How New Zealand adjusts to macroeconomic shocks: implications for joining a currency area

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This is a continuation of a series of articles on what the costs and benefits might be if New Zealand were to join a larger currency area, say if it were to enter into currency union with Australia, or to 'dollarise'. The back-drop is public debate, in New Zealand and in some other countries, on currency union possibilities.

In this article we consider how the New Zealand economy might adjust to shocks if it were a member of a currency union. In a currency union the exchange rate can no longer act as a mechanism of adjustment. Consequently, we consider the role of alternative adjustment mechanisms, such as migration, price and wage flexibility, and fiscal adjustment.

1 Introduction

The September 1999 *Bulletin* contained an overview of the economic issues related to whether New Zealand could or should join a currency area or union.[1] This article extends that discussion by examining how our economy adjusts to macroeconomic shocks. In particular, we examine the role of the exchange rate as a 'shock absorber'.

Consider, for example, the adjustment required if the world price of our commodity exports declines. In that case, non-tradable (domestic) costs and prices in New Zealand need to fall relative to the prices received in the tradable sector. Otherwise, costs of production will be too high for New Zealand to remain a competitive and viable exporter in world markets. New Zealand could achieve that relative price adjustment either by allowing the exchange rate to depreciate or through a reduction in nominal prices and wages.

There is evidence that for commodity exporters with a floating exchange rate, such as New Zealand, Canada, and Australia, the exchange rate reacts rapidly to changes in commodity prices.[2] If New Zealand entered a currency union the exchange rate channel of adjustment would be closed. This article addresses the likely economic consequences that would arise from giving up this adjustment mechanism.

The consequences would depend on three factors:

- the economic structure of potential currency partners;
- the similarity or otherwise of shocks hitting potential currency partners, and
- the effectiveness of the alternative adjustment mechanisms at steering our economy through shocks.

If shocks affecting New Zealand and potential currency partners were largely similar at any given point in time, then a common monetary policy would be for the most part appropriate, and hence there would be few issues associated with sacrificing monetary independence. If, however, macroeconomic shocks facing New Zealand were quite different from those of a potential currency partner or occur with different timing, ie were asymmetric, then any common currency arrangement would require alternative adjustment mechanisms.

Countries with similar economies, trading partners, production, and industrial structures are more likely to face similar shocks. Therefore we need to know how similar the structure of New Zealand's economy is to that of Australia and the United States, since these are New Zealand's mostly likely common currency partners.

Of course, we must also know whether the business cycles are similar. Specifically, are the two potential currency partner economies generally in an expansionary or contractionary phase at the same time? If so, then a common monetary policy, which would be driven by the larger partner country,

[1] Hargreaves and McDermott (1999).

[2] For evidence on Australia and Canada see Bleaney (1996) and Murray (1999), respectively. The correlation between changes in the NZD/USD exchange rate and changes in the ANZ commodity price index is about 0.5 and highly significant.

would often be appropriate for New Zealand conditions too. On the other hand, if the New Zealand business cycle is more often out of phase with the business cycles in Australia or the United States, then a common monetary policy would be de-stabilising, with monetary policy often tight during recessions and loose when the economy is heating up.

Should New Zealand join a common currency area even if shocks to our economy are different from those faced by currency partners? A common currency, and the concomitant loss of monetary policy independence, might still be desirable if there were other viable alternative adjustment mechanisms that could be used to dampen shocks. Three candidate mechanisms exist.

- ***Relative wage and price flexibility***: if domestic wages and prices were fully flexible, a decrease in demand for New Zealand exports would cause local firms to cut costs, so as to enable them to maintain or gain market shares from other countries.
- ***Factor mobility*** (especially labour mobility): if wages and prices were not fully flexible, a decline in demand would lead to a rise in unemployment. The greater the rigidity in wages, the more likely it is that unemployment would rise. However, if workers were geographically mobile and could move to where jobs were available, adjustment could take place via migration.
- ***Fiscal transfers***: a decline in the New Zealand economy could be partially offset by a net fiscal transfer from the common currency partner, and vice versa.

It is sometimes argued that even in the absence of these adjustment mechanisms, an inflexible exchange rate may have benefits. The argument is that the absence of a price adjustment mechanism – that is, the absence of either exchange rate, or wage and price, flexibility – would help to 'shake-out' inefficient economic activities, and to shift resources into alternative uses that enjoy a higher comparative advantage. This view, however, presupposes three things.

First, the argument takes as given that there exists alternative (latent) economic activities with higher comparative advantages. In a world in which comparative advantage is not constrained by natural resource endowments, but can be acquired through, for example, education, this is probably a reasonable assumption.

Secondly, it presupposes that the differences in comparative advantage as between different resource uses are not reflected in the market returns to the alternative resource uses, or that resources are unresponsive to such price signals. This might be the case where, for example, labour is unresponsive to the opportunity to earn higher wages in an alternative sector because acquiring the new skills is perceived to be very expensive. In these circumstances, an enforced 'quantity adjustment', which would initially be reflected in unemployment and bankruptcies, might free up resources quicker than would otherwise occur.

Thirdly, there is an assumption that the freed up resources would be re-absorbed into the 'right' (ie highest comparative advantage) sectors. Whether this could be relied on to occur in the absence of clear price signals is not clear.

To help understand whether New Zealand is a good candidate to join a common currency area we examine features of the New Zealand economy *vis-à-vis* the Australian and United States economies. In a paper of this nature it is not possible to investigate every aspect of the potential adjustment mechanisms. Instead, we aim to provide a flavour of the issues, as background for debate.

The remainder of this paper examines a number of issues in detail. An introduction to the issues is provided in box 1 which looks briefly at some other contributions. In section 2 we compare macroeconomic parameters and the industrial structures of Australia, New Zealand and the United States, while in section 3 we compare the business cycles of these economies. As noted above, business cycles that move together would be a favourable condition for a currency union. Unfortunately, even if New Zealand's business cycle moves in line with potential currency partners' cycles we do not know why. Is it because the cycles are naturally similar or because monetary policy reacts to make them so? To answer this question we need to examine the underlying shocks of the business cycle. Commodity price changes are an important source of shocks to the New Zealand economy and we examine these in detail.

In section 4 we examine how effective the available alternative adjustment mechanisms would be in dampening

Box 1: The role of floating exchange rates in buffering shocks: what have others said?

There is a large literature on the role and performance of floating exchange rates in buffering shocks. In this box we briefly review some of the seminal articles on the issue. In addition, we examine recent work conducted at the Bank of Canada on the evidence for Canada, where some proposals have also been advanced for a monetary union (with the United States). This work is relevant to the New Zealand debate because we find we are in a similar position – a commodity exporter with a bigger neighbour.

Seminal works on the floating exchange rate system

As early as 1953, Milton Friedman provided an article on floating exchange rates versus fixed exchange rates.[1] He argued that market-determined exchange rates facilitate the relative price adjustments required when there are external shocks better than the fixed exchange rate system. Under a fixed exchange rate regime, that adjustment has to come through inflation or deflation of domestic prices. He provides a useful analogy on why it is better to change one price (the exchange rate) following a shock rather than to rely upon changes in the multitude of prices that form the domestic price structure. Daylight saving could be achieved by changing the clock or by having each individual change their routine by exactly one hour every summer. Obviously it is much simpler to change the clock.

