5

The Terms of Trade

Chapter concepts

- *the terms of trade*
- *the terms of trade index*
- *the factors influencing the terms of trade*
- *recent trends in the terms of trade*
- *the significance of changes in the terms of trade*

Introduction

The terms of trade has always played an important role in Australia's economic history and are an important determinant of the nation's economic prosperity. Changes in the terms of trade have a significant effect on Australia's business cycle - affecting key economic indicators such as GDP, national income and the exchange rate. The terms of trade is an index which measures the relative movements in the prices of exports and imports. Why is this important? Because changes in the prices of exports and imports will affect the value of exports and imports. In this way, movements in the terms of trade can have a significant influence on the trade and current account balance, the exchange rate and national income.

Let's use a simple example to illustrate. Assume BHP is receiving $60 per tonne of iron ore and is exporting 1 billion tonnes. This means that the value of their exports equals $60 billion. If the world price of iron ore rises to $80 per tonne, the value of their ore exports is now $80 billion. BHP is very happy! Australia's export price index has risen – this will increase the trade balance and result in an increase in Australia's national income. What about import prices? One of Australia's main imports is petroleum refined from oil. If oil prices increase from $50 per barrel to $60 per barrel, then the value of oil imports will increase by 20 per cent. So a rise in oil prices, ceteris paribus, will increase the import price index. This will mean that Australian households and firms face a higher petrol bill.

The terms of trade provides a measure of the quantity of imports a country can obtain in exchange for a given volume of exports.

The importance of the terms of trade index is that it provides a measure of the quantity of imports a country can obtain in exchange for a given volume of exports. If the terms of trade rise, (that is, if export prices rise relative to import prices) then to purchase a given quantity of imports will require a smaller quantity of exports. In other words, a rise in the terms of trade would be synonymous with an increase in a country's standard of living since more goods and services could be imported for a given amount of exports. This is why an increase in the terms of trade is referred to as a 'favourable movement'.

The terms of trade index

The terms of trade index is measured as a ratio of export prices to import prices:

$$\text{Terms of trade} = \frac{\text{Export Price Index}}{\text{Import Price Index}} \times \frac{100}{1}$$

Note that the terms of trade could rise (fall) if either

- export prices rise (fall), or
- import prices fall (rise)

An index number is a statistical device used to express price changes as a percentage of prices in a base year. The method for calculating the terms of trade from a sample of export and import prices is shown in figure 5.1. A base year is selected and assigned

	Price ($ per unit)			
Exports	Year 1	Year 2	Year 3	Year 4
Good A	170	170	165	170
Good B	130	140	150	160
Good C	100	110	125	130
Total	400	420	440	460
XPI	**100**	**105**	**110**	**115**
Imports	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Good D	300	310	320	310
Good E	80	85	95	95
Good F	120	155	145	155
Total	500	550	560	560
MPI	**100**	**110**	**112**	**112**
TOT	**100**	**95.5**	**98.2**	**102.7**

The export price index (XPI) for year 2 is

$$XPI\ (2):\ \frac{420}{400} \times \frac{100}{1} = 105$$

This means that export prices increased on average by 5 per cent over the course of the year. Between year 2 and year 3, export prices increased by 4.8 per cent (110 - 105 divided by 105).

The same procedure can be used to derive the import price index. In year 2, the MPI is

$$MPI\ (2):\ \frac{550}{500} \times \frac{100}{1} = 110$$

This means that import prices increased on average by 10 per cent during year 2.

The ToT calculation for year 2 is:

$$\textbf{ToT (2):}\ \frac{105}{110} \times \frac{100}{1} = 95.5$$

Figure 5.1 Constructing a terms of trade index

an index value of 100. This is to simplify the task of comparison. Year 1 is chosen as the base year. The index for each year is calculated by dividing the total price for each year by the total price of the base year and then multiplying by 100. In year 2, the export price index equals 105 (420/400). The import price index for year 2 is 110 (550/500). This means that export prices increased by 5 per cent in year 2 and import prices increased by 10 per cent. To calculate the terms of trade for year 2 we divide the export price index (105) by the import price index (110) and multiply by 100. The terms of trade index for year 2 is 95.5. This means that between year 1 and year 2 the terms of trade declined by 4.5 per cent. In year 3 and 4, the terms of trade increased because export prices increased by more than import prices.

