

**The Aviation Trade Weighted Index: Measuring Competitiveness of
International Airlines**

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Introduction¹

Of all industries, international airlines are amongst the most exposed to international trade. On international routes, airlines from one country compete directly with airlines from other countries. As liberalisation of international aviation markets has proceeded, this competition is becoming more intense. Even on those routes which remain regulated, it is mostly no longer the case, as it was in the past, that airlines from one country operated jointly with airlines from other countries. Nowadays, airlines face competition from those other airlines which are permitted to serve a route. The ability of an airline to compete depends critically on its costs relative to those of other airlines. A key determinant of the relative costs faced by an airline, and thus its cost competitiveness, is the exchange rate in the home economy. If the exchange rate of the home country appreciates, the competitive pressure on the airline will increase, since its costs rise relative to those of its competitors.

The best known measure of the competitiveness of a country's industries is the Trade Weighted Index of exchange rates (TWI). This is published widely and used extensively. The idea behind this index is to construct a general index of the competitiveness of the country- it does this by weighting different countries exchange rates according to their relative importance in trade, both in terms of exports and imports. For example, in Australia, [Reserve Bank of Australia](http://www.rba.gov.au) publishes the index three times daily as a measure of the average movement of the \$A against the currencies of Australia's trading partners (www.rba.gov.au). Most other countries publish an index of the average value of their currency. Thus, for Australia, the exchange rates vis a vis the US and Japan (and increasingly China) have high weights in the TWI reflecting their importance in trade patterns. The TWI gives a better indication of the competitive pressure on a country's export and import competing industries than the exchange rate with any one country. Thus, while it is common to quote the value of the Australian \$ in \$US terms, this can be quite misleading as a general indicator of competitiveness because the US may be moving in a different direction from those of other currencies, and the US while an important trading partner, accounts for only a quarter or so of Australia's trade.

The TWI as calculated is a general index, which gives an indication of the competitiveness of all exports and imports for Australia. However, it is quite possible that the competitive position of a particular industry could be quite different from that of exports and imports in general. Considering the tourism industry, a country might be an important destination for Australian tourists, or it might be an important source of tourists, yet it may not be an important source of imports and exports of goods and services in general. The TWI need not be a very good indicator of the competitive pressure on the tourism industry. It is feasible to estimate detailed tourism competitiveness indexes (see Dwyer, Forsyth and Rao, 2000), but this is a large task. A simpler and easy to update measure of a country's tourism competitiveness can be obtained by developing a tourism specific TWI, the Tourism Trade Weighted Index (see Dwyer and Forsyth, 2004). This is an index of exchange rates with the weights being determined by the importance of the different countries in tourism inbound and outbound expenditures.

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The same idea of an industry specific TWI can be applied to the international airline industry. In this paper, the Aviation Trade Weighted Index (ATWI) is developed. Again, it is the same basic index as the TWI, but the weights are such as to reflect the importance of different countries in competing with the home country airlines in international markets. For example, the United Arab Emirates (UAE) is not a particularly important trade partner for Australia in terms of the values of exports and imports. However, it is the source of strong competition for Australian international airlines- the airline based in the UAE which flies to Australia has a significant share of inbound and outbound revenues on long haul flights. Thus the notion of the ATWI is to develop a measure of how exchange rate changes are affecting the competitive position of Australians based airlines vis a vis airlines from other countries with which they are competing. When the Australian ATWI rises, it is an indication that Australian based airlines are facing competitive pressure through their input costs rising relative to those of airlines based elsewhere. For an earlier application of the idea of an Aviation TWI, see Ashworth and Forsyth (1984, Ch 5),

Airlines, Exchange Rates and Competitiveness

Airlines are affected by exchange rates in a number of ways. Changes in exchange rates will affect the flows of passengers- if a country's exchange rate rises, it is likely to attract fewer inbound visitors, but outbound travel is likely to increase. The airlines of the country might gain or lose passengers, on balance, from this. Exchange rate changes can also impact on airlines thorough their capital structure- in what countries currencies they have borrowed, and in which currencies they hold investments. Finally, exchange rate changes will affect the prices they pay for inputs relative to the prices their competitors are paying.

Airlines supply products on international markets. They supply services on international routes, and invariably face competition from airlines based in other countries. Thus an airline based in Australia, such as Qantas, is competing against airlines based in Singapore, the US, the UK and the UAE, amongst others. Airlines buy their inputs on international markets and in home markets. Thus Qantas will hire staff in Australia, buy fuel in Singapore and aircraft in the US. As exchange rates change, the relative prices of these inputs will change. If the \$Australian rises relatively to other currencies, the input costs of Qantas will rise relatively to other airlines' costs. In terms of other currencies, the cost of the Australian purchased inputs will increase, and in terms of Australian currency, its costs will fall, but those of its competitors, which purchase (nearly) all of their inputs outside Australia, will fall by more. A rise in the exchange rate will unambiguously lessen the competitiveness of the home country airlines.