Friedman also argued that 'speculation' would be stabilising rather than destabilising, since any investor who added volatility to the exchange rate must be buying when the price is high and selling when the price is low – a formula for losing money. Such speculators should disappear from the foreign exchange market over time. He did not, however, claim that exchange rates would be stable. He explicitly recognised that if countries followed divergent monetary policies, it would show up in exchange rate fluctuations.

Robert Mundell and Marcus Fleming extended these ideas, in an open economy version of the IS-LM model (the workhorse model of macroeconomic textbooks).[2] They showed that a floating exchange rate dampens the transmission of disturbances internationally, but also that when domestic shocks are important, the choice of exchange rate regime depends on whether these shocks are monetary or real. A fixed exchange rate is better when there is a monetary shock since international reserves would offset the shock and protect the real economy. A floating exchange rate would be better when there is a real shock since the changing exchange rate would produce an offsetting change in net exports, and thus moderate the impact of the domestic shock on output.

Much of the literature on exchange rate regime choice takes for granted that the economically appropriate geographical region for a single currency overlaps with the political region that typically uses a single currency. Robert Mundell introduced, on an abstract level, the idea of an optimum currency area over which there would be a single currency.[3] This area may not match the existing borders of nation states. From this work, he identified attributes needed for a currency area to be an 'optimum currency area'. Labour and capital mobility were attributes he focused on most closely. (We draw heavily on his framework in this article.) An additional point, that has been long recognised, is that the conditions for an optimum currency area may well be endogenous to the exchange rate regime itself. That is, fixing the exchange rate, as in a currency union, might

[1] Friedman, M (1953), "The case for flexible exchange rates," in M. Friedman, ed., *Essays in Positive Economics* (Chicago: Chicago University Press), 157-203.

[2] Mundell wrote a series of papers on this subject, collected in Mundell, R (1968*), International Economics* (New York: Macmillan). See also Fleming, J M (1962), " Domestic financial policies under fixed and under floating exchange rates," *IMF Staff Papers* 9, 369-79.

[3] Mundell, R (1961), "A theory of optimum currency areas," *American Economic Review*, 51, 657-65.

force wage and prices to become more flexible. Stanley Fischer reiterated this point recently.[4]

Finally, one of the surprises in the operation of the floating exchange rate system is the magnitude of the cycle in nominal and real exchange rates. Rudiger Dornbusch, using the Mundell-Fleming model, showed how this could be explained.[5] The stickiness of goods prices relative to financial market prices, such as exchange rates, implies that the return of the real exchange rate to its long-run equilibrium after a nominal shock would be slow. For example, a tightening of monetary policy to slow inflation by increasing interest rates will appreciate the currency in the short run. The tight monetary policy and resulting excess supply of goods will cause the price level to fall gradually over time. Eventually the real exchange rate will return to its original level; but in the interim, there is a substantial movement (an 'overshooting') of the exchange rate.

Evidence for Canada

The feasibility and potential advantages for Canada of a currency union between Canada and the United States were assessed in a recent series of Bank of Canada working papers.[6] They review the theoretical arguments in support of fixed and floating exchange rates and discuss Canada's experiences under each system.

This research acknowledges that there may be potential benefits for Canada from currency union with the United States. These benefits may include substantial reductions in transactions costs and the elimination of currency risk (and hence hedging and other costs) in respect of a substantial proportion of Canada's external trade.

On the other hand, the research suggests that currency union would create potential disadvantages for Canada, including loss of independence of monetary policy (in a situation where the Canadian authorities would have little capacity to influence US monetary policy). Also Canada has greater exposure to external shocks than does the United States economy, and the nature and dynamics of the shocks are very different. Consequently, there may be significant disadvantages for the Canadian economy in moving to a currency union with the United States in the absence of alternative adjustment mechanisms, such as an appropriate degree of wage and price flexibility, factor mobility and fiscal transfers. On balance, it is concluded that the Canadian economy would be better served by retaining its own currency under a floating exchange rate regime.

[4] "New challenges for monetary policy," Jackson Hole conference, August 28, 1999.

[5] Dornbusch, R (1976), "Expectations and exchange rate dynamics, *Journal of Political Economy*, 84, 1161-1176

[6] Murray, J (1999), "Why Canada needs a flexible exchange rate" Bank of Canada working paper 99-12; Antia, Z, R Djoudad, and P St-Amant (1999), "Canada's exchange rate regime and North American economic integration: the role of risk-sharing mechanisms," Bank of Canada working paper 99-17; Lafrance, R and P St-Amant (1999), "Optimal currency areas: a review of the literature," Bank of Canada working paper 99-16; and Laidler, D (1999), "The exchange rate regime and Canada's monetary order," Bank of Canada working paper 99-7.

shocks, if the exchange rate channel were to be removed. We first look at regional unemployment. Persistent regional dispersion in unemployment could indicate that labour market adjustments do not work well or that impediments to labour mobility, such as minimum labour laws, are more important. To address this issue we examine labour adjustments more directly. In particular, we examine how workers are drawn into the labour force (by higher participation or by migration) under changing demand conditions.

Next we turn to the price adjustment mechanisms and examine how flexible are prices. The most direct evidence on price flexibility is the variability of prices. Again the direct evidence can be interpreted in different ways. High variability could mean that prices are flexible and provide a useful alternative adjustment mechanism. Alternatively, it could mean that regional-specific shocks are prevalent.

Finally, an important adjustment mechanism to shocks that is often discussed is fiscal policy. However, a detailed discussion of fiscal policy is beyond the scope of this article because it opens up much bigger questions about political relationships. Section 5 provides some concluding thoughts.

2 Is the New Zealand economy similar enough to Australia or the United States to form a currency union?

Economies with similar structures are more likely to be subject to similar shocks. Table 1 contains some macroeconomic statistics for New Zealand, Australia and the United States. The size of the three economies is the first obvious disparity. Australia has 6 times and the United States about 71 times the population of New Zealand and they both have a higher GDP per capita. This would matter in a currency union to the extent that 'average' economic conditions determine monetary policy settings. New Zealand conditions would be of secondary importance in a currency union with Australia, and completely irrelevant in the setting of US monetary policy, if we were to adopt their currency.

Secondly, the New Zealand economy is more open than those of Australia or the United States. This means that the exchange rate probably plays a more important adjustment role in New Zealand. It also means that New Zealand is more vulnerable to shocks emanating from overseas.

Thirdly, Australasia is clearly not an important trade partner as far as the United States is concerned. Australia and New Zealand have significant trade with each other, but nothing like the degree of intra-regional trade that exists between the Euro countries.[3]

[3] Intra-EU trade was 14 percent of EU GDP in 1989. Trade with Australia comprises just 4.5 percent of New Zealand GDP. Hargreaves and McDermott (1999).