The absolute value of the terms of trade index is relatively unimportant - it is the movement in the index which is relevant. If the terms of trade falls, then this is referred to as an unfavourable movement. Between years 1 and 2, while both export and import prices were rising, the terms of trade fell because import prices rose at a faster rate than exports. The situation changed between years 2 and 3 where export prices increased more quickly than import prices so that the terms of trade increased. If the terms of trade rises, then this is referred to as a favourable movement. In Year 4 the export price index continued to rise while the import price index did not change. This resulted in a further rise in the terms of trade. The following table shows the movement in the terms of trade for the four years.

Year	Terms of Trade	Movement
1	100.0	-
2	95.5	Unfavourable
3	98.2	Favourable
4	102.7	Favourable

Australia's terms of trade

A knowledge of the composition and direction of Australia's trade is useful in understanding the trends in Australia's terms of trade. Australia's exports consist mainly of primary commodities (especially resources), while imports are dominated by manufactured goods. Commodity exports account for around three quarters (75%) of Australia's exports. Commodities include rural goods (wool, wheat, beef), bulk commodities (iron ore and coal) as well as other resources such as liquefied natural gas (LNG), gold and alumina. This means that the most important determinant of Australia's export price index are commodity prices. If Australia's commodity price index rises, Australia's export price index and its terms of trade will increase.

The prices of commodities can be subject to wide fluctuations. Small shifts in demand or supply will cause large price swings. This means that if the Chinese (or world) economy expands, the demand for resources, such as iron ore, coal and LNG, will increase which will boost world commodity prices and increase Australia's export price index. This would be an advantage to Australia's exporters such as BHP and Rio Tinto – they would sell their output for higher prices increasing their export revenue. An increase in Australia's export price index (ceteris paribus) will increase Australia's terms of trade. Conversely, if world economic growth contracts then the demand for commodities will fall, reducing commodity prices and Australia's export price index.

The import price index is also important is determining the terms of trade. The bulk of Australia's imports are manufactured goods and intermediate goods. The prices for these goods do not change as much as the prices of resources or commodities. The supply of manufactured goods is relatively more elastic so changes in demand do not cause large price swings. Australia has very little direct influence on its export and import price indices. This is because Australia's export and import prices are set in the world market. For this reason, Australia is said to be a 'price taker' with respect to the prices of traded goods . The table below and figure 5.2 show the movements in Australia's export and import price indices and the terms of trade. It is evident that the export price index is much more volatile than the import price index.

Year (as at June)	Export Price Index	Import Price Index	Terms of Trade
2014	86.8	89.9	96.5
2015	79.3	92.6	85.6
2016	73.7	90.9	81.1
2017	84.9	91.3	93.0
2018	89.9	95.2	94.4
2019	100.5	98.6	101.1
2020	97.0	98.5	98.5
2021	117.7	96.8	121.6
2022	153.2	117.2	130.7

