now among the largest and highest-credit-quality banks in the world.

Also, our established track record for transparency in our regulatory institutions, sound management of the public accounts, and forward-looking monetary policy are well-regarded internationally. Through this episode, we have attracted relatively little adverse attention in financial markets.

Finally, New Zealand's freely floating exchange rate is an effective buffer against the current, internationally sourced, shock. The downturn in international commodity prices, as well as international investor risk aversion and the contraction of liquidity in the global financial system, have led the value of the New Zealand dollar to fall against all the major currencies (figure 10). This has been especially the case against the Japanese yen – the currency of a country that typically runs a current account surplus, unlike the others in the New Zealand TWI. Not only does depreciation cushion the incomes of sectors exporting goods and services priced in foreign currency, it also acts powerfully and in the right direction to encourage the reduction of national debt and re-balancing of sectoral demand that is needed in New Zealand, as a deficit-running country. As a small, open economy with flexible product and labour markets, we should be better positioned than many others to re-orient

Figure 10
New Zealand TWI³



Source: RBNZ.

production and income generation in response.

However, there are also some negative features about New Zealand's situation. Our exposure to the global commodities trade is particularly evident now, with the commodity price volatility currently. The overall impact on New Zealand depends on the balance between imported (oil) and exported (agricultural) commodity prices. Usually, commodity price rises and falls see the New Zealand terms of trade rise and fall more or less in concert, because of the greater proportion of commodities on the export side than the import side. This is the pattern we are seeing currently, with the terms of trade having fallen about 10 percent so far since early 2008.

With open capital borders, defensive monetary or financial system policy actions taken by bigger economies can cause collateral damage to smaller ones. Guarantees of financial institution liabilities, or provision of official credit facilities, inevitably have to have boundaries, to limit the risk of the sovereign granting the guarantee or credit. But in an environment where depositors and investors are panicky, and the appetite or capacity to take risk is limited, the boundary will inevitably generate a rush of funds to the safe side, putting pressure on governments, even in countries with safe financial systems, to 'match' the actions taken

³ The TWI shown in this figure is a 50:50 trade-to-GDP weighted TWI calculated from 1990 onwards. It is the same as the official TWI after 1999, but differs from the official TWI before 1999 because simple bilateral trade weights were used in the official TWI at that time. The analytical measure is preferred to the official measure for analytical purposes, because it is calculated consistently over history.

abroad. We saw this illustrated clearly in October last year with the extension of government guarantees of bank liabilities overseas.

Finally, even though our banking system is vanilla in terms of credit risk, it has vulnerabilities resulting from the need to fund domestic lending activities by offshore borrowing. As is well known, New Zealand has been running a large external deficit for some time, mirrored by a severe household savings imbalance. This imbalance grew even larger during the credit and house price boom. The banks have been funding this shortfall of domestic savings mostly with short-term debt ('commercial paper') issues, which need to be renewed every few months. The increase in New Zealand's external vulnerability was the reason for Standard and Poor's placing New Zealand's foreign currency credit rating on "negative outlook", increasing the focus on the economy's adjustment to the imbalances and the role of fiscal policy in supporting it.

The banks hedge most of the foreign exchange risk on their offshore liabilities, so we do not face the risk of dangerous escalation of the burden of foreign-currency liabilities if the exchange rate falls, as often happens in emerging market crises. However, the debt still does have to be renewed. Part of the price of that renewal, when offshore investors are both skittish and there is little cash around, is that the terms must become more attractive to the investors, through some combination of a lower exchange rate and higher premiums on credit to New Zealand.

The New Zealand economy will be trading through a world economic and financial environment that will be extremely weak for most or all of this year, at least. The impact of the sudden worsening of international economic conditions and substantial monetary stimulus late last year will not become clear for some quarters. The large fiscal stimulus packages announced in our major trading partners do not take effect until later in the year, with lags from there until spending responds. In the near term, there will be considerable downward pressure on the domestic downturn already well under way, with weakness in household expenditure, the export sector and activity likely to persist through the year.