Table 1: Key macroeconomic statistics for New Zealand, Australia and the US

	New Zealand	Australia	United States
Population (1998)[1]	3.76m	18.53m	267.9m
GDP per capita ($US)[2]	$17,272	$21,202	$29,326
Govt consumption as % of GDP[1]	16%	18%	14%
Unemployment rate (Jan 99)[1]	7.20%	7.50%	4.30%
In percent of FTE, **employment** in:[4]			
Agriculture, forestry, fishing	2.2%	5.2%	2.6%
Manufacturing	18.3%	11.5%	14.3%
Wholesale and retail trade	21.5%	19.1%	22.2%
Three largest export products, and their percent of export value[5]	Dairy (19%) Meat (13%) Forestry (11%)	Coal (11%) Gold (7%) Iron ore (4%)	Computers (7%) Semi-conductors (5%) Electric goods (3%)
Degree of openness*[1]	67%	39%	30%
Exports in percent of GDP(Dec 98)[1]	33%	19%	13%
Imports in percent of GDP (Dec 98)[1]	34%	20%	16%
Percent of **exports** to:[3]			
New Zealand	—	7.2%	0.3%
Australia	19.7%	—	1.7%
United States	10.6%	7.4%	—
Percent of **imports** from:[3]			
New Zealand	—	4.4%	0.2%
Australia	25.2%	—	0.5%
United States	17.9%	22.1%	—

* Merchandise imports and exports in percent of GDP, Jan 1999.

[1] OECD *Main Economic Indicators*.

[2] Datastream: OECD data 1997.

[3] IMF Direction of Trade Statistics, June 1999 (Merchandise trade figures).

[4] NZ 1998 Yearbook, Australia 1999 yearbook (CD-Rom), BLS website: www.bls.gov: LFU156590. Hours worked in New Zealand meat and dairy manufacturing comprise 14.3 percent of total manufacturing hours worked, and "other food, beverage and tobacco", which also contains a significant primary processing element, a further 11.7 percent. Therefore, the figure given in the table understates the importance of agriculture in the New Zealand economy.

[5] By value, date. Source: NZ 1998 Yearbook, Australia 1999 Yearbook (CD-Rom), www.census.gov.

The employment figures for various sectors of the economy given in table 1 seem to suggest that the economies are fairly similar. However, these broad aggregates hide significant differences in composition. This can be seen in the export statistics: the main exports of the three economies are quite different. New Zealand exports primarily 'soft' commodities (agricultural products), Australia 'hard' commodities (minerals), and the United States technological goods. The markets for these products are likely to move quite differently, and generate quite different shocks in the respective economies. New Zealand is also the least diversified in terms of its export goods. Because of this, commodity prices are a significant source of external shocks in New Zealand. This suggests that if the exchange rate's role as a buffer against such shocks were to be given up, it would be important for adjustment to be able to take place through the alternative channels mentioned above.

3 Is the New Zealand business cycle similar enough to Australia or the United States to form a currency union?

The common monetary policy required of a currency union will be easier to implement if the member countries' business cycles are aligned. Monetary policy instruments are macroeconomic variables that work across the board, and in a common currency area they could not be simultaneously tailored to divergent conditions in different countries. In this section we establish some stylised facts about the cyclical behaviour of output in Australia, New Zealand and the United States.[4] We focus on these countries because evidence exists that New Zealand has a business cycle similar to that of Australia and the United States, but not to any European or Asian cycle.[5]

Figure 1 (opposite) dates business cycles in Australia, New Zealand and the United States.[6] The output series for these three countries are available from 1960 to 1999, affording us a sufficiently long data span to glean a good impression of properties of the average cycle for each. Cycles in each country are asymmetric over time, with expansions longer than contractions. The dates of the peaks and troughs are similar (but not identical) in the three countries and the durability of the expansion since 1991 in all three countries has been most remarkable. While these expansions are still ongoing in Australia and the United States, New Zealand's expansion was briefly interrupted in mid-1998.

The 'bar codes' at the bottom of the charts show when a pair of economies are in the same phase of the business cycle. When the two economies contract together or when they expand together the bar code is solid, and it is blank when the two economies are out of phase. The higher the proportion of solid parts of the bar code, the stronger the case for currency union, all other things being equal. When comparing New Zealand's business cycle with those of Australia and the United States, the bar code is solid about 70 percent of the time. In other words, monetary policy settings of Australia and the United States would have been inappropriate for New Zealand about 30 percent of the time. The proportion of time that the United States and Australia are in the same phase is 80 percent.[7]

Some simple statistics are used to examine other salient features of the New Zealand business cycle *vis-à-vis* those of Australia and the United States. In table 2 (overleaf) we report average durations, amplitudes and quarterly amplitudes for expansions and contractions of output in Australia, New Zealand and the United States.[8] The New Zealand business cycle is much more irregular, with shorter expansions. The average New Zealand expansion lasts about 14 quarters, compared to 24 and 20 quarters for Australia and the United States, respectively. The average increase in

[4] The key features of the recent New Zealand business cycle have been examined in more detail in Brook, Collins, and Smith (1998).

[5] See Hall, Kim, and Buckle (1998).

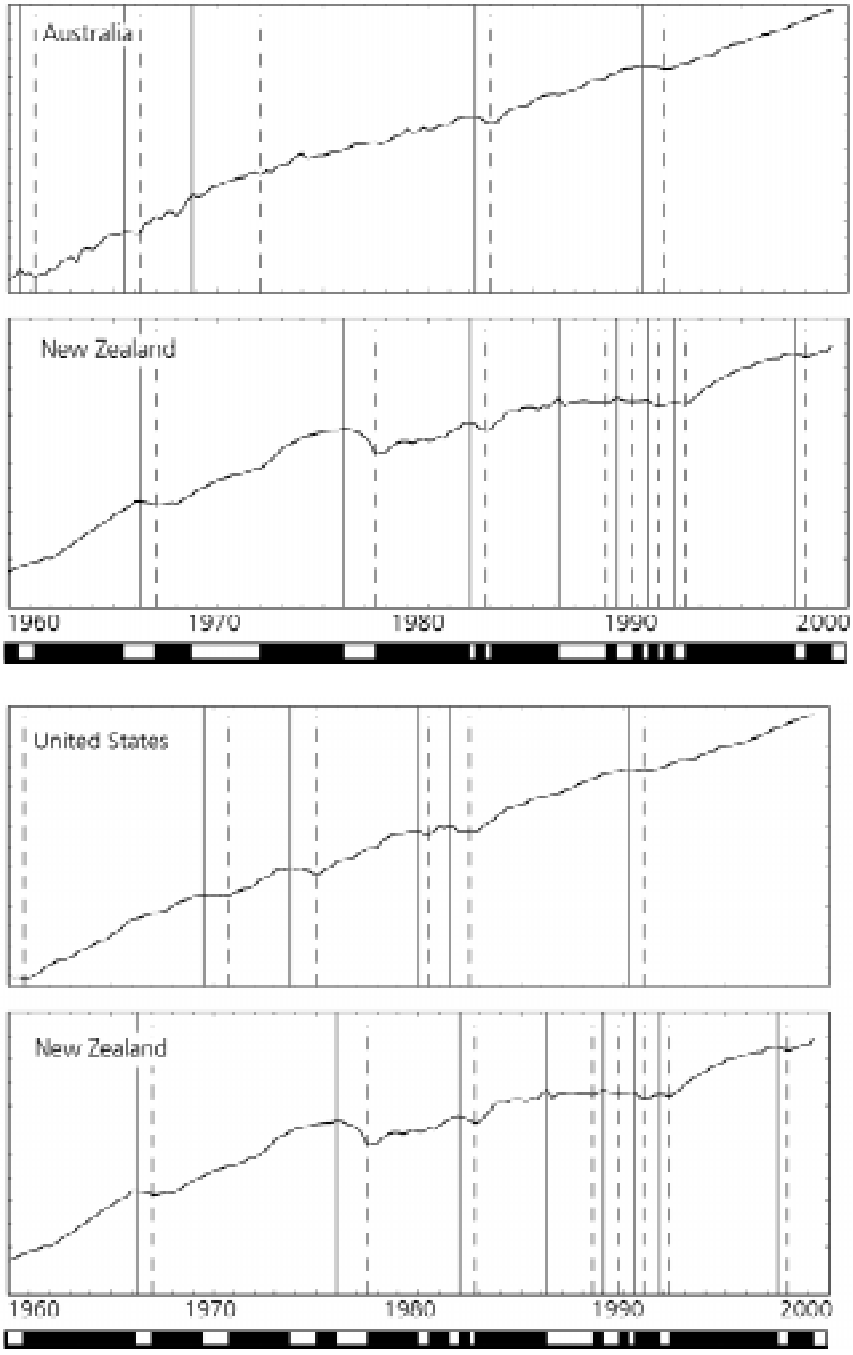
[6] Peaks and troughs are dated using an algorithm similar to that employed by the National Bureau of Economic Research (NBER). It characterises business cycles in terms of expansions and recessions, rather than in terms of faster and slower periods of economic growth.

