DP2007/04

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March 2007

JEL classification: E20, E32

www.rbnz.govt.nz/research/discusspapers/

Discussion Paper Series

ISSN 1177-7567

DP2007/04

Stylised facts about New Zealand business cycles*

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Abstract

This memo characterises the business cycles of the New Zealand economy, *à la* Stock and Watson (1998). The paper provides a set of stylised facts that New Zealand macroeconomic models should, ideally, be capable of emulating. This paper therefore serves as an important backdrop to macro modelling efforts. We also examine the same data series for the US and Australia, providing an indication of which features of New Zealand's business cycles may be idiosyncratic.

* The views expressed in this paper are those of the author(s) and do not necessarily reflect the views of the Reserve Bank of New Zealand. Thanks to Christie Smith, David Hargreaves and other members of the Economics Department for helpful comments.

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ISSN 1177-7567

1 Introduction

Researchers have used a variety of techniques to describe and measure business cycles. In this paper we adopt a simple approach, outlined by Stock and Watson (1998), to characterise the New Zealand business cycle. This style of analysis detrends the data using a consistent detrending technique and then characterises relationships by examining autocorrelation functions, variances and cross-correlations. Results are compared to selected international studies and an earlier New Zealand study.

The advantages of the simple techniques used here are that they are well understood and readily comparable to overseas studies. The main disadvantage of this approach is that the results do not reveal anything about causation. For example, in the market for a single good, the correlation between price and quantity sold could be positive or negative depending on whether demand or supply shocks have dominated over the sample in question. This simultaneity problem affects observed relationships between macroeconomic aggregates too. In addition, the simple bivariate analysis that we undertake cannot capture substitution effects. For example, if production for export increases, resources will be moved out of production for domestic consumption. Furthermore, our results may also include correlations that are economically meaningless – either coincidental due to one-off data quirks, or induced by the filtering methodology.

The objective of this simple analysis is, accordingly, purely descriptive, indicating what data features may be worthy of more advanced analysis and discussion. It would be dangerous, for example, to use these results mechanistically as the sole "target" in calibrating a macroeconomic model. Such calibrations should take into account New Zealand's economic history. Simple data moments, or "stylised facts", should be only one input in such calibration exercises.

Our methodology is primarily drawn from Stock and Watson (1998) and King and Rebelo (2000), which examines the United States (US) economy. Rather than compare his results directly, we make the results more comparable by using the same sample periods and identical techniques. We also compare with an earlier study of New Zealand business cycle facts, Buckle, Hall, and Kim (1994). These authors used similar techniques, but applied them to a considerably longer data sample, back to the 1960s. Compared to their results, volatility of the key macroeconomic variables has fallen significantly, and the correlations are generally higher.

The paper is structured as follows. In section 2 we discuss the concepts and methodology for measuring business cycles. In section 3 we examine our key results, firstly for the volatilities of the series, and secondly for correlations with the output gap, the CPI and non-tradables inflation gaps, and the 90 day rate gap. We also look more closely at correlations between selected foreign and New Zealand variables. Section 4 concludes. References, tables (pp 26 to 57), and data definitions follow. The graphs for each series (including correlations) can be viewed in the research section of the Reserve Bank website: www.rbnz.govt.nz.

2 Measuring business cycles

Most macroeconomic variables grow over time, and must therefore be transformed into stationary data by some kind of filtering process in order to carry out the kind of business cycle analysis we present in this paper. A disadvantage of filtering is that it discards level data, which can be important given that shocks can have permanent effects on the levels of variables. (Results for unfiltered quarterly and annual percent changes of the variables are available on request.) The simplest kind of filtering is differencing. However, differencing generally amplifies high frequency noise, which can make cyclical movements difficult to identify. New Zealand macroeconomic data have tended to be fairly volatile.

There are a range of techniques for removing a trend from data, and the final selection of a "trend" is unavoidably arbitrary to some extent. In this paper we use the Hodrick-Prescott (HP) filter, which has the advantage of being simple and well-known. A key disadvantage with the filter is that the resulting 'gaps', or cyclical components of the series, are highly sensitive to the stiffness parameter, lambda, chosen for the filter. A high lambda implies a stiffer filter and a correspondingly more volatile extracted cyclical component. It has also been shown that the filter can in fact induce business cycle periodicity when none in fact exist (Cogley and Nason 1995 and Canova 1998). In addition, correlations can be thrown by breaks in the co-moving series. Another well-known problem with the filter is that, as with all two-sided filters, there is a lack of information for pinning down the start and end points.[1]

An alternative filter is the bandpass (BP) filter Baxter and King (1999). However,

[1] The statistics were recalculated after cutting off the final two years of data to test the robustness of the results to the end-point problem. The results were little changed from truncating the sample (results available on request).

again reflecting the fact that what constitutes a trend is largely a matter of preference, there is once more an essentially arbitrary choice of parameter, in this case the business cycle duration. A similar stylised-facts study in Norway found very similar results for the BP versus the HP filter. Thus, for simplicity, we use only the HP filter. Some variables, particularly price indices, are examined in both level and annual change terms. Because of the disinflation period, some annual percent change series have a marked level shift during the sample period, and are therefore also HP filtered to isolate the cyclical component before calculating correlations.

We begin with the non-seasonally adjusted data (where available), and use X12-ARIMA to both seasonally adjust the data and remove the "irregular" component in order to mitigate the muddying effects of short-term noise, which can obscure business cycle frequency correlations. The remaining slightly-smoothed series is the X12 trend-cycle component, and it is this which we run the HP filter through to extract the cyclical 'gap'. To allow for the arbitrariness of the choice of lambda, we analyse the data with three values: 800, 1600, and 3200. For most series, the gap is calculated as the percentage difference relative to the trend series. However, for series that are already in percent terms (eg percentage growth series, interest rates) the gap is a simple difference from the trend.

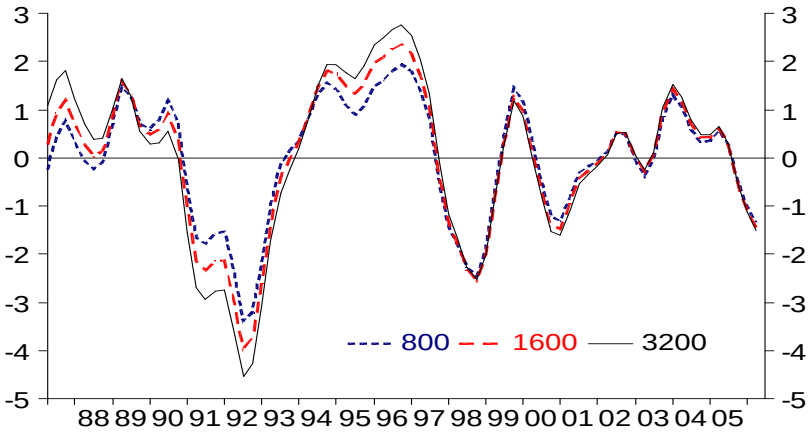
Figure 1 shows the cyclical component of production GDP with the three values of lambda.[2] The main differences between the filtered series are at the start point, where the filter has only one-sided data (the same is true of the end-point, conceptually), and also at the largest cyclical swings, eg the estimated depth of the recession in 1991/92 varies by more than a percentage point. However, the signs of the cycles and the duration of the booms and recessions do not appear to be sensitive to the choice of lambda.

3 Stylised facts about New Zealand business cycles

In this section we discuss the key statistical features of the New Zealand business cycle, as summarised in the volatility, and auto- and cross-correlations of key series.

[2] Throughout this paper we use production GDP, which is generally considered to be the more reliable historical GDP series in New Zealand. Results for expenditure GDP are available on request.

Figure 1
The cyclical component of NZ GDP: HP lambda = 800, 1600, 3200

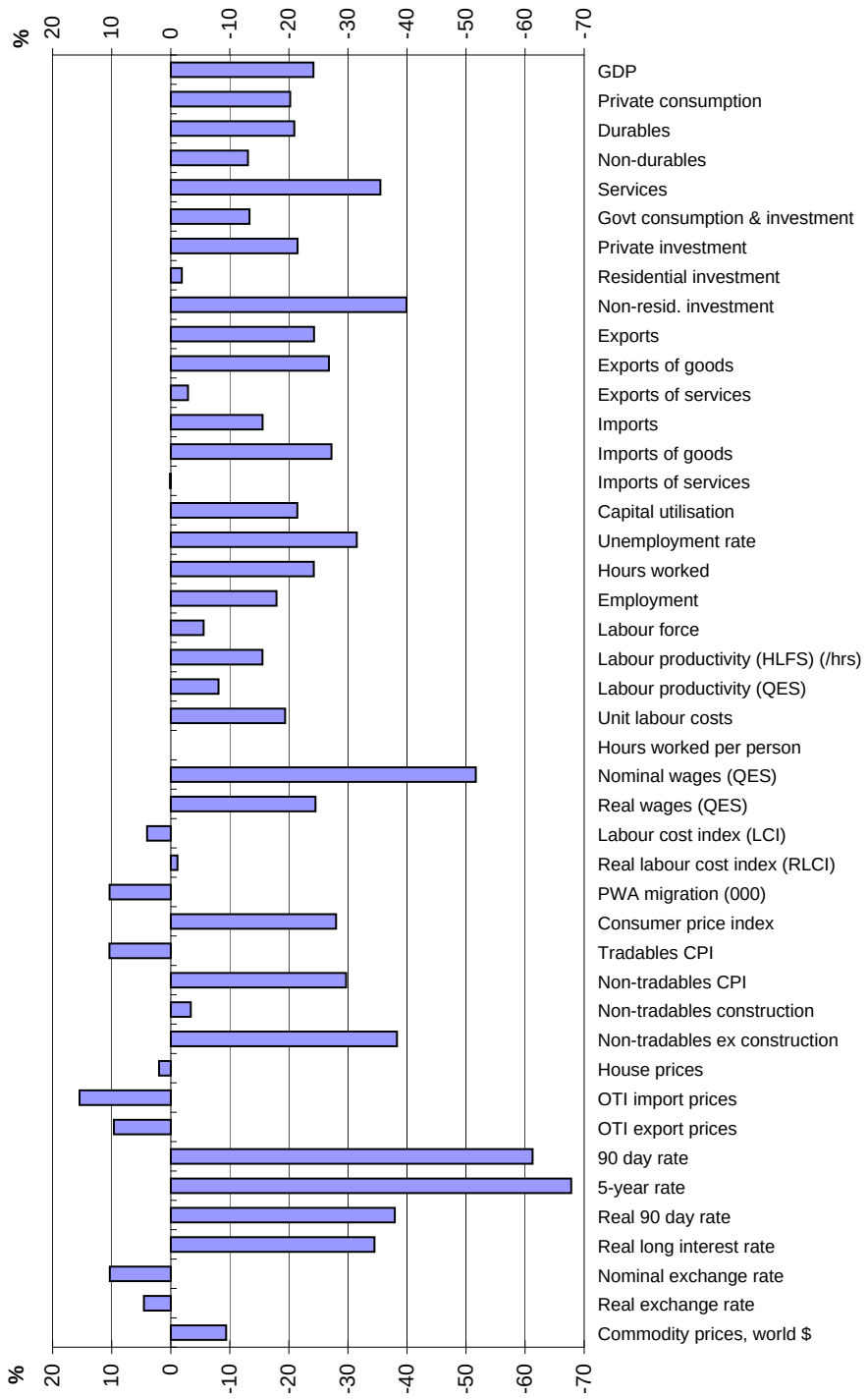


3.1 Volatility and autocorrelation

Table 1 gives the standard deviations, and table 2 the autocorrelations, of the time series examined (see appendix A). For selected series, we compare with Australian and US data. The data have been HP-filtered with lambda 800 to 3200, unless otherwise indicated. For descriptions of each series, see appendix B.

The volatility of most New Zealand data series examined has been lower in the post-1994 sample versus the 1987-2006 sample (see figure 2). This could reflect either the particular shocks that affected the economy during the periods, structural changes in the economy that affect how it responds to shocks or, most likely, a mix of the two. As we will discuss, the fall in volatility is also evident in the Australian data.

Figure 2
Percent difference in standard deviation, 1987-2006 versus 1994-2006



GDP and its components

The volatility of GDP and its components has generally fallen over time.

This is confirmed by comparison with Kim, Buckle and Hall (1994), who used a sample period back to the 1960s, and also by rolling calculations of the standard deviations of series with a 40 quarter rolling window.[3] Exceptions are residential investment, and exports and imports of services, which have exhibited fairly consistent volatility over the samples.

Investment is by far the most volatile component of GDP (although the volatility of non-residential investment has fallen considerably). The smoothest components are private consumption of non-durables and services. Imports of goods are far more volatile than exports.

New Zealand's data for GDP and most of its components have been more volatile over both the sample periods examined than the Australian and US data. One exception is that US goods exports have been more volatile. Most Australian national accounts series have become less volatile over time, but the story is more mixed for the US data, with the exception of residential investment. The US data has also generally been smoother (higher autocorrelations) over the complete data sample, while the Australian GDP and particularly government spending have been less autocorrelated than the New Zealand data.

Labour market

The decline in the volatility of New Zealand labour-related data has been less marked than for GDP, but there has been a fall in the volatility of the unemployment rate and wages (though not the labour cost index). There has also possibly been a reduction in the volatility of hours worked (though not per person) and employment, but not net migration. Similar patterns are evident in the Australian and US data, particularly Australian employment and unemployment.

Net migration and the unemployment rate have been the most volatile of the labour market series, while the labour cost index (not adjusted for productivity) and hours worked per person have evolved relatively smoothly. The volatility of wage inflation has been similar to that of CPI inflation.

Over the sample as a whole, New Zealand has tended to have more volatile labour

[3] These results are also confirmed by examination of the variables in growth rate terms.

market activity series than the US, but similar to Australia. In the period since 1994, however, our employment, unemployment and labour force statistics have been more volatile. On the wage side, our nominal wage inflation has been more volatile than the other countries over the whole sample, but less volatile in the period since 1994.

Prices

The volatility of the consumer price index and its non-tradable components has decreased over time, reflecting the disinflation period at the start of the sample. However, the volatility of *tradables* inflation has not decreased (nor has the volatility of the exchange rate). Over the sample period as a whole, non-tradables inflation has been more volatile than tradables, but the opposite is true in the more recent period since 1994. There has been no fall in the volatility of import (and export) prices, or house prices, all of which have inflation rates that are considerably more volatile than CPI inflation. The volatility in construction sector non-tradable inflation has not decreased. The tradable and non-tradable components of the CPI tend to offset each other by moving independently, meaning that overall CPI inflation is smoother than either.

Over the full sample from 1987 New Zealand CPI annual inflation has been more volatile than that in the US or a trade-weighted average of its trading partners, but similar to Australian CPI inflation. However, in the sample period from 1994, the volatility of New Zealand CPI inflation is similar to the overseas countries examined. Although both our tradables and non-tradables inflation have been more volatile than Australia's over this period, these components in New Zealand are more strongly negatively correlated than their Australian counterparts (-0.35 versus -0.13, for sample period 1994Q1-2006Q2). The New Zealand components therefore offset each other more, smoothing overall CPI inflation to a greater extent.

The volatility of New Zealand's other price measures, such as house prices, import and export prices, have been similarly volatile to their Australian equivalents over the whole sample period, but generally more volatile than the US data. An exception is world prices for our commodities, which have been less volatile, probably because of a lack of exposure to 'hard' commodities.

Financial market variables

There has been a marked decline in the volatility of New Zealand interest rates, both nominal and real, along the curve. This mirrors a decline in the volatility of foreign interest rates. Much of this reflects a decline in inflation volatility, but volatility in real rates has also declined in Australia and New Zealand. Short rates are more volatile than long rates, as one would expect. Over the sample period 1987-2006 NZ interest rates have been much more volatile than US rates, but similar to Australia. Since 1994, New Zealand's 90 day rate has been less volatile than US rates, but more volatile than Australia's, while our 5 year rate has been the least volatile of the three countries. Both short and long nominal rates have evolved less smoothly (have lower autocorrelation) than Australian or US rates over both sample periods.

Exchange rates are considerably more volatile than interest rates. There has not been a decline in the volatility of New Zealand's nominal or real exchange rate (nor in that of the US or Australia). The volatility of the US trade-weighted exchange rate has been markedly lower than New Zealand's.

3.2 Correlations with the output gap

In this section we discuss the simple cross-correlations of various series with the overall business cycle (defined as the HP-filtered GDP output gap). It is important to bear in mind that these simple correlations should not be interpreted causally, but it is useful to see if results match what might one intuitively expect. We again compare results with Australia and the US for key series. Results are presented in tables 3 and 4.

GDP components

The main GDP components are, of course, correlated with the output gap. Over the sample from 1987Q2, consumption (particularly durables), investment (particularly residential), and imports of goods have been strongly and contemporaneously correlated with the overall output gap.

Although strong over the sample as a whole, the correlations have weakened in more recent times. The correlation between consumption and the output gap has

fallen markedly. This partly reflects the Asian crisis period in 1998, when consumption of non-durables and services held up through the export-led recession. The timing of tax cuts at this time also had an influence. However, the correlation after this time is still much lower than pre-1998. The correlation of non-residential investment with the overall cycle also appears to have broken down completely since 2000. On the other hand, the correlation of goods exports with the gap has increased.

This simple analysis cannot reveal whether these changing correlations reflect structural change in the economy or just the nature of the shocks that have occurred over the sample.

Over the period as a whole the Australian correlations are comparable, but there are some interesting differences versus the United States. US non-durables consumption, non-residential investment, goods exports and imports have been more strongly correlated with the output gap, while durables consumption, government demand, residential investment and exports of services are less correlated.

Since 1994, however, the picture is quite different. The cyclical correlation of every US GDP component, except non-durables consumption, is much higher than in the New Zealand data. The differences are particularly marked for non-residential investment, which, as noted above, has been quite uncorrelated with the output gap in New Zealand in recent times. It is also very interesting that exports and imports have been much more correlated with the output gap in the US, a fairly closed economy, than in New Zealand.

The recent Australian data is much more mixed. Consumption is again much more strongly correlated with the output gap, suggesting that the low correlation of consumption with the output gap evident in the more recent New Zealand data sample is quite unusual. Australia's government spending is also more highly correlated with the output gap. However, even more than in New Zealand, Australia's non-residential private investment has become much less procyclical, causing a much lower correlation between the output gap and overall private investment since 1994. Australian imports have also been less correlated with the output gap in this more recent period.

In the United States, on the other hand, the cyclical correlations of most GDP components has increased, the one exception being durables consumption.

Labour market

In the New Zealand labour market the unemployment rate has been contemporaneously (negatively) correlated with the output gap, while employment appears to have lagged output in the early part of the sample but to have been more contemporaneous in the more recent data. Hours worked and capacity utilisation are also relatively strongly contemporaneously correlated with the output gap. Nominal and real wages lag the output gap by 18 months. The correlations of unemployment and hours worked (particularly per person) with the output gap appear to have weakened in recent years. Net migration levels tend to have led the output gap by around six months, though the correlation is not particularly strong.

Labour productivity is positively correlated with the business cycle at a 1 quarter lag.