Source: ABS

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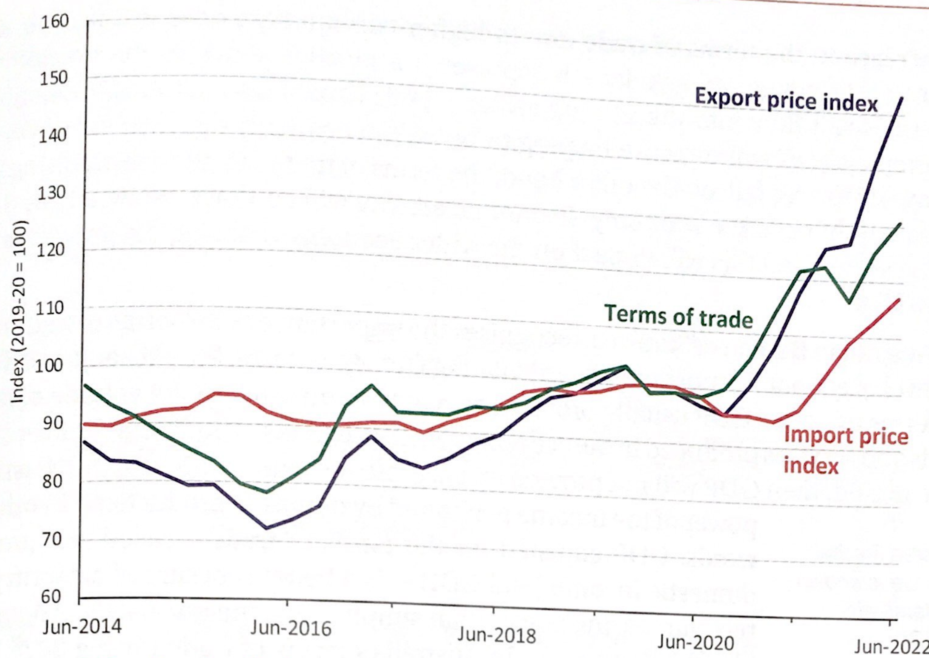


Figure 5.2 Australia's terms of trade

An important point to note from figure 5.2 is how the terms of trade is more closely correlated to the export price index than the import price index. The import price index is normally less volatile compared to the export price index – this is evident in the graph, especially for the period 2014 - 2021. During 2022, the import price index increased significantly due to world oil prices increasing.

From 2016 to 2019 global economic growth increased causing commodity prices to rise. Australia's export price index surged during this period by over 40 per cent – rising from 72 to 103. The COVID pandemic of 2020 caused a global recession and Australia's export price index fell by around 8 per cent. In 2021, the world economy recovered and commodity prices began rising. In 2022 the war in Europe caused energy prices to spike. The combined effect saw Australia's export price index increase by over 50 percent and resulted in Australia's terms of trade reaching its highest level in recorded history in June 2022.

Effects of changes in the terms of trade

Changes in the terms of trade have important effects on:

- the business cycle;
- output and employment;
- the trade and current account balance in the balance of payments;
- the exchange rate;
- national income;
- government tax revenue
- the standard of living.

An increase in the terms of trade due to higher commodity prices will lead to an expansion in economic activity – it represents a positive shock to the economy. Resources will flow into the mining sector – both capital and labour. Production and employment will increase helping to boost the economy's growth rate. When commodity prices fall, on the other hand, the terms of trade will decline resulting in a negative shock to the economy. Economic activity will contract, especially in the mining sector, and this will impact on the wider economy reducing the growth rate of real GDP.

The Australian Bureau of Statistics recognises the importance of the terms of trade on the level of economic prosperity by calculating Gross Domestic Product adjusted for the terms of trade. GDP usually provides an accurate measure of the volume of the goods and services produced in the economy. But if the terms of trade change over the same period, then GDP will not provide an accurate measure of the real purchasing power of the income generated by domestic production. In other words, GDP adjusted for the terms of trade – called real gross domestic income (real GDI) – is a better measure of a country's real purchasing power than simply using the normal GDP figure. The substantial rise in Australia's terms of trade during 2020-22 meant that the purchasing power of Australia's exports increased, thereby increasing real national income. This higher level of income increased domestic economic activity and employment with Australia's unemployment rate falling to its lowest level in over 40 years. In this way a rise in the terms of trade is seen as providing a positive boost to economic growth and living standards.

GDP adjusted for the terms of trade is known as gross domestic income (GDI).

Theoretically there should be a close link between the terms of trade and the trade balance in the balance of payments. The terms of trade measures changes in the prices of exports and imports while the trade balance measures changes in the value of exports and imports. In other words, the trade balance takes into account not only the prices of traded goods but their quantities as well. This is an important distinction. Generally the terms of trade and the balance of goods and services will show a positive relationship. For example, a rise in the terms of trade would normally cause an increase in the trade balance (a larger surplus or a smaller deficit). This is because a rise in export prices will increase the value of exports. It is not surprising that during 2022 Australia recorded its highest trade surplus as a result of a record high terms of trade.