[7] Statistically, we cannot conclude that the proportion of time in which the economies are 'in-phase' is higher than could occur by pure random chance. For details on the measurement of the significance of co-moving business cycles see McDermott and Scott (1999).

[8] Duration refers to the length of the recession or expansion (in quarters). Amplitude refers to the change in the size of the economy from trough to peak during an expansion (or from peak to trough during a recession). The descriptive statistics consider only completed expansions or contractions. Thus, the current record expansion of 35 quarters in the United States is excluded from our analysis.

Figure 1: A comparison of business cycles

Solid vertical lines indicate peaks of the business cycle; dotted vertical lines troughs.



output during an expansion has been only 10 percent in New Zealand compared with 20 percent or more in Australia and the United States. Moreover, average economic contractions in New Zealand have been slightly more severe than those experienced in Australia and the United States. Another feature of these results is that the average per quarter growth rate in expansions is smaller in New Zealand: 0.7 percent compared to 1.2 and 1.0 percent in Australia and the United States, respectively.

Based on these facts about the business cycle, the answer to the question whether Australia or the United States would be suitable currency partners for New Zealand is inconclusive. The business cycles are not identical and so there would be costs to New Zealand if adjustment to exogenous shocks

Figure 1: continued

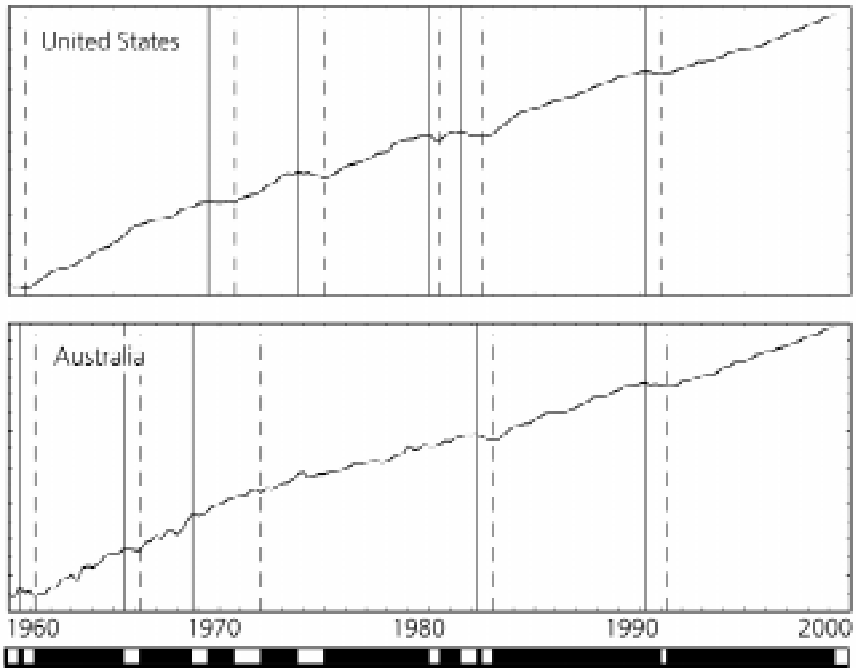


Table 2: Descriptive statistics of the business cycle in Australia, New Zealand and the United States

	Recessions			Expansions		
	Average duration (in quarters)	Average amplitude (in percent)	Average growth rate per quarter	Average duration (in quarters)	Average amplitude (in percent)	Average growth rate per quarter
New Zealand	3.8	-2.9	-0.8	13.9	10.8	0.7
Australia	3.3	-2.8	-0.9	24.3	24.2	1.2
United States	3.7	-1.9	-0.6	20.4	19.7	1.0

could not be readily achieved via alternative mechanisms. We will explore whether some of the alternative mechanisms operate in New Zealand below. From a business cycle perspective – if New Zealand were to form a currency union – there is no obvious advantage to joining with Australia over the United States, or vice-versa. Of course, other factors might favour one country over the other. For example, the Reserve Bank of Australia would be more likely to factor in New Zealand economic conditions than would the United States Federal Reserve System. If extraction of the full benefits of currency union requires a good measure of economic union, for instance in the areas of business law, an absence of trade barriers, and financial sector integration, then Australia would be a stronger candidate, given the already high degree of integration of the two economies.

There is, however, a major conceptual problem with using matching business cycles as a measure of the commonality of the shocks that hit different economies and hence their suitability for currency union. Observed output cycles reflect the effects not only of exogenous shocks, but also of the endogenous monetary policy responses to those shocks. If country-specific shocks have been rare, then similar business cycles will likely be observed. But even if country-specific shocks were widespread, countervailing monetary policy could produce business cycles that look similar. Once the ability to shift monetary policy in different directions has been removed, the country-specific shocks will dominate the shape of the business cycle.

Ideally, we would like to know whether the underlying (exogenous) shocks are similar across countries. Because

Table 3: Proportion of time the price of exports are increasing or decreasing together

	Dairy (butter)	Meat (lamb)	Forestry	Coal	Gold	Iron ore
Dairy (butter)	—	.61	.51	.42	.66	.55
Meat (lamb)		—	.50	.54	.42	.45
Forestry			—	.52	.33	.36
Coal				—	.50	.51
Gold					—	.58
Iron ore						—

Note: Proportions are calculated using the method described in Cashin, McDermott, and Scott (1999). This method enforces the restriction that cycles are at least 24 months long and that each phase of the cycle (rising prices or falling prices) is at least 12 months long. The data is monthly and covers the period 1957 to 1998 (some prices are not available for the full period).