In our international comparison we find that over the entire sample Australian employment, unemployment, and labour force data have been more strongly correlated with the output gap, while their wage inflation has been less so. In the US, hours worked and employment (including per person) have been more strongly correlated, whereas labour productivity and wage inflation have been less strongly correlated with the output gap. In the more recent sample since 1994, the Australian unemployment rate and the real wage level have been more correlated with the output gap, while nominal wage inflation has been less so. Unexpectedly, since 1994 Australian employment and the labour force have been *negatively* correlated with the output gap, though employment is very slightly positively correlated when lagged.

Prices

There is some evidence that the house price inflation gap (though not the house price level gap) lead the output gap, but the correlation between the output gap and the CPI is not strong.[4]

The overall CPI is a mix of both imported and domestically-generated inflation. One means of separating these two is to distinguish between tradable and non-tradable goods. These components have quite different business cycle properties. This split is arbitrary at the margin, and also not conceptually a perfect match

[4] Note that taking annual percent changes induces a phase shift, lagging series' turning points. This must be taken into account when interpreting correlations between different transforms.

with imported versus domestic inflation (tradable goods are produced within New Zealand for domestic consumption, for example). However, the split, while rough, allows us to identify different behaviour over the business cycle between the two sectors. Non-tradables inflation in New Zealand is more closely correlated with the output gap. Annual non-tradables inflation, for example, has a maximum correlation with the output gap of around 0.75 at around a 2 quarter lag, depending on the sample period and the HP filter settings. Tradables inflation is acyclical.

In price *level* terms, construction costs are the component of non-tradables most closely correlated with the output gap, but in annual inflation terms the construction versus non-construction split of non-tradables is less telling, with similar correlations across the two.

Over both sample periods, the annual CPI inflation correlation with the output gap has been considerably higher in the US, while the Australian correlation has become less clear in recent years. Australian tradables inflation has been more procyclical than in NZ, while their non-tradables inflation has been less so. In the sample since 1994, the strongest correlation of Australian non-tradables inflation with their output gap is the negative correlation at a 3-4 quarter lead. The positive relationship evident in the earlier data appears to have completely broken down.

House price inflation has been much more strongly correlated with the output gap in New Zealand than in either Australia or the US over the longer sample period (approximately 0.8 versus 0.5 and 0.4 respectively), but since 1994 the US correlation has been much higher and is on a par with the New Zealand data at around 0.75 (though US house price inflation lags the output gap by 2-3 quarters whereas NZ's leads by 1 quarter).

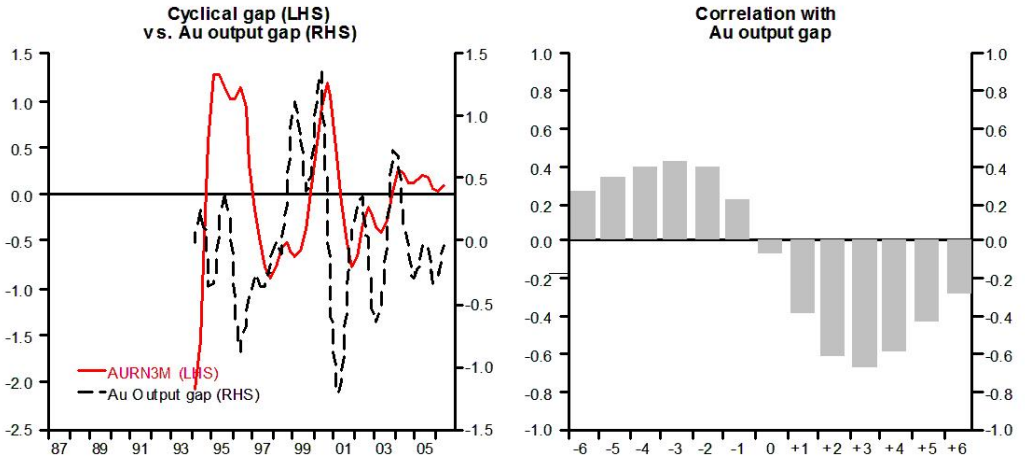
US import prices have been more strongly and positively correlated with the output gap than either New Zealand or Australia, likely reflecting the importance of the US business cycle for world prices.

Financial market variables

New Zealand financial market variables tend to lag the output gap. Nominal and real short rates and exchange rate levels all lag the output gap by 1-3 quarters, and this has been quite consistent throughout the sample. However, the annual percent changes of the nominal and real exchange rates tend to lead the output gap by about a quarter.

It is notable that the annual percentage change in the TWI and annual house price

Figure 3
Australia: 90 day rates and output gap, 1994-2006Q2



inflation have very similar correlation patterns with the output gap. Using our methodology these two variables have a full sample cross-correlation of 0.78, with house price inflation lagging 1 quarter.[5] It seems unlikely that there is a direct causal relationship between the two variables. Rather, house prices both reflect and contribute to the overall economic cycle, to which the exchange rate responds, both directly and via monetary policy.

The correlation of New Zealand 90-day interest rates with the business cycle since 1987 (about 0.75 at a lag of 3 quarters) has been similar to Australia (lag: 1 quarter) and the US (lag: 1-2 quarters) Five year rate correlations have also been similar. However, since 1994, US rates have been more procyclical than in NZ, while the largest correlation of Australian 90 day rates with their output gap has been about -0.67 at a lead of three quarters (versus +0.75 at a lag of 1 quarter for the entire sample 1987Q2-2006Q2). Eyeballing the data (figure 3) the instability of the relationship is clear.

The other interesting fact revealed by looking at the international comparisons is that the exchange rate in New Zealand has been far more procyclical than in Australia and the United States. This result is robust over both sample periods, the choice of nominal and real, and whether in levels or annual percent changes. The only exception has been the US real exchange rate level in the post-1994

[5] The raw (non-HP-filtered) data correlation is 0.86, also at a 1 quarter lag.

sample.

3.3 Correlations with inflation

In this section we examine cross-correlations of the cyclical components of various series with the HP filtered gaps of annual CPI and non-tradables inflation (see tables 5 to 8). It is useful to look at both because the tradables and non-tradables components of headline CPI move quite differently. Tradables (and hence headline) CPI will be more affected by exchange rate shocks and commodity prices, for example.[6] We again compare with Australia and the US for CPI inflation, but the tradables/non-tradables split is only available for Australia.

GDP and its components

GDP and most of its components, except exports and non-residential investment, have been more strongly correlated with non-tradable inflation than with CPI inflation. Most lead non-tradables inflation by 1 to 3 quarters. Capacity utilisation, on the other hand, leads non-tradables inflation by 3-5 quarters (although eyeballing the data the correlations between capacity utilisation and both CPI and non-tradables inflation has been much less evident since 2000).

The correlation between consumption (durables, non-durables and services) and non-tradables inflation has fallen. This is consistent with our finding that consumption has been less correlated with the overall output gap in recent years, but nonetheless the correlation between the output gap and non-tradable inflation has remained strong. In Australia, by comparison, the correlation between consumption and non-tradables inflation is not strong in either period, and nor, as mentioned in the last section, is the correlation from the output gap to non-tradables inflation (in NZ the strongest correlation for the longer sample period is 0.8 with the output gap leading non-tradables inflation by 2 quarters, while in Australia it is around 0.5 at a 4-5 quarter lead).[7] Similarly, both investment and imports in

[6] Note that the results reported below for the correlation between the output gap and CPI or non-tradables inflation will not exactly mirror those reported in the earlier tables. This is because the choice of which variable is lagged slightly changes the sample period for computing correlations.

[7] For a more in-depth discussion of the relationship between the output gap and inflation in NZ, see Hargreaves, Kite, and Hodgetts (2006).

NZ have a stronger lead correlation versus non-tradables inflation than is evident in the Australian data.

As already reported in the previous section, the US output gap is more correlated with CPI inflation than its NZ counterpart, and, particularly since 1994, the GDP components are more correlated with the overall output gap. It is therefore not surprising that the individual GDP components in the US exhibit higher correlation with CPI inflation than is evident in the New Zealand data. New Zealand's low correlation between consumption and CPI inflation is consistent with the low observed consumption/output gap correlation. In the latter period Australian consumption has had a higher correlation with CPI inflation than the NZ data, but the other GDP component correlations are similarly mixed.

Labour market

Nominal wage inflation lags CPI and non-tradables inflation by 1 to 3 quarters, with the correlation with non-tradables inflation a little stronger than with CPI inflation over the sample as a whole, though not for the post-1994 sub-sample. The lag is unsurprising given that wage inflation also lagged the output gap by more than the price inflation series.[8]

As was the case for the GDP components, the correlations of the labour market variables are generally stronger with non-tradables inflation than with overall CPI inflation, an exception being inflation in the labour cost index, possibly indicating some indexing to CPI inflation.

Unemployment, net working age migration[9] and hours worked lead non-tradables inflation by several quarters, employment by one quarter, and wage and unit labour cost inflation clearly lag non-tradables inflation.

Comparing with Australia and the US, many correlations with CPI inflation are similar over the sample as a whole. The US and Australia have a stronger correlation between employment and CPI inflation (consistent with their higher correlations between employment and the overall output gap), but New Zealand has the strongest correlation between wage inflation and CPI inflation. New Zealand

[8] We are using CPI and non-tradables inflation excluding goods and services tax (GST). There is also a GST spike evident in wages in response to the 1989 increase in GST from 10 to 12.5 percent. Correlations of wage inflation with CPI including the GST spike were within 0.05.

[9] There is also a fairly strong correlation between *CPI* inflation and net working age migration a year *later*. However, this is due to a non-causal lining up of the petrol-price led spike in CPI inflation in 2000 and the strong migration pick-up in 2001.

wage inflation lags CPI inflation more than in the other countries (NZ -2 quarters, Australia -1, US +1 quarter). In the data since 1994, virtually all US labour market series are more closely correlated with CPI inflation than in NZ (again with the exception of wage inflation), while Australian CPI inflation is more strongly correlated with employment and unemployment than in NZ (even though the Australian employment gap has been negatively correlated with the Australian output gap over this period).

In Australia since 1994 the unemployment rate is *positively* correlated with non-tradables inflation, and employment *negatively* correlated. However, these maximum correlations are lagging five quarters behind non-tradables inflation, which is not the Phillips Curve economic causality we are most interested in. Australian wage inflation is much less correlated with non-tradables inflation than in the NZ data in both periods.

Prices

There is some evidence that import prices have led CPI inflation by a quarter in the more recent sample period, but inflation in the world price of our commodity exports has led CPI inflation by a year. Import and export price inflation has been negatively correlated with non-tradables inflation at a 3-4 quarter lead, mirroring the TWI/non-tradables inflation relationship discussed below. House prices have led non-tradables inflation by around 2 quarters quite consistently.

Compared with Australia, over the sample as a whole, our non-tradables inflation has been less correlated with overall CPI inflation (0.5 at a 1 quarter lead versus 0.7 at a 1 quarter lag). In both countries the correlations have been much lower since 1994. The correlation between tradables inflation and overall CPI has been higher in Australia in the sample as a whole (0.8 versus 0.7), but higher in New Zealand since 1994 (0.85 versus 0.75).

Import price inflation has been most correlated with CPI inflation in the US in both sample periods, and for export prices in the post-1994 sample. NZ has the strongest CPI inflation correlation with inflation in the world price of our commodity exports in both sample periods.

House price inflation has been much more strongly correlated with non-tradables inflation in NZ than in Australia over the sample as a whole (0.65 versus around zero), but the difference is smaller in the more recent sample period (0.71 versus 0.58).

Financial market variables

New Zealand 90 day rates have tended to be more strongly correlated with non-tradables than CPI inflation since 1994, but over the sample as a whole the correlations have been very similar. 5 year rates have been more correlated with non-tradables inflation since 1987, but the opposite is true since 1994. The 90 day rate has been contemporaneous with inflation, while 5 year rates lead a little.

The nominal and real exchange rates do not appear to have had a clear correlation with the CPI inflation gap, but in annual percent change terms they lead non-tradables inflation by a year, with the correlation stronger in more recent data (around -0.85).[10]

Over the entire sample from 1987Q2, NZ 90-day interest rates (both nominal and real) have been a little more closely correlated with CPI inflation than in Australia and the US, while the 5 year rate correlation is similar. However, the NZ 90-day correlation has fallen from around 0.75 for the sample as a whole to about 0.6-0.65 since 1994, likely reflecting the influence of the period in which the Reserve Bank of NZ focused on a monetary conditions index. The same correlations in Australia and the US have been more stable at around 0.7.

The US nominal exchange rate is positively correlated with US CPI inflation with a 4-6 quarter lag, particularly post-1994 and in annual percent change terms (0.8 with a 4 quarter lag, versus 0.6 in Australia and 0.5 in New Zealand).

NZ 90-day interest rates have been more strongly correlated with non-tradables inflation than in the Australian data in both sample periods.

3.4 Correlations with 90 day interest rates

Correlations between 90 day rates and other variables are reported in tables 9 and 10.

[10] Given that this is the correlation with non-tradables inflation, this is not exchange rate passthrough. Rather, it likely reflects the variables' common correlation with the output gap. On the other hand, the correlation of the TWI and *tradables* inflation is causal. The maximum correlation between the HP-filtered APC of the nominal TWI and tradables inflation (1987-2006) is -0.6, with tradables inflation lagging three quarters.

GDP and its components

Economic theory suggests two-way causation between the output gap and interest rates. Higher (lower) interest rates decrease (increase) output with a lag of about a year. However, on the other hand, interest rates are increased in response to an increase in output (all else equal) to ward off future inflation pressure. The observed correlation between output and short-term interest rates will be a mix of these two opposing effects.

The output gap, consumption (particularly durables) and investment gaps all lead 90 day rates by typically 2 to 4 quarters, with a positive correlation. This suggests that the latter causality has dominated the correlation over the sample period.

The correlations are generally lower when the sample is restricted to the period from 1994, probably reflecting that the smaller sample effectively puts more weight on the Asian Crisis period when 90-day rates were very volatile.

The correlation between consumption and interest rates has been higher in Australia and the US in both sample periods, reflecting the higher correlation between consumption and the overall output gap in those countries. In Australia, interest rates have been much less correlated with residential investment than in NZ or the US. In the more recent sample since 1994, 90-day interest rates in Australia have been less correlated with all investment and export components than in NZ, but the US correlations between interest rates and all GDP components except government spending are much higher. The latter case reflects that the US GDP components tend to move more in tandem, as already discussed. Although the Australian maximum correlation is of the opposite sign to NZ, the story for residential and total investment is in fact much the same, with a negative correlation at lags (interest rates reduce investment) but a positive correlation at leads (interest rates are raised in response to high investment). However, the non-residential correlation profile looks quite different, with the NZ data strongly positively correlated with interest rates, but the Australian data uncorrelated.

The labour market

There is some evidence that capacity utilisation leads interest rates. Employment, hours worked, and unemployment lead 90 day rates, but by a little less than the output gap does. On the other hand, nominal wages lag 90 day rates considerably in the post-1994 sample.

Over both sample periods, the main labour market indicators are more closely correlated with 90 day rates in both the US and Australia than in New Zealand. The exception is wage inflation, which is considerably more correlated with interest rates in NZ, reflecting the greater correlation between wage and CPI inflation in NZ discussed earlier.

Prices

The relationship between 90 day rates and CPI and non-tradables inflation has already been discussed. Annual CPI and non-tradables inflation are roughly contemporaneous with 90 day rates. The construction cost component of non-tradables inflation is the most closely correlated. The correlation between 90 day rates and overall CPI inflation has been a little lower in the post-1994 sample, while that with non-tradables inflation has been more consistent (for both the construction and ex-construction components).

In New Zealand 90 day rates have been positively correlated with house price inflation (approx 0.55, with a 2-3 quarter lead). In the US correlation is weak over the sample as a whole, but strong (approx. 0.65) since 1994. In Australia the largest correlation in both sample periods is negative (approx -0.6), at a 2-3 quarter lag. The difference in the correlation profile between interest rates and house price inflation will reflect the fact that in Australia, house price inflation leads the output gap by 6 quarters, whereas in NZ it has been roughly contemporaneous (a 1 quarter lead).

Financial market variables

The maximum correlation between 5-year and 90-day rates is contemporaneous in all countries over the longer sample period, but since 1994 the 5 year rate has possibly anticipated changes in the 90-day rate by around a quarter in NZ and the US. The annual percent change in the TWI is weakly positively correlated with the 90 day rate 4 quarters later.

3.5 Cross-correlations with foreign variables

As New Zealand is a small open economy, one would expect the foreign sector to be an important source of shocks to the New Zealand business cycle. We there-

fore examine the correlations of foreign output gaps and commodity prices with a range of New Zealand variables, and also examine the cross-correlations between inflation and interest rates.

Foreign output gaps

Tables 11, 12 and 13 give the correlations of New Zealand variables with the US, Australian and export-weighted output gaps respectively. Key findings are:

- The strongest correlations of New Zealand's export values or volumes with foreign output gaps are with the US output gap, though they are only economically significant in the post-1994 sample. The strongest correlations are with export values, whereas the supply-driven nature of our agricultural exports mutes export volume responses to changes in demand in the short term. The strongest export volume correlation with foreign output is with non-commodity exports (but still <0.5).
- Import values are also more strongly correlated with foreign output than are import volumes. The highest correlations are with the US output gap, and again, particularly since 1994. Rather than a direct causal relationship, this likely reflects the positive correlation of our output gaps.
- The strongest correlation of New Zealand's overall output gap with foreign output gaps is with that of our trade-weighted trading partners, but New Zealand's output gap leads theirs by 2 quarters. The correlation between our output gap and that of Australia has become less clear in the more recent data, partly reflecting the different outcomes following the Asian Crisis of 1998-9. The components of NZ GDP are also most closely correlated with the trade-weighted foreign output gap, but again, consumption and investment have tended to lead the foreign output gap. This is clearly not a causal relationship, but perhaps reflects differing responses to common shocks.[11]
- Tradables inflation is positively correlated with both US and trade-weighted foreign output, with a lag of about a year.

[11] Other highly open economies with certain export structures have been observed to lead the cycle of their trading partners. Belgium has at times appeared to lead the aggregate European cycle, for example (see Vanhaelen, Dresse, and Mulder 2000).

Commodity prices

Tables 14 and 15 show the correlations between world commodity prices (in SDR terms)[12] and NZ data. We find that:

- The correlations between commodity prices and our export volumes are very unclear and inconsistent with respect to both sign and lead/lag. As above, this likely reflects supply constraints muting volume responses. The lags are also affected by the Asian Crisis period, where export volumes (particularly services – ie tourism) plummeted faster than commodity prices. The strongest relationship is the contemporaneous correlation with goods export values.
- Non-residential investment is positively correlated with commodity prices with a 1-2 quarter lag.
- Interestingly, although the New Zealand dollar is generally considered to be a 'commodity currency', there is not a consistent correlation between the TWI and world commodity prices. The relationship was dominated by other factors during the period 1999-2003, when the dollar was extremely weak despite strong commodity prices.
- World prices for our commodities feed (by definition) strongly into our terms of trade.
- International commodity price inflation and NZ tradables inflation are strongly positively correlated, with commodity prices leading by a year. This correlation also exists with CPI inflation.

Interest rates and inflation rates

Table 16 and figure 4 give the correlations between New Zealand and foreign interest rates. The correlations have been lower since 1994, particularly against the US, while long rates are more closely correlated than short rates. Our interest rates are more closely correlated with Australian than US rates.

