AN AUGMENTED TRADE-WEIGHTED INDEX OF THE AUSTRALIAN DOLLAR[1]

Introduction

Trade-weighted exchange rate indices provide a guide to a country's exchange rate against the currencies of its trading partners, and are often used as an indicator of international competitiveness. Since September 1974, the RBA has published a trade-weighted index (TWI) of the Australian dollar, with the weight of each country's currency in the index determined by the value of that country's bilateral goods trade with Australia.[2]

When monitoring general trends in the exchange rate, the RBA also periodically reviews alternatives to the TWI.[3] This article describes one such alternative measure, hereafter referred to as the augmented TWI (ATWI), which is designed to provide weights that more accurately reflect the relative importance of Australia's trading partners and competitors. The ATWI extends the published TWI in three major respects. First, both goods and services trade are used to determine currency weights in the ATWI, in contrast with the published TWI which includes only goods trade. Second, the ATWI treats commodities trade separately in the construction of currency weights, to account for the fact that competition in the commodities sector tends to take place on a global basis rather than on a bilateral basis. Third, the ATWI currency weights account for 'third market' competition in manufactured goods, recognising that Australia's manufactured exports may compete with a foreign country's manufactures not just in that foreign country's market, but also in other markets.

The changes generate a number of differences from the published TWI weights:

- while the Asian-Pacific countries have risen in importance over time under both sets of weights, their weight increases have been less pronounced in the ATWI;

- the ATWI weights of North American currencies are more stable than their TWI weights, which have fallen since the early 1980s; and

- despite their more marked decline since the mid 1970s, the ATWI weights of European currencies tend to be higher than their TWI weights.

As is discussed later, the new method of accounting for competition in commodities trade is primarily responsible for these differences.

Compared with the TWI weights, construction of the ATWI weights is complicated and data intensive. Further, despite the differences in weights, the ATWI moves broadly in line

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2 *Currently, the currencies of 22 countries, which account for a little over 90 per cent of Australia's gross merchandise trade, are included in the TWI basket. The methodology used to calculate the published TWI is explained in the RBA* Bulletin *article 'Developments in the Trade-weighted Index', October 2002, pp 1–6.*

3 *For examples, see Ellis L (2001), 'Measuring the Real Exchange Rate: Pitfalls and Practicalities', RBA Research Discussion Paper No 2001-04.*

with the TWI. This suggests that the published TWI serves well as an indicator of Australia's international trade competitiveness over time. However, there have been periods of divergence between the indices, which have generally resulted from particular bilateral exchange rates against the Australian dollar moving in different directions, as they did for instance during the Asian crisis.

This article outlines the method used to construct the ATWI country weights and then compares the derived ATWI of the Australian dollar with the RBA's published TWI. Separate commodities, manufacturing and services sub-weights are also presented, which serve to explain some of the differences between the ATWI weights and the TWI weights, and provide a concise summary of developments in Australian trade patterns since the mid 1970s.

Calculating the ATWI Weights

Following the methodology proposed in Bayoumi, Lee and Jayanthi (1999), the ATWI weight assigned to each country's currency is constructed from separate sub-weights for services, commodities and manufactured goods.[4] Separate services sub-weights are calculated to incorporate data on services trade, which accounts for around 20 per cent of Australia's total trade (Graph 1). The sub-weights are also designed to account more accurately for the specific characteristics of trade competition in each sector. For instance, commodity sub-weights reflect *global* commodity trade shares rather than bilateral trade shares, to account for the fact that trade competition in individual commodities tends to occur in a global market setting owing to the more homogenous nature of primary products. On the other hand, as manufactured goods tend to be differentiated products (i.e. there are generally quality differences between manufactured goods of the same type), manufactured goods competition between countries tends to occur bilaterally, as well as in common export markets (third-market competition). To reflect the distinct nature of competition in manufactured goods, separate manufacturing sub-weights are calculated. The ATWI weight of each trading partner (or competitor) is then based on a weighted average of the separate services, commodities and manufacturing sub-weights calculated for that trading partner. The average is weighted by the shares of services, commodities and manufacturing in Australia's total gross trade (Graph 1). Sub-weights are estimated using disaggregated trade data available from the United Nations Comtrade database, which