Australia and New Zealand are largely commodity exporters and price-takers in world markets, price data on our export commodities can be treated as exogenous. The commodity prices associated with Australia are mostly those for 'hard' commodities such as coal, gold, and iron ore. The commodity prices associated with New Zealand are those for 'soft' commodities such as dairy, meat, and forestry products.

We might expect *a priori* that shocks to the price of key export goods would have a greater impact on New Zealand, as these three goods make up 43 percent of our trade, while the top three goods for Australia make up only 22 percent. The United States' exports are far more diversified; the top three goods together represent only 15 percent of United States' exports by value. This is, of course, exacerbated by the openness of our economy: New Zealand, at 67 percent, is more than twice as open as the United States (30 percent, see table 1). Consequently, the United States is excluded from this part of the study because it cannot be viewed as primarily a commodity exporter, and its largest three exports (by value) represent only a small proportion of its economy.

There is a common perception that the prices of commodities move together, and thus because both New Zealand and Australia are both commodity exporters they should be faced with similar external shocks. Empirical evidence in support of this proposition (that commodity prices move together) has been offered in a paper examining movements in the price of intuitively unrelated commodities.[9] However, this conclusion has been contested.[10] Next we examine whether the prices of New Zealand's and Australia's three largest exports move together. We do this by comparing, for each bilateral relationship, the proportion of time these prices are synchronised (that is, move in the same direction at the same time). The results are shown in table 3 and indicate that there is little evidence of synchronisation in price movements. In most cases, the synchronisation is only marginally greater than would have been expected from the toss of two fair coins coming up on the same side (0.5). When comparing the nine New Zealand-Australia bilateral relationships (eg dairy versus coal and forestry versus gold) we find in five cases the synchronisation is less than 0.5.

As well as the general co-movement between commodity-price cycles, an important aspect to consider is the movement in an individual commodity price between turning points in the cycles. For each of the six commodity-price series, the data is split into two phases—slumps and booms. The following results are presented for each phase: the average duration (in months) of phases; the average amplitude (in percent change) of price movements over phases; and the average monthly rates of change as a measure of the speed of price movements (see table 4).

The results we report in table 4 imply that the duration of price cycles varies dramatically across these six commodities. The length of an average cycle (peak to trough plus trough to peak) ranges from about five years for coal prices to about nine years for dairy and gold prices. The average declines in 'hard' commodity prices are roughly the same as the average

[9] See Pindyck and Rotemberg (1990), who find that movements in the price of a set of unrelated commodities (cocoa, copper, cotton, crude oil, gold, lumber, and wheat) are correlated.

[10] Cashin, McDermott and Scott (1999) argue that correlation analysis used by Pindyck and Rotemberg is inappropriate because it is prone to spurious results induced by large one-time shifts in the price level. Large shifts are a common feature of commodity prices (see Deaton and Larque, 1992). The correct method is to measure the proportion of time that the prices are in the same boom or slump phase. When one does this there is no evidence (over the last forty years) that commodity prices for unrelated commodities move together.

Table 4: Descriptive statistics for Australian and New Zealand major export prices

	Periods of declining prices			Period of increasing prices		
	Average duration (in months)	Average amplitude (in percent)	Average monthly change (percent)	Average duration (in months)	Average amplitude (in percent)	Average monthly change (percent)
NEW ZEALAND						
Dairy prices (butter)	36	-38	-1.3	75	50	0.7
Meat prices (lamb)	35	-32	-1.0	49	53	1.3
Forestry prices	24	-26	-1.2	47	56	1.5
AUSTRALIA						
Coal prices	36	-25	-0.8	26	23	0.9
Gold prices	66	-32	-0.9	48	55	1.2
Iron ore prices	63	-23	-0.4	34	29	0.9

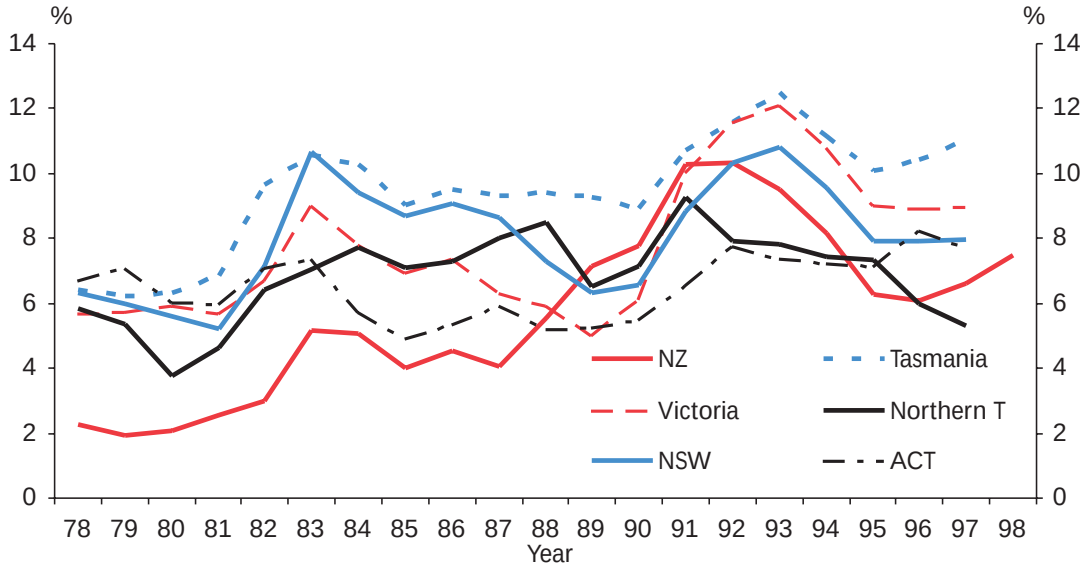
declines in 'soft' commodities but the speed of price adjustment is faster for 'soft' commodities. On the other hand, the average increases in 'hard' commodity prices are typically lower than the average increases in 'soft' commodity prices, while the speed of price adjustment is about the same.

Overall, this lack of conformity in the nature of the price cycles means that there is little support for the notion that Australasian commodity prices typically move together. The idiosyncratic shocks emanating from commodity prices suggest that Australian monetary policy would not always be suitable for New Zealand. As noted above, the removal of the exchange rate as a mechanism to adjust to commodity price shocks may not be that costly if there are alternative mechanisms open to New Zealand. The next section examines how effective some of these alternatives have been in the past.