Table 17 and figure 5 show the correlations between New Zealand and foreign inflation (Australia is the only other country with a tradable and non-tradable inflation split).

[12] World prices for our commodities are available in SDRs, US dollars, or "world" prices. The results were similar for the alternative measures, and are available on request.

Figure 4
NZ and foreign interest rates, HP lambda = 1600

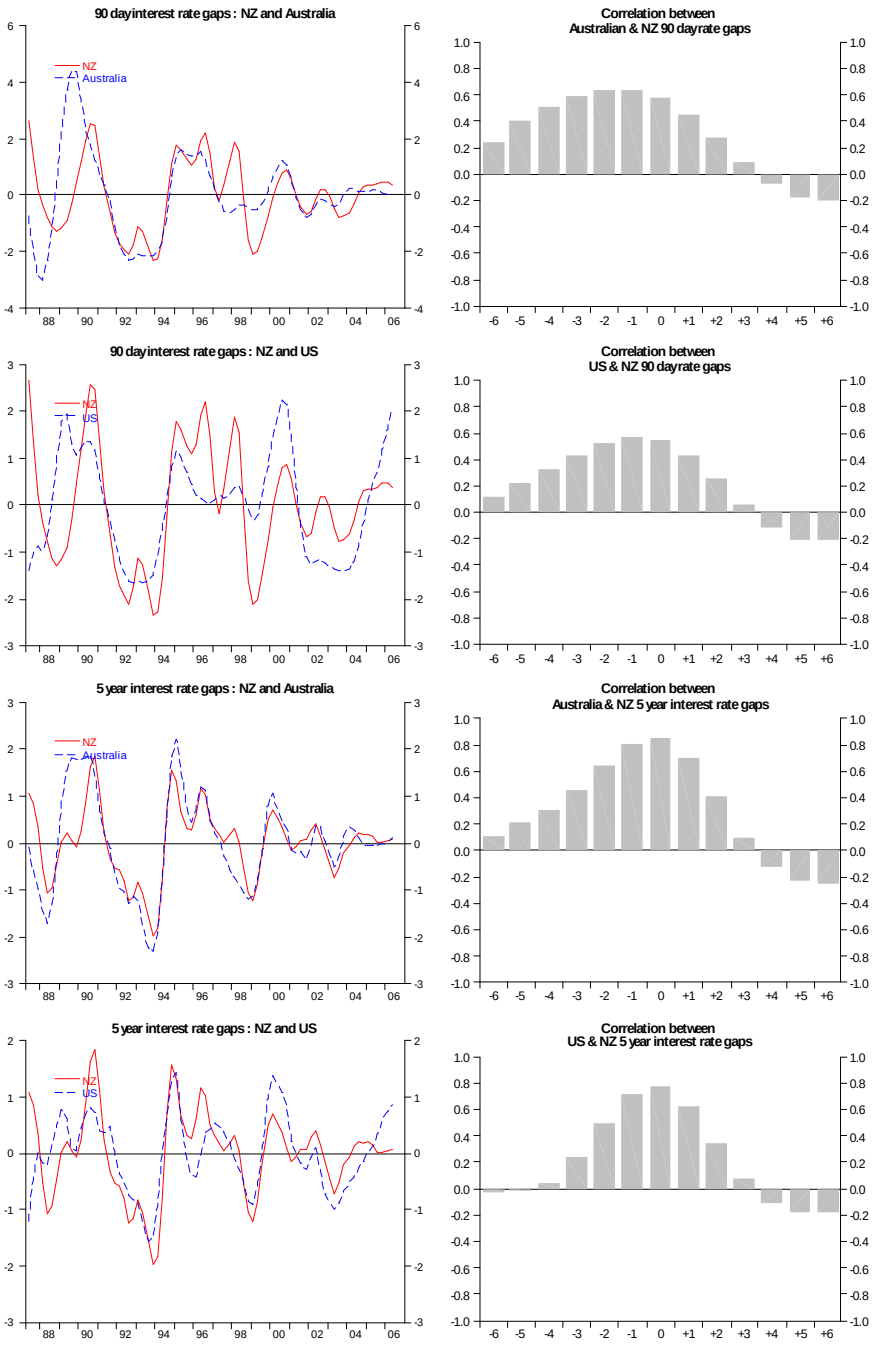
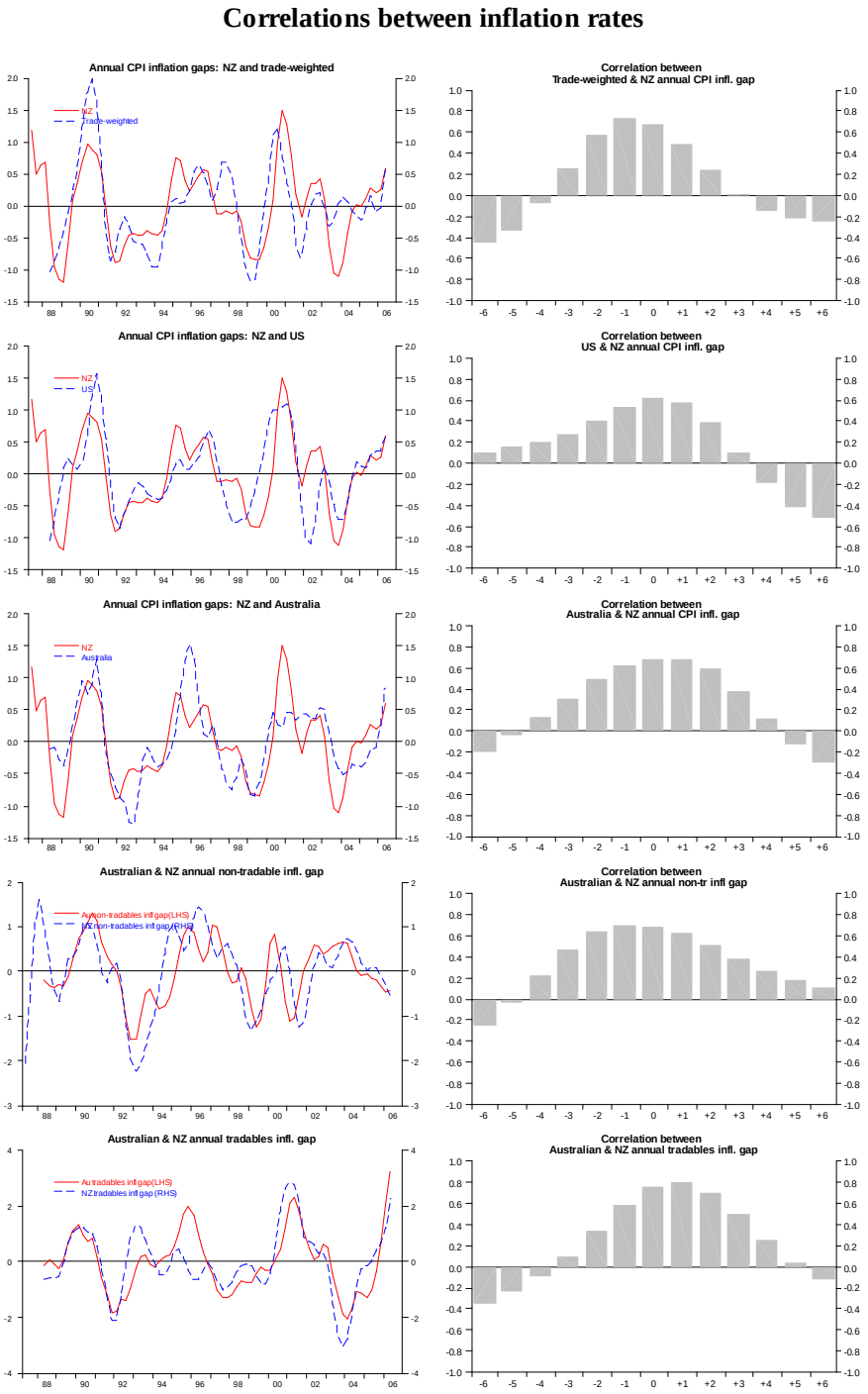


Figure 5
NZ and foreign annual inflation rates, HP lambda = 1600



Our CPI is most closely correlated with a trade-weighted mix of our trading partners. Correlations of our CPI with the US, Australia and a trade-weighted basket of countries have all fallen slightly. However, although the correlation between Australian and NZ CPI inflation has fallen, the correlations between both the tradable components and the non-tradable components of Australia and New Zealand have been *higher* in the post-1994 sample. The increase in the tradable inflation correlation likely reflects the correlation between our exchange rate cycles (the correlation between the monthly nominal trade-weighted exchange rates in the two countries has been 0.71 over the period 1987-2006, but 0.85 in the period since 1994). It is interesting that the correlation between non-tradables inflation in the two countries has also increased over the sample even as the correlation between our business cycles has fallen (note, however, that the relationship has become less contemporaneous).[13] New Zealand CPI inflation is also quite highly correlated with CPI inflation in a trade-weighted basket of our trading partners, but in this case NZ CPI lags by a quarter.

The maximum correlation between non-tradable inflation in New Zealand and Australia is stronger when construction is excluded from the NZ index. NZ and Australian CPI inflation are contemporaneously correlated, a combination of NZ tradables inflation leading Australian tradables inflation by a quarter, but Australian non-tradables inflation leading New Zealand's by 1-2 quarters. Trade-weighted CPI inflation in NZ's trading partners has also led NZ CPI inflation by a quarter.

4 Conclusion

In this paper, we have described the bivariate properties of macroeconomic time series.

The findings confirm the "received wisdom" of monetary policy in New Zealand: that the general volatility of the real economy has fallen; that the output gap leads inflation, particularly for non-tradables; that wages lag inflation; and that the exchange rate is highly procyclical. Some of the less obvious findings include:

- instability in the correlations between GDP components and the overall output gap, including a notable decline in the correlation between consumption and

[13] See Coleman (2007) for a thorough discussion of the relationship between tradables and non-tradables inflation in Australia and NZ.

output;

- a much more reliable output gap / non-tradables inflation correlation than in Australia;
- the exchange rate is more closely correlated with the output gap than is the case in Australia or the US;
- NZ house price inflation is generally more closely correlated with the output gap than is the case in Australia or the US;
- it is difficult to find international variables that have reliably led our export volumes or output gap, though the relationship between US GDP and commodity prices with NZ export receipts is clear in the data since the mid-1990s.
- New Zealand CPI inflation is strongly correlated with inflation in our trading partners, and New Zealand 5 year interest rates also follow Australian rates quite closely.

To determine *causality* between variables, in terms of how independent changes in one variable will affect another, more than just statistical facts are required; one needs a model with theoretical restrictions. This is because observed data samples do not consist of independent changes in variables, but rather the simultaneous endogenous responses of an entire system to unobserved disturbances. However, all models, theoretical or not, should be able to replicate the correlation properties that are evident in the data (to the extent that one believes that the sample period is representative of the nature of the economy). This paper has clarified some of these key features regarding the NZ economy. In addition, the international comparison gives hints as to how the structure and parameterisation of a model of the New Zealand economy may need to differ from international models.

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Appendices

A Tables

The ranges given in all tables cover the HP λ values 800, 1600 and 3200.

Table 1
Standard deviations of the cyclical components

	1987Q2-2006Q2			1994Q1-2006Q2			BHK[15]
	NZ	Australia	US	NZ	Australia	US	NZ
GDP	1.24-1.67	0.95-1.19	0.85-1.08	1.04-1.19	0.53-0.59	0.75-0.95	3.64
Private consumption	1.11-1.56	0.87-1.04	0.63-0.80	0.91-1.22	0.69-0.73	0.59-0.78	2.77
- of durables	2.73-3.53	–	2.03-2.53	2.30-2.65	–	1.59-1.94	–
- of non-durables	1.19-1.41	–	0.73-0.87	1.03-1.23	–	0.61-0.76	–
- of services	0.70-0.99	–	0.50-0.64	0.51-0.58	–	0.54-0.69	–
Govt cons. & invstmnt	2.16-2.64	0.86-0.96	0.72-1.09	1.96-2.20	0.70-0.74	0.70-0.99	7.67
Private investment	5.98-7.53	5.42-6.53	3.90-5.14	5.02-5.59	4.36-4.95	3.73-4.96	9.37
- residential	7.40-8.55	7.96-8.59	3.91-4.86	7.37-8.28	7.96-8.71	2.56-2.96	10.53
- non-residential	9.44-12.7	5.53-7.67	3.46-5.00	5.97-7.33	3.59-5.07	3.71-5.23	10.20
Exports	2.05-2.40	2.17-2.48	2.79-3.73	1.52-1.85	2.12-2.42	3.10-4.23	5.68
- of goods	2.30-2.48	2.10-2.51	3.35-4.40	1.70-1.80	2.15-2.47	3.68-4.88	6.59
- of services	4.13-5.49	5.40-7.78	1.99-2.63	4.03-5.31	4.06-4.62	2.11-2.88	5.22
Imports	3.59-4.13	4.25-5.08	2.56-3.30	3.05-3.47	3.03-3.63	2.89-3.53	8.90
- of goods	4.48-5.00	4.51-5.26	2.71-3.50	3.29-3.61	3.43-3.97	3.02-3.68	9.51
- of services	3.33-3.99	4.85-5.82	2.36-3.12	3.26-4.07	3.93-4.42	2.47-3.02	11.03
Capital utilisation	0.95-1.15	1.34-1.62	1.42-1.93	0.77-0.88	0.69-0.75	1.42-2.00	1.86
Unemployment rate	0.58-0.82	0.63-0.79	0.40-0.54	0.47-0.54	0.31-0.33	0.34-0.47	–
Hours worked	1.25-1.93	–	1.20-1.66	1.10-1.31	–	0.99-1.45	2.51
Employment	1.00-1.57	1.10-1.38	0.62-0.77	0.92-1.19	0.53-0.59	0.53-0.66	1.10
Labour force	0.66-0.96	0.55-0.70	0.34-0.39	0.60-0.93	0.38-0.42	0.34-0.39	–
Labour productivity (/hrs)	0.99-1.07	–	0.63-0.76	0.83-0.91	–	0.51-0.62	4.13
Unit labour costs	1.05-1.17	1.47-1.71	0.88-1.35	0.79-1.00	1.28-1.72	0.94-1.32	–
Hours worked per person	0.61-0.70	–	0.73-1.04	0.64-0.67	–	0.64-0.97	2.11
Nominal wages	0.85-1.28	0.71-1.03	0.87-1.24	0.46-0.57	0.58-0.69	0.77-1.04	–
Real wages	0.68-0.87	0.49-0.51	0.91-1.22	0.91-1.22	0.57-0.64	0.81-1.19	2.53
Labour cost index (LCI)	0.21-0.29	1.19-1.69	–	0.22-0.30	0.95-1.12	–	–
Real labour cost index	0.40-0.48	0.75-0.94	–	0.40-0.47	0.72-0.86	–	–
APC nominal wages $\sim$	1.84	1.55	1.54	0.79	1.23	1.37	–
APC real wages $\sim$	1.16	1.16	1.66	0.89	1.19	1.47	–

$\sim$ These series are HP-filtered for calculating correlations but not for the standard deviations reported here.

[15] Buckle, Hall, and Kim (1994). The numbers are calculated using a lambda of 1600. Sample period 1966Q4-1990Q1.

Table 1
Standard deviations – continued from previous page

	1987Q2-2006Q2			1994Q1-2006Q2			BHK[14]
	NZ	Australia	US	NZ	Australia	US	NZ
Net PWA migration (000)	1.95-2.49	–	–	2.17-2.73	–	–	–
Consumer price index	0.50-0.75	0.59-0.67	0.48-0.61	0.42-0.48	0.45-0.57	0.49-0.55	2.32
- tradables	0.91-1.21	1.02-1.17	–	1.04-1.30	0.93-1.05	–	–
- non-tradables	0.80-1.22	0.62-0.72	–	0.52-0.90	0.47-0.65	–	–
- construction	1.91-2.80	–	–	1.75-2.80	–	–	–
- ex-construction	0.74-1.14	–	–	0.46-0.70	–	–	–
APC CPI $\sim$	1.73	1.86	1.03	0.69	0.66	0.71	–
- tradables $\sim$	1.61	1.88	–	1.56	1.42	–	–
- non-tradables $\sim$	1.94	1.94	–	0.96	0.75	–	–
- construction $\sim$	3.24	–	–	3.39	–	–	–
- ex-constructn $\sim$	1.66	–	–	0.78	–	–	–
House prices	3.41-5.19	3.91-5.44	0.96-1.38	3.35-5.42	3.06-4.38	0.93-1.41	–
APC house prices $\sim$	6.22	7.42	3.16	6.79	5.72	3.03	–
Real house prices	3.34-5.15	3.77-4.98	0.96-1.25	3.42-5.38	3.08-4.39	0.81-1.26	–
Import prices	4.03-5.16	3.72-4.42	1.86-2.29	4.67-5.94	4.04-4.84	2.09-2.55	6.37
Export prices	5.05-6.17	5.10-5.77	1.55-2.02	5.50-6.80	5.66-6.31	1.42-1.92	5.92
APC import prices $\sim$	6.41	6.08	3.58	7.29	6.50	4.09	–
APC export prices $\sim$	8.13	8.30	2.75	8.67	9.22	2.56	–
Commodity prices	5.22-5.86	5.53-7.15	6.76-9.48	4.79-5.25	4.96-6.61	5.84-7.97	–
APC comm. prices $\sim$	8.42	10.71	12.17	7.89	10.67	11.52	–
90 day rate $\sim$	3.82	3.60	2.15	1.48	0.96	1.80	16.20
5 year rate $\sim$	2.95	3.05	1.74	0.95	1.39	1.30	–
Real 90 day rate $\sim$	2.53	2.09	1.68	1.57	0.91	1.72	2.07
Real 5 year rate $\sim$	1.74	1.70	1.27	1.14	1.39	1.37	–
Exchange rate (TWI)	4.50-6.25	4.12-5.28	3.45-4.13	4.98-6.88	3.87-5.04	3.90-4.66	–
Real exchange rate	4.80-6.66	4.28-5.42	2.24-2.82	5.01-6.97	3.70-4.76	2.43-3.10	5.03
APC TWI $\sim$	7.42	6.77	6.07	8.28	6.36	6.85	–
APC real exchange rate $\sim$	7.81	7.36	4.24	8.27	6.75	4.68	–
Trade-weighted series							
World output gap	0.63	–	–	0.58	–		–
Trading partner CPI (level)	0.53-0.77	–	–	0.42-0.45	–		–
APC trading partner CPI $\sim$	1.34	–	–	0.60	–		–

$\sim$ These series are HP-filtered for calculating correlations but not for the standard deviations reported here.

