Tradables and non-tradables inflation in Australia and New Zealand

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This article presents a detailed comparison of price changes for non-tradable and tradable items in the CPI across Australia and New Zealand. The main result is that relative price movements in Australia and New Zealand are highly correlated in the medium term, although not in the very short term. Sectors that have had large price increases in New Zealand have tended to have large price increases in Australia, and sectors that have had small price increases in New Zealand have tended to have small price increases in Australia. In both countries, price increases for non-tradable items have generally outpaced price increases for tradable items. However, the article finds that non-tradable price increases have not been noticeably higher in New Zealand than in Australia. Moreover, price changes have been high relative to Australia's in several of New Zealand's 'tradable' sectors since June 1998, particularly for non-food retail items.

1   Introduction

Economists have noted that the prices of goods and services that must be produced locally, such as restaurant meals or dental examinations or electricity, tend to increase at a faster rate than the prices of goods and services that can be traded between countries, such as cars or books or cheese. This has been the case in New Zealand – according to Statistics New Zealand, average non-tradable prices increased by 63 percent in the 15 years to June 2006, or 3.3 percent per year, while average tradable prices increased by only 16 percent, or 1.0 percent per year.[1] The size of this difference has caused some economists to wonder whether non-tradable prices have increased more rapidly than tradable prices because there is less competition in non-tradable sectors.

At first glance, this idea is plausible, simply because non-traded goods or services cannot be directly imported. Yet the idea is far from compelling, because the amount of competition in any sector depends on the ease of entry into that sector, not whether or not the goods can be easily transported. Since international firms can set up in New Zealand to provide non-traded goods, and since producers of internationally traded goods must have a local distributor, there is no inherent reason why non-traded goods sectors should be less competitive than traded goods sectors.

An alternative explanation for the different rates of price increase concerns the relative size of cost pressures in the two sectors. So long as it is not too difficult for new firms to enter a market, prices in a sector should ultimately reflect production costs, including an ordinary profit margin. Since costs fall if productivity increases exceed wage growth, or if the price of imported inputs falls, one would expect relatively low rates of price increase in sectors that have had relatively high rates of technical progress, or in sectors that import a large fraction of inputs from countries where prices are falling. According to this explanation, non-tradable goods and services have had greater price increases in the last 15 years because there has been slower technical progress in these sectors than in tradable sectors, and less opportunity to import inputs from low-cost international suppliers. A corollary of this idea is the famous Balassa-Samuelson hypothesis, that the ratio of non-tradable to tradable prices should be higher in developed countries than in less-developed countries because technological advances are much faster in tradable than non-tradable sectors (Balassa 1964; Samuelson 1964).

There is a second implication of the 'cost-pressure' theory of relative prices. Because most technical advances are readily copied, and because cheap imports are readily obtained everywhere, the relative size of cost pressures should be similar in most developed countries. Consequently, the relative rates of tradable and non-tradable price increases in New Zealand should be similar to those in other countries.

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[1]   Currently Statistics New Zealand categorises 46 percent of items in the Consumers Price Index (CPI) as tradable.

In principle, this hypothesis can be tested directly, using price data from different countries. In practice, most price data are not readily comparable, because statistics agencies in different countries publish different prices. Fortunately, however, it is reasonably straightforward to compare Australian and New Zealand retail prices.

This article presents the results of this comparison. The main result is that relative price movements in Australia and New Zealand are highly correlated in the medium term, although not in the very short term. Quite simply, sectors that have had large price increases in New Zealand have tended to have had large price increases in Australia, and sectors that have had small price increases in New Zealand have tended to have had small price increases in Australia. This tendency is particularly pronounced for tradable sectors, but it is also observed for non-tradable sectors. That said, some New Zealand prices have increased much faster than the same prices in Australia. However, in the last few years these prices have tended to be the retail prices of imported goods, rather than the prices of traditional non-tradable goods and services such as housing or hairdressing.

The high correlation of Australian and New Zealand prices suggests that most of the medium-term relative price movements in New Zealand reflect global — or at least Australasian — factors (see also the article by Chris Hunt in this issue of the *Bulletin*). If so, it is likely that relative price movements in New Zealand largely reflect cost pressures rather than local macroeconomic conditions or the local competitive environment. In turn, this means that the Reserve Bank has much more influence on the overall level of inflation than it has on the pattern of tradable and non-tradable prices.