4 Alternative adjustment mechanisms to country-specific shocks

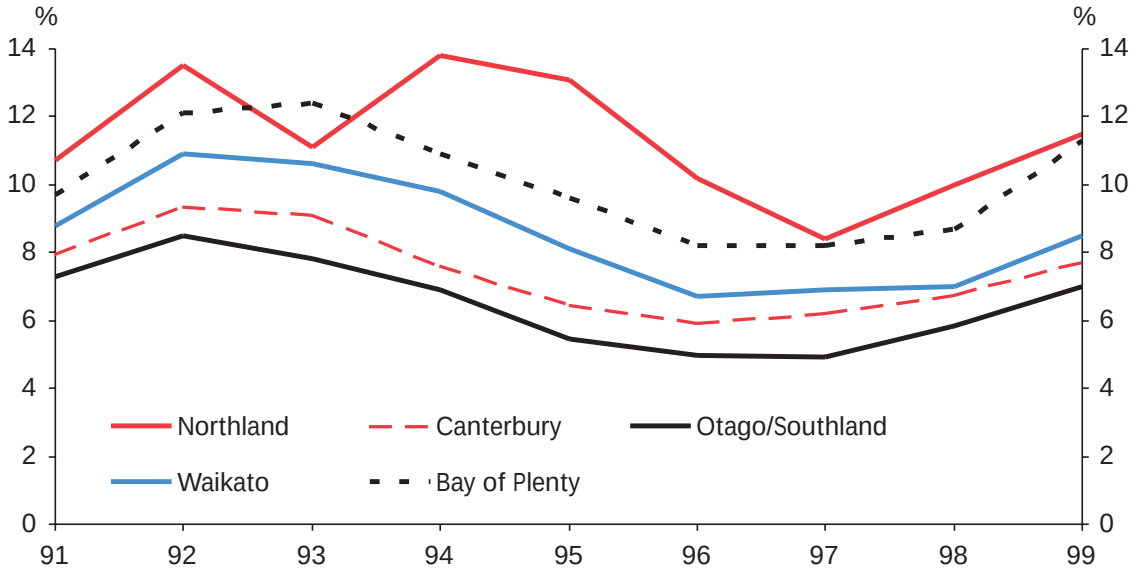
Often the most visible impact of an adverse shock is the loss of jobs. In this section we provide an overview of regional unemployment trends in Australia and New Zealand. This overview provides a backdrop for the analysis of regional economic adjustment: in particular, the speed of adjustment and trans-Tasman differences in intra-national adjustment patterns.

Figure 2: Unemployment rates in New Zealand and states of Australia[1]



[1] Unemployments rates in Queensland, Western Australia, South Australia, and New South Wales all moved similarly. For clarity, only New South Wales is graphed.

Figure 3: Unemployment rates in selected regions of New Zealand



We look first at the regional unemployment data. It is clear that the aggregate unemployment rate is affected by economic shocks. For example, unemployment rates rose sharply in all states of Australia and New Zealand during the recessionary period of 1990 (figure 2). The relative performance of regions, in terms of unemployment rates, tends to remain constant. That is, the worst performing regions have tended to remain so, irrespective of whether the economy is in recession or expansion.

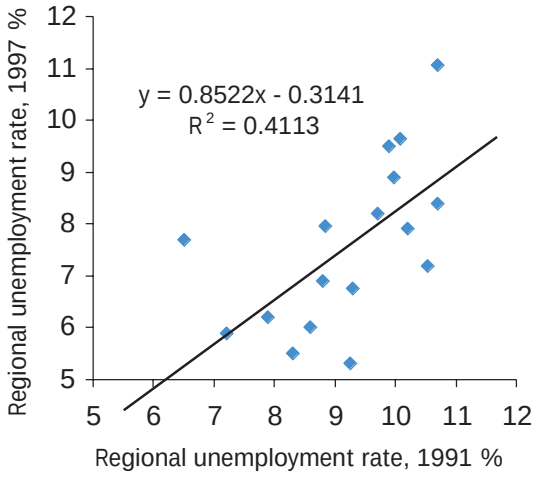
For example, Tasmania has had a consistently high unemployment rate while ACT's rate has been comparatively low. In New Zealand, Northland has had consistently high unemployment, while the unemployment rate of Otago/Southland has typically been low (figure 3).

The fact that Australasian regional unemployment rates persistently deviate from the national average over time can be shown using simple scatter plots of regional unemployment rates in 1997 against regional unemployment rates in 1991. Figure 4 shows a strong positively sloped relationship, confirming the notion that high unemployment regions remain high and low unemployment regions remain low. If we examine Australia and New Zealand separately, we find that there is greater history-dependence in New Zealand regional unemployment rates.

How can we explain these facts? There are two possible explanations, with very different implications for the appropriateness of currency union.

First, regions may have persistently different rates of unemployment throughout the cycle, due to *structural* factors such as the administration of unemployment benefits, minimum wage laws, and national wage settlement practices. In this case, persistence of unemployment in a particular region does not necessarily imply that *cyclical* adjustment mechanisms, such as migration or wage changes, are failing

Figure 4: Persistence of regional unemployment rates in Australia and New Zealand 1991-97



in the face of regional shocks. On the other hand, strong persistence of unemployment deviations from the national average may be a result of barriers to cyclical adjustment. This might be the case if there were resistance to migration.

If structural factors are causing the unemployment persistence, then cyclical adjustment may be occurring as appropriate and currency union would do no harm. But if the persistence reflects the fact that regional shocks result in higher unemployment, then a floating currency between the regions may be beneficial. How can we determine which of these explanations is more credible? The first explanation, of structural rigidities but good cyclical adjustment, implies that an unemployment rate that is higher than its long-term average for a region should be associated with downward pressure on regional prices (particularly wages), allowing adjustment to take place. That is, regional competitiveness would improve, eventually feeding through into local labour demand to remove the effects of the regional shock on employment.

However, past use of a system of centralised wage determination did not allow regional wages to reflect regional productivity differences, and so unemployment was above average in below-average productivity regions. Thus, the most likely explanation for the persistence of regional unemployment is the existence of structural factors. While examining unemployment data is suggestive, it is hardly conclusive. To obtain more evidence on why regional unemployment persists we will need to look at more direct evidence such as labour mobility; this we do in the next section.

Labour mobility

Migration is one potential means of adjustment to regional shocks. If a region suffers an adverse shock and unemployment rises, possibly driving down real wages, then there are greater incentives for workers to migrate in search of higher incomes. If workers in a country are highly mobile between regions, then this might suggest that they would be more willing than otherwise to move between countries in a currency union.

One channel for reducing regional unemployment differentials is interregional migration. Net migration is substantially higher within New Zealand than within Australia and the United States, which in turn is higher than in European countries such as Germany. For example, during the last decade New Zealand's average net interregional migration was 1.6 percent of regional population, compared with 0.9, 0.6 and 0.3 percent for the United States, Australia, and Germany, respectively.[11] Taken as a rough guide of labour mobility, these numbers suggest that mobility is high in New Zealand and an important channel of adjustment.[12]

However, there is a conceptual problem in accepting migration data as evidence about mobility. Observed net flows reflect both the push of country-specific shocks and also resistance to migration. We cannot tell whether the observed high mobility in New Zealand occurs because we suffer more from idiosyncratic shocks or because there are fewer barriers to mobility. To address this identification problem we use a more complex econometric technique. We estimate an econometric model that attempts to explain the dynamic response of regional labour markets to local shocks.[13]

The model we use allows us to address how firms (in aggregate) fulfil an increase in demand for labour. They can fulfil their demand by: (i) encouraging workers already in the labour force to work more (increasing the employment rate); (ii) encouraging more people to enter the labour force (increasing the participation rate); or (iii) encouraging workers from other regions to enter the local labour force (increasing migration). The means of encouragement is higher wages. However, as wages are increased firms may revise their initial

[11] These figures are population-weighted averages over regions. Each regional figure is calculated as the average absolute value of the change in regional working-age population (measured net of national working-age population growth). The figures for the United States and Germany are from Obstfeld and Peri (1998) and cover the first half of the 1990s only. The data for Australia covers the period 1990-98 and the data for New Zealand covers the period for 1991-1999.

