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Author(s): Frost, Mark; Parton, Kevin

Can the Australian exchange rate still be considered a commodity based currency?

Mark Frost

Faculty of Business

Charles Sturt University

PO Box 883 ORANGE NSW 2800

mfrost@csu.edu.au

Ph. 02 6365 7830

Fx. 02 6365 7785

Professor Kevin Parton

Faculty of Business

Charles Sturt University

PO Box 883 ORANGE NSW 2800

The Australian dollar is considered a commodity-based currency, with the high level of primary commodity exports in Australia's trade balance given as an explanation. Key studies have concluded that Australia's terms of trade are a primary driver of the real exchange rate based on a comparative advantage trade model. These studies have been undertaken at an aggregate level where changes in the terms of trade have been assumed as a given.

Since the Australian economy was deregulated in the early 1980s, there have been dramatic changes in the structure of the economy. Australia's trading activity has grown and now contributes more within the domestic economy. Similarly the structure and contribution of key imports and exports has also evolved. Furthermore the role of the traded goods and services balance and the income balance within the Australian current account balance has also changed, with a significant change occurring in 2003/04.

The purpose of this paper is twofold. Firstly it establishes whether the relationship between the Australian exchange rate and terms of trade has changed in response to changes in the role of the traded goods and services sector within the Australian current account balance.

Secondly the paper disaggregates the movements in the terms of trade to establish what role its various components have on the wider relationship between the Australian exchange rate and the terms of trade.

The paper concludes that despite substantial changes in the structure and nature of the current account balance and the traded goods and services sector, the Australian exchange rate still responds to changes in the terms of trade as if it is still a commodity-based currency and economy.

Topic Codes: Demand and Price Analysis, International Agricultural Trade

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Introduction

This paper is a progress report on doctoral research of the presenting author. While not finalised the research to date provides some insights into the impact of structural changes in the Australian trade sector on the Australian terms of trade. The paper builds upon a similar paper presented at the 2009 AARES Conference.

Australia has long been considered a commodity-based economy with a strong correlation identified by several authors between movements in Australia's terms of trade and the real Australian exchange rate. The role of primary commodity exports within the traded sector has often been identified as a potential reason for this strong correlation. However the majority of studies have examined this relationship at an aggregate level, i.e. empirically testing the impact of an assumed exogenous shock to the terms of trade on the real exchange rate to confirm the correlation. There have been fewer studies on potential sources of these shocks and their disaggregated impact

The objective of the research is to disaggregate such movements in the terms of trade and identify the key triggers of any movement. This is being undertaken for the period since 1983 following the floating of the Australian exchange rate. Over this period there have been significant changes in the role of the traded sector in the Australian economy as well as changes in the structure of the Australian traded sector.

This paper provides an overview of these changes. The paper commences with a brief overview of the key research examining the relationship between the terms of trade and the real exchange rate. An overview of the role of the traded sector is then provided followed by an examination of the composition of the key traded sectors. This is followed by some preliminary analysis seeking to update the relationship between the terms of trade and the real exchange rate, in both nominal and real terms. As detailed above any conclusions will be limited as this paper represents a "work in progress" within wider doctoral research.

Australia as a Commodity Based Exchange Rate

The Australian dollar has long been considered primarily a commodity-based currency given the high level of commodity-based exports in Australia's trade balance (Clements and Freebairn 1990, Blundell-Wignal et al. 1993). Traditionally most research has focused on the long-term relationship between Australia's terms of trade and the real exchange rate.

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Key studies include Clements and Freebairn (1990), Gruen and Wilkinson (1991), Blundell-Wignall et al (1993), Bleaney (1996), Gruen and Kortian (1996), Cuddington and Liang (2003), Gillitzer and Kearns (2005) and Bloch et al (2006). These authors all found a strong relationship between the terms of trade and the real exchange rate over time periods in excess of thirty years. The consensus of this work is that a one percent change in the terms of trade would lead to at least a 0.8 percent change in the real exchange rate within the same quarter. The contemporaneous feature of this relationship is thought to show that the Australian exchange rate acts as a buffer that insulates the Australian economy from shocks to the terms of trade.

However most of this literature has examined the impact of an unidentified exogenous shock in the terms of trade on the real exchange rate. While some authors mentioned the role of primary commodities, none of the authors sought to nominate or identify the source of such a shock to the terms of trade itself or examine different types of shocks. Rather the format has been to typically focus on an assumed general shock on the terms of trade and how this impacts the real exchange rate. Few of the authors sought to examine changes in the role of the traded sector or the composition of the traded sector or composition of the terms of trade and these may affect the underlying relationship between the terms of trade and the real exchange rate.