There is, of course, a rather extensive literature examining the cross-border behaviour of consumer prices. However, most of this literature has focused on the behaviour of relative price movements in the short term, and found little relationship between the prices of the same good in different countries. Engel (1993), for example, studied the volatility of consumer prices in the G7 countries over horizons from one month to one year and concluded that: *"the volatility of the consumer price of a good relative to another good within the same country tends to be much lower than the volatility of the price of that good relative to the same good in another country. For example, the price of a wool shirt relative to a bottle of wine in the United States is less volatile than the price of a wool shirt in the United States relative to the price of a wool shirt in Canada"* (Engel 1993, pp. 35-36). In keeping with this finding, there is little short term correlation of relative price movements between Australian and New Zealand in the short term. In contrast with most of this literature, however, the focus of this article is the behaviour of prices in the medium term, for at this horizon, price changes for the same good in each country are very similar.

2   The data

The key analytic task of this analysis is the matching of Australian and New Zealand sector-specific consumer price data. Changes in data availability meant the matching was done for two periods, December 1983 – December 1993, and December 1993 – June 2006. The post-1993 analysis is based on the Australian consumer price index regime used since 1998 and backdated to 1993, which has separate sub-indices for 90 industries. Examples of these industries include eggs, electricity, furniture, and house repairs and maintenance. The New Zealand Consumers' Price Index (CPI) in use between 1998 and June 2006 is considerably more detailed, with nearly 300 categories.[2] In many cases, therefore, it was necessary to combine several New Zealand industries together to provide a match with the Australian industry.[3] In the above examples, for instance, Australian eggs were matched with New Zealand eggs; Australian electricity was matched with New Zealand electricity; but Australian furniture was matched with three New Zealand classifications, bedroom furniture, dining and lounge furniture, and garden and outdoor furniture. In the last case, the three New Zealand price series were combined together using their 2003 CPI regime weights to form a composite 'furniture' category. The matching was based upon

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[2]   Statistics New Zealand introduced a new CPI regime in September 2006, and now publishes data on 108 classes of goods and services.

[3]   Australian data was more detailed than the New Zealand for two categories and, in these cases, the Australian sub-sectors were averaged to form a composite matching the New Zealand data.

information provided by the Australian Bureau of Statistics that indicates the main goods and services in each category.[4] Thirteen New Zealand items totalling 3 percent of the CPI could not be matched with the Australian classification and were ignored.

Data for most of the 90 Australian CPI categories are available back to 1993, and for some series, they are available much earlier. However, Australian price indices for three categories of education expenditure and three categories of finance charges are not available prior to September 1999, and data do not exist for a further nine categories of goods and services between 1993 and June 1998. In addition, New Zealand price data are unavailable for a few items before 2002. For this reason, the post-1993 data are analysed twice, once using the 82 categories of goods and services available for the period 1998–2006, and once using the 73 categories of goods and services available for the period 1993 – 2006.

Although detailed price data for the period prior to 1993 are no longer readily available, it proved possible to find these data from contemporaneous records.[5] There were 107 different Australian classifications for the pre-1993 period. They were matched with contemporaneous New Zealand data in a fashion similar to that described above. Different weights for used the 1983–1988 and 1988–1993 periods because Statistics New Zealand changed the CPI classification in 1988. After deletions, 98 common categories remained.
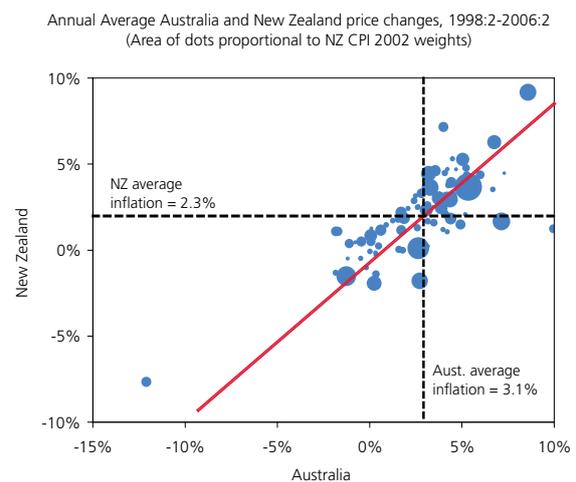
3   The main findings