Coping at the business and household level

In light of this weakness and uncertainty about what the year holds, New Zealand businesses and households are understandably behaving cautiously. They are reducing expenses, increasing savings and otherwise shoring up balance sheets. The availability of government-guaranteed savings vehicles at relatively attractive interest rates, certainly compared to those elsewhere, is probably encouraging this behaviour. However, the shutters on spending have not come down completely. Overall, we are seeing a broadly rational response to the difficulties we face.

The massive financial downdrafts hitting the economy this year will force a mix of pricing and wage-setting restraint, moderated employment plans, and higher hurdles for new investment. Within this, the precise coping strategies taken will vary across the economy's sectors, depending on the particular shape of domestic and external forces playing out in each.

None of this will be easy. Business and labour will be challenged by the need to be realistic about the painful adjustment ahead, without undermining our collective ability to respond to the recovery in demand when it arrives. The more that the domestically-generated part of the economy's cost structure can be kept under control, the less pressure there will be for the burden to show up in reduced employment and output.

Banks also will need to play their part. Lending policies have turned conservative and cautious, which is normal banking behaviour in risky times. However, just as the banks have done very well in New Zealand in good times, so they have a key role to play in tough times. They are a critical part of the mechanism by which monetary policy stimulus gets through to the wider economy. While continuing to manage their risk prudently, the banks' challenge will be to continue lending on sound business proposals, to keep working to develop stable sources of funding from depositors and the financial markets, and to keep passing on to lending rates the cuts in wholesale interest rates.

What if things get worse?

What if things get markedly worse? For the Reserve Bank at least, as for other New Zealand authorities and our colleagues abroad, the first priority for the coming year will be to remain ready to respond. Further adverse news is likely and further remedial interventions may well be necessary.

Lest there be any doubt, the tool box is by no means empty. We have done a lot already and it will take some time for these actions to have their full effects, but we are entering the year well-positioned on the monetary policy, liquidity management and prudential policy fronts.

If we need to, there is still room for us to cut the OCR further in response to adverse economic developments. The Policy Targets Agreement provides ample scope to respond consistent with our inflation target. Although there remain local financial market frictions, the conventional monetary transmission mechanism through interest rates is working adequately. We remain confident that we will be able to keep future inflation tracking satisfactorily, with inflation expectations anchored, and both well clear of the danger zone of deflation.

This contrasts with the position of, say, the US and the UK, where official interest rates have been cut to levels close to zero, and where the capacity of banks to lend is seriously constrained. Japan, of course, has had several recent years of experience in this position. Japan still has very low inflation and the difficult challenge of stimulating the economy with little means of imparting conventional monetary stimulus. These authorities are now pursuing other means of reducing the cost of borrowing in the economy. It is possible we may learn from them new techniques to manage the range of effective short- and longer-term interest rates.

The depth and scalability of the Reserve Bank's money market operations and liquidity facilities have served and positioned us well through the current episode.

The expanded facilities – especially the acceptance of residential mortgage-backed securities as collateral and the Term Auction Facility – give us substantial capacity to scale up the volume of cash in the system if required.

Prudential policy will continue to put priority on ensuring that banks adequately manage the risks associated with rolling over their debt funding. Consultation on a proposed new prudential regime for the management of liquidity risk by registered banks closed at the end of last year, and the Reserve Bank aims to finalise the new policy in this area by around March 2009. We expect the finalised policy to reinforce incentives for banks to lengthen the maturity of their funding, and hence reduce their future vulnerability to short-term funding risks. We will be further advancing our work programme with our Australian counterparts on improving regulation and supervision of banks with trans-Tasman operations.

Finally, the Reserve Bank is not the only agency with a role to play in stabilising the economy. Fiscal policy is sharing some of the burden of the shock by stimulating spending, and New Zealand's fiscal position is stronger than that in many other countries. Regulatory policy has the potential to address identifiable problems in a targeted way, though of course longer-term structural adjustments and re-allocations of resources need to be allowed to take place.

4 Conclusions

Last year might have seemed like a blizzard of outlandish news, large-scale economic and financial policy interventions, and confusing messages. We are in the middle of a major international shock, currently developing from financial turbulence into economic recession.