Changes in the economy and / or traded sector should be an important consideration when updating any research on the Australian terms of trade. Grenville and Gruen (1999) suggest that the anchor for an exchange rate is found in the productive sector of an economy and the exchange rate reflects a country's international competitiveness. Exchange rates should have the capacity to adjust in response to shocks or in response to the changing productive capacity of an economy. Therefore any structural changes in the economy could impact the productive sector of the economy.

Furthermore Clements and Freebairn (1990) add that an important consideration in the immediate response of the exchange rate is the way expectations of current and future commodity price movements are formed. A longer sighted perspective would give more prominence to international capital flows in offsetting the balance of trade fluctuations caused by world commodity price fluctuations. A shorter sighted perspective should see greater exchange rate fluctuations, economic activity fluctuations and inflation rate changes. This short-term perspective implies the existence of "sticky prices" and assumes that international price level ratios exhibit less volatility than the corresponding exchange rates. The implication is that domestic output price is pre-determined and can only adjust over time. Thus the exchange rate market can clear instantaneously, but there is

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some short-term output price rigidity. Swift(1998; 2001; 2004) examined the role of sticky prices and how domestic prices in exports respond to changes in their respective world price.

The distinction between a short-sighted and longer-sighted perspectives is further examined by Goldstein and Khan (1988). They suggest that each commodity is impacted by world supply and world demand, and only larger dominant countries can influence these. A small country has a small share of world trade and limited domestic factor supplies, and faces nearly perfect competition for its exports. Export prices follow competitors' export prices with price elasticity close to one. Larger countries with higher world trade shares (and market influence) and larger production bases have lower demand elasticity for their exports and lower marginal costs. Distinguishing the role Australia satisfies will be an important consideration when examining the relationship between world commodity prices, the Australian terms of trade and the real Australian exchange rate.

In summary, while the relationship between the Australian terms of trade and the real exchange rate are well documented, movements within the components of the terms of trade and how these affect the terms of trade is less well documented. For example an increase in the world coal price would imply a higher export destination price received by Australian coal exporters, which in turn improves the Australian terms of trade. Given the close relationship between the Australian terms of trade and the real exchange rate, the exchange rate would be expected to appreciate to act as a buffer to the domestic coal export price such that the Australian coal price decreases back towards its original level. However this appreciation of the exchange rate should also cause other movements in the terms of trade, either through domestic prices of imports and non-coal exports (based on the appreciated exchange rate). The doctoral research project seeks to examine these interactions within the terms of trade, while this paper reports on some preliminary findings.

Furthermore the role of the income balance within the traded sector is an important consideration. Trade theory suggests that imbalances in the current account are usually offset by counterbalancing transactions in the capital account. However a sustained current account deficit will see sustained capital inflows in an economy to maintain external balance, and should continue to do so while future goods and services trade is expected to be utilised to meet the financial obligations. However a sustained current account deficit could lead to the situation where the income payments in the current account to service the capital flows increase to an extent where they actually dominate the wider current account balance. The next section examines the Australian economy since 1983 to examine whether there have been any structural changes in the Australian traded sector.

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Australian Traded Sector

Australia has long been considered an "open" economy, i.e. one whose traded sector plays an important role in the economy. Kriesler (1995) suggests that since European settlement in 1788 the Australian economy has been dependent on the economic well-being of the rest of the world for its own economic health. Gruen and Shuetrim (1994) support this by suggesting that Australia has always relied on crucial trade and financial links with the rest of the world.

This has become apparent since the Australian economy was deregulated in the early 1980s. The role of the trade sector has increased, trading patterns are now more diverse albeit with an Asian destination focus, the role of the resource sector in the economy has increased, and the role of income within the current account balance has become more significant.

Table 1 measures the contribution of the traded goods and services sector to the Australian economy since 1983/84.

Table 1: Contribution of Australian Traded Goods and Services Sector to the Australian Economy

as measured by Trade Intensity

$A m	1983/84	1988/89	1993/94	1998/99	2003/04	2008/09
Total exports	28,888	55,322	83,301	114,095	147,205	285,701
Total imports	32,162	62,296	85,504	127,519	168,714	279,896
Total Trade	61,050	117,618	168,805	241,614	315,919	565,597
Australian GDP	434,458	533,775	595,329	739,629	873,197	1,095,370
Total Trade as % GDP	14.1%	22.0%	28.4%	32.7%	36.2%	51.6%

Source ABARE Commodity Statistics Yearbook 2009

Trade intensity is calculated as total goods and service exports plus total goods and services imports expressed as a percentage of total Gross Domestic Product. Since 1983/84 the role of the traded sector has increased from 14.1 percent of Australian GDP to 51.6 percent in 2008/09. Over this time period while Australian GDP has increased 2.5 times while the size of traded sector has increased 9.3 times. Similarly total exports have increased 9.9 times while imports have increased 8.7 times.

