Common Cycles Across OECD Countries[1]

Introduction

The strong correlation between Australian and US output growth over the last two decades has been widely documented and analysed.[2] What has always been difficult to understand is the source of this correlation, particularly since the extent of Australia's integration with the US economy is no greater in many respects than with other countries.

A recent research project within the Economic Research Department of the Bank takes a broader perspective on this issue and examines the correlation in economic activity across bilateral pairs of a large number of OECD economies. It looks, in particular, at whether Australia's economy has moved more closely with other countries' economies than is the norm, and examines a range of factors that could explain the common cycles that are observed. Both economic linkages, such as trade in goods and assets, and common structural features are examined as potential explanations for the observed relationships.

The Stylised Facts

The relationships between a large number of countries' economies are examined by calculating how closely output growth in pairs of these countries move together. Seventeen OECD countries are included, giving 136 bilateral pairings. The countries included in the study are: Australia, Austria, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, United Kingdom, and United States. The growth correlations are examined over the period from 1960 to 2000, although most of the formal analysis focuses on the period 1980–2000.

Table 1 provides summary statistics of the correlations across these pairs of countries for three time periods: 1960–1979, 1980–2000, and 1960–2000. The comparable statistics for the English-speaking countries in the data set are also provided.

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1. This article was prepared by Glenn Otto, Graham Voss and Luke Willard, Economic Research Department. It summarises the results of research work that these authors have published in RBA Research Discussion Paper No 2001-05, entitled 'Understanding OECD Output Correlations'. Staff research published by the Bank is intended to contribute to debate, and does not necessarily reflect the views of the Bank.

2. See, for example, Debelle and Preston (1995) and de Roos and Russell (1996).

Table 1: GDP Growth Rate Correlations
Four-quarter-ended growth rates

	Pairs	1960:Q1–1979:Q4	1980:Q1–2000:Q4	1960:Q1–2000:Q4
All country pairs	136			
Mean		0.31	0.27	0.33
Minimum		−0.22	−0.37	−0.07
Maximum		0.72	0.85	0.75
English-speaking country pairs	10			
Mean		0.31	0.52	0.42
Minimum		0.03	0.22	0.18
Maximum		0.70	0.85	0.75

Notes: Statistics are calculated over the correlations of real GDP growth rates from the bilateral pairings. The English-speaking countries are Australia, Canada, New Zealand, the United Kingdom and the United States.

This table shows that:

•   Across all countries, average correlations have remained roughly stable over time. This seems a little surprising given that most of these economies have, arguably, become more closely integrated in more recent years. The table also shows that the dispersion of correlations across countries has increased over the two sample periods.

•   The English-speaking countries have become considerably more closely linked during the past two decades. In the earlier sample period, by contrast, the English-speaking countries were, on average, no more closely linked than other countries.

Graph 1 shows a scatter plot of correlations for 1960–1979 against those for 1980–2000. If these correlations were fairly stable across time, one would expect the scatter of points to be bunched closely around the 45-degree line shown in grey. In fact, the points are widely dispersed, suggesting that the correlations have not been particularly stable, and the regression line that best fits these data points, shown in black, has a slope considerably less than one-to-one. This regression line is positively sloped, however,

Graph 1
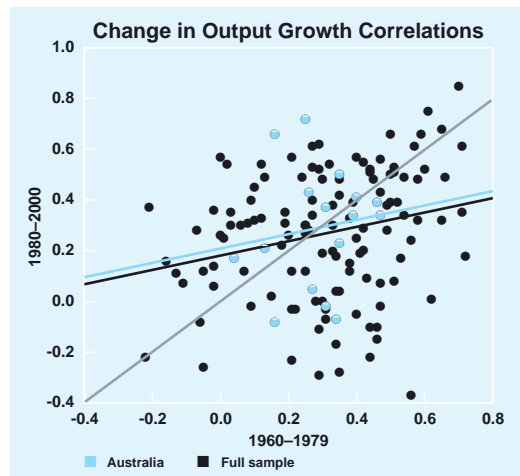
suggesting that there has been some tendency for countries that have had positively correlated growth cycles in 1960–1979 to also have positively correlated cycles in 1980–2000[3], although the weakness of the relationship implies that one should be careful about relying too closely on these correlations as a guide to future developments. Australia's experience (illustrated in this and all subsequent graphs by the pale blue dots and

3.   Econometric analysis shows that the positive slope is significant.

trend line) appears to be broadly similar to that of the rest of the countries in the sample.