A rise in the terms of trade will normally increase both the trade and current account balance.

Figure 5.3 shows both Australia's trade balance and the terms of trade. It does indeed show a very strong positive correlation. Rises in the terms of trade do coincide with a rise in the trade balance and vice versa. But it is important to remember that the terms of trade is one of many factors that will affect the trade balance. Movements in the terms of trade also have a direct impact on the exchange rate. A strong terms of trade will lead to an appreciation of the exchange rate. The Australian dollar is often referred to as a commodity currency, reflecting Australia's dependence on commodity exports. High export prices increase the demand for the Australian dollar boosting its value. While a higher Australian dollar is good for consumers it

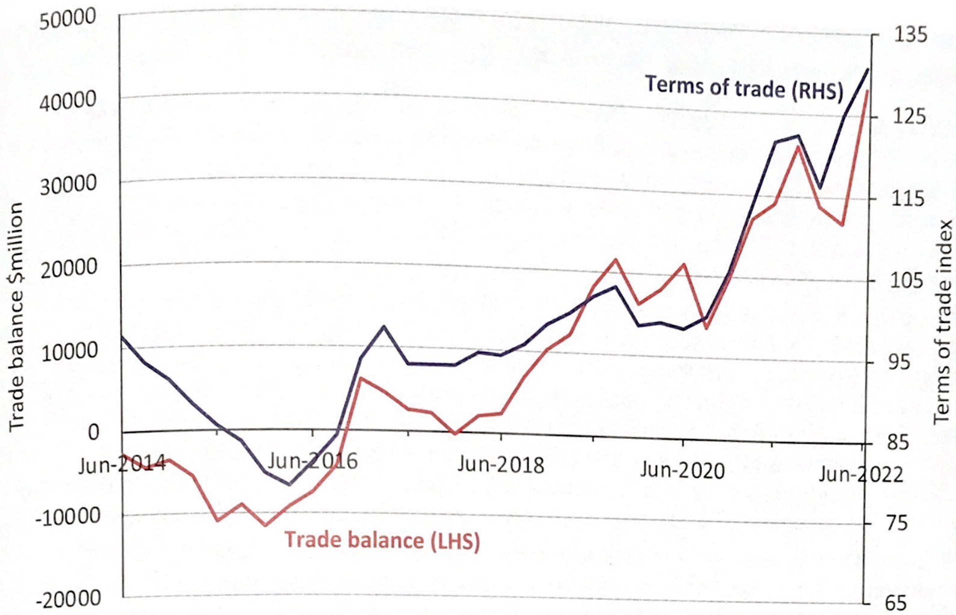


Figure 5.3 The terms of trade and the trade balance

is a disadvantage for domestic producers and exporters not in the mining sector because it reduces their competitiveness. One potential problem of a very high exchange rate is known as 'Dutch disease' (see next page). A mining boom caused by high commodity prices will often result in a 'two speed' economy. The mining sector will grow at a fast pace, but other domestic industries, adversely affected by a high exchange rate, will grow at a much slower speed and may even contract. The terms of trade do have significant effects on the Australian economy.

	Favourable Movement	Unfavourable Movement
Cause	The XPI rises relative to the MPI e.g an increase in iron ore prices	The MPI rises relative to the XPI e.g. an increase in oil prices
Meaning	*More imports can be purchased from a given volume of exports*	*Less imports can be purchased with a given volume of exports*
Effects	1. Increase in the trade balance	1. Decrease in the trade balance
	2. Increase in national income	2. Decrease in national income
	3. Aggregate demand increases	3. Aggregate demand decreases
	4. Increase in government tax revenue	4. Decrease in government tax revenue
	5. Rise in living standards	5. Fall in living standards
	6. Investment & employment rises in the resources sector	6. Investment & employment falls in the resources sector
	7. AUD appreciates	7. AUD depreciates
	8. CPI (inflation) rises	8. CPI (inflation) falls

Australia's terms of trade boom & the 'Dutch disease'

With Australia's terms of trade reaching record levels in 2022, there is a fear that the Australian economy could suffer from the much-hyped Dutch disease (or the 'two–speed' economy effect). Dutch disease refers to the potential negative effects on the economy caused by an appreciation in the exchange rate arising from high iron ore, coal and natural gas prices. (It is named after the negative impact of an oil & gas boom on Dutch manufacturing industry in the 1970s).