Price changes in the medium term

The cross-sector correlations were calculated for the eight year period June 1998–June 2006 (82 goods and services); the 12 year period December 1993–December 2005 (73 goods and services); and the 10 year period December 1983–December 1993 (98 goods and services). Average

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[4]   Australian Bureau of Statistics document 6461.0 - Australian Consumer Price Index: Concepts, Sources and Methods, 2005.

[5]   The data came from a source that obtained them contemporaneously from the ABS to study how distance affected prices in Australia. Only prices from Sydney, Perth, Brisbane, and Hobart, not the whole of Australia, were obtained. An Australian average was calculated from these series using their 1993 populations as weights.

inflation rates in Australia and New Zealand were similar over the period. In New Zealand, the CPI increased by 32 percent between December 1993 and June 2006, or 2.2 percent per year. In Australia, the CPI increased by 40 percent, or 2.7 percent per year. The introduction of GST in Australia in 2000 accounted for nearly 4 percent of the total price change. Similarly, the exchange rates at the beginning, middle, and end of the period were similar, being equal to $NZ1 = $A0.826 in December 1993, $NZ1 = $A0.847 in June 1998, and $NZ1 = $A0.837 in June 2006.

Figure 1 shows a scatter-plot of the New Zealand price changes against the Australian price changes for each sector, 1998–2006, along with a 45-degree line passing through the average inflation rate in each country. Each point represents the average annual price increase in a single sector; the area of the point is proportional to the New Zealand CPI weight. The points above the 45-degree line indicate New Zealand price changes relative to average New Zealand inflation that were higher than Australian price changes relative to average Australian inflation.

Figure 1

Relative price changes in Australia and New Zealand, 1998–2006

Annual Average Australia and New Zealand price changes, 1998:2-2006:2 (Area of dots proportional to NZ CPI 2002 weights)

The dominant feature of the graph is the high correlation of the two series. The simple correlation coefficient, calculated using equal weights for each of the 82 series, is 0.77.[6] Given that the New Zealand disaggregated series are not calculated in exactly the same way as the Australian series,

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[6]   The correlation is the same if it is calculated by weighting each series by its CPI weight.

the estimated correlation coefficient is likely to be an under-estimate of the true correlation of price changes, because some of the difference between the measured relative price changes in each country will reflect the different measurement practices.[7]

Figure 2

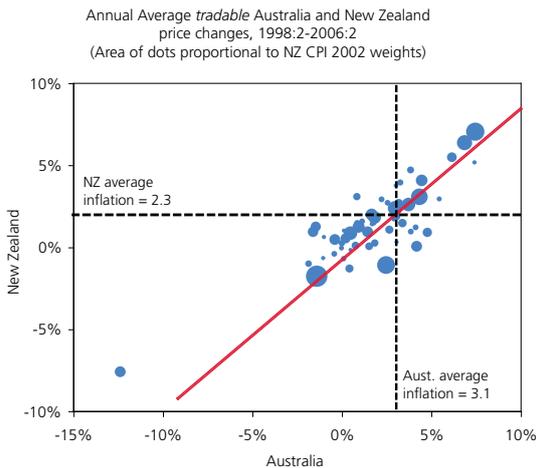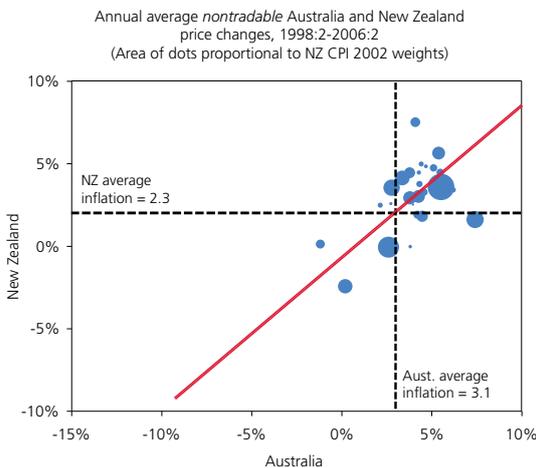## Tradable price changes in Australia and New Zealand, 1998–2006