Our banking system remains well capitalised. Widespread credit problems have not suddenly appeared. However, we have not escaped the impact of the massive tightening in credit conditions internationally. In our case, the tightening has exposed vulnerabilities associated with household and external indebtedness. The global recession is also now affecting us through trade channels and a slump in world commodity prices.

The remedial efforts we have taken in New Zealand have probably been about as successful as might be expected. We eased monetary policy substantially and very rapidly. Inflation remains under control, following the largest international commodity- and asset-price surge for decades.

We greatly expanded our liquidity facilities. Cash continues to circulate, in the face of enormous pressure to hoard it.

We continue to develop our monetary policy, liquidity management and prudential policy tools and to consider how the mix of tools might best be applied. This includes working with other government agencies to promote overall stability. Sometimes our tools can be treated independently, sometimes they work together, and sometimes they work against each other, necessitating judgement about the right balance.

Issues remain. This episode has shown that apparently isolated risks can suddenly correlate, threatening the stability of the system. Central bank liquidity operations and the impact of monetary policy will be blunted if credit markets do not work and financial institutions cannot lend. Scarce liquidity makes banks' short-term funding vulnerabilities painfully evident. Debt loads that looked sustainable during good times are less sustainable under crisis conditions.

In the medium term, prices and quantities will adjust to correct imbalances. However, that process can be very rocky for exposed players, with real economic costs. Perhaps the foremost lesson of the Depression experience is that a sequence of setbacks should be anticipated.

In responding to the urgency of cyclical stabilisation, we need to recognise the underlying large structural adjustments under way. The debt build-up will take years to prune back down to sustainable and prudent levels.

It is by no means clear how the international financial system will be organised in the future. The institutions and tools of financial regulation and supervision may well undergo far-reaching change. We need to understand better how financial risks can reinforce each other and harm the macro-economy.

Households, firms and banks will naturally be very cautious during this process. However, we should also be watchful for the opportunities, and mindful of the risks of defeatism. Within the Western world, New Zealand's economy and financial system are relatively well placed to weather the adjustment. Our challenge will be to remain well positioned to take advantage of the economic recovery when it arrives – possibly suddenly and strongly, which has been New Zealand's experience in the past. Households and firms should not pull down the shutters, and banks should continue to lend on sound business propositions.

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DISCUSSION PAPERS

DP2009/01

Revealing monetary policy preferences

Christie Smith

This paper uses multiple criteria decision making, also termed conjoint analysis, to reveal the preferences of central bank policy-makers at the Reserve Bank of New Zealand. Guided by the Policy Targets Agreement between the Governor of the Reserve Bank and the Minister of Finance, we identify policy-makers' willingness to trade off inflation outcomes for reductions in volatility in GDP, the exchange rate, and interest rates. Using 1000Minds software, policy-makers are presented with a sequence of pairwise choices that ultimately quantify which macroeconomic attributes are most important to them. The paper also distinguishes between the preferences of senior management, and a broader cross-section of economists and other staff.

DP2009/02

Real-time conditional forecasts with Bayesian VARs: An application to New Zealand

Chris Bloor and Troy Matheson

We develop a large Bayesian VAR (BVAR) model of the New Zealand economy that incorporates the conditional forecasting estimation techniques of Waggoner and Zha (1999). We examine the real-time forecasting performance as the size of the model increases using an unbalanced data panel. In a real time out-of-sample forecasting exercise, we find that our BVAR methodology outperforms univariate and VAR benchmarks, and produces comparable forecast accuracy to the judgementally-adjusted forecasts produced internally at the Reserve Bank of New Zealand. We analyse forecast performance and find that, while there are trade offs across different variables, a 35 variable BVAR generally performs better than 8, 13, or 50 variable specifications for our dataset. Finally, we demonstrate techniques for imposing judgement and for forming a semi-structural interpretation of the BVAR forecasts.

DP2009/03

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

Mark Smith

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;

- (i) An increase in house prices increase homeowners' wealth, which increases their desired level of expenditure;
- (ii) Rising house prices facilitates additional consumption by reducing credit constraints to homeowners; and
- (iii) 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, research findings from this paper suggest that the house price and consumption relation is most consistent with the presence of wealth effects.