Table 2
Autocorrelations of the cyclical components

	1987Q2-2006Q2			1994Q2-2006Q2		
	NZ	Australia	US	NZ	Australia	US
GDP	0.90-0.93	0.89-0.92	0.90-0.93	0.85-0.88	0.74-0.78	0.92-0.94
Private consumption	0.91-0.95	0.86-0.89	0.91-0.94	0.91-0.94	0.82-0.83	0.92-0.95
- of durables	0.91-0.94	–	0.89-0.92	0.88-0.91	–	0.83-0.88
- of non-durables	0.77-0.83	–	0.91-0.93	0.74-0.82	–	0.89-0.92
- of services	0.92-0.95	–	0.88-0.92	0.88-0.91	–	0.89-0.92
Govt consumptn & invstmnt	0.88-0.91	0.77-0.81	0.84-0.92	0.82-0.85	0.58-0.61	0.84-0.91
Private investment	0.89-0.92	0.90-0.93	0.90-0.94	0.88-0.90	0.87-0.89	0.93-0.95
- residential	0.89-0.91	0.89-0.90	0.94-0.97	0.87-0.90	0.86-0.87	0.90-0.92
- non-residential	0.91-0.94	0.91-0.95	0.90-0.93	0.86-0.90	0.86-0.92	0.95-0.97
Exports	0.77-0.82	0.81-0.84	0.89-0.93	0.67-0.74	0.80-0.83	0.88-0.92
- of goods	0.81-0.82	0.79-0.85	0.89-0.93	0.77-0.78	0.78-0.83	0.88-0.92
- of services	0.90-0.93	0.81-0.89	0.83-0.89	0.90-0.93	0.79-0.82	0.82-0.89
Imports	0.88-0.91	0.90-0.92	0.88-0.92	0.88-0.91	0.90-0.92	0.90-0.93
- of goods	0.86-0.89	0.88-0.90	0.89-0.92	0.84-0.86	0.87-0.90	0.90-0.92
- of services	0.85-0.90	0.90-0.92	0.86-0.91	0.91-0.94	0.84-0.86	0.85-0.90
Labour market						
Capital utilisation	0.88-0.91	0.92-0.93	0.90-0.94	0.82-0.86	0.80-0.81	0.91-0.94
Unemployment rate	0.93-0.95	0.95-0.96	0.94-0.96	0.95-0.96	0.90-0.91	0.93-0.95
Hours worked	0.84-0.92	–	0.94-0.96	0.81-0.87	–	0.94-0.96
Employment	0.92-0.95	0.94-0.95	0.90-0.93	0.91-0.94	0.85-0.87	0.88-0.91
Labour force	0.87-0.92	0.87-0.90	0.78-0.83	0.84-0.90	0.69-0.74	0.80-0.84
Labour productivity (/hrs)	0.65-0.69	–	0.85-0.89	0.74-0.77	–	0.76-0.82
Unit labour costs	0.73-0.77	0.86-0.89	0.87-0.93	0.74-0.83	0.90-0.93	0.85-0.91
Hours worked per person	0.80-0.85	–	0.89-0.94	0.62-0.65	–	0.88-0.93
Nominal wages	0.89-0.94	0.81-0.88	0.88-0.94	0.73-0.82	0.82-0.89	0.82-0.89
Real wages	0.84-0.90	0.69-0.71	0.87-0.92	0.81-0.86	0.70-0.71	0.86-0.92
Labour cost index (LCI)	0.80-0.86	0.88-0.91	–	0.84-0.90	0.83-0.87	–
Real labour cost index	0.86-0.89	0.79-0.84	–	0.87-0.90	0.82-0.85	–
APC nominal wages $\sim$	0.78-0.84	0.77-0.79	0.82-0.87	0.69-0.73	0.77-0.83	0.77-0.83
APC real wages $\sim$	0.78-0.82	0.69-0.71	0.79-0.83	0.75-0.79	0.76-0.77	0.73-0.78
Net PWA migration (000)	0.91-0.93	–	–	0.90-0.93	–	–
Prices						
Consumer price index	0.87-0.92	0.90-0.94	0.83-0.88	0.85-0.87	0.89-0.92	0.83-0.85
- tradables	0.92-0.95	0.91-0.93	–	0.93-0.95	0.91-0.92	–
- non-tradables	0.93-0.95	0.91-0.95	–	0.89-0.95	0.87-0.92	–
- construction	0.93-0.96	–	–	0.92-0.96	–	–
- ex-construction	0.92-0.94	–	–	0.83-0.91	–	–
APC CPI $\sim$	0.86-0.88	0.87-0.89	0.86-0.88	0.84-0.86	0.88-0.90	0.87-0.88
- tradables $\sim$	0.88-0.90	0.90-0.92	–	0.90-0.91	0.90-0.92	–

$\sim$ HP-filtered for auto- and cross-correlations but not the standard deviations in table 1.

Table 2
Autocorrelations – continued from previous page

	1987Q2-2006Q2			1994Q2-2006Q2		
	NZ	Australia	US	NZ	Australia	US
- non-tradables∼	0.87-0.90	0.84-0.87	–	0.82-0.87	0.76-0.82	–
- construction∼	0.88-0.91	–	–	0.83-0.88	–	–
- ex-construction∼	0.88-0.91	–	–	0.80-0.84	–	–
House prices	0.95-0.97	0.91-0.94	0.88-0.92	0.94-0.96	0.93-0.95	0.89
APC house prices ∼	0.89-0.93	0.84-0.87	0.80-0.83	0.88-0.92	0.86-0.88	0.83-0.85
Real house prices						
Import prices	0.93-0.95	0.88-0.91	0.86-0.88	0.95-0.96	0.90-0.92	0.76-0.82
Export prices	0.93-0.94	0.89-0.90	0.93-0.95	0.94-0.95	0.90-0.91	0.93-0.95
APC import prices ∼	0.87-0.90	0.83-0.86	0.83-0.84	0.90-0.92	0.86-0.88	0.88-0.89
APC export prices ∼	0.89-0.91	0.85-0.86	0.89-0.91	0.91-0.92	0.86-0.87	0.88-0.90
Commodity prices	0.90-0.91	0.93-0.95	0.90-0.94	0.90-0.91	0.93-0.94	0.85-0.92
APC commod. prices ∼	0.86-0.87	0.88-0.90	0.81-0.86	0.88-0.89	0.90	0.77-0.81
Financial markets						
90 day rate ∼	0.87-0.90	0.93-0.94	0.93-0.95	0.79-0.83	0.91-0.92	0.92-0.94
5 year rate ∼	0.83-0.86	0.89-0.90	0.86-0.88	0.78-0.80	0.83-0.86	0.85-0.88
Real 90 day rate ∼	0.84-0.88	0.87-0.90	0.89-0.93	0.78-0.82	0.79-0.83	0.85-0.91
Real 5 year rate ∼	0.80-0.83	0.76-0.79	0.76-0.78	0.74-0.76	0.71-0.73	0.72-0.74
Nominal exch. rate (TWI)	0.94-0.96	0.89-0.93	0.88-0.91	0.94-0.96	0.91-0.94	0.92-0.94
Real exchange rate	0.94-0.96	0.89-0.92	0.86-0.91	0.94-0.96	0.89-0.92	0.91-0.94
APC TWI ∼	0.88-0.91	0.80-0.84	0.86-0.88	0.87-0.91	0.85-0.88	0.91-0.92
APC real exchange rate ∼	0.87-0.91	0.81-0.85	0.83-0.85	0.88-0.91	0.84-0.86	0.88-0.90
World series						
World output gap	0.88	–	–	0.87	–	–
Trading partner CPI (level)	0.88-0.92	–	–	0.82-0.83	–	–
APC trading partner CPI ∼	0.85-0.87	–	–	0.82	–	–

∼ HP-filtered for auto- and cross-correlations but not the standard deviations in table 1.

The first column gives the contemporaneous cross-correlation between GDP and the series. The second column generally contains the maximum absolute value correlation (if different) with the applicable quarters lead or lag in parentheses. However, sometimes the largest correlation is not the most economically sensible, and so, occasionally the smaller but more "economically interesting" correlation is reported. This is marked with an asterisk (this is of course a matter of judgement, and full correlations are available in the figures).

Unless indicated otherwise, in all correlation tables the lag refers to the number of quarters the left column variable lags or leads the variable listed across the top of the table. For example, in Table 3, (-4) in the maximum correlation column indicates that the variable lags GDP by a year.

Table 3
Correlations with lag and lead of GDP, 1987Q2-2006Q2

	NZ 1987Q2-2006Q2			New Zealand: BHK			Australia			US		
	T=0	Max	at	T=0	Max	at	T=0	Max	at	T=0	Max	at
Private consumption	0.69-0.73	0.69-0.75	0/-1	0.62	T=0	-	0.68-0.72	0.73-0.79	-1	0.81-0.83	0.81-0.84	0/-1
- of durables	0.84-0.88	T=0	-	-	-	-	-	-	-	0.73-0.76	0.75-0.78	+1
- of non-durables	0.57-0.66	T=0	-	-	-	-	-	-	-	0.78-0.82	T=0	0
- of services	0.69-0.82	0.71-0.82	+1/0	-	-	-	-	-	-	0.70-0.72	0.76	-1
Govt cons. & investment	0.21-0.22	0.45-0.64	-6	0.16	0.39	-3	0.29-0.33	0.57-0.64	-3/-4	-(0.22-0.24)	-(0.26-0.43)	+4
Private investment	0.83-0.88	T=0	-	0.56	T=0	-	0.73-0.76	0.77-0.81	+1	0.90-0.92	T=0	0
- residential	0.78-0.79	T=0	-	0.58	T=0	-	0.46-0.54	0.54*-0.62	+1	0.47-0.59	0.64-0.73	+2
- non-residential	0.68-0.79	0.68-0.80	-1	0.48	T=0	-	0.70-0.76	T=0	0	0.82-0.88	0.89-0.91	-1
Exports	0.20-0.21	0.20*-0.34*	0/+6	0.29	-0.31	-2	-(0.41-0.52)	-(0.43-0.57)	+1	0.57-0.67	0.62-0.69	-1
- of goods	0.00-0.02	0.02*-0.08*	-1/-4	0.23	-0.35	-2	-(0.28-0.36)	-0.46-0.54	+2/-6	0.59-0.70	0.65-0.72	-1
- of services	0.34-0.37	0.64-0.71	+3/+4	0.36	T=0	-	-(0.15-0.31)	-0.37-0.56	+1/+6	0.38-0.50	0.39-0.50	-1
Imports	0.67-0.71	T=0	-	0.37	0.40	-1	0.67-0.73	0.70-0.75	+1	0.84-0.88	T=0	0
- of goods	0.70-0.73	T=0	-	0.40	T=0	-	0.61-0.68	0.69-0.74	+2/+1	0.83-0.86	T=0	0
- of services	0.16-0.33	0.36-0.52	-4	0.14	0.25	-1	0.63-0.69	T=0	0	0.59-0.71	0.68-0.79	-2
Capital utilisation	0.64-0.66	0.66-0.68	0/+1	0.33	0.36	+1	0.59-0.68	0.60-0.68	+1/0	0.67-0.78	0.69-0.78	+1/0
Unemployment rate	-(0.73-0.84)	T=0	0	-	-	-	-(0.81-0.86)	-(0.87-0.90)	-1	0.76-0.82	-(0.83-0.85)	-1
Hours worked	0.74-0.84	T=0	0	0.18	0.24	-2	-	-	-	0.82-0.86	0.86-0.87	-1
Employment	0.61-0.76	0.66-0.78	-2/-1	0.33	0.40	-1	0.67-0.73	0.78-0.82	-2	0.74-0.82	0.78-0.85	-1

$\sim$ These series are HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table 1.

Table 3
Correlations with lag and lead of GDP, 1987Q2-2006Q2 – continued from previous page

	NZ 1987Q2-2006Q2			New Zealand: BHK			Australia			US		
	T=0	Max	at	T=0	Max	at	T=0	Max	at	T=0	Max	at
Labour force	0.19-0.44	0.51-0.63	-4/-3	-	-	-	0.42-0.46	0.71-0.72	-4	0.53-0.54	0.53*-0.56	0/-1
Labour productivity (/hrs)	0.17-0.35	-0.28-0.35	+4/0	0.79	T=0	-	-	-	-	-0.14-0.02	-(0.54-0.64)	-3/-4
Unit labour costs	-(0.49-0.55)	T=0	0	-0.62	T=0	-	0.12-0.23	0.13*-0.23	-1	-(0.09-0.32)	0.26*-0.29*	-6
Hours worked per person	0.46-0.50	0.56-0.63	+1/+2	0.04	-0.15	+3	-	-	-	0.71-0.78	T=0	0
Nominal wages (level)	-(0.35-0.49)	0.44*-0.57*	-6	-	-	-	-0.07-0.03	0.49*-0.53	-6/-5	-(0.04-0.08)	0.20*-0.37*	-6
APC nominal wages ∼	0.39-0.47	0.64-0.75	-5	-	-	-	0.20-0.28	0.31-0.36	-2	0.27-0.42	0.29-0.44	-1
Real wages	-(0.22-0.34)	0.32*-0.41*	-6	0.15	T=0	-	0.08-0.13	-0.18-0.15	+6/+1	0.03-0.09	-0.25-0.24	-3/-6
APC real wages ∼	0.18-0.26	0.53-0.64	-6	-	-	-	-(0.05-0.07)	0.08-0.11	+6	0.08-0.23	0.28-0.30	+6
Labour cost index (LCI)	-(0.09-0.27)	0.27*-0.49*	-6	-	-	-	-(0.09-0.11)	0.55-0.59	-6	-	-	-
APC labour cost index ∼	0.26-0.46	0.54-0.63	-6/-5	-		-	0.21-0.33	0.51-0.55	-4/-5	-	-	-
Real labour cost index	-(0.19-0.33)	-0.43	-4/+3	0.34	T=0	-	-(0.08-0.14)	0.30-0.42	-6	-	-	-
Net PWA migration (000)	0.40-0.44	0.44-0.52	+2/+3	-	-	-	-	-	-	-	-	-
Consumer price index	-(0.10-0.25)	0.30*-0.52	-6/-5	-0.18	-0.20	-1	-(0.03-0.13)	0.51*-0.58	-6	-(0.14-0.18)	0.39*-0.41*	-4/-6
- tradables	-0.04-0.10	-0.19-0.16	-6/+4	-	-	-	0.00-0.05	0.47*-0.52	-5/-4	-	-	-
- non-tradables	-(0.16-0.22)	0.56*-0.62*	-6	-	-	-	-(0.15-0.21)	0.48*-0.55	-6	-	-	-
- construction	0.39-0.50	0.84-0.86	-4	-	-	-	-	-	-	-	-	-
- ex-construction	-(0.25-0.37)	0.36*-0.47*	-6	-	-	-	-	-	-	-	-	-
APC CPI ∼	0.21-0.28	0.45-0.48	-3	-	-	-	0.38-0.42	0.57-0.60	-2/-3	0.33-0.40	0.67-0.68	-2
- tradables ∼	-(0.11-0.19)	-0.14-0.19	-6/+4	-	-	-	0.23-0.27	0.37-0.41	-2/-3	-	-	-
- non-tradables ∼	0.55-0.64	0.71-0.77	-2	-	-	-	0.22-0.29	0.52-0.55	-5	-	-	-
- construction ∼	0.57-0.67	0.65-0.70	-1	-	-	-	-	-	-	-	-	-
- ex-construction ∼	0.48-0.54	0.68-0.78	-3/-4	-	-	-	-	-	-	-	-	-
House prices	0.54-0.55	0.61-0.71	-2/-3	-	-	-	0.33-0.54	0.35-0.63	+1	0.27-0.30	0.54-0.58	-3/-4
APC house prices ∼	0.73-0.77	0.78-0.81	+1	-	-	-	-(0.10-0.18)	0.49*-0.50*	+6	0.23-0.34	0.33-0.42	+2
Real house prices	0.55-0.58	0.58-0.69	-1/-3	-	-	-	0.35-0.53	0.39-0.65	+1/+2	0.41-0.48	0.48-0.50	+2/+1

∼ These series are HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table 1.

Table 3
Correlations with lag and lead of GDP, 1987Q2-2006Q2 – continued from previous page

	NZ 1987Q2-2006Q2			New Zealand: BHK			Australia			US		
	T=0	Max	at	T=0	Max	at	T=0	Max	at	T=0	Max	at
Import prices	-(0.27-0.39)	-0.40-0.35	-2/+6	0.10	0.27	-2	-(0.16-0.21)	-(0.17-0.22)	+1	0.09-0.21	0.26-0.48	-2
Export prices	-(0.12-0.23)	0.24*-0.33	+6	0.14	-0.36	-4	0.12-0.18	0.18-0.25	-3	0.26-0.29	0.29-0.40	-1/-2
Commodity prices	0.34-0.38	0.39-0.52	-2	-	-	-	0.29-0.41	0.32-0.41	+2/+1	0.14-0.27	-(0.29-0.46)	-6
APC import prices ∼	-(0.37-0.41)	-(0.49-0.50)	+1	-	-	-	0.00-0.01	0.11-0.13	-3/+6	0.27-0.35	0.34-0.44	-1
APC export prices ∼	-0.35	T=0	0	-	-	-	-0.01-0.03	0.15-0.19	+6	-0.04-0.09	-(0.25-0.34)	-6
APC commodity prices ∼	0.08-0.14	0.13-0.17*	+6	-	-	-	-(0.11-0.18)	0.14*-0.27	+6	-0.14-0.11	-(0.40-0.47)	-5
90 day rate ∼	0.37-0.51	0.72-0.78	-3	-	-	-	0.68-0.74	0.74-0.79	-1	0.64-0.73	0.77-0.80	-2/-1
5 year rate ∼	0.53-0.56	0.62-0.67	-1/-2	-	-	-	0.54-0.58	0.69-0.70	-2	0.49-0.57	0.54-0.61	-1
Real 90 day rate ∼	0.32-0.46	0.72-0.79	-3	0.00	-0.23	+4	0.63-0.70	T=0	0	0.57-0.68	T=0	0
Real 5 year rate ∼	0.48-0.50	0.54-0.61	-1/-3	-	-	-	0.40-0.43	0.42-0.47	-1/-2	0.17-0.22	0.20*-0.27	+1
Nominal exch. rate (TWI)	0.56-0.63	0.60-0.69	-1/-2	-	-	-	0.23-0.34	0.25-0.35	-5/-1	-0.09-0.06	0.34-0.49	-5
Real exchange rate	0.60-0.66	0.65-0.74	-1/-2	-0.01	-0.19	-5	0.24-0.33	0.29-0.35	-5/-2	-(0.01-0.14)	0.46-0.58	-5
APC TWI ∼	0.67	0.76-0.78	+1	-	-	-	0.03-0.06	0.12-0.17	+2/+3	-(0.05-0.17)	0.28-0.32	-5/-4
APC real exchange rate ∼	0.69	0.77	+1	-	-	-	0.01-0.04	-0.12-0.12	+6/+3	0.09-0.24	0.43-0.48	-4

∼ These series are HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table 1.