Looking at the data in a little more detail, the top 20 and bottom 20 country pairs, ranked by 1980–2000 correlations, are presented in Graph 2. The left panel of this graph suggests that trade linkages may influence growth correlations; of the ten most correlated pairs of countries during 1980–2000, seven share a common border and each of these was also fairly highly correlated in the earlier sample period. Two of the exceptions, however, are pairs that include Australia. The highly correlated growth outcomes of the Australian and both the US and Canadian economies during 1980–2000 stand out, as does the fact that these bilateral correlations were markedly lower during the earlier sample period.
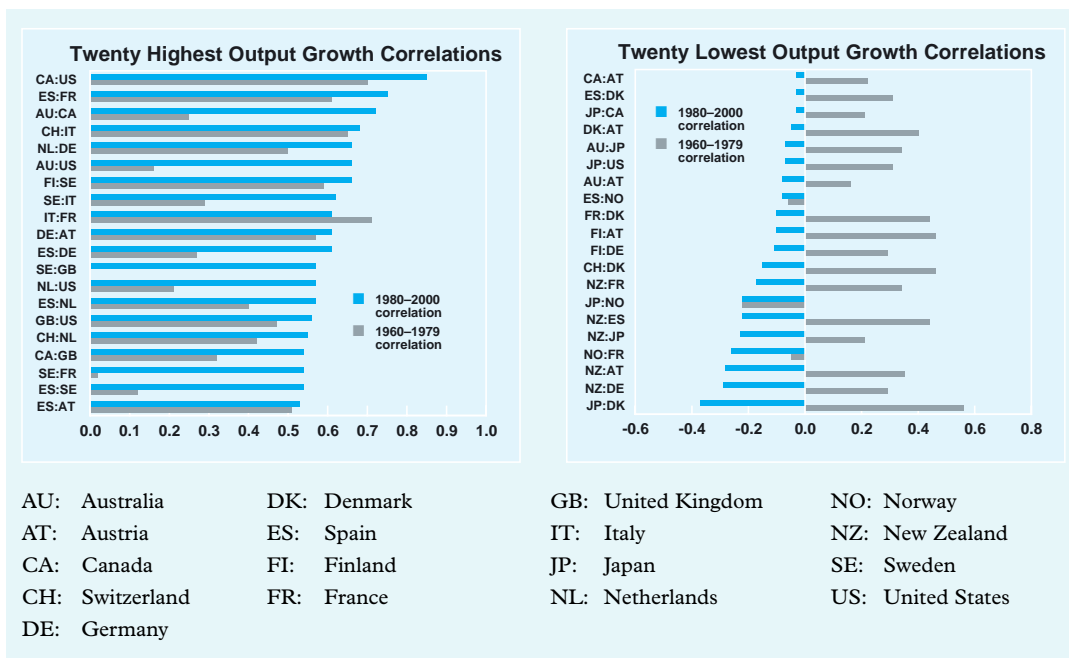
In terms of the other countries, the Swedish experience also appears to stand out, recording particularly strong correlations with a wide range of countries. Like Australia, the correlations between Sweden and its non-contiguous partners were much stronger in 1980–2000 than in the earlier sample period. On the other hand, the right panel of

Graph 2 suggests that Japan and New Zealand have had economic cycles during the past 20 years that have been quite unlike those of most of the other countries.

Economic Integration, Common Shocks and Common Cycles

Looking across all of these countries, the research then tries to identify whether particular factors can be identified that influence whether or not a given pair of countries exhibits similar cyclical patterns in growth. A wide range of factors is considered, some of which are discussed below. As a starting point, the paper examines whether the degree of economic integration of two countries is important. It seems plausible that countries that are highly integrated would exhibit closely correlated growth rates, as having highly integrated economies may well imply that shocks affecting one country are transmitted relatively quickly to the other. The paper then examines whether any structural

Graph 2

AU:	Australia	DK:	Denmark	GB:	United Kingdom	NO:	Norway
AT:	Austria	ES:	Spain	IT:	Italy	NZ:	New Zealand
CA:	Canada	FI:	Finland	JP:	Japan	SE:	Sweden
CH:	Switzerland	FR:	France	NL:	Netherlands	US:	United States
DE:	Germany						

or institutional features of these economies can be identified that imply that, even though there are no direct linkages between particular countries, a given global shock has a similar effect on growth in each economy.