Graph 1
Composition of Australia's Goods and Services Trade

Source: United Nations Comtrade database

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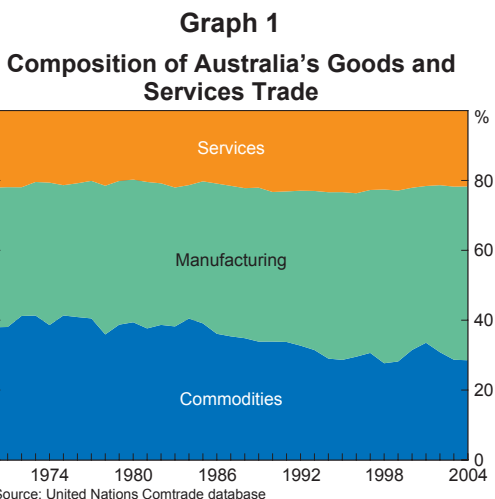
4   See Bayoumi T, J Lee and S Jayanthi (1999), 'New Rates from New Weights', IMF Working Paper WP/05/99. Although the IMF has already calculated a (real) Australian TWI that incorporates these methodological changes, there are a number of important differences between the IMF TWI and the ATWI. For instance, weights in the IMF TWI are updated only every ten years, whereas ATWI weights are updated every two years (with a two-year lag). Also, the IMF generally assumes that services trade and manufacturing trade are identically distributed, whereas the ATWI uses actual services trade data.

are published with a two-year lag, and services trade data from the ABS and the Department of Foreign Affairs and Trade.

ATWI services sub-weights

The calculation of services (STWI) sub-weights is based on the method applied to merchandise trade in the RBA's published TWI, and uses bilateral services trade data from the ABS and the Department of Foreign Affairs and Trade. That is, each trading partner's services sub-weight is determined by the value of its two-way services trade with Australia. While competition in services trade is likely to have similar characteristics to competition in manufactured goods trade (because of the differentiated nature of services), there are insufficient data on bilateral services trade to estimate third-market competition effects accurately.

ATWI commodity sub-weights

Primary commodities are generally close substitutes.[5] The potential for arbitrage tends to lead to the setting of a world price (usually denominated in US dollars) for most commodities, meaning that producers of primary commodities are typically price-takers in global markets. As a result, commodities trade is sometimes excluded from trade-weighted index calculations.

However, exchange rate shifts *are* important to Australia's commodities trade, because they may cause shifts in commodity supply and demand. The relative competitiveness of Australian commodity producers can depend on the extent to which domestic currency prices change as a result of such exchange rate movements. Accordingly, the commodity (CTWI) sub-weight assigned to a particular country is modelled as that country's share in the global trade of the primary commodities which Australia also trades. That is, the CTWI sub-weights depend on the share a country has in the global trade of a particular commodity, as well as the share of that commodity in Australia's commodity trade. This special treatment of commodities trade allows for a more accurate depiction of competition than the published TWI calculation (which utilises information only on bilateral commodities trade), and is particularly relevant for Australia given the importance of commodities to Australia's exports. One particular advantage of this approach is that countries exporting primary products are recognised as competing more against each other than against domestic producers in the country of destination.

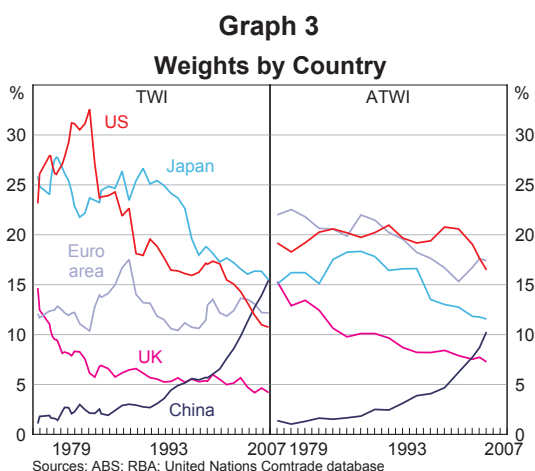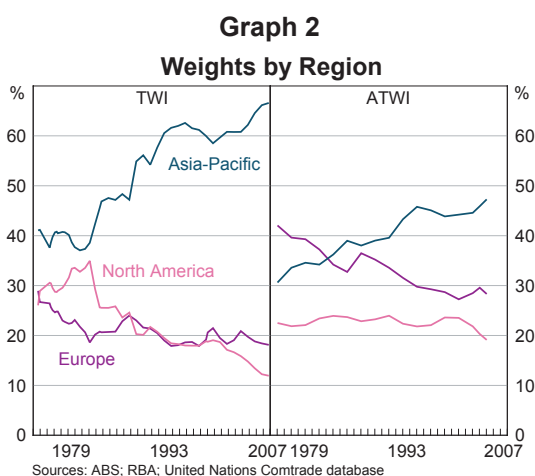## ATWI manufacturing sub-weights