NEWS RELEASES

Everyone needs to play their part

10 December 2008

Reserve Bank Governor Alan Bollard said today that further monetary policy easings depend on all sectors of the economy responding to reduced demand and not adding inflationary pressures to the system.

“We need to see inflationary pressures reducing significantly across the board, if we are to keep on easing monetary policy, thus helping the New Zealand economy to recover,” Dr Bollard told a Wellington business audience.

“With a global economic slowdown, for some commentators, concerns over inflation appear to have taken a back seat. Many commentators are of the view that lower commodity prices and weak economic activity will drive inflation significantly lower.

“It is worth remembering that for the moment, however, inflation rates in New Zealand remain very high. In the September 2008 year CPI inflation reached 5.1 percent, the highest rate since 1990. The higher rates of inflation are broad-based.

“Common drivers have been: strong world commodity prices; domestic capacity pressures due to demand; and sizeable price increases in areas not directly exposed to a high degree of competition, such as local authority rates and electricity prices.”

Dr Bollard said that with substantially lower commodity prices, there is room for further price cuts. Retail margins could be expected to reflect lower costs and the current tight environment. He also noted that banks should not be looking to maintain high profit margins in the current environment. Since July the Reserve Bank has cut the Official Cash Rate by 3.25 percent. Short-term mortgage rates have been cut, but not by this much.

“We would hope that the electricity industry does not take advantage of its market position and keep increasing rates, that local authorities realise they need to set rates increases below inflation for a change, that the construction materials industry respond to much weaker demand, that the food industry react to lower international commodity prices with price cuts, that petrol companies keep cutting forecourt

prices, that the transport industry pass on fuel price cuts, and that the banks pass on interest rate cuts. Only then will all these firms be playing their proper role in New Zealand’s recovery.”

Reserve Bank well placed to manage crisis

11 December 2008

The Reserve Bank is well placed as a “full service” central bank to be fully informed and engaged in the economic and financial system, while it has been weathering extreme international disorder, the Bank says in its Briefing to the Incoming Minister.

The Briefing was released today by the Minister of Finance, the Hon Bill English. It covers the Bank’s responsibilities for monetary policy, financial stability, currency, and payments systems.

“We have direct information flows from all these critical areas and powers to respond where necessary,” Reserve Bank Governor Alan Bollard said. In many other countries, central banks operate only some of these functions.

The Briefing, written before last week’s *Monetary Policy Statement*, says adjustment to the international financial turbulence is proving extremely disruptive, and it will likely be some time before financial market conditions normalise.

The Bank notes that the New Zealand economy is expected to grow only slowly before gaining more momentum toward the end of 2009. Inflation pressures are expected to lessen, although price trends for some non-tradeables inflation remain of concern.

As markets have become more risk averse and illiquid, New Zealand banks’ access to and the cost of offshore funding have been affected. While the Bank expects banks to access all available sources of liquidity, including from shareholders, we have also been widening the eligible collateral that banks can use to access liquidity from it. Further changes to funding and liquidity are currently being discussed with banks.

The Bank is reviewing the longer-term impact of the government deposit and wholesale funding guarantee schemes on prudential supervision policies. The guarantees give non-banks the opportunity to consolidate their balance

sheets and improve systems and risk management practices. Implementation of non-bank deposit taker regulation is continuing, and insurance prudential supervision legislation is expected to be introduced.

In its currency function, the Bank says it is improving the monitoring of trends in the use of currency, and ensuring it is holding sufficient cash reserves for emergencies.

Reserve Bank announces further liquidity measures

12 December 2008

The Reserve Bank today announced further measures to support the New Zealand debt markets and financial system liquidity, in response to the current financial market stress. Deputy Governor Grant Spencer said the measures are similar to actions taken by other central banks in the wake of the global financial market turmoil.

“Following a number of similar measures adopted earlier in the year, we are taking these steps to further enhance system liquidity and ease some of the current pressures on corporate sector funding,” Mr Spencer said.