Table 4
Correlations with lag and lead of GDP, 1994Q1-2006Q2

	NZ			Australia			US		
	T=0	Max	at	T=0	Max	at	T=0	Max	at
Private consumption	0.41-0.43	0.41*-0.45	0/+1	0.58	0.71	-1	0.77	0.81-0.84	-1/-2
- of durables	0.74-0.76	0.80-0.81	+1	-	-	-	0.59-0.64	0.66	+1
- of non-durables	0.63-0.69	0.71-0.72	+1	-	-	-	0.79-0.81	T=0	0
- of services	0.38-0.49	0.49-0.54	+2	-	-	-	0.70	0.86-0.87	-2
Govt consumption & investment	0.05-0.08	0.28*-0.39	-6	0.32-0.34	0.51-0.54	-3	-(0.21-0.37)	-(0.43-0.49)	-2/-3
Private investment	0.71-0.74	0.73-0.76	-1	0.50-0.53	0.52*-0.53	+1/0	0.93-0.94	T=0	0
- residential	0.72-0.74	T=0	0	0.69-0.71	T=0	0	0.55-0.56	0.82-0.85	+2/+3
- non-residential	0.24-0.35	0.31-0.43	-2	0.12-0.15	0.20*-0.28*	+2/+6	0.86-0.91	0.92-0.94	-1
Exports	0.50-0.58	T=0	0	-(0.23-0.36)	-0.48-0.34	+2/-6	0.73-0.78	0.80-0.83	-1
- of goods	0.46-0.49	0.56-0.59*	-1	-(0.11-0.25)	-0.47-0.42	+3/-6	0.71-0.77	0.81-0.82	-1
- of services	0.22-0.25	0.58*-0.60*	+3/+4	-(0.37-0.43)	-(0.48-0.58)	+1	0.71-0.74	0.74-0.75	0/-1
Imports	0.57-0.58	0.57-0.61	0/+1	0.43-0.44	0.52-0.57	-1	0.88-0.92	0.93-0.95	-1
- of goods	0.63	0.66-0.69	+1	0.41	0.47-0.54	-1/-2	0.88-0.92	0.92-0.94	-1
- of services	0.15-0.21	0.23-0.36	-3	0.26-0.29	0.41	-1	0.78-0.84	0.88-0.91	-1
Capital utilisation	0.69-0.71	T=0	0	0.52-0.56	0.57-0.60	-1	0.70-0.76	0.76-0.78	+1/+2
Unemployment rate	-(0.59-0.67)	T=0	0	-(0.32-0.33)	-(0.73-0.75)	-2	-(0.81-0.87)	-(0.90-0.91)	-2/-1
Hours worked	0.63-0.70	0.68-0.72	+1	-	-	-	0.90-0.93	0.93-0.94	-1
Employment	0.55-0.62	0.58-0.62	+1/0	-(0.08-0.16)	-0.57	+2	0.75-0.82	0.83-0.89	-1
Labour force	0.39-0.45	0.39-0.49	0/-2	-(0.30-0.37)	-(0.40-0.49)	-1	0.45	0.50*-0.56*	-1/-2
Labour productivity (/hrs)	0.46-0.53	0.50-0.59	-1	-	-	-	-0.13-0.12	-(0.60-0.65)	-3/-4
Unit labour costs	-(0.44-0.50)	0.46*-0.51	-6	-(0.32-0.45)	-(0.49-0.59)	-3	-0.03-0.18	0.48*-0.54*	-6/-3
Hours worked per person	0.24-0.30	0.28*-0.33*	+1	-	-	-	0.74-0.82	0.76-0.85	+2
Nominal wages (level)	-(0.06-0.10)	0.64-0.67	-6	-(0.34-0.46)	-(0.55-0.63)	-2	0.36-0.43	0.63-0.72	-5
APC nominal wages $\sim$	0.10-0.19	0.61-0.62	-6	-(0.29-0.32)	0.52-0.53	-6	0.61-0.72	T=0	0

$\sim$ These series are HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table 1.
See previous table for notes.

Table 4
Correlations with lag and lead of GDP, 1994Q1-2006Q2 – continued from previous page

	NZ			Australia			US		
	T=0	Max	at	T=0	Max	at	T=0	Max	at
Real wages	0.02-0.15	0.26*-0.37*	-6	0.05-0.08	-0.38-0.37	-2/-6	0.32-0.41	0.41-0.56	0/-6
APC real wages ∼	0.17-0.23	0.49-0.58	-6	-0.17	0.34-0.39	+6/-6	0.25-0.39	0.45-0.49	+6
Labour cost index (LCI)	-(0.05-0.14)	0.37-0.51	-6	-(0.68-0.69)	T=0	0	-	-	-
APC labour cost index ∼	0.14-0.26	0.41-0.49	-6	-(0.42-0.45)	0.65-0.66	-4	-	-	-
Real labour cost index	-(0.11-0.24)	-(0.35-0.37)	+3/-4	-(0.35-0.46)	T=0	-3/-4	-	-	-
Net PWA migration (000)	0.33-0.44	0.42-0.55	+3	-	-	-	-	-	-
Consumer price index	-0.19-0.00	0.43-0.46	-4	-(0.44-0.55)	-(0.50-0.57)	+2/+1	0.11-0.13	-(0.55-0.69)	+6/+5
- tradables	-0.06-0.05	0.48-0.59	+5	-(0.61-0.67)	T=0	0	-	-	-
- non-tradables	-0.06-0.00	0.49*-0.55*	-4/-5	0.08-0.27	-0.48-0.39	-4/+6	-	-	-
- construction	0.07-0.17	0.71-0.73	-4	-	-	-	-	-	-
- ex-construction	0.09-0.11	0.35*-0.54*	-3/-4	-	-	-	-	-	-
APC CPI ∼	-(0.06-0.09)	0.27-0.39	-3	-(0.25-0.34)	-(0.56-0.62)	+3	0.43	0.56-0.57	-2
- tradables ∼	-(0.36-0.42)	-(0.41-0.45)	+1/0	-(0.38-0.50)	0.49*-0.59	-5	-	-	-
- non-tradables ∼	0.49-0.61	0.73-0.79	-2	-0.01-0.23	-(0.59-0.61)	+3/+4	-	-	-
- construction ∼	0.18-0.36	0.68-0.70	-3	-	-	-	-	-	-
- ex-construction ∼	0.47-0.57	0.63-0.71	-2	-	-	-	-	-	-
House prices	0.40-0.45	0.46*-0.49*	-1/-3)	0.04-0.30	-0.33-0.35	-4/+1	-(0.05-0.06)	0.56-0.82	-5
APC house prices ∼	0.68-0.75	0.73-0.78	+1	0.10-0.22	-(0.48-0.55)	-3	0.42-0.52	0.76-0.80	-2/-3
Real house prices	0.37-0.42	0.42*-0.45*	0/-3	0.13-0.38	0.13*-0.41	0/+1	-0.02-0.01	0.33-0.62	-5
Import prices	-(0.30-0.35)	0.38-0.44	+6	-(0.21-0.34)	-0.37-0.38	+1/-5	0.20-0.32	-(0.36-0.58)	+6
Export prices	-(0.30-0.32)	0.25*-0.36	+6	-(0.40-0.47)	-(0.41-0.47)	+1	0.03-0.13	-(0.30-0.43)	-6/+6
Commodity prices	0.22-0.30	0.49-0.51	-3	-(0.51-0.54)	-(0.51-0.55)	0/+1	-(0.01-0.18)	-(0.66-0.75)	-6
APC import prices ∼	-(0.34-0.46)	-(0.58-0.65)	+2	-(0.11-0.28)	-0.35-0.41	+1/-4	0.51-0.59	0.52-0.61	+1
APC export prices ∼	-(0.31-0.41)	-(0.43-0.51)	+2	-(0.21-0.32)	-0.43-0.44	+1/-4	0.38-0.61	T=0*	0

∼ These series are HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table 1.
See previous table for notes.

Table 4
Correlations with lag and lead of GDP, 1994Q1-2006Q2 – continued from previous page

	NZ			Australia			US		
	T=0	Max	at	T=0	Max	at	T=0	Max	at
APC commodity prices ∼	0.29-0.31	0.36-0.41	-1	-(0.31-0.33)	-(0.56-0.59)	+2	-0.15-0.12	-(0.41-0.47)	-5
90 day rate ∼	0.12-0.23	0.66-0.69	-3	-(0.03-0.12)	-(0.66-0.68)	+3	0.73-0.79	0.85	-1/-2
5 year rate ∼	0.57	0.63-0.65	-1	-0.10-0.03	-(0.77-0.80)	+4	0.72-0.75	T=0	0
Real 90 day rate ∼	0.07-0.19	0.62-0.67	-3	0.24-0.25	0.48-0.57	-2	0.59-0.72	0.66-0.73	-1
Real 5 year rate ∼	0.56	0.59	-1	0.28-0.30	0.31-0.32	-1	0.26-0.34	T=0	0
Nominal exch. rate (TWI)	0.57-0.59	0.59	0/-1	0.19-0.28	0.33*-0.41	+2	-(0.11-0.30)	-0.61-0.70	+3/-6
Real exchange rate	0.54-0.55	0.55-0.60	-1	-0.03-0.09	-(0.14-0.37)	-5	-(0.09-0.28)	0.60-0.72	-6
APC TWI ∼	0.65-0.70	0.79-0.83	+1	0.01-0.18	-(0.37-0.47)	-3	0.05-0.21	-0.64-0.57	+4/-4
APC real exchange rate ∼	0.71-0.75	0.78-0.82	+1	0.05-0.21	-(0.44-0.45)	+5	-0.04-0.16	0.60-0.62	-4

∼ These series are HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table 1.
See previous table for notes.

Table 5
Correlations with CPI inflation gap, 1987Q2-2006Q2

	New Zealand			Australia			US		
	T=0	Max corr	Max at:	T=0	Max corr	Max at:	T=0	Max corr	Max at:
GDP	0.20-0.27	0.52	+3	0.38-0.42	0.58-0.59	+2/+3	0.33-0.40	0.67-0.68	+2
Private consumption	0.06-0.13	0.26-0.29	+3	0.32-0.35	0.47-0.51	+2	0.32-0.38	0.64-0.67	+3
- of durables	0.04-0.14	0.49-0.51	+3/+4	-	-	-	-0.05-0.04	0.73-0.77	+4
- of non-durables	0.17-0.21	0.21-0.24	-4	-	-	-	0.39-0.46	0.66-0.69	+3/+2
- of services	0.13-0.20	0.32-0.38	+3	-	-	-	0.31-0.36	0.46-0.47	+2
Govt consumption & investment	0.18-0.19	0.27*-0.32*	-3/-4	0.26-0.29	0.37-0.39	-2	-0.07-0.00	0.24-0.34	-6
Private investment	0.21-0.26	0.65-0.67	+3	0.00-0.08	0.35-0.37	+3	0.21-0.23	0.57	+3
- residential	-(0.01-0.06)	0.35-0.38	+3	-(0.20-0.22)	-(0.55-0.59)	-3	-(0.25-0.27)	-(0.57-0.60)	-2/-3
- non-residential	0.60-0.62	0.62-0.64	+1	0.23-0.28	0.33-0.36	+2	0.53-0.56	0.57-0.59	+1
Exports	-(0.15-0.18)	0.26-0.27	+6/-5	-(0.08-0.09)	-(0.26-0.33)	+2/+3	0.47-0.51	0.50-0.53	+1
- of goods	-(0.28-0.30)	0.34-0.40	-5	-(0.03-0.07)	-(0.33-0.34)	+3	0.49-0.53	T=0	0
- of services	0.20-0.22	0.47-0.48	+4	0.02-0.05	0.15-0.22	-2/+6	0.30-0.38	0.44-0.47	+2
Imports	0.26-0.27	0.58	+2	-0.02-0.06	0.46-0.54	+4	0.35-0.37	0.63-0.66	+2
- of goods	0.28-0.30	0.58-0.60	+2	-0.04-0.04	0.43-0.49	+3/+4	0.33	0.61-0.65	+2
- of services	-(0.03-0.16)	-(0.36-0.49)	-3	0.07-0.14	0.45-0.54	+4	0.41-0.48	0.56-0.58	+2
Labour market									
Capital utilisation	0.34-0.35	0.62-0.65	+3	0.17-0.28	0.69-0.70	+5/+4	0.21-0.25	0.51*-0.57	+3/+2
Unemployment rate	-(0.56-0.59)	-(0.61-0.63)	+1	-(0.60-0.62)	-(0.71-0.74)	+2	-(0.54-0.55)	-0.63	+1/+2
Hours worked	0.41-0.46	0.45-0.50	+1	-	-	-	0.50-0.52	0.61	+2
Employment	0.45-0.49	0.45-0.50	0/-1	0.72	0.72-0.74	0/+1	0.60-0.63	0.67-0.69	+1
Labour force	0.22-0.23	0.44-0.52	-4	0.64-0.68	0.65-0.68	-1/0	0.38-0.43	0.41-0.44	+1
Labour productivity (/hrs)	-(0.31-0.34)	T=0	0	-	-	-	-(0.52-0.55)	-(0.55-0.61)	-1

$\sim$ These series are HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table 1.
The interpretation is as for the previous table. As explained above table 3, the maximum is generally the greatest absolute value unless marked with *.

Table 5
Correlations with CPI inflation gap, 1987Q2-2006Q2 – continued from previous page

	New Zealand			Australia			US		
	T=0	Max corr	Max at:	T=0	Max corr	Max at:	T=0	Max corr	Max at:
Hours worked per person	0.06-0.08	0.50*-0.56	+3/+5	-	-	-	0.31-0.32	0.59-0.60	+4
Unit labour costs	-(0.01-0.07)	-(0.34-0.38)	+4	0.40-0.46	0.41*-0.51	+1	0.16-0.30	-(0.40-0.41)	+6
APC unit labour costs ~	0.12-0.16	-(0.28-0.31)	+5	0.37-0.41	0.52-0.54	+2	0.42-0.45	0.44-0.45	+1/0
APC nominal wages ~	0.41-0.46	0.59-0.62	-2	0.48-0.55	0.49-0.55	-1	0.25-0.33	0.32*-0.37	+1
APC labour cost index (LCI) ~	0.13	0.74-0.81	-4	0.63-0.66	T=0	0	-	-	-
APC real wages ~	-(0.21-0.28)	0.55	-4	-0.18	-0.22	+1	-(0.17-0.30)	0.34-0.37	-5
Net PWA migration (000)	0.09-0.13	0.48-0.56	-4	-	-	-	-	-	-
Prices									
APC non-tradables CPI ~	0.49-0.51	0.50-0.53	+1	0.62-0.63	0.67-0.70	-1	-	-	-
- construction ~	0.48-0.52	0.53-0.57	+1	-	-	-	-	-	-
- ex-construction ~	0.39-0.41	0.41	+1/0	-	-	-	-	-	-
APC tradables CPI ~	0.69-0.75	T=0	0	0.80	0.80-0.82	0/+1	-	-	-
APC house prices ~	-(0.02-0.08)	0.22-0.23	+4	-(0.19-0.34)	-(0.21-0.34)	-1/0	-0.07-0.00	0.29-0.34	+4
APC import prices ~	0.35-0.41	0.42-0.49	+1	0.09-0.19	0.13*-0.21*	+1	0.57-0.63	0.65-0.69	+1
APC export prices ~	0.19-0.20	0.33*-0.34*	+2	0.18-0.21	0.34*-0.36*	+2/+3	0.28-0.42	0.31*-0.42	+1
APC commodity prices ~	-(0.03-0.07)	0.58-0.62	+4	0.01-0.09	0.42-0.49	+5	-0.03-0.11	-(0.31-0.38)	-3
Financial markets									
90 day rate ~	0.75-0.78	T=0	0	0.60-0.63	0.67	+1/+2	0.67-0.68	0.69-0.70	+1
5 year rate ~	0.57-0.60	0.63-0.65	+1	0.56-0.63	0.69-0.70	+1/+2	0.54-0.60	0.55-0.61	+1
Real 90 day rate ~	0.68-0.71	T=0	0	0.18-0.27	0.45-0.53	+3	0.08-0.20	0.42-0.48	+3
Real 5 year rate ~	0.37-0.43	0.48-0.51	+1	-0.05-0.04	0.40-0.47	+3	-(0.34-0.41)	T=0	0

~ These series are HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table 1.
The interpretation is as for the previous table. As explained above table 3, the maximum is generally the greatest absolute value unless marked with *.

Table 5
Correlations with CPI inflation gap, 1987Q2-2006Q2 – continued from previous page

	New Zealand			Australia			US		
	T=0	Max corr	Max at:	T=0	Max corr	Max at:	T=0	Max corr	Max at:
Nominal exch. rate (TWI)	-(0.03-0.07)	-0.13-0.16	+2/-6	-(0.18-0.28)	0.37-0.43	-6	-(0.16-0.27)	0.41-0.43	-5
Real exchange rate	-(0.01-0.06)	0.17-0.21	-6	-(0.01-0.10)	0.44-0.48	-4	-(0.13-0.24)	0.37-0.41	-5
APC TWI $\sim$	-0.04-0.00	0.18-0.21	-3/+5	-(0.02-0.14)	0.52-0.55	-4	-0.07-0.00	0.54-0.56	-4
APC real exchange rate $\sim$	-0.02-0.03	0.19-0.23	-3/+5	-0.03-0.09	0.45-0.48	-3/-4	-0.01-0.08	0.47-0.48	-4/-3

$\sim$ These series are HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table 1.
The interpretation is as for the previous table. As explained above table 3, the maximum is generally the greatest absolute value unless marked with *.

Table 6
Correlations with CPI inflation gap, 1994Q1-2006Q2

	New Zealand			Australia			US		
	T=0	Max corr	Max at:	T=0	Max corr	Max at:	T=0	Max corr	Max at:
GDP	-(0.08-0.10)	0.34-0.39	+3/-6	-(0.25-0.34)	0.27*-0.34*	+5/+6	0.43	0.56-0.57	+2
Private consumption	-0.44	0.29*-0.41*	+6	-(0.04-0.06)	0.54*-0.57*	+5	0.41-0.42	0.55-0.62	+2/+3
- of durables	-(0.31-0.32)	0.30*-0.42	+5	-	-	-	-(0.09-0.19)	0.71-0.82	+4
- of non-durables	-0.22	0.16*-0.22*	-6/+5	-	-	-	0.43-0.47	0.60	+2/+3
- of services	-(0.31-0.34)	0.24*-0.26*	-6/+6	-	-	-	0.42-0.43	0.45	+1
Govt consumption & investment	-(0.37-0.39)	0.62-0.65	-6	0.18-0.22	0.48*-0.49*	+4	-0.27	-(0.32-0.38)	-2
Private investment	-0.06	0.48-0.58	+3	-(0.47-0.57)	-(0.52-0.58)	-2/-1	0.36-0.37	0.48*-0.48	+2
- residential	-(0.52-0.53)	-(0.59-0.62)	-1	-0.41	-(0.60-0.64)	-2	-(0.05-0.07)	0.61-0.66	+5
- non-residential	0.51-0.59	0.56-0.63	-1	-(0.38-0.48)	-(0.56-0.65)	+5/+4	0.53-0.58	T=0	0
Exports	0.12-0.16	-(0.29-0.42)	-3	0.16-0.25	0.19-0.65	+4/0	0.56-0.60	0.58-0.63	+1
- of goods	-(0.08-0.13)	-(0.45-0.48)	-3	0.22-0.30	0.30-0.33	0/+4	0.56-0.60	T=0	0
- of services	0.37-0.38	0.39-0.40	+4/+1	-0.03-0.06	0.25-0.32	-5	0.45-0.48	0.59-0.64	+2
Imports	-(0.29-0.31)	-(0.62-0.67)	-2	-(0.44-0.55)	-(0.59-0.63)	-2	0.49-0.50	0.61-0.64	+2/+1
- of goods	-(0.29-0.30)	-(0.60-0.64)	-2	-(0.35-0.47)	-(0.54-0.58)	-2	0.50-0.51	0.63-0.65	+2/+1
- of services	-(0.16-0.24)	-(0.56-0.64)	-3	-(0.31-0.40)	-(0.34-0.42)	-2	0.34-0.37	0.53-0.54	+2
Labour market									
Capital utilisation	0.24-0.29	0.58-0.62	+3	-(0.16-0.25)	-(0.36-0.43)	-3	0.28-0.32	0.48*-0.52*	+2
Unemployment rate	-0.46	-(0.46-0.47)	0/+2	-(0.23-0.29)	-(0.74-0.75)	-6	-(0.55-0.59)	-(0.58-0.62)	+1
Hours worked	0.19-0.24	0.26-0.32	-5/+1	-	-	-	0.51-0.57	0.54-0.61	+1
Employment	0.25-0.32	0.33-0.34	-4	0.72-0.79	T=0	0	0.69-0.74	T=0	0
Labour force	0.02-0.11	0.45-0.52	-5	0.48-0.54	0.50-0.54	-1/0	0.58-0.61	0.64-0.67	-1
Labour productivity (/hrs)	-(0.27-0.29)	T=0	0	-	-	-	-(0.52-0.53)	-(0.57-0.58)	-1

$\sim$ These series are HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table1.
The interpretation is as for the previous table. As explained above table 3, the maximum is generally the greatest absolute value unless marked *.