It is also noted that the value of traded goods and services balance in 2008/09 was the first to record a surplus, i.e.in previous periods imports were higher than exports, while in 2008/09 the value of exports was higher than imports. Further investigation of this is beyond the scope of this paper although preliminary investigation suggests it is due to a large increase in the value of coal exports that was largely due to increase in the coal export price in 2008/09.

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Notwithstanding this, the key feature of Table 1 is that the role of trade in the wider economy has increased since 1982/83. The relevance of this is that the terms of trade still retains an important component in the determination of the Australian exchange rate – link to theory – e.g. purchasing power and monetary model. This could suggest that the terms of trade remain an important determinant of the real Australian exchange rate.

Commensurate with the increase in the role of the traded sector has been a re-alignment within the export sector of the traded sector. Table 2 highlights the key components of the export sector since 1982/83.

Table 2: Industry Sectors as a Proportion of Total Australian Exports 1982/83 to 2006/07

	1982/83	1987/88	1992/93	1997/98	2002/03	2006/07	2008/09
Farm Commodities	18%	20%	21%	20%	18%	14%	11%
Resource Commodities	39%	39%	39%	36%	37%	49%	56%
Other Commodities	13%	10%	2%	2%	2%	0%	1%
Total Commodities	*70%*	*69%*	*62%*	*58%*	*57%*	*63%*	*67%*
Manufacturing	*13%*	*12%*	*12%*	*20%*	*22%*	*17%*	*14%*
Services	*17%*	*19%*	*22%*	*22%*	*21%*	*20%*	*19%*
	100%	100%	100%	100%	100%	100%	100%

Source : ABS (1985; 1989; 1996; 1999; 2005; 2009).

The role of primary commodity exports has fluctuated between 57 percent and 70 percent of total exports over the period since 1983. After remaining largely steady until 2002/03, the role of resource commodity exports in total exports has increased through until 2008/09. Table 3 provides an insight into the major resource commodities that have contributed to this increase.

The relative role of agricultural exports has remained steady apart from the period since 2002/03. Table 3 expands this further. Other commodities largely relate to forestry and fishing and have decreased in their relative role.

The relative role of manufactured exports has remained steady over the last 25 years, although after peaking in 2002/03 the relative contribution of manufactured exports has decreased, as has service exports although to a lesser extent.

It is noted that the strong growth in coal exports in 2008/09 may slightly overstate the decline in relative contributions of all exports. Notwithstanding this trend declines were evident in the period prior to 2008/09.

Table 3 seeks to differentiate the role of the top eight primary commodity exports over the period; five resource commodities and three agricultural commodities.

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Table 3: Top Eight Commodity Goods Exports as a Percentage of Total Exports (By Value)

	1982/83	1987/88	1992/93	1997/98	2002/03	2006/07	2008/09
Coal	12.00%	9.20%	9.80%	8.40%	8.10%	9.50%	19.14%
Alumina / Aluminium	5.00%	6.90%	5.70%	5.40%	5.20%	5.50%	3.76%
Crude Petroleum	4.50%	3.80%	4.30%	3.40%	5.70%	3.60%	3.06%
Gold	1.10%	4.70%	5.60%	5.50%	3.80%	5.30%	5.65%
Iron Ore	6.40%	4.40%	5.30%	5.00%	3.60%	7.50%	12.46%
Cattle	4.50%	3.90%	3.90%	2.40%	2.70%	2.10%	1.90%
Wool	6.90%	10.00%	3.90%	2.00%	2.20%	1.20%	0.81%
Wheat	5.40%	3.30%	2.60%	3.20%	2.10%	0.90%	1.76%
Total	45.80%	46.20%	41.10%	35.30%	33.40%	35.60%	48.54%

Source: ABS (1985; 1992; 1995; 1999; 2003) Department of Foreign Affairs and Trade (2008: 2009)

For the period 1982/83 to 2006/07 the contribution of these eight commodities has decreased from nearly 46 percent of total exports to 36 percent of total exports, although as detailed above the increase in the value of coal and iron ore exports have seen these movements largely reversed since 2006/07. The contribution of iron ore and gold has increased substantially since 1982/83. While in relative terms the contribution of crude petroleum and alumina has decreased, these declines have not been as substantial as the relative decline in the contribution of beef cattle, wool and wheat. While the drought may have impacted the latter figures in 2006/07 and 2008/09, a trend decline in their relative role was clear by 1997/98 and 2002/03.