In contrast to commodities, manufactured goods supplied by producers in one country are not usually perfect substitutes for manufactured goods of the same type supplied by another country. This means that manufactured goods competition will tend to occur in the markets of individual countries, rather than at the global level. Australia faces three types of manufactured goods competition, based on location. In Australia's domestic market there is competition between Australian goods and foreign imported goods (bilateral import competition), and in Australia's export markets there is competition between Australian goods and local producers' goods (bilateral export competition). In any particular Australian export market there is also competition between Australian exports to that market and other countries' exports to that market (third-market competition). Unlike the published TWI, the ATWI accounts for third-

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5   *The presence of transport costs, for example, means that commodities are not strictly homogeneous.*

market competition as well, assigning weights to each country for each of the three types of manufactured goods competition. The overall manufacturing (MTWI) sub-weight assigned to each trading partner is a weighted average of these three weights, with bilateral import competition weighted by the proportion of Australia's manufacturing trade accounted for by imports, and bilateral export and third-market competition being weighted equally (by assumption). In effect, the more sales a country makes in the markets in which Australian manufacturing producers compete, the higher the manufacturing sub-weight assigned to that country.

Comparing the ATWI with the Published TWI

Using the methodology outlined above, ATWI weights have been calculated for every second calendar year from 1970 to 2004 inclusive.[6] The ATWI weights exhibit much less variation over time than the TWI weights, although the general trends are in the same direction (Graphs 2

Graph 2
Weights by Region

Sources: ABS; RBA; United Nations Comtrade database

Graph 3
Weights by Country

Sources: ABS; RBA; United Nations Comtrade database

and 3). The importance of the Asia-Pacific region has risen under both sets of weights, although its weight increase since the mid 1970s has been less marked in the ATWI. The weight of European currencies as a group has declined in both the ATWI and the TWI over the same period, but is consistently higher in the ATWI. North American currencies have maintained their combined ATWI weight at around 20 per cent for most of the period, while their TWI weight has fallen significantly since the early 1980s. Reasons for these differences are explained in the analysis of the ATWI sub-weights that follows.

The ATWI also includes different countries from the TWI (Table 1). Over the past decade, commodity exporters such as Russia, Denmark, Brazil, Mexico and Norway are regularly included in the ATWI, but have not appeared in the TWI.[7] Although these countries generally have ATWI weights of only around

6   *At the time of publication, the United Nations trade data needed to calculate the ATWI weights for 2006 had not been fully reported. TWI weights for 2007/08 can be found at <http://www.rba.gov.au/MediaReleases/2007/mr_07_17.html>.*

7   *The ATWI is calculated using a similar '90 per cent' rule to the TWI: currencies are included until 90 per cent of the total trade weight is accounted for.*

Table 1: TWI and ATWI Weights
2004/05 financial year/2004 calendar year

	TWI weight	ATWI weight		TWI weight	ATWI weight
Japan	16.36	11.56	Vietnam	1.48	na
Euro area	13.08	17.41	Canada	1.48	2.63
China	12.75	10.26	Saudi Arabia	1.25	na
USA	11.94	16.48	South Africa	1.16	1.23
Korea	5.72	3.87	Papua New Guinea	1.14	na
New Zealand	5.64	4.10	Sweden	0.87	1.21
United Kingdom	4.18	7.27	United Arab Emirates	0.81	0.86
Singapore	4.13	4.28	Switzerland	0.67	1.42
Malaysia	3.31	2.49	Philippines	0.61	na
Taiwan	3.30	2.11	Russia	na	1.25
Thailand	3.15	2.35	Denmark	na	1.00
India	2.83	1.99	Brazil	na	1.00
Indonesia	2.62	1.95	Mexico	na	0.94
Hong Kong	1.52	2.31			