The new measures, most of which will take effect from 17 December, include the following:

- Extension of the range of securities eligible for acceptance in the Reserve Bank’s domestic liquidity operations to include:
 - Securities guaranteed by the New Zealand government;
 - Highly rated NZ corporate securities, denominated in NZD, with a long term credit rating of BBB- or better;
 - Highly rated NZ corporate securities, denominated in NZD, with a short term credit rating of A2, F2, P2 or better; and
 - NZD Asset Backed Securities rated AAA, A1+, F1+ or P1.
- The current graduated ‘haircut’ regime will apply for all securities eligible for domestic liquidity operations.

- All issues will be approved on a case-by-case basis.

Mr Spencer noted that these liquidity measures did not mean the Reserve Bank would be lending direct to the corporate sector. However, corporate debt will become more liquid and therefore a more attractive investment prospect for banks and portfolio managers.

Mr Spencer emphasised that the measures had no implications for the Bank’s monetary policy stance.

The changes are seen as temporary, to be kept in place while global markets remain unsettled.

Reserve Bank issues consultation paper

19 December 2008

The Reserve Bank today released a Consultation Paper seeking comment on two proposed policies for non-bank deposit takers (NBDTs):

- Related party requirements; and
- Minimum capital ratio framework.

In September 2008, Parliament passed the Reserve Bank Amendment Act empowering the Reserve Bank as the prudential regulatory authority for NBDTs.

The proposed scope of related party regulation as set out in the Consultation Paper includes:

- Definition of a related party;
- Definition of a related party exposure; and
- Setting a maximum limit on aggregate exposure to related parties.

The minimum capital ratio framework has three main components:

- Definition and measurement of capital;
- Definition and measurement of risk exposures; and
- Setting a minimum capital adequacy ratio.

Further details are in the Consultation Paper found on the Reserve Bank’s website <http://www.rbnz.govt.nz/finstab/nbdt/regulation/index.html>

Comments and responses to the questions raised in the

Consultation Paper should be submitted by 9 February 2009, as regulations are targeted to be in place in the second quarter of 2009.

The Bank intends to undertake consultation with stakeholders early next year, and will release details of consultation meetings it will hold around the country.

The Bank will be consulting early next year for NBDTs' credit ratings and liquidity requirements.

Amended Policy Targets Agreement signed

19 December 2008

Hon Bill English

Minister of Finance

A new Policy Targets Agreement signed by Finance Minister Bill English and Reserve Bank Governor Alan Bollard has been released today.

The only change to the Policy Targets Agreement is a statement of the government's economic objectives, as a backdrop for the operation of monetary policy. The statement is as follows: "The government's economic objective is to promote a growing, open and competitive economy as the best means of delivering permanently higher incomes and living standards for New Zealanders. Price stability plays an important part in supporting this objective".

The Finance Minister and Reserve Bank Governor agree that the monetary policy framework and the main features of the Policy Targets Agreement continue to provide the best basis for monetary policy to contribute to the economy returning to a sustainable, stronger growth path over time, notwithstanding the current very difficult international environment.

The Policy Targets Agreement is available on the Reserve Bank of New Zealand website: <http://www.rbnz.govt.nz/monpol/pta/index.html>

December 2008 Reserve Bank Bulletin released

19 December 2008

The Reserve Bank today released the December 2008 issue of the Reserve Bank of New Zealand *Bulletin*.

This edition of the *Bulletin* is built around the theme of liquidity and New Zealand's financial markets.

The first article discusses the evolution of the Reserve Bank's liquidity management arrangements over the past few years. This evolution includes the measures introduced this year as the global financial system turmoil deepened. The arrangements are now more robust and adaptable to a variety of stresses, including those the economy currently faces.

The second article explores how instability in the international financial system spread far beyond its original source in the US sub-prime mortgage market, including to New Zealand. The article discusses the key role of New Zealand's debt to offshore investors – a substantial part of which is due to local banks raising funds offshore for lending in New Zealand.

The existence of settlement risk is one reason why banks need to ensure they have adequate liquidity resources at all times. The third article looks at settlement risk in the retail payment system and how the Reserve Bank is addressing it through its payment system oversight activities.

The fourth article explains the new regulatory framework for non-bank deposit takers.