It is important to be explicit about what "home priced" and internationally priced" or "foreign priced" inputs mean. The important distinction is where the price of the inputs is set.

It is not important in which country's currency an input is purchased. An airline might pay for an input in \$US or in Euro, but these currencies are quite convertible. The \$A might rise vis a vis the \$US but not the Euro, but this need not affect the price an Australian airline pays for an input. If it is buying fuel, for example, a change in the

\$US/Euro rate will lead to a change in the US and Euro prices of fuel. It is also not important *where* the input is purchased. Fuel might be purchased in Australia and Singapore. Fuel is priced internationally, and if exchange rates change, prices in countries markets will change.

Rather, the critical factor is where the price of the input is set. Is it set in the country's home market, or is it set internationally, or in foreign markets? When a country's exchange rate appreciates, the prices of its non tradable goods and services rise relatively to the price of tradeables. The price of domestically hired labour is essentially set in the home market (though there will be some inputs, such as pilots, who may be hired domestically but whose price is now set on international markets). Rent on facilities in the home market is set in the home market. Many input prices are set on international markets- these include fuel, aircraft and some labour. If the \$A rises, Qantas pays the same in \$A for its domestically priced inputs, but more in terms of other currencies. It pays the same in other currencies for internationally priced inputs, and less in \$A. Its foreign competitors will only purchase a small proportion of their inputs at prices set in Australia (some labour hired in Australia, but not for fuel bought in Australia). Thus their input costs will fall relative to those of the Australian airlines, in either \$A or foreign currency terms.

Thus, if the real exchange rate of a country rises by 10%, the cost of home priced inputs will rise by 10% in foreign currency terms. The price of internationally priced inputs will stay unchanged. If half the airline's inputs are home country priced, and the rest are internationally priced, its input costs will rise by 5% compared to those of other airlines.

In reality, a country's exchange rate may be rising relative to some, and falling relatively to others. Thus it becomes important to specify the countries compared to which the exchange rate is rising. If these are countries which are strong competitors in airline markets, the effect on the airline is more than if these countries airlines are not strong competitors. Thus, to obtain an indicator of how a country's airlines competitive position is changing overall, it is necessary to develop an index which weights countries by the strength of the competition they provide in relevant aviation markets. This is the objective of the ATWI.

The Aviation Trade Weighted Index

The Aviation Trade Weighted Index of exchange rates (ATWI) seeks to provide an indicator of the change in the international competitive pressure on a country's aviation sector resulting from exchange rate changes. It weights different currencies according to how important different countries airlines are as competitors in markets operated in by home country airlines. An early example of the use of this concept is given in Ashworth and Forsyth, 1984, pp 66-71).

The ATWI here is developed for Australian based airlines. It measures competitive pressure from the range of airlines from other countries which compete on the same routes as the Australian airlines. Effectively, there is only one Australian airline, Qantas, which operates on an extensive range of international routes to and from Australia, and thus this approximates the competitive pressure on Qantas resulting from exchange rate changes.

There is no ideal weighting structure for a trade weighted index (Rosensweig 1987; Lafrance, Osakwe and St-Amant 1998). Different weighting structures measure subtly different aspects of competitiveness. For the ATWI, weights are based on a proxy for the revenues gained in different route markets by airlines of different countries. The proxy for revenues is the number of inbound and outbound passengers carried by an airline (from Department of Transport and Regional Services, International Aviation Statistics) multiplied by the length of the typical haul (from airline timetables). Thus the exchange rate of the UAE is given greater weight than the exchange rate of New Zealand- even though New Zealand airlines fly more passengers to and from Australia, virtually all are on much shorter hauls than the airline based in the UAE. Thus, in terms of revenues, the share of the UAE airline would be larger than that of the New Zealand airlines. Thus the interpretation of the ATWI is that it measures how the input costs of home country, as reflected in the real exchange rates, in this case, Australian, airlines compare to those of the international airlines with which they compete. The weights are given in Table 1.

The ATWI can be expressed in nominal or real terms. The TWI which is widely used in Australia is the nominal index, though real indices are also calculated. There are problems in using a nominal index when countries have different rates of inflation (Rosensweig 1987). To obtain an accurate measure of the competitive pressure on an airline, a real index is preferred. Thus the real index is emphasised, though the nominal index is also reported here. Country Consumer Price Indices (CPI) are used to deflate nominal exchange rates.

Two related indices are produced here.