Table 4 Proportion of the Five Resource Commodities and Three Agricultural Commodities

to Total Exports (By Value)

	1982/83	1987/88	1992/93	1997/98	2002/03	2006/07	2008/09
Top 5 Resource	29.00%	29.00%	30.70%	27.70%	26.40%	31.40%	44.07%
Top 3 Agricultural	16.80%	17.20%	10.40%	7.60%	7.00%	4.20%	4.47%
Total Top 8	45.80%	46.20%	41.10%	35.30%	33.40%	35.60%	48.54%

Source: ABS (1985; 1992; 1995; 1999; 2003) Department of Foreign Affairs and Trade (2008: 2009)

Table 4 provides a summary of the contribution of the five resource commodities and three agricultural commodities from Table 3. By comparing Tables 2 and 4 it can be seen that the relative contribution of the top five resource commodities of total resource exports has increased from 29 percent of 39 percent in 1982/83 to 44 percent of 56 percent in 2008/09. Against this the contribution of agricultural exports decreased from 18 percent in 1982/83 to 11 percent in 2008/09. Of this the role of wheat, beef, and wool decreased from 17 percent of the 18 percent in 1982/83 to only 4.5 percent of the 11 percent in 2008/09.

In short the role of the top five resource commodities within total exports has increased, while the role of the top three agricultural commodities has decreased. While the latter has been partially

offset by increased exports of other agricultural commodities (e.g. dairy, wine, cotton and rice), the agricultural export sector is still dominated by beef cattle, wool and wheat. Furthermore the role of manufactured and service exports increased initially, but has remained largely stable since the late 1990s. These changes have occurred in a background of an increasing traded sector within the economy. In effect these export segments have been increasing in a period of increasing trade.

Terms of Trade

The measurement of a nation's term of trade has strong linkages with the Purchasing Power Parity trade theory model. Salvatore (2001) defines the terms of trade as the ratio of the export price index of goods a country exports to the import price index of goods that same country imports. This ratio is often multiplied by 100 in order to express the measure in percentage terms. This allows, for example an increase in the index from say 100 to 120 to represent a relative 20 percentage improvement in that country's terms of trade.

An improvement in the terms of trade is considered beneficial in the sense that the competitiveness of nation increases with an increase in the prices of its exports or a decrease in the price of its imports. Alternatively competitiveness decreases with a fall in export prices or an increase in import prices. To distinguish this measure of the terms of trade from other common measures, the export / import price index is often referred to as the commodity or net barter terms of trade. Along similar lines the gross barter terms of trade is expressed as the ratio (expressed as a percent) of a quantity index of exports to a quantity index of inputs (as distinct from price). Similarly the income terms of trade is the ratio (expressed as a percent) of the value of exports to the value of imports. For the purpose of this discussion the terms of trade relate to the commodity / net barter terms of trade, i.e. the ratio of relative price indexes.

The structural changes identified in the previous section are important to consider as such changes can impact on the structure and response of the terms of trade to movements in world prices. Traditionally manufactured goods prices (exported and imported) are considered less volatile than primary commodity prices. Furthermore Gruen and Shuetrim (1994) suggest that mineral commodities are about 40 percent less volatile than agricultural commodities given they are more susceptible to changes in demand while agricultural commodity prices tend to be more susceptible to changes in supply. However the large increases in the world gold, coal and iron ore prices suggest that updated analysis of this conclusion may be required. Similarly semi-manufactured agricultural product prices such as dairy, cotton, rice, etc. should be less volatile than the larger more homogenised agricultural commodities such as beef, wheat and wool.

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This raises key issues for the period 1983 – 2009 in Australia. The large role of commodity-based-exports within total exports suggests that Australia has become more specialized in commodity based production, particularly in the top three resource commodity exports. The decrease in the role of the top three agricultural commodity exports, the increase in all resource commodities, and the steady contribution of service exports suggest that the export price component of the terms of trade should become less volatile –particularly when measured in destination price terms before the impact of the exchange rate is considered.

A final consideration is the composition of the current account balance. Figure 1 shows the annual Australian current account balance since 1982/83 and the contribution of the goods and services trade balance and the income balance (i.e. financial payments such as interest, dividends, etc.) within the current account balance.