Table 6
Correlations with CPI inflation gap, 1994Q1-2006Q2 – continued from previous page

	New Zealand			Australia			US		
	T=0	Max corr	Max at:	T=0	Max corr	Max at:	T=0	Max corr	Max at:
Hours worked per person	0.00-0.01	0.37*-0.52*	+6	-	-	-	0.33	0.53-0.59	+3
Unit labour costs	-(0.17-0.21)	0.27-0.30	+6	0.37-0.39	0.39-0.50	0/-6	0.47-0.59	0.50-0.61	-1
APC unit labour costs ~	-(0.11-0.18)	-(0.52-0.53)	+3	0.41-0.52	T=0	0	0.57-0.60	0.67-0.69	+1
APC nominal wages ~	0.03-0.05	0.59-0.62	-3/-2	0.38-0.45	0.54-0.57	-2	0.18-0.24	0.38-0.43	+3
APC labour cost index (LCI) ~	0.04-0.08	0.72-0.76	-4	0.25-0.29	0.52-0.53	+6	-	-	-
APC real wages ~	-(0.70-0.71)	-(0.82-0.83)	+1	-(0.07-0.08)	-0.29-0.34	+5/-2	-(0.34-0.42)	T=0	0
Net PWA migration (000)	-0.03-0.04	0.69-0.70	-4/-5	-	-	-	-	-	-
Prices									
APC non-tradables CPI ~	0.25-0.34	0.31*-0.43	-6/+1	0.44-0.45	0.45-0.55	-6	-	-	-
- construction ~	0.23-0.27	0.28*-0.37*	+1	-	-	-	-	-	-
- ex-construction ~	0.19-0.30	0.36*-0.38	+1/-6	-	-	-	-	-	-
APC tradables CPI ~	0.83-0.85	T=0	0	0.72-0.73	0.74-0.78	+1	-	-	-
APC house prices ~	-(0.43-0.45)	0.37*-0.44	-6	0.07-0.25	0.33*-0.37*	-3/-5	0.34-0.39	0.36-0.39	-5/0
APC import prices ~	0.54-0.62	0.67*-0.73	+1	0.10-0.21	0.38*-0.43*	+6	0.64-0.65	0.82-0.83	+1/+2
APC export prices ~	0.45-0.49	0.55*-0.56*	+2/+1	0.25-0.33	-(0.34-0.39)	-4	0.61-0.65	0.71-0.76	+1
APC commodity prices ~	0.24-0.27	0.64*-0.67	+4	0.39-0.42	0.45-0.48	+2/+1	0.19-0.27	0.32*-0.44	+1/+2
Financial markets									
90 day rate ~	0.59-0.67	T=0	0	0.57-0.58	T=0	0	0.67-0.71	T=0	0
5 year rate ~	0.43-0.46	0.74-0.77	+2	0.45-0.54	0.59-0.61	+2	0.59-0.62	T=0	0
Real 90 day rate ~	0.51-0.60	T=0	0	-(0.32-0.39)	-(0.37-0.39)	-6/0	0.02-0.12	0.30-0.32	+3
Real 5 year rate ~	0.29-0.31	0.65-0.69	+2	-(0.49-0.50)	T=0	0	-(0.44-0.50)	T=0	0

~ These series are HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table1.
The interpretation is as for the previous table. As explained above table 3, the maximum is generally the greatest absolute value unless marked *.

Table 6
Correlations with CPI inflation gap, 1994Q1-2006Q2 – continued from previous page

	New Zealand			Australia			US		
	T=0	Max corr	Max at:	T=0	Max corr	Max at:	T=0	Max corr	Max at:
Nominal exch. rate (TWI)	-(0.46-0.49)	T=0	0	-(0.67-0.68)	-(0.69-0.72)	+1	-(0.17-0.24)	0.72-0.79	-6
Real exchange rate	-(0.43-0.46)	-(0.46-0.47)	+1	-(0.43-0.46)	-(0.49-0.62)	+1/+5	-(0.19-0.28)	0.63-0.74	-6
APC TWI $\sim$	-(0.29-0.38)	0.45-0.52	+1/-6	-(0.19-0.27)	0.57-0.64	-4/-5	0.27-0.32	0.80-0.83	-4
APC real exchange rate $\sim$	-(0.16-0.24)	0.49-0.56	-6	-0.10-0.01	0.50-0.57	-4	0.14-0.20	0.71-0.74	-4/-5

$\sim$ These series are HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table1.
The interpretation is as for the previous table. As explained above table 3, the maximum is generally the greatest absolute value unless marked *.

Table 7
Correlations with non-tradables inflation gap, 1987Q2-2006Q2

	New Zealand			Australia		
	T=0	Max corr	Max at:	T=0	Max corr	Max at:
GDP	0.55-0.64	0.81-0.85	+2	0.22-0.29	0.52-0.53	+4/+5
Private consumption	0.59-0.67	0.63-0.68	+1	0.27-0.33	0.33-0.35	+1/+4
- of durables	0.48-0.62	0.75-0.80	+2	-	-	-
- of non-durables	0.65-0.75	T=0	0	-	-	-
- of services	0.48-0.59	0.62-0.71	+4/+3	-	-	-
Govt consumption & investment	0.27-0.38	0.34-0.46	-6	0.13-0.33	0.29-0.39	+5/-1
Private investment	0.43-0.53	0.66-0.74	+2	0.08-0.18	0.29*-0.33	+3
- residential	0.43-0.54	0.68-0.74	+2	-(0.11-0.12)	-(0.49-0.53)	-3
- non-residential	0.50-0.61	0.64-0.70	+4/+3	0.27-0.36	0.47-0.48	+2/+3
Exports	0.10-0.18	0.14*-0.18*	+2/0	-0.04-0.06	-(0.39-0.41)	+3
- of goods	0.10-0.15	0.13*-0.20*	-1	0.03-0.12	-(0.41-0.42)	+3
- of services	0.07-0.11	0.50*-0.63*	+6	-(0.01-0.05)	-(0.21-0.28)	-6
Imports	0.50-0.60	0.57-0.65	+1	-0.02-0.09	0.27-0.28	+4
- of goods	0.47-0.57	0.58-0.66	+1	-0.03-0.07	0.23-0.25	+4/+3
- of services	0.33-0.44	0.35-0.47	-1	0.04-0.13	0.29-0.33	+5
Labour market						
Capital utilisation	0.17-0.20	0.63-0.71	+4/+5	-(0.02-0.10)	0.56*-0.62	+5
Unemployment rate	-(0.56-0.62)	-(0.62-0.73)	+3	-(0.32-0.40)	-(0.60-0.62)	+4/+3
Hours worked	0.60-0.62	0.66-0.69	+1/+2	-	-	-
Employment	0.67-0.70	0.67-0.71	0/+1	0.50-0.57	0.61-0.65	+2
Labour force	0.52-0.60	0.52-0.61	-1	0.60-0.65	0.67-0.69	+1
Labour productivity (/hrs)	0.00	0.18-0.28	+3	-	-	-
Hours worked per person	0.01-0.03	0.53*-0.64	+6	-	-	-
Unit labour costs	-(0.06-0.08)	-(0.57-0.58)	+4	0.33-0.38	0.37-0.40	+1
APC unit labour costs $\sim$	0.28-0.33	0.43-0.49	-3	0.10-0.13	0.32-0.36	+6
APC nominal wages $\sim$	0.57-0.67	0.60-0.70	-1	0.31-0.36	0.31-0.37	0/+5
APC labour cost index (LCI) $\sim$	0.19-0.43	0.67-0.72	-5/-4	0.26-0.35	0.39-0.42	+5/+4
APC real wages $\sim$	0.24-0.38	0.49-0.61	-3	-(0.06-0.07)	-(0.27-0.29)	+2
Net PWA migration (000)	0.19-0.27	0.54-0.58	+3	-	-	-
Prices						
APC CPI $\sim$	0.49-0.51	T=0	0	0.62-0.62	0.67-0.70	+1
APC tradables CPI $\sim$	-(0.20-0.27)	-0.33-0.39	-5/+6	0.06	-(0.61-0.66)	-6
APC house prices $\sim$	0.42-0.50	0.61-0.69	+2/+3	-(0.06-0.11)	-0.21-0.23	-2/+6
APC import prices $\sim$	-(0.01-0.15)	-(0.52-0.55)	+3	-(0.24-0.31)	-(0.32-0.38)	+2
APC export prices $\sim$	-(0.16-0.25)	-0.53	+3	-(0.20-0.25)	-(0.24-0.28)	+2/-3
APC commodity prices $\sim$	-0.02-0.00	-(0.18-0.25)	+6/-6	-(0.15-0.16)	-0.30-0.18	-6/+6

$\sim$ HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table 1. The interpretation is as for the previous table. As explained above table 3, the maximum is generally the greatest absolute value unless marked *.

Table 7
Correlations with non-tradables inflation gap, 1987Q2-2006Q2 – cont'd from previous page

	New Zealand			Australia		
	T=0	Max corr	Max at:	T=0	Max corr	Max at:
Financial markets						
90 day rate ∼	0.75-0.80	T=0	0	0.37-0.47	0.58-0.62	+3
5 year rate ∼	0.73-0.76	T=0	0	0.44-0.52	0.67-0.71	+2
Real 90 day rate ∼	0.72-0.78	0.73-0.78	-1	0.12-0.26	0.44-0.45	+3
Real 5 year rate ∼	0.67-0.72	T=0	0	0.08-0.19	0.42	+3
Nominal exchange rate (TWI)	0.50-0.61	0.53-0.61	+2/0	0.25-0.34	0.48-0.55	-4
Real exchange rate	0.59-0.70	0.74-0.78	+2	0.34-0.45	0.46-0.55	-3
APC TWI ∼	0.18-0.30	0.76-0.78	+4	0.26-0.35	0.36-0.44	+2
APC real exchange rate ∼	0.06-0.12	0.66-0.70	+3/+4	0.27-0.33	0.38-0.45	+2

∼ HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table 1. The interpretation is as for the previous table. As explained above table 3, the maximum is generally the greatest absolute value unless marked *.

Table 8
Correlations with non-tradables inflation gap, 1994Q1-2006Q2

	New Zealand			Australia		
	T=0	Max corr	Max at:	T=0	Max corr	Max at:
GDP	0.49-0.61	0.73-0.79	+2	-0.01-0.23	-(0.60-0.62)	-3
Private consumption	0.29-0.39	0.29-0.42	+1/-6	-(0.03-0.13)	-0.43	-4
- of durables	0.26-0.43	0.64	+3	-	-	-
- of non-durables	0.45-0.60	0.50-0.62	+1	-	-	-
- of services	0.42-0.54	T=0	0	-	-	-
Govt consumption & investment	-(0.11-0.29)	0.71-0.73	-6	0.00-0.11	-(0.41-0.43)	-4
Private investment	0.56-0.64	0.69-0.73	+1	0.21-0.30	-(0.61-0.69)	+5/+6
- residential	0.41-0.52	0.65-0.66	+2	0.20-0.27	-(0.40-0.43)	+5
- non-residential	0.31-0.45	0.47-0.57	-2	0.19-0.29	-(0.70-0.74)	+6
Exports	0.25-0.34	-(0.41-0.47)	-4	-0.06-0.13	-(0.29-0.32)	+3
- of goods	0.37-0.38	-0.41-0.38	+6/-1	-0.07-0.16	-(0.30-0.37)	+3/-3
- of services	0.04-0.10	-0.69-0.58	-6/+5	-(0.02-0.07)	-(0.34-0.36)	+2
Imports	0.30-0.41	0.38-0.43	+1	-0.02-0.10	-(0.68-0.76)	+5
- of goods	0.29-0.39	0.40-0.45	+1	0.08-0.19	-(0.67-0.74)	+5
- of services	0.34-0.40	0.34-0.43	0/-1	-0.10-0.00	-(0.54-0.61)	+3
Labour market						
Capital utilisation	0.30-0.34	0.53-0.61	+3	0.01-0.03	-(0.27-0.29)	-4
Unemployment rate	-(0.48-0.58)	-(0.55-0.66)	+2	-0.04-0.07	0.56-0.59	-5
Hours worked	0.56-0.69	0.63-0.72	+1	-	-	-
Employment	0.46-0.61	0.54-0.65	+1	0.33	-(0.51-0.59)	-6
Labour force	0.45-0.56	0.53-0.64	-5	0.29-0.38	0.40-0.45	
Labour productivity (/hrs)	0.07-0.13	-(0.36-0.57)	+6	-	-	-
Hours worked per person	0.12-0.19	0.19*-0.26*	+1	-	-	-
Unit labour costs	-(0.15-0.24)	0.46*-0.55	-4/-5	0.33-0.51	0.38-0.52	+6/-1
APC unit labour costs $\sim$	-(0.03-0.13)	0.51*-0.54	-4	0.13-0.16	-0.33-0.35	+3/+6
APC nominal wages $\sim$	-0.05-0.10	0.60-0.64	-3	0.20-0.22	0.35-0.39	-2/+6
APC labour cost index (LCI) $\sim$	0.02-0.22	0.58-0.64	-5/-4	-(0.36-0.41)	T=0	0
APC real wages $\sim$	-(0.07-0.27)	0.55-0.63	-4	0.38-0.41	0.49-0.56	-6
Net PWA migration (000)	0.09-0.26	0.61-0.70	+3/+4	-	-	-
Prices						
APC CPI $\sim$	0.25-0.34	0.30*-0.43	-1	0.44-0.45	0.64-0.71	+6
APC tradables CPI $\sim$	-(0.21-0.36)	-(0.50-0.53)	+2	-(0.40-0.41)	-(0.50-0.61)	-6
APC house prices $\sim$	0.47-0.61	0.67-0.76	+2	0.50-0.52	0.56-0.59	+1
APC import prices $\sim$	-0.18-0.08	-(0.66-0.72)	+4	-(0.36-0.48)	-(0.66-0.70)	+2
APC export prices $\sim$	-0.12-0.08	-(0.61-0.67)	+3	-(0.19-0.30)	-(0.50-0.52)	+2/+3
APC commodity prices $\sim$	0.19-0.24	-(0.40-0.47)	-6/+6	0.00-0.04	-(0.21-0.22)	-6

$\sim$ HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table 1. The interpretation is as for the previous table. As explained above table 3, the maximum is generally the greatest absolute value unless marked *.

Table 8
Correlations with non-tradables inflation gap, 1994Q1-2006Q2 – cont'd from previous page

	New Zealand			Australia		
	T=0	Max corr	Max at:	T=0	Max corr	Max at:
Financial markets						
90 day rate ∼	0.70-0.71	T=0	0	0.27-0.29	-(0.48-0.54)	-6
5 year rate ∼	0.53-0.54	0.56-0.57	+1	0.41-0.45	0.45-0.50	+1
Real 90 day rate ∼	0.68-0.69	0.68-0.70	0/-1	-(0.09-0.11)	-(0.37-0.48)	+5
Real 5 year rate ∼	0.53	0.56-0.57	+1	0.02-0.03	-(0.65-0.66)	+6
Nominal exchange rate (TWI)	0.37-0.52	0.43-0.58	+2/-4	0.09-0.12	-(0.72-0.76)	+6
Real exchange rate	0.29-0.47	0.43-0.49	+1/-4	0.25-0.31	-(0.68-0.69)	+6
APC TWI ∼	0.07-0.28	0.84-0.88	+4/+3	0.41-0.53	0.69-0.70	+2
APC real exchange rate ∼	-0.05-0.08	0.63-0.69	+4	0.40-0.51	0.68-0.72	+2

∼ HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table 1.
The interpretation is as for the previous table. As explained above table 3, the maximum is generally
the greatest absolute value unless marked *.

Table 9
Correlations with 90-day rate gap, 1987Q2-2006Q2

	New Zealand			Australia			US		
	T=0	Max corr	Max at:	T=0	Max corr	Max at:	T=0	Max corr	Max at:
GDP	0.37-0.51	0.74-0.81	+3	0.68-0.74	0.74-0.79	+2	0.64-0.73	0.79-0.80	+2/+1
Private consumption	0.39-0.56	0.51-0.63	+2	0.74-0.79	T=0	0	0.58-0.60	0.64-0.71	+1/+2
- of durables	0.26-0.46	0.70-0.77	+4/+3	-	-	-	0.29-0.43	0.70-0.75	+3/+4
- of non-durables	0.48-0.61	T=0	0	-	-	-	0.69-0.73	0.78-0.81	+1/+2
- of services	0.35-0.50	0.55-0.69	+4/+3	-	-	-	0.45-0.48	0.45-0.54	+1
Govt consumption & investment	0.34-0.44	0.35-0.48	+1/-3	0.46-0.50	0.59-0.65	-2	-(0.34-0.39)	-0.52-0.39	+6/-6
Private investment	0.34-0.46	0.73-0.81	+3	0.43-0.50	0.70-0.74	+3	0.57-0.67	0.78-0.83	+2
- residential	0.22-0.34	0.63-0.67	+3	0.03-0.05	-(0.65-0.66)	-4	0.02-0.10	0.75-0.78	+5
- non-residential	0.66-0.73	0.70-0.78	+1	0.67-0.69	0.73-0.74	+1	0.79-0.84	T=0	0
Exports	-(0.18-0.19)	-0.18-0.28	0/+6	-(0.32-0.33)	-(0.41-0.45)	+3	0.68-0.76	T=0	0
- of goods	-(0.16-0.18)	0.27-0.38	-5	-(0.13-0.15)	-(0.54-0.60)	+6	0.71-0.79	T=0	0
- of services	-0.02-0.01	0.46-0.54	+4/+6	-(0.19-0.23)	-0.24-0.35	+1/+6	0.43-0.55	T=0	0
Imports	0.37-0.49	0.72-0.77	+2	0.66-0.69	0.79-0.80	+2	0.68-0.74	0.77-0.80	+1
- of goods	0.37-0.48	0.71-0.76	+2	0.60-0.64	0.75-0.77	+2	0.65-0.71	0.76-0.78	+1
- of services	0.17-0.34	0.35-0.46	+2	0.64-0.70	0.69-0.74	+1	0.62-0.65	T=0	0
Labour market									
Capital utilisation	0.21-0.24	0.66*-0.69	+3/+4	0.21-0.22	0.89-0.90	+4/+5	0.60-0.63	0.80-0.84	+2
Unemployment rate	-(0.60-0.64)	-(0.77-0.82)	+2	-(0.93-0.94)	T=0	0	-(0.88-0.92)	-(0.89-0.93)	+1
Hours worked	0.53-0.57	0.61-0.70	+2	-	-	-	0.86-0.90	0.90-0.93	+1
Employment	0.63-0.68	0.65-0.72	+1	0.91-0.94	T=0	0	0.81-0.86	0.82-0.86	+1/0
Labour force	0.41-0.54	0.62-0.66	-3/-4	0.71-0.76	0.80-0.85	-1/-2	0.42-0.47	T=0	0

$\sim$ These series are HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table 1.
The interpretation is as for the previous table. As explained above table 3, the maximum is generally the greatest absolute value unless marked with an asterisk.