In Australia's case it is seen when the terms of trade boom sucking investment and resources into the mining sector and away from manufacturing and other sectors of the economy. A resources or mining boom normally puts the Australian dollar on steroids which can have a negative impact on non-mining exporters as well as the tourism sector. A high Australian dollar makes it difficult for agricultural and service exporters to compete on the global market and it also makes it difficult for domestic producers to compete against cheaper imports. At the same time, labour is attracted into the mining sector because of the lure of higher wages which imposes cost pressures on other sectors of the economy.

What are the benefits? While a high exchange rate imposes costs on some groups it does bring benefits to others - namely consumers. High commodity prices boost export and national income which results in higher spending to all sectors of the economy. The government gains because taxation revenue increases with more employment, increased mining royalties and higher company profits. So while a terms of trade boom can result in an appreciation in the exchange rate, it also provides a significant boost to the nation's purchasing power and can have a positive effect on economic growth.

Factors affecting Australia's terms of trade

Changes in both the export and import price index will affect the terms of trade. Australia is a price taker for both exports and imports - this means that prices are set in the world market. The export price index is dominated by commodity prices - mineral, energy and agricultural commodity prices. Increased demand for commodities will increase their price and increase Australia's export price index. But decreases in supply due to supply chain bottlenecks and global drought in the case of rural goods will also increase export prices. During 2022, Australia's export price index increased due to both demand and supply factors.

The import price index is dominated by manufactured goods such as motor vehicles, electrical and technology goods, machinery and capital goods and oil. Increases in the cost of producing these goods will increase the import price index and reduce Australia's terms of trade. During 2022, for example, oil prices spiked due to the Ukraine-Russia war, which increased petrol prices. Improvements in technology tend to reduce production costs for many manufactured goods, especially technology goods, which should cause the import price index to fall.

Will a change in the AUD exchange rate affect Australia's terms of trade? Let's use a depreciation in the AUD as an example. A depreciation will raise the price of imports in Australian dollars which will increase Australia's import price index. For example an imported car costing $US30,000 is equal to $AUD40,000 at the exchange rate AUD1=USD0.75. If the AUD falls to $0.70, then the car will now cost $AUD42,857. But at the same time a depreciation will also raise the price of Australia's exports in AUD. If 1 tonne of iron ore sells for $US100, then at an exchange rate of $US0.75, the AUD price is $133. If the AUD falls to $US0.70, then the iron price in AUD rises to $143. So a depreciation of the AUD will increase both import and export prices in AUD terms and therefore have minimal impact on Australia's terms of trade. Similarly an appreciation of the AUD will decrease both import and export prices in AUD and have minimal impact on the terms of trade.

Worksheet

1. Define the terms of trade.
2. Explain how the terms of trade could fall even if the export price index increases.
3. Construct an export price index and an import price index for year 3 in the table opposite.
4. Calculate the terms of trade for years 2 and 3.
5. Which export showed the greatest % increase in price over the three years?
6. Which import showed the greatest % increase in price over the three years?
7. Describe the movement in the terms of trade for years 2 and 3.
8. Explain the link between Australia's commodity price index and the export price index.
9. Explain why Australia's terms of trade increased during 2022.
10. Explain how changes in the terms of trade affect the trade balance.
11. How does a rise in the terms of trade affect the exchange rate?
12. What effect has China had on Australia's export price index and import price index?
13. Explain the problem of 'Dutch disease'.