Figure 1 Australian Annual Current Account Balance, Goods and Services Balance and Income Balance 1985/96 to 2006/07 ($Am)
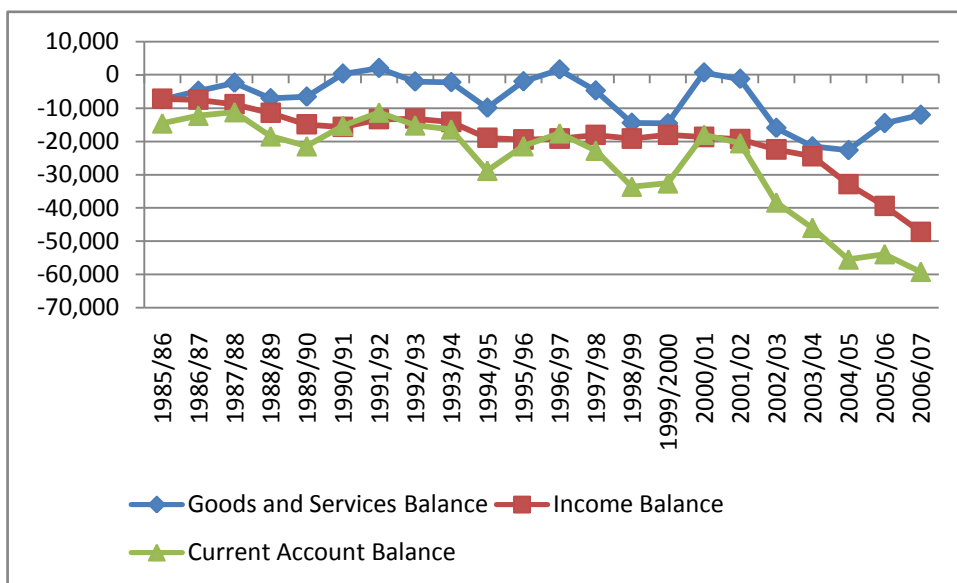
Source ABARE 2009

The relationship between the three indicators provides some useful insights. In the period from 1985/86 to 2002/03 the underlying current account balance appears to be trending in a similar downward trend as is the income balance, suggesting that both are recording increasing annual deficit figures. However annual variations in the downtrend of the current account balance are similar to variations in the goods and services balance. In effect the current account balance evidences similar patterns to both the income balance and the goods and services balance.

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The period 1994/95 to 2001/02 suggests a steady decline in the income balance. The goods and services balance shows a cyclical pattern over the total time period that troughs every five years, with at least three years of declining balances before the trough of the cycle. Notwithstanding this the magnitude and duration of the length and distance between peaks and troughs in the goods and services balance appear to be increasing. While the figure only covers the period to 2006/07, Table 1 shows a continuation of this pattern until 2008/09. However despite the goods and services balance trending higher since 2004/05, the overall current account balance is lower given a larger fall in the income balance. While the decrease in the current account balance has not been as large as the decrease in the income balance, it appears that over the period since 2004/05 the underlying relationship between the current account balance, the goods and services balance and the income balance has changed from that which has been observed prior to 2004/05. Whether this is linked to income payments related to investment in the resource sector and the commensurate increase in resource exports requires further investigation and is beyond the scope of this paper. It could suggest that income balances now play an increasing role in the traded / external sector of the economy.

As stated earlier, further investigation of this is not provided in this paper however will be an important component of the underlying doctoral research. A change in the relationship between the current account balance (external balance) and the goods and services balance could have implications on the relationship between the terms of trade and the real Australian exchange rate.

In summary the link between the terms of trade and the real Australian exchange rate is well documented and several studies have confirmed a strong contemporaneous relationship. However these studies have focused on the aggregate relationship between these indicators and a change in the terms of trade.

Since 1983 the role of the traded sector has increased, structural changes in the export sector suggest that the terms of trade should becoming less volatile and the role of the income balance within the traded sector is increasing. These factors combined suggest that the relationship between the terms of trade and the real exchange rate could be varying over time.

Preliminary analysis

The next section undertakes preliminary analysis on the Australian terms of trade and the real Australian exchange rate. Quarterly data from December 1983 to June 2009 were sourced from the Reserve Bank of Australia, ABS and ABARE. Following the approach in the terms of trade and

exchange rate literature, the data were expressed in logarithmic form.. Both the terms of trade and the real exchange rate are weighted indices based on their respective export, import and exchange rate components. While nominal terms of trade data are available from ABARE and the ABS, the real terms of trade was calculated using the real export price index and real import price index provided by the RBA.

Figure 2 shows the real terms of trade and the real export and real import price indexes.