Table 9
Correlations with 90-day rate gap, 1987Q2-2006Q2 – continued from previous page

	New Zealand			Australia			US		
	T=0	Max corr	Max at:	T=0	Max corr	Max at:	T=0	Max corr	Max at:
Labour productivity (/hours)	-(0.20-0.21)	-0.21-0.30	0/+5	-	-	-	-(0.66-0.72)	-(0.73-0.75)	-1
Hours worked per person	-(0.02-0.06)	-0.61-0.66	-3/+6	-	-	-	0.66-0.77	0.82-0.87	+3/+2
Unit labour costs	-0.02	-(0.53-0.59)	+5	0.33-0.34	0.47-0.51	-2	-0.25-0.13	-(0.51-0.61)	+6/+5
APC unit labour costs ~	0.30-0.33	0.31-0.36	+1/-4	0.32-0.34	0.33-0.36	-1	0.41-0.51	0.42-0.51	-1/0
APC nominal wages ~	0.57-0.68	T=0	0	0.39-0.45	T=0	0	0.32-0.40	0.35-0.50	-1/-6
APC labour cost index (LCI) ~	0.24-0.44	0.75	-4	0.59-0.66	0.71-0.72	-2	-	-	-
APC real wages ~	0.06-0.23	0.61-0.67	-4	-0.06	-0.13	-6	-0.08-0.05	-0.31-0.43	+4/-6
Net PWA migration (000)	0.18-0.20	0.22-0.27	+3/+4	-	-	-	-	-	-
Prices									
APC CPI ~	0.75-0.78	T=0	0	0.60-0.63	0.67	-1	0.67-0.68	0.69-0.70	-1
- tradables ~	0.17-0.30	-(0.42-0.51)	-6	0.48-0.50	T=0	0	-	-	-
- non-tradables ~	0.75-0.80	T=0	0	0.37-0.47	0.60-0.62	-3	-	-	-
- construction ~	0.63-0.70	0.68-0.70	+1	-	-	-	-	-	-
- ex-construction ~	0.63-0.72	T=0	0	-	-	-	-	-	-
APC house prices ~	0.17-0.25	0.52-0.59	+2/+3	-(0.40-0.46)	-(0.62-0.68)	-3	0.16-0.30	0.29-0.33	-3/-2
Real house prices	0.31-0.48	0.49-0.56	+2	-(0.50-0.54)	-(0.68-0.74)	-3/-2	0.26-0.36	0.38	+2/+4
APC import prices ~	0.08-0.18	-(0.28-0.32)	+5	0.04-0.08	-(0.18-0.21)	+4	0.38-0.49	0.44-0.55	+1
APC export prices ~	-(0.01-0.06)	-(0.26-0.31)	-4	0.12-0.15	-(0.22-0.24)	-6	0.21-0.38	-(0.50-0.59)	-6
APC commodity prices ~	-(0.14-0.16)	0.31-0.37	+4/+5	0.04-0.06	-(0.27-0.40)	-6	-0.12-0.10	-(0.55-0.67)	-4
Financial markets									

~ These series are HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table 1.
The interpretation is as for the previous table. As explained above table 3, the maximum is generally the greatest absolute value unless marked with an asterisk.

Table 9
Correlations with 90-day rate gap, 1987Q2-2006Q2 – continued from previous page

	New Zealand			Australia			US		
	T=0	Max corr	Max at:	T=0	Max corr	Max at:	T=0	Max corr	Max at:
Nominal 5 year rate ∼	0.84-0.86	T=0	0	0.85-0.87	T=0	0	0.78-0.83	T=0	0
Real 5 year rate ∼	0.72-0.76	0.73-0.76	+1/0	0.59-0.63	0.62-0.64	+1	0.16-0.26	0.26-0.35	+2
Nominal exchange rate (TWI)	0.28-0.45	0.34-0.48	+2	0.25-0.37	0.31-0.38	+2/+1	-(0.07-0.15)	0.29-0.41	-5/-6
Real exchange rate	0.32-0.48	0.36-0.50	+2	0.40-0.50	0.42-0.50	+1/0	-(0.14-0.17)	-(0.34-0.47)	+3/+5
APC TWI ∼	0.05-0.12	0.54-0.56	+4	-0.02-0.04	0.24-0.30	+3	-0.02-0.12	0.36-0.42	-4
APC real exchange rate ∼	0.04-0.10	0.53-0.58	+4/+5	0.05-0.08	0.27-0.33	+3/+4	0.09-0.22	0.37-0.47	-4

∼ These series are HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table 1.
The interpretation is as for the previous table. As explained above table 3, the maximum is generally the greatest absolute value unless marked with an asterisk.

Table 10
Correlations with 90-day rate gap, 1994Q1-2006Q2

	New Zealand			Australia			US		
	T=0	Max corr	Max at:	T=0	Max corr	Max at:	T=0	Max corr	Max at:
GDP	0.12-0.23	0.66-0.70	+3	-(0.03-0.12)	-(0.60-0.64)	-4/-3	0.73-0.79	0.85-0.86	+2/+1
Private consumption	-0.13-0.12	0.39-0.40	+6	0.42-0.46	0.63-0.64	+2	0.63-0.69	0.63-0.72	0/+1
- of durables	-0.15-0.05	0.61-0.67	+5	-	-	-	0.13-0.23	0.45-0.63	+3
- of non-durables	0.02-0.21	0.41-0.52	+3	-	-	-	0.66-0.67	0.66-0.70	0/+1
- of services	0.00-0.11	0.56-0.64	+6	-	-	-	0.61-0.69	T=0	0
Govt consumption & investment	-(0.19-0.37)	0.64-0.69	-5	0.51-0.53	0.61-0.62	+1	-(0.63-0.72)	-(0.70-0.72)	-1
Private investment	0.28-0.36	0.60-0.66	+2	-(0.25-0.26)	-(0.63-0.73)	-3	0.69-0.78	0.80-0.85	+2/+1
- residential	-0.08-0.03	0.43*-0.46	+3	-(0.35-0.39)	-(0.87-0.88)	-3	0.04-0.22	0.82-0.85	+5
- non-residential	0.59-0.68	0.70-0.76	-1	-(0.06-0.08)	-(0.19-0.34)	-2	0.88-0.91	T=0	0
Exports	-(0.07-0.16)	0.29*-0.38*	+3	0.12-0.20	0.62	+6	0.86-0.91	T=0	0
- of goods	-0.02	0.31	-6	0.13-0.23	-(0.59-0.62)	+6	0.85-0.90	T=0	0
- of services	-0.05-0.09	0.41*-0.44	+6	0.13-0.14	-(0.55-0.56)	+3/+4	0.66-0.77	0.75-0.86	+2
Imports	-0.06-0.10	-0.46-0.50	-2/+5	0.16-0.20	-(0.33-0.45)	-4	0.82-0.84	0.85-0.87	+1
- of goods	-0.06-0.07	-0.51-0.57	-2/+5	0.15-0.19	-(0.43-0.55)	-4	0.82-0.84	0.87-0.88	+1
- of services	0.12-0.27	0.23-0.34	+2/+1	0.23-0.26	T=0	0	0.73-0.74	T=0	0
Labour market									
Capital utilisation	0.23-0.27	0.58-0.60	+3/+4	-(0.13-0.14)	0.74-0.76	+5	0.60-0.66	0.80-0.86	+2
Unemployment rate	-(0.45-0.50)	-(0.62-0.67)	+2	-(0.76-0.80)	-(0.84-0.88)	+1	-(0.88-0.92)	T=0	0
Hours worked	0.27-0.43	0.55-0.64	+2	-	-	-	0.85-0.89	0.88-0.90	+1
Employment	0.40-0.54	0.53-0.63	+2	0.75-0.77	T=0	0	0.87-0.88	T=0	0
Labour force	0.29-0.46	0.58-0.60	-5/-4	0.22-0.28	0.31-0.39	-2	0.51-0.61	-(0.67-0.71)	+6

$\sim$ These series are HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table 1.
The interpretation is as for the previous table. As explained above table 3, the maximum is generally the greatest absolute value unless marked with an asterisk.

Table 10
Correlations with 90-day rate gap, 1994Q1-2006Q2 – continued from previous page

	New Zealand			Australia			US		
	T=0	Max corr	Max at:	T=0	Max corr	Max at:	T=0	Max corr	Max at:
Labour productivity (/hours)	-(0.10-0.17)	-(0.39-0.42)	-3	-	-	-	-(0.45-0.59)	-(0.68-0.75)	-2
Hours worked per person	-(0.09-0.14)	-(0.45-0.49)	-2	-	-	-	0.62-0.77	0.80-0.86	+3/+2
Unit labour costs	-(0.10-0.27)	0.45-0.51	-4	-0.12-0.05	-0.44-0.43	+5/-3	0.14-0.55	-0.68-0.62	+5/-1
APC unit labour costs ~	-(0.08-0.13)	-(0.49-0.55)	+3	0.07-0.10	-0.59	+5	0.72-0.79	T=0	0
APC nominal wages ~	-0.03-0.10	0.62-0.65	-3	0.35	-(0.67-0.68)	+5	0.63-0.72	T=0	0
APC labour cost index (LCI) ~	0.13-0.27	0.69-0.71	-4	0.52-0.55	0.79-0.81	-2	-	-	-
APC real wages ~	-(0.33-0.51)	0.58-0.61	-4	0.22	-(0.60-0.61)	+4	0.16-0.32	0.22-0.32	+6/0
Net PWA migration (000)	0.07-0.09	0.16-0.32	+3/-5	-	-	-	-	-	-
Prices									
APC CPI ~	0.59-0.67	T=0	0	0.57-0.58	0.61-0.63	-1/-2	0.67-0.71	T=0	0
- tradables ~	0.18-0.32	-0.41-0.42	-6/-1	0.19-0.20	0.43-0.49	-2	-	-	-
- non-tradables ~	0.70-0.71	T=0	0	0.27-0.29	-(0.36-0.45)	+6	-	-	-
- construction ~	0.64-0.74	T=0	0	-	-	-	-	-	-
- ex-construction ~	0.55-0.58	0.58-0.61	+1	-	-	-	-	-	-
APC house prices ~	-(0.03-0.13)	-0.36-0.40	-2/+4	-(0.34-0.36)	-(0.53-0.58)	-2	0.57-0.63	0.64-0.67	-1
Real house prices	-0.06-0.20	0.27-0.39	-6/-5	-(0.09-0.15)	-(0.42-0.54)	-3	0.20-0.22	0.34-0.50	-3/-4
APC import prices ~	0.26-0.41	-(0.46-0.62)	-5	0.11-0.14	-0.37	+4	0.41-0.52	0.54-0.69	+2
APC export prices ~	0.25-0.35	-(0.46-0.58)	-6	0.30	-0.54	+5	0.28-0.54	-0.50-0.63	-6/+1
APC commodity prices ~	0.20-0.24	0.49-0.51	+2	0.52-0.55	-(0.83-0.84)	+6	-0.21-0.06	-(0.56-0.58)	-4
Financial markets									

~ These series are HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table 1.
The interpretation is as for the previous table. As explained above table 3, the maximum is generally the greatest absolute value unless marked with an asterisk.

Table 10
Correlations with 90-day rate gap, 1994Q1-2006Q2 – continued from previous page

	New Zealand			Australia			US		
	T=0	Max corr	Max at:	T=0	Max corr	Max at:	T=0	Max corr	Max at:
Nominal 5 year rate ∼	0.67	0.78-0.79	+1	0.75-0.76	T=0	0	0.71-0.77	0.79-0.81	+1
Real 5 year rate ∼	0.63-0.65	0.76-0.77	+1	0.16-0.17	0.26	+1	-0.02-0.12	0.38-0.41	-6
Nominal exchange rate (TWI)	-0.10-0.18	0.39-0.42	-6/-5	-(0.10-0.16)	-(0.18-0.32)	-2	-(0.04-0.08)	0.70-0.77	-6
Real exchange rate	-0.03-0.22	0.44-0.45	-6/-5	0.02-0.08	0.26-0.29	-5	-0.06	-(0.64-0.68)	+4/+5
APC TWI ∼	-(0.23-0.35)	0.53-0.54	+4	-(0.12-0.14)	-0.24-0.23	-2/-6	0.40-0.51	0.70-0.74	-3
APC real exchange rate ∼	-(0.09-0.18)	0.50-0.51	+4	0.14-0.16	0.35-0.36	+2	0.37-0.49	0.67-0.72	-3

∼ These series are HP-filtered (λ 800-3200) for calculating auto- and cross-correlations but not the standard deviations in table 1.
The interpretation is as for the previous table. As explained above table 3, the maximum is generally the greatest absolute value unless marked with an asterisk.

Table 11
Correlations with US output gap

	1987Q2-2006Q2			1994Q1-2006Q2		
	T=0 corr	**Max**	**Max at**	**T=0 corr**	**Max**	**Max at**
Export volumes	-(0.29-0.33)	-(0.35-0.43)	-2	-0.02-0.18	0.01*-0.18*	-1/0
- goods	-(0.25-0.32)	-(0.39-0.44)	-2	0.14-0.27	-(0.59-0.64)	-5
- commodity	-(0.32-0.38)	-(0.45-0.48)	-2	-(0.03-0.18)	-(0.62-0.63)	-5
- non-commodity	0.38	0.39	-1	0.52-0.58	0.58-0.64	-1
- services	-0.13-0.05	-(0.31-0.35)	+6	-(0.07-0.18)	0.37*-0.44*	-6
Export values	0.00-0.13	0.34*-0.35*	-4/-5	0.07-0.12	0.76*-0.78	-5/-4
- goods	0.08-0.17	0.38*-0.40*	-3/-4	0.18-0.19	0.77-0.78	-4
- services	-(0.01-0.16)	0.13*-0.16*	-6	-(0.08-0.17)	0.53*-0.58 *	-6
Import volumes	0.39-0.49	T=0	0	0.14-0.30	-0.59-0.51	-6/+3
- goods	0.38-0.48	T=0	0	0.13-0.28	-0.49-0.49	-5/+2
- services	0.35-0.39	0.44-0.49	+2/+3	0.20-0.31	-(0.58-0.70)	-6
Import values	0.41-0.50	0.57*-0.63*	-2/-1	0.32-0.34	0.73-0.77	-3/-4
- goods	0.39-0.49	0.55*-0.64*	-2	0.25-0.30	0.65*-0.72*	-4/-5
- services	0.28-0.30	0.40-0.46	-2	0.32-0.42	0.81-0.85	-3
Net export volumes	-(0.45-0.47)	-(0.45-0.48)	0/-1	-(0.12-0.19)	0.36*-0.53*	-4/-6
Net export values	-(0.40-0.45)	-(0.44-0.45)	-1/0	-(0.27-0.29)	0.46*-0.47*	-4/-5
Current account balance	-0.40	-(0.44-0.47)	+1/+2	-(0.44-0.46)	-(0.53-0.56)	+1/+2
Terms of trade	0.34-0.43	0.37-0.46	-1	-0.02-0.03	0.44-0.55	-4
TWI	-(0.06-0.09)	-(0.27-0.44)	-5/-6	-(0.20-0.27)	-(0.82-0.86)	-4/-5
Real exchange rate	-(0.07-0.11)	-0.23-0.42	-6/+6	-(0.17-0.32)	-(0.82-0.86)	-4/-5
90 day interest rates	0.06-0.13	-0.56-0.31	+4/-2	-(0.04-0.13)	-(0.36-0.53)	+4
5 year interest rates	0.18-0.24	-0.50-0.37	+4/-2	0.09-0.23	-(0.55-0.64)	+5
CPI annual inflation	0.08-0.13	0.54-0.60*	-3	0.00-0.02	0.51*-0.57*	-3
- non-tradables	0.01-0.02	0.03*-0.21*	-1/-6	-(0.07-0.32)	-(0.45-0.59)	-5/-4
- construction	-0.02-0.19	-(0.36-0.47)	+4	-0.26-0.10	-(0.48-0.54)	+4
- ex-construction	-0.06-0.03	-0.31-0.14	+5/-6	-(0.02-0.25)	-(0.55-0.63)	-5/-4
- tradables	0.23-0.30	0.73	-3	0.10-0.22	0.82-0.86	-4
GDP	0.12-0.21	-(0.25-0.28)	-6/+6	-(0.05-0.30)	-(0.46-0.56)	-4/-3
Consumption	0.33-0.36	0.33-0.46	0/+5	0.08-0.18	-0.75-0.66	-6/+4
Private investment (total)	0.31-0.50	-0.38-0.50	-6/0	0.08-0.32	-0.47-0.37	-6/+1
- residential	0.19-0.33	-0.43-0.37	-6/+1	-0.13-0.07	-(0.75-0.80)	-5
- non-residential	0.26-0.27	0.32-0.48	-1/-2	-(0.31-0.35)	0.09*-0.37*	-6

As explained above table 3, the maximum is generally the greatest absolute value unless marked *.