[12] One must be careful in comparing the statistic across countries because of the different average sizes of the 'regions' for which data is available.

[13] The econometric model originated by Blanchard and Katz (1992) estimates a three-equation vector-autoregressive (VAR) system. The variables of interest are the change in the log level of regional employment, the log employment rate (ratio of employment to the labour force) and the log participation rate (ratio of the labour force to working-age population). The critical identifying assumption is that innovations in the employment-change equation are exogenous labour demand shocks.

demand so that the long-run response of employment is lower. It seems reasonable to assume that in the short-run extra labour demand will be satisfied by increasing the employment rate. However, over time increased participation and migration may come to be more important factors. The model we use allows us to capture these dynamic effects. That is, it allows us to trace through time the response of: (i) employment, (ii) the employment rate, (iii) the participation rate, and (iv) migration from the region.[14] These dynamic responses for both the New Zealand labour market and the total Australian/New Zealand labour market are shown in figure 5 (overleaf). In generating these dynamic responses we assume an initial increase of labour demand of 1 percent. We find that in New Zealand, employment remains about 0.5 percent higher three years after a 1 percent increase in labour demand, while on average across Australasian states the impact three years out is less than 0.2 per cent. This employment growth is decomposed as follows:

- 40 percent of the increase in New Zealand employment (ie 0.2 percent) is due to an increase in the employment rate while nearly half of the increase in total Australasian employment is due to an increase in the employment rate.
- In New Zealand, 40 percent of the increase in employment is due to an increase in the participation rate, whereas the total Australasian participation rate hardly changes.
- The remainder of the changes in employment can be attributed to migration. In New Zealand this plays a large role, where it has an immediate and permanent effect, accounting for about 20 percent of the long-run increase in employment. In Australasia as a whole, the migration effect takes longer to show through and is weaker than in New Zealand by itself.

The results suggest that the labour market in New Zealand is more flexible than labour markets in states of Australia.[15] That is, in response to an increased employment demand New Zealand tends to spread the adjustment across three channels—reducing unemployment, increasing participation, and increasing migration. In contrast, for Australasia as a whole, most of the adjustment is through changes in unemployment. These results are consistent with previous Australian studies, which find that the persistence of regional differences in unemployment rates can be attributed to the relatively low levels of internal migration in Australia.[16]

It appears that migration is an important adjustment mechanism for New Zealand. Under a currency union we might expect to see increased trans-Tasman migration, suggesting that it would be important that labour flows remain unfettered.

Price and wage flexibility

Another potential adjustment mechanism to regional shocks under a currency union is price adjustment. This encourages resources to move in response to changing demand conditions.

One method used to gauge the flexibility of prices is to examine variations in regional price data. However, there are two ways of interpreting this data. One can argue that if the prices of goods adjust across regions to reflect demand, then demand and supply will more easily be reconciled. In this case, short-run price variability between regions is a good thing for currency union, as it indicates that prices and wages are an effective method of adjustment to regional shocks.

On the other hand, wide and persistent variation in regional prices may indicate that regional demand and supply shocks are not being dissipated via factor mobility and strong mutual trade. If this is the case then the real exchange rate will be highly variable between regions, suggesting a region is unsuitable for currency union.[17] If real exchange rate variability between regions that experience different shocks is low, then other adjustment mechanisms must be working well when required, and giving up nominal floating exchange rates between the regions would have little cost. Evidence

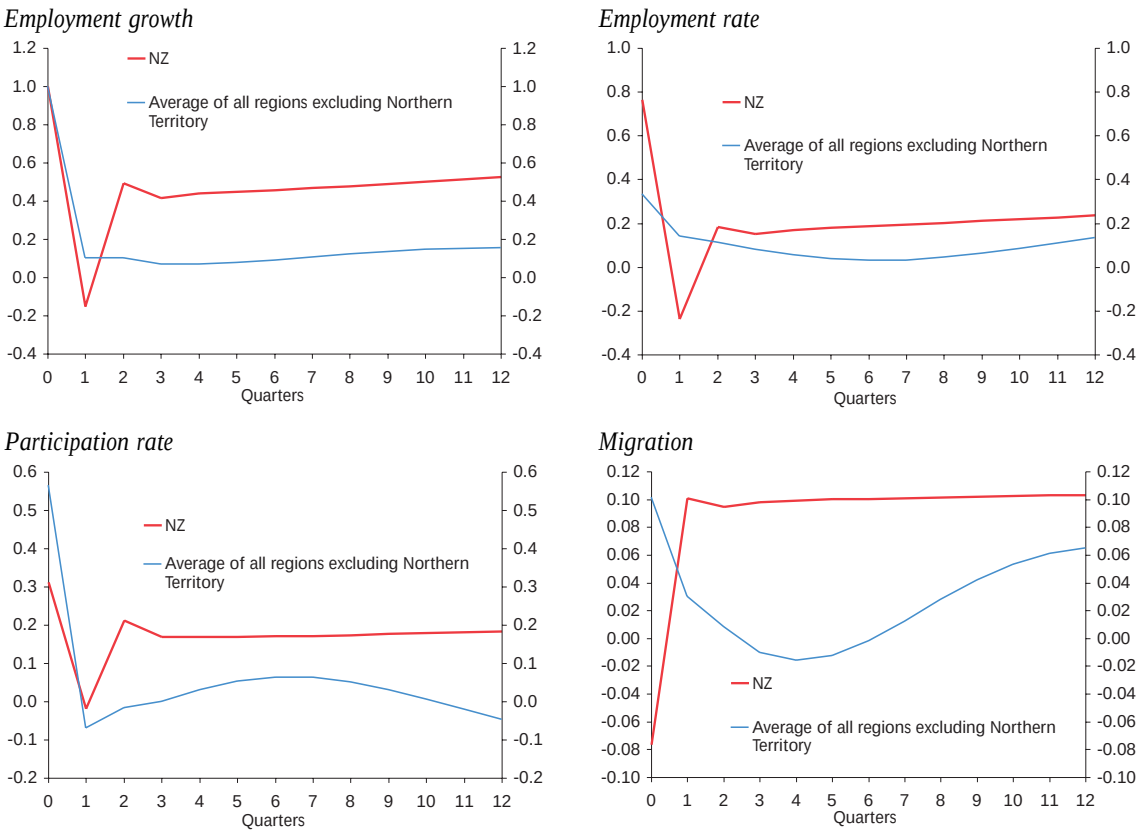
[14] To track this effect we use the identity that regional employment equals the product of the employment rate (one minus the unemployment rate), the participation rate, and working-age population.

[15] The Northern Territory has been omitted, as it appears to be an outlier in terms of its labour market behaviour.

[16] See Cashin and Strappazzon (1998) for a summary of these studies.

[17] The real exchange rate is defined as the nominal exchange rate times the domestic price level, deflated by the foreign price level. When the nominal exchange rate is fixed, as under a currency union, this is simply the relative price level between regions.