Figure 2 Australian Real Terms of Trade, Real Export Price Index and Real Import Price Index December 1983 to June 2009
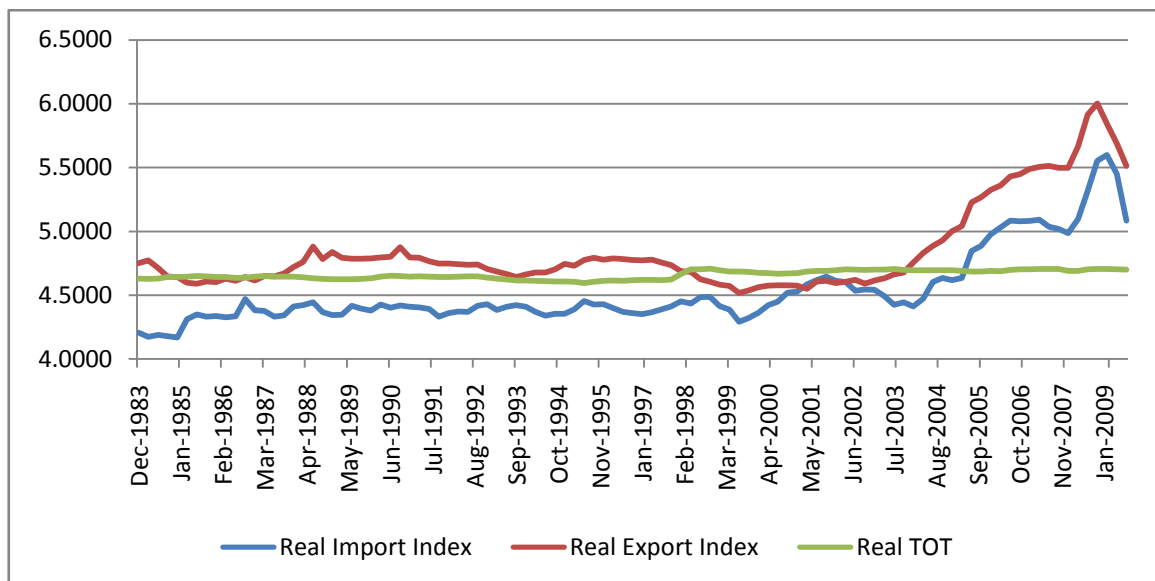
Source ABARE (2009), Authors calculations

The real export and import prices indexes are similar over the period and appear to follow similar trends. The correlation between them was 0.91. Given these close movements it is not surprising that the real terms of trade is steady over the period. Whilst not definitive this could suggest that any changes to any of the major components of either the export or import price index are largely offset by subsequent movements in other sectors of the ratio within the same quarter. Whether this is due to correlation between various prices or through exchange rate movements is not established.

For example in the previous example looking at an increase in coal export prices, this would suggest that the subsequent movements in non-coal exports and import prices are such that the overall terms of trade remains largely unchanged. Also the steady real terms of trade over time suggested that it could be worth investigating the stationarity of the series.

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Figure 3 Australian Real Terms of Trade and Real Australian Exchange Rate

December 1983 to June 2009
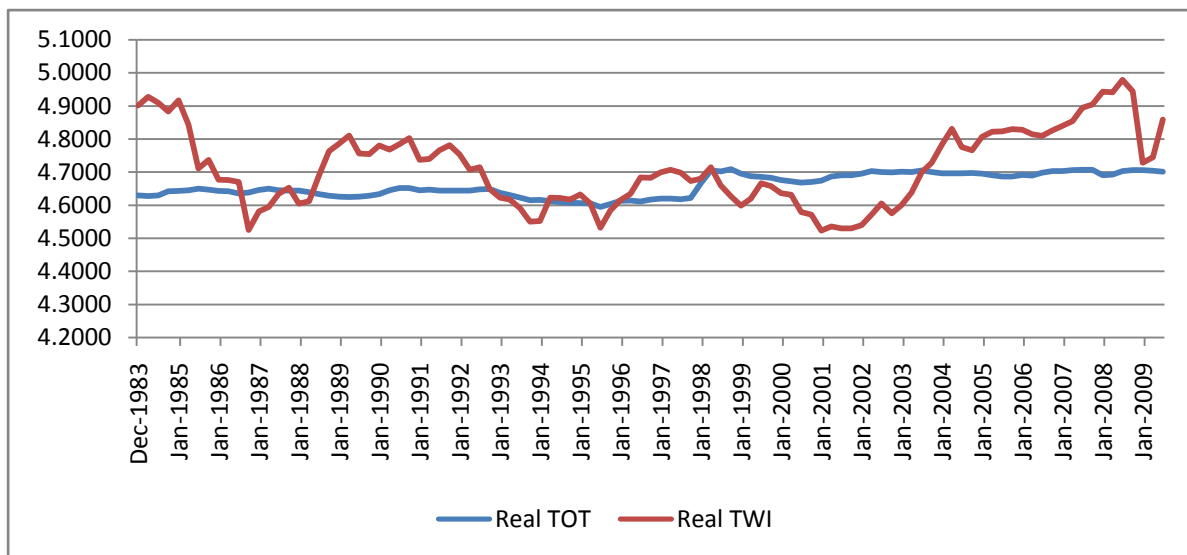
Source ABARE (2009), Authors calculations

Figure 3 is a plot of the real terms of trade against the real Australian exchange rate, as identified by the RBA Real Trade Weighted Index. It shows that while the real exchange rate varies more than the real terms of trade, it appears to trend around the real terms of trade on a medium-term basis. Furthermore the real exchange rate can trend away from the real terms of trade for periods of up to four years. Similarly there appears to be a divergence in the data since 2003, which coincides with the period of the growing role of the income balance in the current account balance. Notwithstanding this the correlation co-efficient between the two indices is 0.24 over the period. Whilst not definitive it could be suggested that while the real exchange rate trends around the real terms of trade, there are lengthy periods of movements away from the real terms of trade which suggest that there are other factors at play that influence the exchange rate on a medium-term basis.