Sources: ABS; RBA; United Nations Comtrade database

1 per cent, the inclusion of Russia and Brazil in particular has substantially affected the evolution of the ATWI.[8] On the other hand, the past decade has seen nations such as Vietnam, Papua New Guinea and the Philippines included in the TWI but not the ATWI, although their weights in the TWI are only small.
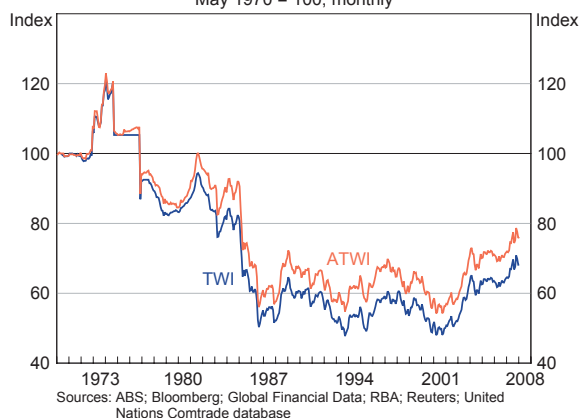
The nominal ATWI, calculated on the basis of the weights above, is highly correlated with the published TWI, which may reflect the tendency of the Australian dollar to move broadly in the same direction against other currencies (Graph 4). Moreover, the real ATWI is similarly highly correlated with its real TWI equivalent. That said, the (nominal) ATWI and the RBA's published TWI have diverged noticeably at times. In particular, the ATWI has tended to move sharply relative to the TWI when bilateral exchange rates against the Australian dollar have moved in opposite directions (Graph 5).

For instance, the persistent gap between the nominal ATWI and the TWI is primarily attributable to the large difference that opened up
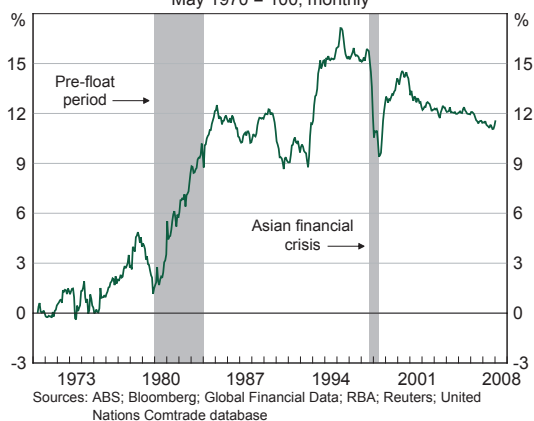
Graph 4

Nominal TWI and ATWI
May 1970 = 100, monthly

Sources: ABS; Bloomberg; Global Financial Data; RBA; Reuters; United Nations Comtrade database

8 *Despite its small weight, the massive nominal depreciation of the Brazilian real over the past three decades has caused the level of the ATWI to be substantially higher than it otherwise would be. Given the disproportionate size of this effect, Brazil is excluded from the nominal estimates of the ATWI that follow.*