Figure 5: Dynamic responses to a one percent increase in labour demand



exists that in North America and Europe at least, relative regional prices tend to fluctuate less than international relative prices.

Unfortunately no regional price data exists for New Zealand. However, we can examine the relationship between prices in Australian states.[18] Table 5 gives the interregional price variability over approximately the last 15 years for the Australian states. Interregional price variability is calculated as the standard deviation of (log) regional GDP deflators relative to national GDP deflators (ie the variability in the 'real exchange rate' of each region with Australia as a whole).

The results are similar to those found for regions of Canada, Germany and Italy, from 1970 to the 1990s. Variability in prices across Australian states is higher than for Germany or Canada, but lower than for Italy. Variability in Australian annual changes (ie inflation rates) are considerably higher than in most other countries. This is an unusual result, especially considering that the states already have a common currency and monetary policy. It is possible that because

[18] We need to interpret results derived from this data carefully because the prices indices are not composed from a consistent basket of goods.

Table 5: Interregional relative price variability
1985 - 1997: annual data (average of quarterly data)

Region	Levels[1]	Changes[2]
NSW	0.9	1.0
Western Australia	1.2	1.2
South Australia	1.9	1.5
Queensland	1.2	1.1
A.C.T.	3.1	1.9
Tasmania	1.4	1.4
Victoria	1.7	1.5
Northern Territory	2.4	1.5
Australian average (equally weighted)	1.7	1.4
Australian average (GDP weighted)	1.3	1.2
Canadian average[3]	1.4	0.8
German average[3]	1.2	0.9
Italian average[4]	2.5	0.8

1 Regional standard deviations of 100*(log regional GDP deflator less log national GDP deflator.)

2 Regional standard deviations of regional GDP deflator annual inflation rate less national GDP deflator inflation rate.

3 For the period 1970-95. Source Obstfeld and Peri (1998).

4 For the period 1970-96. Source Obstfeld and Peri (1998).

other adjustment mechanisms are not operating in Australia the impact of regional shocks is seen in regional price variability.

However, even if Australia has flexible prices as a channel of adjustment it is not clear that this flexibility would be transmitted to New Zealand. For example, disaggregated price data show that the speed of retail price convergence between New Zealand and Australia is muted. In particular, New Zealand retail prices for supermarket goods are much less influenced by average Australian retail prices than are Australian state prices.[19]

Could flexible wage adjustment be a useful adjustment mechanism to country-specific shocks? Most empirical evidence in New Zealand and overseas suggests that nominal wages rarely fall.[20] There are several reasons for the downward rigidity of wages. For example, union agreements and wage/salary contracts tend to keep nominal wages fixed, at least for a while, and there has been an historical resistance to downward wage adjustments.

Overall, the available evidence on price and wage flexibility in Australia and New Zealand is insufficiently robust to enable conclusions to be drawn as to whether prices and wages could facilitate smooth macroeconomic adjustment in the wake of country-specific shocks to the New Zealand economy.

Fiscal adjustment

If we cannot rely on price and wage adjustment and we know labour mobility, although important, is slow to adjust, what macroeconomic tool would be available to cope with shocks to the New Zealand economy under a currency union? The typical answer is fiscal policy. However, because trans-national fiscal policy presupposes other political links, a detailed discussion is beyond the scope of this paper. Instead we briefly note the findings of some relevant literature.

Government interregional transfer schemes and the automatic stabilising nature of fiscal policy can cushion the effects of temporary and permanent economic shocks. In the case of temporary adverse shocks, tax revenue from the most affected region will tend to fall automatically while welfare payments will tend to rise. Regions could also borrow against future income to provide relief against a shock, but fiscal transfers would provide better protection. Of course, it is often difficult to determine whether a shock is temporary or permanent when it first occurs. Moreover, tax changes and new spending programmes are slow to be put in place, making discretionary fiscal policy a difficult tool to use to buffer shocks. In the case of permanent shocks, fiscal transfers would reduce the need for a long-run adjustment in regional consumption levels, but would also tend to delay necessary shifts in resource allocation.

The experience of the United States and Canadian federal systems point to the potential effectiveness of a central system of automatic stabilisers at buffering the effects of regional cyclical contractions.[21] Sala-i-Martin and Sachs (1992) find that federal taxes and transfers in the United States may offset almost one-third of the deviations of per capita income from the national average. Bayoumi and Masson (1995) arrived at a lower estimate of 10-20 percent. Of course, one should be careful about automatically extrapolating these results to a possible union with Australia and even more cautious when considering a possible union with the United States. In Australia, the Commonwealth government effectively controls most of the national revenue base and grants from the Commonwealth account for about 36 percent of state government revenue (see Callen, 1998).

Nevertheless, joining a common currency area would seem to be easier if it were matched by the introduction of a federal tax system. The key rationale for joining a federal tax system, in the context of temporary region-specific shocks, is that it provides a means of risk-sharing. Thus, if New Zealand suffered an adverse temporary shock the cost of this would be shared by the currency partner, and vice versa. The design of risk-sharing mechanisms is, however, quite complicated. First, we would have to get the partner country to agree to provide us with such insurance, and New Zealand would have to agree to provide a degree of insurance to the partner country. Second, it introduces a moral hazard problem, as such mechanisms would lessen the need for New Zealand to make itself more adaptable to economic shocks. In the

[19] Coleman and Daglish (1998).

[20] See Akerlof, Dickens and Peri (1996) and Cassino (1995).

[21] In addition to formal transfers, personal transfers, such as workers' remittances, can also play an important role.

case of longer-lasting shocks, the role of fiscal policy is necessarily more limited, since adjustment rather than fiscal financing is required.

5 Conclusion

It is inherently difficult to draw inferences about the likely success of currency union, since such a union would fundamentally alter the nature of macroeconomic adjustment in New Zealand. Nonetheless, we can try to envisage some of the likely issues that may arise under a currency union.

First, the New Zealand economy is more open than that of either of our likely currency partners, Australia and the United States. It is also much smaller, meaning that monetary policy settings would be unlikely to be much affected by conditions in New Zealand. Given this, the asymmetry of shocks hitting the economies and the relationship between the business cycles of member countries would be of key importance. But perhaps of even greater importance is the effectiveness of alternative channels of adjustment.

Our analysis provides hints about which adjustment channels might be expected to work well with a common currency. Regional migration does appear to be a significant adjustment mechanism, at least in the trans-Tasman labour market. However, migration would not be an available channel in a union with the United States under current immigration laws.

It is also difficult to draw inferences about price flexibility, because of the paucity of available data, but we can make some broad generalisations. Prices and wages are generally sticky, suggesting that relative movements in these prices alone are unlikely to provide a smooth, alternative adjustment mechanism. Fiscal data is also hard to come by on a regional basis. However, the uncertainties surrounding the likely success of the other adjustment mechanisms suggests that agreement on fiscal policy might be important if a currency union were to be an advantageous proposition for New Zealand. That, of course opens up broader issues that go beyond currency union per se. Indeed, it would likely involve moving in the direction of fuller economic union, a subject which is beyond the scope of this article.

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