Annual Average *tradable* Australia and New Zealand
price changes, 1998:2-2006:2
(Area of dots proportional to NZ CPI 2002 weights)

Figure 3

Non-tradable price changes in Australia and New Zealand, 1998–2006

Annual average *nontradable* Australia and New Zealand
price changes, 1998:2-2006:2
(Area of dots proportional to NZ CPI 2002 weights)

Figures 2 and 3 show the relationships between tradable price changes and non-tradable price changes respectively. The correlation between tradable price changes in Australia and New Zealand was 0.79, somewhat higher than that for non-tradable prices, 0.53.[8] Nonetheless, as the graphs show, for both tradable and non-tradable goods and services there is a clear positive relationship between relative price changes in Australia and those in New Zealand.

Relative prices were slightly more correlated over the longer period, December 1993–June 2006. The cross-sector correlation coefficient for the 73 series over this period was 0.84, compared to 0.76 for the period June 1998–June 2006. However, the cross-sector correlation in the ten years to December 1993 was appreciably smaller, 0.56. As is well known, the New Zealand economy experienced substantial reforms during this period, so it is to be expected that there might have been many idiosyncratic components to relative price movements as sectors were deregulated and taxes and tariffs were changed. The higher cross-sector correlation of prices since 1993 suggests that global influences have become more important determinants of medium-term relative prices than they were prior to this date.

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7   The best example is the audio, visual and computing equipment classification, which has the highest rates of price decline in either country, -7.6 percent per year in New Zealand and -12.1 percent in Australia. It is doubtful that Australian prices have declined faster than New Zealand prices by 5 percent per year since 1998. Rather, Statistics New Zealand and the Australian Bureau of Statistics measure the price of home computing equipment quite differently. Statistics New Zealand surveys prices in New Zealand; since 1998, it has recorded a decline in computer prices of 7 percent per year. The ABS did not survey computer prices in Australia until

September 2005, but used the United States Bureau of Labor Statistics hedonic price index, which declined at 15 percent per year. Given that computers have a 0.64 weight in the New Zealand CPI, this difference in methodology accounts for almost all of the difference in the audio, visual and computing equipment classification.

8   The low correlation in part reflects a single point, insurance services, which had price changes of 7.1 percent in Australia but only 1.7 percent in New Zealand. Without this sector, the correlation was 0.65.

Price changes in the short term

Even though sectoral price movements in Australia and New Zealand were similar in the medium term, there are considerable differences in the timing of price changes. These differences can be seen in the four graphs in figure 4, which show the change in each sector's prices in Australia and New Zealand over quarterly, annual, four yearly, and 12-yearly time horizons. Each graph plots the price changes for 73 sectors for the 12-year period December 1993–December 2005. In the top graph, there are 73x48 = 3504 separate points, representing all pairs of quarterly changes over the 12-year period: in the bottom graph, there are 73 points, representing the 12-year price change for each sector.[9] All price changes are calculated in terms of the average annual percentage change.

If relative price changes in each sector in Australia and New Zealand were identical, all points would lie along the 45-degree line. In the graph showing 12-yearly price changes, the points lie close to this line. In the graphs showing quarterly and annual price changes, however, the points are scattered all over the place, indicating that price changes in New Zealand and Australia are not particularly highly correlated. Indeed, the average cross-sector correlation coefficients for the quarterly and annual horizons are only 0.25 and 0.45 respectively, compared to 0.64 and 0.84 for the four-yearly and 12-yearly correlations.