Finally, the edition includes the results of the Reserve Bank's 2008 survey of *Bulletin* readers.

New bank registered

6 January 2009

The Reserve Bank of New Zealand today announced that Australia and New Zealand Banking Group Limited has been registered as a bank in New Zealand.

Australia and New Zealand Banking Group Limited, which is incorporated in Australia and is the owner of ANZ National Bank Limited, will operate in a limited capacity as a branch

in New Zealand. The status and lending activities of ANZ National Bank Limited in New Zealand are unaffected.

The activities in New Zealand of the Australia and New Zealand Banking Group Limited branch will be restricted, and will not include any retail banking or lending. The new branch will be permitted to acquire mortgages originated by ANZ National Bank Limited and will be funded by the parent bank. The value of the mortgages held by the branch must not exceed \$15 billion in aggregate.

There are now 19 registered banks in New Zealand, which are listed on the Reserve Bank's website.

Tuesday OMO to accept Corporate and Asset-Backed securities

13 January 2009

The Reserve Bank today released details of a change to the daily OMOs, affecting only those held on Tuesdays and starting from 20 January 2009, where just Corporate and Asset-Backed eligible securities will be acceptable as collateral. Details are available at <http://www.rbnz.govt.nz/finmarkets/domesticmarkets/3531101.html>

OCR reduced to 3.5 percent

29 January 2009

The Reserve Bank today reduced the Official Cash Rate (OCR) from 5.0 percent to 3.5 percent.

Reserve Bank Governor Alan Bollard commented that "the news coming from our trading partners is very negative. The global economy is now in recession and the outlook for international growth has been marked down considerably since our December *Monetary Policy Statement*.

"Globally, there has been considerable policy stimulus put in place and we expect this to help bring about a recovery in growth over time. However, there remains huge uncertainty about the timing and strength of a recovery.

"The extent of the decline in global growth prospects and the ongoing uncertainty has played a large part in today's decision. We now expect the impact on New Zealand of

these developments to be greater than we did in December, as a result of a more negative outlook for the terms of trade and exports, and tighter credit conditions.

"Inflation pressures are abating. We have confidence that annual inflation will be comfortably inside the target band of 1 to 3 percent over the medium term.

"Given this backdrop it is appropriate to take the OCR to a more stimulatory position and to deliver this reduction quickly.

"Today's decision brings the cumulative reduction in the OCR since July 2008 to 4.75 percentage points. Lower interest rates will have a positive impact on growth, alongside a lower exchange rate and fiscal stimulus, provided firms and households do not unnecessarily contract their spending.

"To ensure the response we are seeking, we expect financial institutions to play their part in the economic adjustment process by passing on lower wholesale interest rates to their customers. This will help New Zealand respond flexibly.

"Further movements in the OCR will be assessed against emerging developments in the global and domestic economies and the response to policy changes already in place. We would expect any further reductions to be smaller than those seen recently."

NZ needs to be ready for recovery

30 January 2009

New Zealand will be better prepared for economic recovery if households, firms and banks do not "pull down the shutters", Reserve Bank Governor Alan Bollard said today.

Dr Bollard told the Canterbury Employers' Chamber of Commerce the economy is in the middle of a major international shock that is developing from financial turbulence into economic recession.

"Households, firms and banks will naturally be very cautious during this process. However, we should also be watchful for the opportunities, and mindful of the risks of defeatism. Within the Western world, New Zealand's economy and financial system are relatively well placed to weather the adjustment."

Dr Bollard said that past recoveries have occurred suddenly and strongly, and New Zealand needs to remain well positioned for such a recovery. "This has been New Zealand's experience in the past. Households and firms should not pull down the shutters, and banks should continue to lend on sound business propositions."

Dr Bollard said large underlying structural adjustments are under way internationally. The process of readjustment could be very rocky for exposed players, with real economic costs. The debt build-up will take years to prune back to sustainable and prudent levels.

"We have not escaped the impact of the massive international credit crunch. In our case, the tightening has exposed vulnerabilities associated with household and external indebtedness, and how this debt is funded. The global recession is also now affecting us through trade channels and a slump in world commodity prices."