Table 12
Correlations with Australian output gap

	1987Q2-2006Q2			1994Q1-2006Q2		
	T=0 corr	**Max**	**Max at**	**T=0 corr**	**Max**	**Max at**
Export volumes	-(0.38-0.42)	-(0.38-0.43)	0/-1	0.06-0.12	0.36-0.42	-2
- goods	-(0.51-0.52)	T=0	0	0.09-0.12	-(0.29-0.30)	-5
- commodity	-(0.34-0.37)	-(0.36-0.38)	+1	0.00-0.07	-0.29-0.30	-4/+5
- non-commodity	0.11-0.12	0.24-0.29	-2	0.06-0.18	0.55-0.61	-2
- services	0.01-0.14	-(0.22-0.33)	-6	-0.04-0.01	0.38*-0.43*	-3
Export values	-(0.17-0.21)	T=0	0	-(0.23-0.37)	0.50*-0.62	-6
- goods	-(0.23-0.25)	T=0	0	-(0.25-0.41)	0.50*-0.63	-6
- services	-0.06-0.05	-0.16-0.08	-5/-1	-0.10	0.36*-0.41*	-3/-6
Import volumes	0.61-0.67	0.65-0.75	-1	0.16-0.32	0.29*-0.49	-1
- goods	0.61-0.67	0.66-0.75	-1	0.14-0.27	0.28*-0.45*	-2
- services	0.33-0.35	0.35-0.37	0/-1	0.11-0.26	-0.40-0.55	-6/-2
Import values	0.30-0.38	0.37-0.46	-1	-(0.02-0.11)	0.46*-0.59	-6
- goods	0.37-0.46	0.43-0.53	-1	-(0.07-0.14)	0.46*-0.58	-6
- services	-0.04	-(0.15-0.19)	+2/+3	-0.07-0.06	0.37*-0.47	+-3
Net export volumes	-(0.66-0.69)	-(0.70-0.74)	-1	-(0.08-0.22)	0.33-0.43	-6/+6
Net export values	-(0.65-0.66)	-(0.70-0.72)	-1	-(0.45-0.60)	T=0	0
Current account balance	-(0.28-0.31)	-(0.32-0.37)	-1	-(0.22-0.28)	0.31-0.54	+5
Terms of trade	0.32-0.34	0.40-0.46	+2/+3	-(0.46-0.47)	T=0	0
TWI	0.21-0.23	0.24-0.32	-1/-3	-0.13-0.04	-(0.38-0.56)	-6
Real exchange rate	0.23-0.25	0.26-0.34	-1/-2	-(0.03-0.19)	-(0.45-0.60)	-6
90 day interest rates	0.12-0.25	0.60-0.67	-3	-(0.49-0.55)	-(0.58-0.61)	+1
5 year interest rates	0.22-0.35	0.58-0.59	-3/-4	-(0.14-0.24)	-0.68	+4
CPI annual inflation	0.08-0.17	0.53-0.57	-3	-(0.56-0.59)	-(0.73-0.78)	+1
- non-tradables	0.18-0.28	0.52-0.59	-3	-(0.30-0.43)	-(0.56-0.59)	+2
- construction	0.22-0.31	-0.30-0.42	-6/-2	-(0.22-0.36)	-(0.33-0.47)	+3
- ex-construction	0.09-0.26	0.55-0.56	-3	-(0.28-0.38)	-(0.52-0.56)	+2/+1
- tradables	0.10-0.12	0.25-0.26	-2/-3	-(0.27-0.43)	-0.51-0.47	+1/-5
GDP	0.46-0.50	T=0	0	-0.18-0.02	-(0.50-0.53)	+5
Consumption	0.56-0.59	0.59-0.60	0/-1	0.12-0.30	-0.48-0.39	-6/-1
Private investment (total)	0.52-0.62	T=0	0	0.00-0.16	-(0.59-0.60)	+5/+4
- residential	0.53-0.61	T=0	0	0.19-0.37	-0.41-0.37	-6/0
- non-residential	0.56-0.57	0.57-0.61	0/-1	-(0.49-0.57)	-(0.57-0.59)	+2/+3

As explained above table 3, the maximum is generally the greatest absolute value unless marked *.

Table 13
Correlations with trade-weighted output gap

	1987Q2-2006Q2			1994Q1-2006Q2		
	T=0 corr	**Max**	**Max at**	**T=0 corr**	**Max**	**Max at**
Export volumes	0.30-0.39	0.30*-0.39*	+1/0	0.30-0.43	T=0*	0
- goods	0.39-0.42	T=0*	0	0.38-0.43	T=0*	0
- commodity	0.23-0.30	T=0*	0	0.20-0.26	T=0*	0
- non-commodity	0.26-0.28	T=0*	0	0.28	0.37-0.39	-1
- services	0.05-0.09	-(0.46-0.47)	-5	0.00-0.07	-(0.38-0.44)	-5
Export values	0.06-0.15	0.23*-0.35	-2	0.15-0.24	0.38-0.51	-3
- goods	0.08-0.16	0.36*-0.46	-3	0.21-0.27	0.54-0.66	-3
- services	0.06-0.13	-(0.29-0.30)	-6	0.01-0.08	-(0.20-0.23)	-6
Import volumes	0.42	0.62-0.63	+3	0.32-0.34	-(0.61-0.66)	-4/-5
- goods	0.37-0.39	0.68-0.69	+3	0.31-0.32	-(0.66-0.69)	-4
- services	0.38-0.39	0.41	+6	0.27-0.28	-0.51-0.45	-6/+6
Import values	0.25-0.31	0.30-0.36	-1	0.29-0.35	0.35-0.41	-1
- goods	0.29-0.34	0.30-0.36	-1	0.33-0.40	0.37-0.44	-1
- services	0.04-0.07	0.40-0.46	-3	0.10	0.46-0.51	-3
Net export volumes	-(0.16-0.23)	-(0.58-0.61)	+3	-(0.05-0.10)	-(0.59-0.67)	+3
Net export values	-(0.22-0.28)	0.27*-0.39*	-4	-(0.14-0.19)	0.47*-0.63	-4
Current account balance	-0.51	-(0.66-0.67)	+2	-(0.57-0.58)	-(0.73-0.76)	+2
Terms of trade	-(0.11-0.13)	0.32-0.38	-3	-(0.03-0.04)	0.54-0.57	-3
TWI	0.27-0.28	0.40-0.45	+2	0.15-0.16	-(0.30-0.41)	-5/-4
Real exchange rate	0.25	0.35-0.37	+2	0.11-0.12	-(0.25-0.33)	-5/-4
90 day interest rates	0.47-0.51	0.66-0.67	-2	0.35-0.38	0.68-0.69	-2
5 year interest rates	0.57-0.62	T=0	0	0.58-0.60	T=0	0
CPI annual inflation	0.39-0.45	0.67-0.70	-2	0.33-0.34	0.69-0.71	-2
- non-tradables	0.56-0.58	T=0	0	0.41-0.49	0.42*-0.49*	-1/0
- construction	0.21-0.26	0.24*-0.31*	-1	0.23-0.30	0.36*-0.48*	-2
- ex-construction	0.59-0.61	T=0	0	0.44-0.50	T=0	0
- tradables	-(0.01-0.03)	0.46-0.49	-3	0.09-0.11	0.57-0.61	-3
GDP	0.46-0.47	0.60*-0.62	+2	0.44-0.51	0.54*-0.62	+1
Consumption	0.39-0.41	0.60-0.65	+3	0.19	0.55-0.64	+4
Private investment (total)	0.50-0.52	0.61*-0.62*	+2	0.62-0.67	0.67*-0.71*	+1
- residential	0.29-0.30	0.47*-0.49*	+2	0.26-0.31	0.38*-0.44*	+2/+1
- non-residential	0.32-0.38	0.33-0.38	-1/0	0.27-0.30	0.49-0.51	-3

As explained above table 3, the maximum is generally the greatest absolute value unless marked *.

Table 14
Correlations with level of world commodity prices

	1987Q2-2006Q2			1994Q1-2006Q2		
	T=0 corr	**Max**	**Max at**	**T=0 corr**	**Max**	**Max at**
Export volumes	-(0.07-0.10)	-0.59-0.59	-3/+4	0.05-0.09	-0.43-0.46	-3/+2
- goods	-0.26	-(0.54-0.55)	-2	0.08-0.10	0.26-0.30	+2
- commodity	-(0.16-0.17)	-(0.45-0.47)	-2	-(0.06-0.07)	-0.29-0.29	-2/-6
- non-commodity	0.23	0.31-0.32	+2	0.13-0.21	-(0.36-0.38)	-6
- services	0.24-0.26	0.53-0.60	+5	0.08-0.09	0.54-0.56	+6
Export values	0.33-0.52	0.34*-0.52	+1/0	0.46-0.65	T=0*	0
- goods	0.30-0.50	T=0*	0	0.51-0.69	T=0*	0
- services	0.26-0.30	-0.45-0.38	-6/+3	0.19-0.26	-(0.37-0.43)	-6
Import volumes	0.27-0.38	0.28-0.39	-1	-0.03-0.06	0.57-0.58	+4
- goods	0.25-0.37	0.29-0.39	-2	-0.06-0.03	0.63	+4
- services	0.33-0.39	0.37-0.40	+1	0.07-0.13	-0.50-0.35	-5/+3
Import values	0.38-0.47	0.41*-0.51	-1	0.35-0.47	-(0.59-0.62)	-6
- goods	0.41-0.45	0.44-0.53	-1/-2	0.37-0.47	-(0.55-0.59)	-6
- services	0.14-0.32	-(0.48-0.52)	-6	0.27-0.39	-(0.51-0.54)	-6
Net export volumes	-(0.26-0.35)	-(0.46-0.52)	-2	0.00-0.13	0.13*-0.32*	-4
Net export values	-0.07-0.02	-(0.38-0.44)	-3	0.33-0.49	0.34-0.51	1
Current account balance	-(0.16-0.22)	-(0.20-0.24)	+1	-(0.09-0.14)	0.23*-0.37	-4
Terms of trade	0.70-0.72	0.73-0.76	-1	0.66-0.67	0.67-0.69	-1
TWI	-0.05-0.16	0.44-0.45	-6	-0.15-0.01	-0.28-0.33	-2/-6
Real exchange rate	0.03-0.22	0.48	-6	-0.12-0.03	0.32-0.38	-6
90 day interest rates	0.20-0.34	0.50-0.59	-3	0.54-0.59	0.54-0.60	0/-1
5 year interest rates	0.15-0.27	0.35-0.45	-3	0.50-0.56	0.52-0.57	+1
CPI annual inflation	0.29-0.36	0.54-0.55	-3	0.60-0.61	T=0	0
- non-tradables	0.16-0.31	0.22-0.37	-3	0.27-0.35	0.50-0.52	+2
- construction	0.28-0.40	0.30-0.40	-2/+2	0.43-0.47	0.46-0.50	+1
- ex-construction	0.08-0.22	0.26-0.37	-6	0.10-0.20	0.42-0.45	+3/+2
- tradables	0.24-0.32	0.37-0.50	-2/-3	0.38-0.48	0.40-0.52	-1
GDP	0.33-0.48	0.40-0.52	+3/+2	0.21-0.29	0.51-0.53	+3
Consumption	0.07-0.27	0.35-0.36	+3/+4	-(0.09-0.26)	0.40-0.54	+5
Private investment (total)	0.47-0.57	0.49-0.60	+2	0.34-0.40	0.82	+3
- residential	0.04-0.18	0.29-0.31	+5	-(0.16-0.25)	-0.56-0.47	-3/+5
- non-residential	0.47-0.59	0.68-0.71	-2	0.67-0.70	0.73-0.76	-1

As explained above table 3, the maximum is generally the greatest absolute value unless marked *.

Table 15
Correlations of NZ inflation with APC commodity prices

	1987Q2-2006Q2			1994Q1-2006Q2		
	T=0 corr	**Max**	**Max at**	**T=0 corr**	**Max**	**Max at**
CPI inflation	-(0.03-0.07)	0.62-0.65	-4	0.24-0.27	0.67-0.69	-4
- non-tradables	-0.02-0.00	0.03*-0.09*	+3/-6	0.19-0.24	0.26*-0.35*	+2
- construction	0.09-0.18	0.33-0.40	-3	0.41-0.44	0.47-0.51	-1
- ex-construction	-(0.04-0.09)	0.03*-0.05*	-6/+3	0.09-0.11	0.31*-0.39	+2
- tradables	-(0.05-0.08)	0.65-0.74	-4	0.14-0.17	0.66-0.72	-4

As explained above table 3, the maximum is generally the greatest absolute value unless marked *.

In tables 16 and 17 the lag refers to how much the NZ variable lags/leads the foreign.

Table 16
Correlations of NZ and foreign interest rates

	1987Q2-2006Q2					
	90 day			**5 year**		
	T=0	Max	Max at	T=0	Max	Max at
Australia	0.54-0.60	0.63-0.64	+2/+1	0.85	T=0	0
US	0.54-0.57	0.58	+1	0.77	T=0	0
	1994Q1-2006Q2					
Australia	0.48-0.49	0.49*-0.53	+1	0.80-0.81	T=0	0
US	0.28-0.38	T=0*	0	0.59-0.69	T=0	0

Table 17
Correlations of NZ and foreign annual inflation rates

	T=0	Max	Max at
US			
CPI versus NZ CPI			
1987Q2-2006Q2	0.62	T=0	0
1994Q1-2006Q2	0.56-0.57	T=0*	0
World (trade-weighted)			
CPI versus NZ CPI			
1987Q2-2006Q2	0.67	0.74-0.78	-1
1994Q1-2006Q2	0.54	0.73	-1
Australia			
CPI versus NZ CPI			
1987Q2-2006Q2	0.67-0.70	T=0	0
1994Q1-2006Q2	0.57-0.60	0.60-0.63	+1
Tradables versus NZ tradables			
1987Q2-2006Q2	0.74-0.76	0.78-0.81	+1
1994Q1-2006Q2	0.89-0.91	0.93-0.94	+1
Non-tradables versus NZ non-tradables			
1987Q2-2006Q2	0.65-0.71	0.68-0.71	-1
1994Q1-2006Q2	0.45-0.56	0.72-0.78	-2
Non-tradables versus NZ non-tradables ex-construction			
1987Q2-2006Q2	0.65-0.72	0.74-0.78	-1
1994Q1-2006Q2	0.42-0.51	0.77-0.82	-2

As explained above table 3, the maximum is generally the greatest absolute value unless marked *.

B Data definitions

Table 18
Data definitions and sources

	General	NZ	Australia	US
1. National Accounts Series :				
Real volumes				
GDP	log	SNZ. Production	ABS. Expenditure	USDOC. Expenditure, s.a.
Private consumption	log	SNZ	ABS	USDOC. s.a.
- of durables	log	SNZ	–	USDOC. s.a.
- of non-durables	log	SNZ	–	USDOC. s.a.
- of services	log	SNZ	–	USDOC. s.a.
Govt consumption & investment	log	SNZ. Frigates excluded.	ABS	USDOC. s.a.
Private investment	log	SNZ	ABS	USDOC. s.a.
- residential	log	SNZ	ABS	USDOC. s.a.
- non-residential	log	SNZ	ABS	USDOC. s.a.
Exports	log	SNZ	ABS	USDOC. s.a.
of goods	log	SNZ	ABS	USDOC. s.a.
of services	log	SNZ	ABS	USDOC. s.a.
Imports	log	SNZ. Frigates excluded.	ABS	USDOC. s.a.
- of goods	log	SNZ. Frigates excluded.	ABS	USDOC. s.a.
- of services	log	SNZ	ABS	USDOC. s.a.
Values				
Exports	log	SNZ	–	–
of goods	log	SNZ	–	–
of services	log	SNZ	–	–
Imports	log	SNZ. Frigates excluded.	–	–
- of goods	log	SNZ. Frigates excluded.	–	–

Table 18
Data definitions and sources – continued from previous page

	General	NZ	Australia	US
- of services	log	SNZ	–	–
2. Labour market				
Unemployment rate		SNZ, HLFS	Stdised (qtrly avg)	Stdised. Qtrly avg
Hours worked	log	SNZ, HLFS	–	BLS. Business, s.a.
Employment	log	SNZ, HLFS	ABS	BLS. Civilian. Qtrly avg
Labour force	log	SNZ, HLFS	ABS	BLS. Civilian. Qtrly avg
Labour productivity	log. Per hour worked	SNZ, HLFS and production GDP	–	BLS. Business, s.a.
Unit labour costs	log	Real wages/lab. productivity (hrs)	OECD. Manufacturing	OECD. Manufacturing
Hours worked per person	log. Per employed	SNZ, HLFS	–	BLS
Nominal wages	log	SNZ, QES Average hourly earnings	ABS. Average weekly	BLS. Hrly, business, s.a.
	log	ord. time - private sector	earnings	
Real wages	log. Deflated by CPI	Using SNZ data	Using ABS data	Using BLS data
Labour cost index	log	SNZ All salary/wage rates priv. sector	RBA. Non-farm	BLS
Real labour cost index	log. Deflated by CPI	Using SNZ data	Using ABS & RBA data	–
Net migration (000)	log	SNZ, Working age migrants /1000	–	–
3. Prices				
Consumer price index	log	SNZ. CPI excluding	RBA. Excluding mortgage interest,	BLS, Qtrly average
	log	interest & GST	credit charges & GST	
- tradables	log	ex GST (RBNZ estimate)	RBA. Ex GST	–
- non-tradables	log	ex GST (RBNZ estimate)	RBA. Ex GST	–
- construction	log	Section purchase & construction of	–	–
	log	new dwellings, ex GST (est)	–	–
- ex-construction	log	Excluding above section & GST (est)	–	–
House prices	log	QVNZ	ABS, capital cities	OFHEO
Real house prices	log. Deflated by CPI	QVNZ	ABS, capital cities	OFHEO

Table 18
Data definitions and sources – continued from previous page

	General	NZ	Australia	US
Import prices	log	OTI, SNZ	ABS	USDOC
Export prices	log	OTI, SNZ	ABS	USDOC
Terms of trade	log		–	–
Commodity price index		ANZ, SDRs. Qtrly avg.	RBA (SDRs) Qtrly avg.	Economist US$, total
4. Misc domestic and financial				
Capital utilisation	Manufacturing.	NZIER QSBO	NAB	FRBUS
Nominal 90 day interest rate		RBNZ	RBA	FRBUS
Nominal 5 year interest rate		RBNZ	RBA	US Treasury
Real 90 day interest rate		Less 2 yr ahead infl. expectations	Defl. by annual CPI infl.	Defl. by annual CPI infl.
Real 5 year interest rate		Less 2 yr ahead infl. expectations	Defl. by annual CPI infl.	Defl. by annual CPI infl.
Nominal exchange rate	log. Trade-weighted index	RBNZ	RBA	BOE
Real exchange rate	log. CPI-based, qtrly avg	IMF	IMF	IMF
Current account	BOP	NZ $billion	–	–
5. Trade-weighted world variables				
World output gap	HP-filtered s.a. GDP of NZ's 12 largest trading partners weighted by exports			
Trade-weighted CPI	log. 5-country. Source: RBNZ			

Abbreviations

ABS:	Australian Bureau of Statistics
ANZ:	ANZ Bank
BOE:	Bank of England
BOP:	Balance of Payments
CPI:	Consumer Price Index
FRBUS:	Federal Reserve Board, United States
GDP:	Gross Domestic Product
GST:	Goods and services tax
HLFS:	Household Labour Force Survey
IMF:	International Monetary Fund
LCI:	Labour Cost Index
NAB:	National Australia Bank
NAICS:	North American Industry Classification System
NZ:	New Zealand
NZIER:	New Zealand Institute of Economic Research
OFHEO:	Office of Federal Housing Enterprise Oversight
OTI:	Overseas Trade Indexes
QES:	Quarterly Employment Survey
QSBO:	Quarterly Survey of Business Opinion
QVNZ:	Quotable Value New Zealand
RBA:	Reserve Bank of Australia
RBNZ:	Reserve Bank of New Zealand
s.a.:	Seasonally adjusted
SDR:	Special Drawing Rights (IMF)
SNZ:	Statistics New Zealand
US:	United States
USDOC:	US Department of Commerce

Note, graphs of all series and correlations can be found on the Reserve Bank of New Zealand website: www.rbnz.govt.nz