Figure 4

Relative price changes over different horizons

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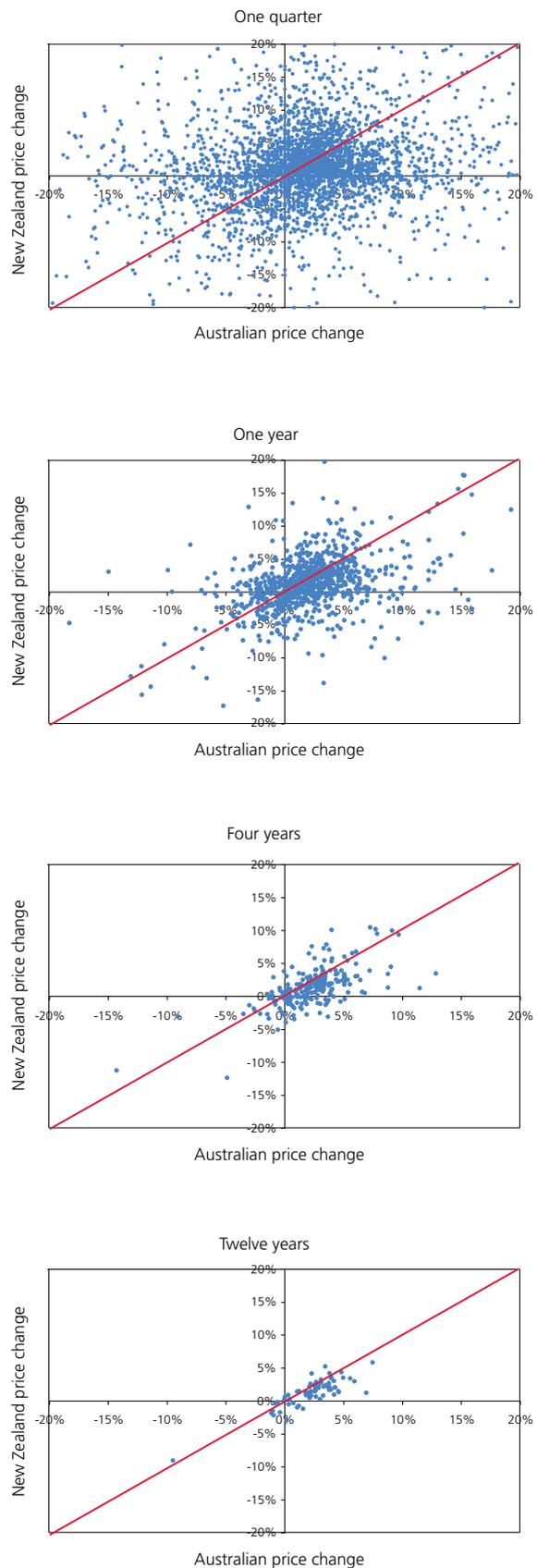
9   Because points with price changes greater than 20 percent are omitted from the graphs, some of the possible 3504 points are not shown in the top graph.

Table 1

Estimated correlation coefficients between New Zealand and Australia sector-specific price changes, by time period, 1993–2005

1-year horizon		2-year horizon		4-year horizon		12-year horizon	
1994	0.33	1993:4-1995:4	0.37	1993:4-1997:4	0.61	1993:2-2005:4	0.84
1995	0.22						
1996	0.60	1995:4-1997:4	0.68				
1997	0.52						
1998	0.45	1997:4-1999:4	0.36	1997:4-2001:4	0.57		
1999	0.24						
2000	0.35	1999:4-2001:4	0.53				
2001	0.69						
2002	0.51	2001:4-2003:4	0.51	2001:4-2005:4	0.75		
2003	0.43						
2004	0.61	2003:4-2005:4	0.76				
2005	0.52						
Mean	**0.45**		**0.53**		**0.64**		**0.84**

Table 1, above, shows how the cross-sector correlations for these 73 sectors have changed through time. The data suggest the one-year horizon cross-sector correlations have increased over the period, from an average of 0.39 in the six years 1993–1999 to an average of 0.52 subsequently. If this difference reflects an underlying increase in the extent to which the two series are becoming correlated, and not just random sampling error, it means that the New Zealand economy is becoming more integrated with the Australian economy in the sense that relative prices increasingly move by the same amount at the same time.[10]

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[10] Statistical tests of the difference in the mean correlation are not particularly meaningful given the small number of observations, particularly as the variances of the pre-2000 and post-2000 samples appear to be quite different. so that a standard 'difference in means' test is not valid. Non-parametric procedures such as the Wilcoxon-Mann-Whitney test have little power with such small samples.