The first, Index A or the Base Index, provides a measure of how the real exchange rates of Australia and the sixteen most important competitor countries on Australia's international air routes have varied over this decade. This index is not an accurate reflection of how relative input costs of Australia and international competitor airlines alter due to exchange rate changes because it makes no allowance for the fact that Australian airlines purchase many of their inputs on international markets.

To obtain an airline input cost competitiveness index, Index B, the assumption is made that 50% of an Australian airline's inputs are purchased on international markets with prices set internationally, and not set domestically in Australia. While 50% may seem arbitrary, there is evidence that the breakdown between domestically and internationally priced inputs would be about this level (on airline cost breakdowns, see Doganis, 1985). The airline competitiveness index, Index B, is a measure of the extent to which the airlines costs have changed relative to those of its international competitors as a result of exchange rate changes. Thus, if the Airline Competitiveness Index rises from 100 to 105, this indicates that the overall costs of the Australian based airlines have increased by 5% in real terms compared to the weighted average of their competitors.

Results

The ATWI for Australia is presented in Table 2. Index A and B are both presented, for the period June 2000 to September 2006, and preliminary figures based on projected inflation rates, are reported for December 2006. Data are presented quarterly. In addition, the nominal indices corresponding to these indices are presented.

The Base index is relatively unchanged from June 2000 (indeed, from June 1995) to about December 2002. Over the next year, it rose sharply, by over 25%. Since then it has mainly hovered within the 125.0 to 135.0 band. The real index is around about five points higher than the nominal index, indicating that the nominal index understates the competitive pressure. The airline competitiveness index, Index B, has risen by half the rise in Index A (which it should, given its construction). It shows that, compared to the position up to December 2002, the competitive position of the Australian airline has become more difficult vis a vis its foreign competitors. The input costs it faces, in real terms, have risen by 10-15% since then (or since 1995) as compared to the input costs of the foreign airlines it competes with.

These figures confirm that an Australian international airline such as Qantas would have faced a difficult operating environment since late 2002. In addition to challenges such as SARS and the fuel price rise, its input costs have risen significantly to those of its competitors. It is unlikely to be able to increase its yields relative to those of its competitors by this margin, and thus its margins would be under pressure. This highlights the need for productivity increases and cost reductions.

References

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Table 1**Aviation Trade Weighted Index****Country Weights**

Country	Index A	Index B
Australia	0.000	0.050
NZ	0.057	0.028
UK	0.115	0.058
US	0.065	0.032
Canada	0.021	0.011
HK	0.070	0.035
Singapore	0.184	0.092
Malaysia	0.096	0.048
Indonesia	0.019	0.010
Thailand	0.054	0.027
Japan	0.061	0.030
China	0.037	0.018
Euro	0.017	0.009
Taiwan	0.011	0.005
Korea	0.021	0.011
UAE	0.156	0.078
Bahrain	0.016	0.008

Table 2**Aviation Trade Weighted Index, Nominal and Real, Australia, 1990-2006****1995 = 100.0**

1990 (June)	109.47	102.35	104.69	101.12	1990 (June)
1995 (June)	100.00	100.00	100.00	100.00	1995 (June)
2000 (June)	101.82	105.28	100.94	102.77	2000 (June)
2001 (June)	94.53	95.88	97.30	98.09	2001 (June)
2002 (March)	99.50	98.88	99.76	99.57	2002 (March)
2002 (June)	101.57	100.61	100.79	100.42	2002 (June)
2002 (Sep)	98.97	97.57	99.48	98.90	2002 (Sep)
2002 (Dec)	101.72	99.91	100.86	100.07	2002 (Dec)
2003 (March)	109.08	106.50	104.54	103.38	2003 (March)
2003 (June)	118.72	115.75	109.34	107.99	2003 (June)
2003 (Sep)	119.75	116.38	109.86	108.32	2003 (Sep)
2003 (Dec)	129.78	126.14	114.87	113.21	2003 (Dec)
2004 (March)	129.91	126.65	114.94	113.47	2004 (March)
2004 (June)	120.99	117.64	110.49	108.97	2004 (June)
2004 (September)	124.86	121.29	112.42	110.79	2004 (September)
2004 (December)	132.38	128.25	116.17	114.28	2004 (December)
2005 (March)	131.59	128.25	115.77	114.29	2005 (March)
2005 (June)	132.53	128.91	116.25	114.62	2005 (June)
2005 (September)	132.65	129.38	116.31	114.87	2005 (September)
2005 (December)	128.06	124.45	114.00	112.38	2005 (December)
2006 (March)	123.45	119.81	111.68	110.03	2006 (March)
2006 (June)	127.44	122.66	113.67	111.46	2006 (June)
2006 (September)	128.79	123.21	114.34	111.73	2006 (September)
2006 (December est)	132.87	126.92	116.37	113.59	2006 (December est)

Source: Own calculations as described in text.