Figure 4 shows the relationship between the nominal terms of trade and the nominal exchange rate. The correlation between them is 0.45.

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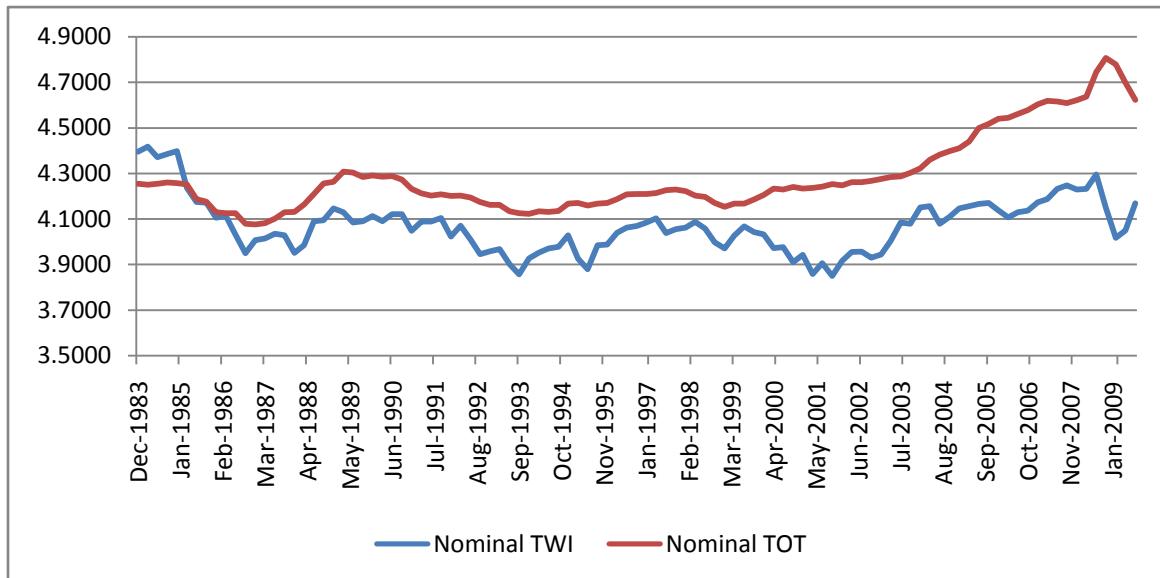
Source ABARE (2009) RBA (2009)

For the period 1983 to 2003 the nominal terms of trade trended largely steady, before increasing higher and at an increasing rate post-2003. While the nominal exchange rate has increased as well, it did not increase at the same rate. As such a divergence appears from 2003 onwards.

Hence from 2003 the real exchange rate increased faster than the real terms of trade, while the nominal terms of trade increased at a faster rate than the nominal exchange rate. This contrast requires further investigation.

When contrasting the relationship between the nominal and real terms of trade and the nominal and real exchange rate some interesting observations were made. Figure 5 shows the two exchange rate indexes.

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Figure 5 Nominal and Real Australian Exchange Rate - December 1983 to June 2009
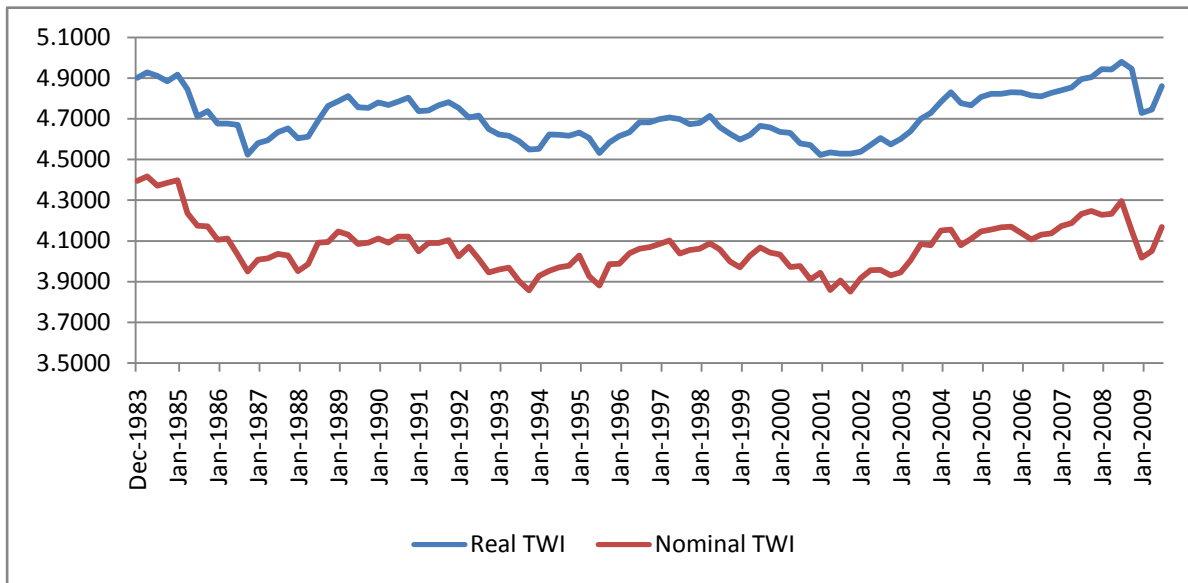
Source: ABARE (2009) RBA