The largest price differences between Australia and New Zealand

Table 2, opposite, indicates the 17 sectors in which New Zealand price changes differed from Australian price changes by at least 2 percent per year more than the difference in the average inflation rate over the period June 1998–June 2006.

The list of sectors has two features. First, price increases in most of the traditional non-tradable sectors have not been much higher in New Zealand than Australia. Government motoring charges, electricity prices, and audio, visual, and computing services prices did increase at noticeably faster rates in New Zealand than Australia; but prices for insurance and child care increased at much lower rates, and price increases in other non-tradable sectors were similar in both countries. Secondly, there has been a significant divergence in price trends in the food and non-food retailing sectors in Australia and New Zealand. Relative price changes for many food items were much lower in New Zealand than Australia; but relative price changes for items such as sports

Table 2

Sectors with the largest relative price change, 1998:2–2006:2

	New Zealand price change	Australian price change	Relative price movement
Audio, visual and computing equipment	-7.6%	-12.1%	5.3%
Other motoring charges	7.2%	4.0%	4.0%
Sports and recreational equipment	1.1%	-1.9%	3.8%
Towels and linen	1.1%	-1.7%	3.7%
Audio, visual and computing media and services	0.4%	-1.1%	2.4%
Electricity	4.5%	3.2%	2.1%
Glassware, tableware and household utensils	0.5%	-0.8%	2.1%
Tools	1.3%	0.1%	2.0%
Ice cream and other dairy products	0.3%	3.1%	-2.0%
Pork	2.1%	5.2%	-2.2%
Fats and oils	1.0%	3.8%	-2.0%
Cheese	1.1%	4.2%	-2.3%
Child care	3.6%	6.7%	-2.3%
Vegetables	1.5%	4.9%	-2.5%
Overseas holiday travel and accommodation	-1.8%	2.7%	-3.6%
Insurance services	1.7%	7.1%	-4.6%
Fruit	1.3%	9.9%	-7.8%

Australian inflation was 0.8 percent higher than New Zealand inflation over the period. The relative price movement is adjusted for this difference.

equipment, tableware, tools, and linen were much higher in New Zealand than Australia. In each of these latter sectors, prices increased by less than the average inflation rate in New Zealand, but the relative price decline was greater in Australia.[11]

This pattern is curious. It suggests that food and non-food retailing have followed different trajectories in Australia and New Zealand since 1998. Moreover, it appears a small but measurable part of the average inflation rate in New Zealand can be attributed to a failure of many non-food retail prices to fall as quickly in New Zealand as in Australia (notwithstanding some substantial price declines for some products). Whether this divergence reflects differences in the competitive environment of the retail industries in the two countries or some other factor is an open question.

Relative price movements within Australia

To provide a comparison, cross-sector correlation coefficients were calculated for Brisbane, Perth, and Hobart against the Australian average using data for the period June 1998–June 2006. The correlation coefficients for the eight year price changes were 0.97, 0.96, and 0.97, appreciably higher than the Australia-New Zealand figure of 0.77. The average correlation coefficients for the annual price changes were 0.89, 0.83, and 0.82, nearly twice as large as the Australia-New Zealand figure of 0.42.[12] Two conclusions follow. First, it is apparent that relative price movements within Australia are extremely highly correlated in both the short term and medium term, despite the vast distances between the major cities. Secondly, short-term relative price movements display much greater idiosyncrasy in New Zealand than between the different Australian states, but most of this idiosyncrasy disappears in the medium term. It appears to be the case that

[11] A small amount of the difference can be attributed to the changes in wholesale tax rates in Australia. When GST was introduced in July 2000, various wholesale taxes were removed, and overall taxation on many non-food items such as tools declined. However, relative price movements were larger in New Zealand than Australia even when an adjustment has been made for this factor.

[12] The figure of 0.42 is the average of the correlation coefficients calculated using annual June-year price changes in the eight years to June 2006.

that New Zealand firms face a different set of cost pressures in the short term than Australian firms, or that cost pressures are transmitted into prices at quite different speeds.