New Zealand's policy responses have probably been about as successful as might be expected, he said.

"We have eased monetary policy substantially and very rapidly. Inflation remains under control, following the largest international commodity and asset price surge for decades. We greatly expanded our liquidity facilities. Cash continues to circulate, despite enormous pressure to hoard it.

"Our banking system remains well capitalised and has avoided the problematic credit exposures that have brought some major overseas financial institutions to their knees."

Entries open for the Reserve Bank Monetary Policy Challenge

9 March 2009

Entries have opened for the Reserve Bank of New Zealand 2009 Monetary Policy Challenge.

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

The Challenge involves students becoming, in effect, central bankers. Just like economists working in the Reserve Bank,

each team analyses the economic conditions facing New Zealand and the outlook for inflation. On the basis of that analysis, they decide on an appropriate setting for the Official Cash Rate (the Reserve Bank's interest rate).

Teams present the reasons for their decision in a written submission and, if selected as a regional finalist, give an oral presentation. Regional finals will be held in Dunedin, Christchurch, Wellington, Hamilton and Auckland during August.

The winning team from each region will be invited to the Reserve Bank to compete in the national final, to be held on 27 August 2009. The winner of the national final will receive a cash prize and its team will be invited to attend the Monetary Policy Statement release in Wellington on 10 September 2009.

Past winners of the competition have included Scots College, Wellington (2008), New Plymouth Girls' High School (2007) and St Kentigern College, Auckland (2006).

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

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

Entries close on 3 April 2009 and an information pack has been sent to each secondary school. The Challenge is run annually and began in 2002.

OCR reduced to 3 percent

12 March 2009

The Reserve Bank today reduced the Official Cash Rate (OCR) by 50 basis points to 3 percent.

Reserve Bank Governor Alan Bollard said: "The world economy deteriorated very rapidly late last year, amid ongoing losses and extreme volatility in international financial

markets. While monetary and fiscal policy responses in many countries have been substantial we still expect the adverse economic forces generated by the crisis to remain dominant throughout 2009. The timing and extent of global recovery remain highly uncertain.

“In New Zealand, the impact of difficult trading conditions is showing through clearly in reduced export revenues, weak business sentiment, and sharply curtailed investment and employment. Further house price falls and increased precautionary saving by households are driving a weakness in spending. Inflation pressure is abating rapidly as a result.

“The OCR has now been reduced 525 basis points in little more than six months, taking interest rates to very stimulatory levels. Further falls in the lending rates faced by households and businesses are in the pipeline. While credit growth is easing in line with the weak economy, we expect financial institutions to continue lending on sound business propositions, to support the recovery.

“In addition to the substantial change in monetary policy settings, there has been a large amount of stimulus from

fiscal policy. These policy changes, together with the sizeable exchange rate depreciation, will act to support the New Zealand economy: therefore, we expect to see activity troughing in the middle of this year and then gradually picking up thereafter. However, the scale of the global financial crisis is such that there is great uncertainty about future economic developments and there is a risk that the recovery may occur later and be more protracted than we anticipate.

“As economic activity troughs, we expect the rapid easing of monetary policy to slow. Any future cuts will be much smaller than observed recently. We do not expect to see in New Zealand the near-zero policy rates of some countries. New Zealand needs to retain competitiveness in the international capital markets. We will assess the need for further cuts in the OCR against emerging developments in the global and domestic economies and the responses to policy changes already in place.”

PUBLICATIONS

Regular publications

Annual Report

Financial Stability Report

Monetary Policy Statement

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

Published in October each year.