As seen in Figure 5 there is a similarity between the nominal and real exchange rates, with a correlation of 0.91. In short these indexes show a similar pattern which has not changed over time. Thus the nominal and real exchange rates move largely in similar patterns. Therefore any discrepancy between the respective real and nominal relationships must be due to terms of trade rather than the exchange rate. This difference between real and nominal Australian terms of trade is shown in Figure 6.

Figure 6 Nominal and Real Australian Terms of Trade - December 1983 to June 2009
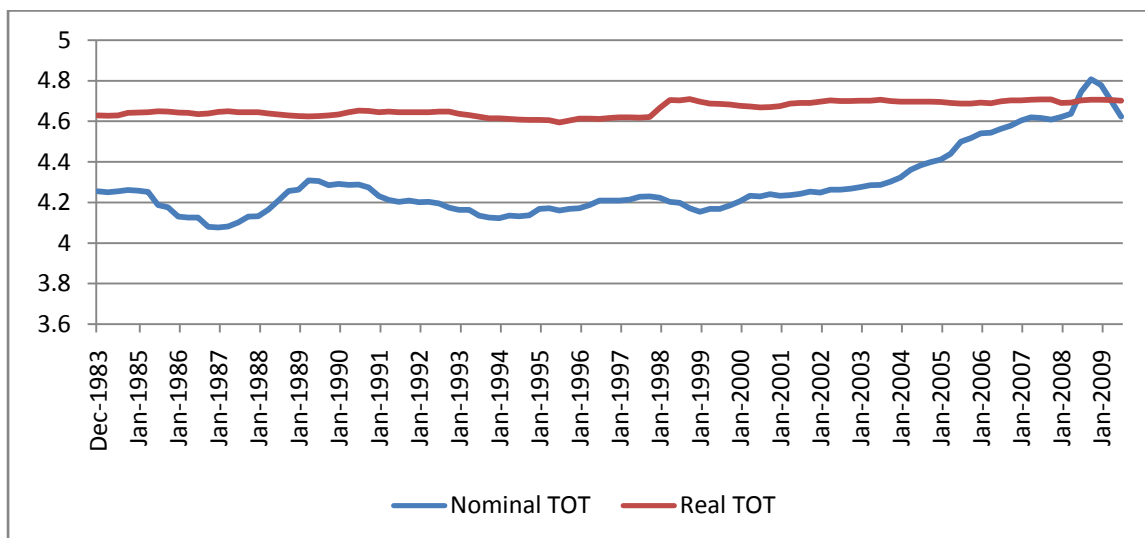
Source: ABARE (2009) RBA, Authors Calculations

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Figure 6 provides an interesting insight and perhaps the source of the contrast. The graph shows that until 2003 both indexes moved in a similar fashion, but since 2003 the nominal terms of trade has increased while the real terms of trade has remained largely unchanged. While the exchange rate in nominal and real terms have moved in a similar fashion over the period since 1983, the two respective terms of trade indexes have converged since 2003. This requires further investigation and will be the focus of future research.

Conclusion

The relationship between the Australian terms of trade and the real exchange rate has been well documented where it has been concluded that movements in the terms of trade will see a similar movement in the real exchange rate within the same quarter. However the preliminary analysis suggests that the real exchange rate is more variable that the real terms of trade, particularly since 2003. Furthermore since 1983 there have been structural changes in the size and nature of the traded sector in the economy as well as the role of the income balance within the current account balance. Resource commodity exports have increased relative to other exports and combined with changes in the composition of agricultural exports it would be expected that the terms of trade would be less volatile over time and thus the real exchange rate. Until 2003 this appeared to be the case, however since this time there has been a large increase in the role of resource exports, the role of the income balance has become more significant and the relationship between the nominal and real terms of trade has diverged.

Thus while literature suggests that there is a strong relationship between the terms of trade and the real exchange rate, further analysis is required to establish whether these events since 2003 now impact this relationship.

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