4   Implications

Three claims can be made in light of the above analysis:

(i)   Australian and New Zealand relative price movements are highly correlated over medium-term but not short-term time horizons;

(ii)   this correlation has increased through time, although is still significantly lower than the correlation of prices within Australia; and

(iii)   non-tradable price increases have not been noticeably higher in New Zealand than in Australia; if anything, price increases have been high relative to Australia in several New Zealand 'tradable' sectors since June 1998, particularly non-food retailing.

These results raise doubts about the claim that New Zealand's inflation rate is caused by large price increases in uncompetitive non-tradable sectors. It is, of course, possible that uncompetitive non-tradable sectors are the cause of inflation in both countries: in response to similar economic shocks, firms in each country might have changed prices in much the same way. Nonetheless, it could also be the case that the majority of relative price changes in New Zealand reflect Australasia-wide – probably global – changes in the costs of producing goods and services rather than peculiarly New Zealand factors. If this is the case, the large increase in the ratio of non-tradable to tradable prices over the last 15 years could be interpreted as an appropriate relative price movement, not as a problematic cause of a 'high' average inflation rate.

These findings suggest the medium-term pattern of tradable and non-tradable prices is driven by non-monetary factors. Clearly, temporary changes in the exchange rate and interest rates can affect the ratio of tradable to non-tradable prices in the short term. In the longer term, however, it appears the Reserve Bank of New Zealand may have more influence on the overall level of inflation than on relative prices.

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Appendix

The 1998-2006 price study included the following categories of goods and services, along with their 2002 New Zealand CPI weights.

Milk	0.83	Furniture	1.48
Cheese	0.34	Floor and window coverings	0.42
Ice cream and other dairy products	0.19	Towels and linen	1.02
Bread	0.72	Major household appliances	1.04
Cakes and biscuits	0.51	Small electric household appliances	0.44
Breakfast cereals	0.23	Glassware, tableware and household utensils	0.21
Other cereal products	0.39	Tools	0.21
Beef and veal	0.96	Household cleaning agents	0.39
Lamb and mutton	0.18	Toiletries and personal-care products	1.46
Pork	0.28	Other household supplies	0.54
Poultry	0.68	Child care	0.38
Bacon and ham	0.34	Hairdressing and personal-care services	0.52
Other fresh and processed meat	0.49	Other household services	0.20
Fish and other seafood	0.36	Hospital and medical services	3.33
Fruit	0.90	Optical services	0.33
Vegetables	1.19	Dental services	0.70
Soft drinks, waters and juices	1.18	Pharmaceuticals	0.58
Snacks and confectionery	1.88	Motor vehicles	4.48
Restaurant meals	1.64	Automotive fuel	3.31
Takeaway and fast foods	1.99	Motor vehicle repair and servicing	1.14
Eggs	0.18	Motor vehicle parts and accessories	0.62
Jams, honey and sandwich spreads	0.13	Other motoring charges	1.22
Tea, coffee and food drinks	0.28	Urban transport fares	0.88
Food additives and condiments	0.36	Postal services	0.12
Fats and oils	0.34	Telecommunication Services	2.62
Food not elsewhere classified	0.65	Audio, visual and computing equipment	1.21
Beer	2.81	Audio, visual and computing media and services	0.99
Wine	1.54		
Spirits	2.09	Books	0.23
Tobacco	2.29	Newspapers and magazines	1.34
Men's clothing	1.19	Sports and recreational equipment	1.14
Women's clothing	1.87	Toys, games and hobbies	0.33
Children's and infants' clothing	0.64	Sports participation	0.73
Men's footwear	0.32	Pets, pet foods and supplies	0.52
Women's footwear	0.41	Pet services including veterinary	0.23
Children's footwear	0.15	Other recreational activities	0.73
Accessories	0.19	Domestic holiday travel and accommodation	1.48
Clothing services and shoe repair	0.08	Overseas holiday travel and accommodation	3.11
Rents	5.48	Insurance services	3.55
Electricity	2.73		
Gas and other household fuels	0.31		
House purchase	8.48		
Property rates and charges	2.04		
House repairs and maintenance	2.12		