The integration of two economies can be gauged in various different ways. As mentioned above, a cursory look at the data in Graph 2 suggests that some countries that share common borders are particularly highly correlated, implying that trade linkages may be an important explanation for some of the common cycles observed. Trade linkages can be quite easily measured by bilateral trade intensity or openness; that is, exports plus imports relative to GDP[4]. A scatter plot of the bilateral output correlations against this measure of bilateral openness shows that pairs of countries which trade more with each other tend to have more highly correlated growth rates (Graph 3), suggesting that trade linkages between countries probably do systematically affect relative growth outcomes. Furthermore, examining these data for each of the sub-samples, suggests that trade linkages have grown in importance over the past four decades, along with the falls in global protection and increases in trade integration that has taken place. Trade linkages seem to

matter as much to Australia as to the average of the rest of the sample, as illustrated by the similar relationship observed for the bilateral correlations including Australia in Graph 3.

The degree of integration between two countries' financial markets could be another type of economic integration that is important. While indicators of financial integration are readily available, it is more difficult to examine whether financial integration matters. This is because it is difficult to determine the direction of causation between indicators of financial integration and growth. For example, do closely related interest rates or a stable exchange rate, as evidence of financial integration, lead to common cycles or do common cycles, arising from other transmission mechanisms, common shocks and/or common economic policies, lead to closely related movements in interest rates and exchange rates? Properly addressing this issue is difficult, as it requires controlling for the endogenous movements of the indicator of financial integration. Without going into the detail, the results of the research indicate that there is a weak positive relationship between the degree of financial integration across countries and their output correlations.

If common global shocks, rather than economic integration, are important determinants of relative growth performances across countries, this would suggest that countries that have similar industrial structures, for example, could exhibit more highly correlated growth cycles. Graph 4 presents a scatter plot of output growth correlations and a measure of the difference between the industry structures of each pair of countries. The relationship between these two variables is noisy, but the regression line, being negatively sloped, suggests that countries whose industry structures are quite similar (the difference between their structures is smaller) do tend to have more highly correlated cycles.
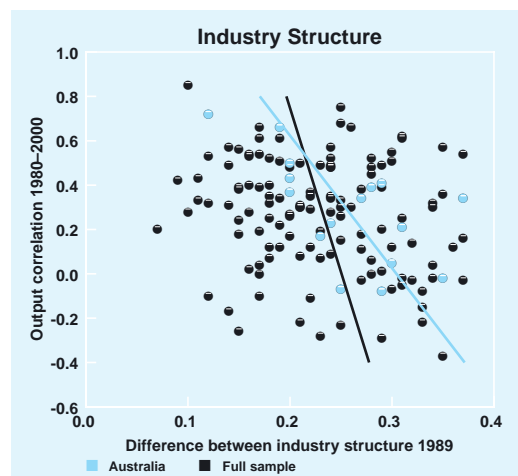
Another possibly important structural feature of an economy is its flexibility or its

Graph 3
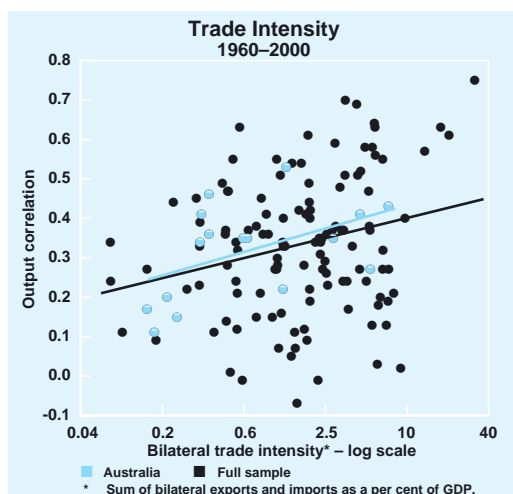
4.   Precise details about how these and the other variables discussed in this article are calculated, as well as details of the econometric analysis undertaken, are provided in Otto, Voss and Willard (2001).