Graph 5

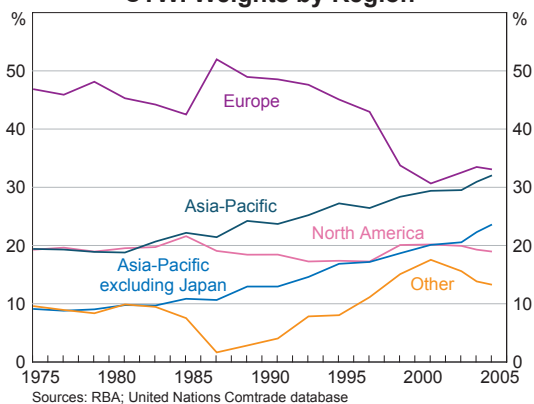**Difference between the ATWI and TWI**

May 1970 = 100, monthly

in the few years prior to the float, when the Australian dollar was managed under a crawling peg to the TWI, and bilateral Australian dollar exchange rates were moving in opposite directions. On the other hand, in the period from August 1997 to March 1998 – during the Asian financial crisis – the ATWI declined back towards the TWI. In this case, the Australian dollar appreciated against currencies in the Asian region, while depreciating against the US dollar and European currencies. Since the US and Europe were weighted more heavily in the ATWI, while the Asia-Pacific was weighted more heavily in the TWI, the ATWI fell by more than the TWI over this period.

The ATWI Sub-weights

Differences between the ATWI and TWI weights can be attributed to the sub-weights upon which the ATWI is based, which are calculated using disaggregated commodities, manufacturing and services trade data.

The assumption that competition in commodities trade takes place in the global market rather than bilaterally means that a country may have a higher weight in the ATWI (compared with its TWI weight) if it has a large presence in world commodity markets, but is proportionally less significant as a bilateral commodity trading partner of Australia. The euro area falls into this category, while Asian countries, on the other hand, generally obtain a higher proportion of their commodity imports from Australia, relative to their shares of global commodities trade. As

Graph 6

CTWI Weights by Region

a result, the CTWI sub-weights (and therefore the ATWI weights) tend to attribute more importance to Europe and less to the Asia-Pacific region than the TWI weights (Graph 6).

The other innovations have less of an effect on the ATWI weights. Accounting for manufactured goods competition in third markets has only minor implications for the evolution of the ATWI, because Australia faces most of its manufacturing competition in its domestic market. In 2004, for example, manufacturing
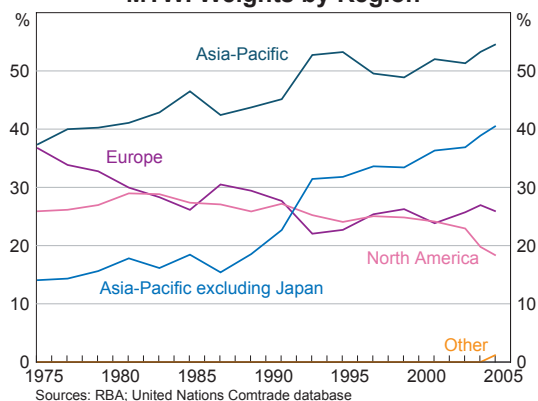
imports amounted to three-quarters of Australia's gross manufacturing trade. The remaining share of the manufacturing trade sub-weights is apportioned equally between bilateral and third-market export competition in overseas markets, meaning that accounting for third-market export competition has only a minor effect on these sub-weights (Graph 7). The services sub-weights, which are calculated on the basis of bilateral services trade, are generally quite similar to the ATWI weights, and hence the inclusion of services trade data also has only a minor influence on the evolution of the ATWI (Graph 8).

Conclusion

There are three major innovations that distinguish the methodology underlying the ATWI from that underlying the RBA's published TWI: services trade is included, separate sub-weights are calculated for commodities trade on the basis of global market shares, and sub-weights for manufacturing trade incorporate the effect of third-market competition. Relative to their respective TWI weights, European currencies tend to have higher ATWI weights and Asian-Pacific currencies lower ATWI weights, mainly because of the different method of accounting for commodities trade.

Graph 7
MTWI Weights by Region

Sources: RBA; United Nations Comtrade database

Graph 8
STWI Weights by Region

Sources: ABS; RBA; United Nations Comtrade database

While these innovations are designed to provide weights that more accurately account for the relative influence of different exchange rates on Australia's trade competitiveness, calculating the ATWI weights is complicated and data-intensive, and involves long time-lags. Moreover, despite the differences in weights, the ATWI itself is highly correlated with the TWI. Thus, the much simpler, more transparent TWI serves well as a measure of Australia's exchange rate competitiveness. However, differences between the two indices can arise during periods in which Australian dollar cross-rates move in opposite directions. ⊼