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

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

Recent Reserve Bank Discussion Papers

2008

DP2008/01	Some benefits of monetary policy transparency in New Zealand <i>Aaron Drew and Özer Karagedikli, January 2008</i>
DP2008/02	Explaining movements in the NZ dollar – central bank communication and the surprise element in monetary policy? <i>Özer Karagedikli and Pierre L Siklos, January 2008</i>
DP2008/03	Changes in the transmission mechanism of monetary policy in New Zealand <i>Aaron Drew, Özer Karagedikli, Rishab Sethi and Christie Smith, February 2008</i>
DP2008/04	'Automatic' cycle-stabilising capital requirements: what can be achieved? <i>Tim Ng, February 2008</i>
DP2008/05	How do housing wealth, financial wealth and consumption interact? Evidence from New Zealand <i>Emmanuel De Veirman and Ashley Dunstan, February 2008</i>
DP2008/06	The tax system and housing demand in New Zealand <i>David Hargreaves, February 2008</i>
DP2008/07	Heterogeneous expectations, adaptive learning, and forward-looking monetary policy <i>Martin Fukac, May 2008</i>
DP2008/08	A macro stress-testing model with feedback effects <i>Mizuho Kida, May 2008</i>
DP2008/09	Analysing shock transmission in a data-rich environment: A large BVAR for New Zealand <i>Chris Bloor and Troy Matheson, May 2008</i>
DP2008/10	Incorporating judgement with DSGE models <i>Jaromír Beneš, Andrew Binning and Kirdan Lees, September 2008</i>
DP2008/11	Limited information estimation and evaluation of DSGE models <i>Martin Fukac and Adrian Pagan, September 2008</i>
DP2008/12	The relative size of New Zealand exchange rate and interest rate responses to news <i>Andrew Coleman and Özer Karagedikli, September 2008</i>
DP2008/13	Real-time prediction with UK monetary aggregates in the presence of model uncertainty <i>Anthony Garratt, Gary Koop, Shaun P Vahey and Emi Mise, September 2008</i>
DP2008/14	Over the hedge? Exporters' optimal and selective hedging choices <i>Richard Fabling and Arthur Grimes, October 2008</i>
DP2008/15	Practical monetary policies <i>Alfred V Guender and David Gillmore, October 2008</i>
DP2008/16	Inheritances and their impact on housing equity withdrawal <i>Phil Briggs, December 2008</i>

DP2008/17	Does natural rate variation matter? Evidence from New Zealand <i>Michael Kirker, December 2008</i>
DP2008/18	Combining forecast densities from VARs with uncertain instabilities <i>Anne Sofie Jore, James Mitchell and Shaun Vahey, December 2008</i>
DP2008/19	The evolution of the Forecasting and Policy System (FPS) at the Reserve Bank of New Zealand <i>Felix Delbrück, Ashley Dunstan, David Hargreaves, Ashley Lienert, Hamish Pepper and Cath Sleeman, December 2008</i>
2009	
DP2009/01	Revealing monetary policy preferences <i>Christie Smith</i>
DP2009/02	Real-time conditional forecasts with Bayesian VARs: An application to New Zealand <i>Chris Bloor and Troy Matheson</i>
DP2009/03	Evaluating household expenditures and their relationship with house prices at the microeconomic level <i>Mark Smith</i>

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

Selected other publications

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

Pamphlets

Explaining Currency

Explaining Monetary Policy

The Reserve Bank and New Zealand's Economic History

Central Banking in New Zealand

This is the Reserve Bank

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

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

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

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

Vol. 71, No. 1, March 2008

Money and credit

The use of money and credit measures in contemporary monetary policy

Recent trends and developments in currency

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

Future directions for Reserve Bank financial statistics

The business cycle, housing and the role of policy

Vol. 71, No. 2, June 2008

The New Zealand business cycle and monetary policy

Some perspectives on past recessions

The changing transmission mechanism of New Zealand monetary policy

The relationship between financial stability and monetary policy

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

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

Vol. 71, No. 3, September 2008

Inflation

Flexibility and the limits to inflation targeting

Inflation in New Zealand's trading partner economies

The costs of inflation – what have we learned?

Events precede ideas: Bob Gordon on macroeconomics and monetary policy

Financial turmoil and global imbalances: the end of Bretton Woods II?

A user's guide to credit ratings

Vol. 71, No. 4, December 2008

Liquidity and the New Zealand financial system

Evolution of the Reserve Bank's liquidity facilities

The global financial crisis and its transmission to New Zealand – an external balance sheet analysis

The Reserve Bank's payment system oversight role applied to settlement risk in the retail payment system

New legislation for regulation of non-bank deposit takers

Results from the recent survey of *Bulletin* readers