Graph 4

Industry Structure

to adopt new technologies. The analysis presented shows that countries that have similar propensities to adopt new technologies have tended to have more closely correlated growth rates.

Finally, it is interesting to examine whether there are other common characteristics or similar institutional features, such as legal frameworks, accounting standards or linguistic backgrounds, which may make two economies more likely to move together. These features could lead to greater economic integration in a manner that is not fully captured using the measures of trade and financial integration above, or they could lead to a similar response to common shocks. One characteristic that seems to be important is the origin of a country's legal structure, which has implications for corporate governance. The relationship between two countries' legal frameworks and the correlation between their growth rates is provided in Table 2. This shows that:

• Countries that share a common legal origin, taken together, have a significantly higher correlation between their output growth rates than is the average for all

capacity to adapt to change. This can affect the speed at which global technology shocks, or technological innovations, are propagated through the economy. The paper develops an indicator that measures the propensity for each country to take-up new technologies (mobile phones, personal computers and the Internet), which is interpreted as being indicative of each country's general willingness

Table 2: GDP Growth Rate Correlations
Four-quarter-ended growth rates

	Pairs	Mean correlations		
		1960:Q1–1979:Q4	1980:Q1–2000:Q4	1960:Q1–2000:Q4
All country pairs	136	0.31	0.27	0.33
All countries that share a country of legal origin	28	0.37	0.45	0.45
Of which:				
English	10	0.31	0.52	0.42
French	6	0.50	0.56	0.56
German	6	0.55	0.39	0.56
Scandinavian	6	0.16	0.30	0.27

Notes: Statistics are calculated over the correlations of real GDP growth rates from the bilateral pairings. English-origin includes: Australia, Canada, New Zealand, United Kingdom and United States. French-origin includes: France, Italy, Netherlands and Spain. German-origin includes: Austria, Japan, Switzerland and West Germany. Scandinavian-origin includes: Denmark, Finland, Norway and Sweden.

Source: Country of legal origin data in La Porta *et al* (1998).

countries; this is true for all sample periods, although more so for the latter period.

• For the latest two decades, countries which share either English or French legal origins have growth rates which are approximately twice as correlated as the average.

• Scandinavian-origin pairs, by contrast, typically have relatively weakly correlated growth rates, with growth in the Finnish and Swedish economies (particularly Finland) being unsynchronised with that of Norway and Denmark.

Putting It All Together

The above discussion suggests that there are a number of factors that may explain why some pairs of countries have relatively more closely linked economic cycles. Many of these factors, however, are themselves quite highly correlated, and many of the relationships are quite weak, so it is not clear how important each of these factors would be when they are considered together. The European countries, for example, have tended to have closely linked exchange rates and have traded intensively with each other. Both of these factors have been identified as being associated with having more closely correlated cycles but it is possible that only one of these factors is really important. Similarly, while the English-speaking countries have a common legal structure, many of them also have quite integrated financial markets and have been identified as having a high take-up rate for new technologies. This research has identified all of these factors as leading to more closely correlated growth cycles, but perhaps it is the case that it is one of these factors that has been most important.

In the research paper, econometric analysis is used to assess the relative importance of each factor in explaining the growth outcomes. Looking across all of these countries, it shows that trade linkages, exchange rate volatility, common legal structure, high quality accounting standards and the flexibility of the economy (as indicated by technological take-up) are all important and seem to be the most important variables when all factors are considered together.

The econometric analysis also shows that Australia's experience has been broadly in line with that of the other countries in the data set. When taken together, trade linkages, similarities in legal structure, and the rates of adoption of new technologies can explain most of the strong correlation between cycles in Australia and those in the UK and NZ. While these factors are also important in explaining Australia's cyclical linkages with the US and Canada, in both cases, the observed correlation in growth rates remains somewhat stronger than would be predicted by this analysis. In the case of Canada, it seems plausible that the stronger than expected correlation is a by-product of the close relationships between Australia and the US and the US and Canada. In the case of the US, however, the strength of the linkage with Australia remains, to some degree, unexplained.

References

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