	Prices		
Exports	Year 1	Year 2	Year 3
Wheat	75	70	65
Coal	85	90	110
Iron Ore	90	120	135
Total	250	280	....
Imports			
Machinery	70	75	80
Car parts	65	70	75
Computers	85	80	80
Total	220	225	....
Export Price Index (XPI)	100	112	....
Import Price Index (MPI)	100	102	....
Terms of Trade	100		....

Article

Changes in the terms of trade 'drive' Australia's business cycle

The terms of trade is more important for the Australian economy than most people think. The terms of trade - the ratio of export prices to import prices - reflects the capacity of any given amount of exports to pay for a quantity of imports. If the rest of the world pays more for what Australia exports, then our terms of trade rises. This is equivalent to Australia receiving a 'pay rise'! The same improvement comes if the rest of the world charges less for what it sells us. Expressed as an index, Australia's terms of trade virtually doubled between 2016 and 2022. In June 2022, they reached their highest level in over 150 years on the back of substantial price rises for coal, iron ore and natural gas. This resulted in Australia's largest ever trade surplus and largest current account surplus in the nation's history. They also delivered substantial tax and royalty revenue for the Australian government.

But boom periods are likely to be followed by 'bust' periods! By late 2022, commodity prices had abruptly fallen by 20 per cent from the record high of June, taking billions of dollars out of the economy. The world was poised to enter a recession phase which would see the mining sector contract with a decline in mining investment and employment and a fall in national income.

Questions

1. Explain how the terms of trade 'drives' the Australian economy.
2. What are commodity exports? Explain their importance for the terms of trade.
3. Explain how an increase in the terms of trade provides a stimulus to the economy.
4. Explain why Australia's terms of trade increased during 2021-22?
5. Explain the effect of a rise in the terms of trade on the trade balance.

Multiple choice

1. A terms of trade index can be calculated as
   a. exports - imports x 100
   b. import price index/export price index x 100
   c. value of exports/value of imports x 100
   d. export price index/import price index x 100

2. A favourable movement in the terms of trade means that
   a. the terms of trade index must be greater than 100.
   b. a country can import more with the same quantity of exports.
   c. a country can export more goods for the same quantity of imports.
   d. the current account deficit must improve.

3. If import prices rise relative to export prices, then the terms of trade will
   a. improve.
   b. decrease.
   c. remain unchanged.
   d. fall, but only if the exchange rate falls as well.

4. An unfavourable movement in the terms of trade can occur if
   a. import prices rise less rapidly than export prices.
   b. import prices rise more than export prices.
   c. import prices fall while export prices rise.
   d. import prices fall while export prices remain constant.

5. A favourable movement in the terms of trade tends to raise the country's standard of living by
   a. creating a balance of trade surplus and stimulating export industries.
   b. increasing the value of the currency and thereby stimulating exports.
   c. increasing real GDP through an improved export performance.
   d. increasing the volume of imports obtained from the sale of a given volume of exports.

6. An important distinction between the terms of trade and the trade account is
   a. the terms of trade measure volumes whereas the trade account measures values.
   b. the terms of trade measure prices whereas the trade account measures volumes.
   c. the terms of trade measure prices whereas the trade account measures values.
   d. the terms of trade measure values whereas the trade account measures prices.

7. If the export price index rises faster than the import price index this means
   a. the country is less competitive on world markets.
   b. the country is more competitive on world markets.
   c. the country must use a greater quantity of exports to obtain a given quantity of imports.
   d. the country is able to obtain a greater quantity of imports with a given quantity of exports.

8. From the table it can be concluded that, over the period shown:
   a. export prices were rising but by less than import prices.
   b. less imports could be purchased with the same quantity of exports.
   c. import prices were rising but by less than export prices.
   d. there was a deterioration in the terms of trade.

Year	XPI	MPI
1	100	100
2	110	105
3	120	110

9. An unfavourable movement in the terms of trade will be the result of
   a. export prices remaining stable and import prices falling.
   b. import prices rising faster than export prices.
   c. import prices remaining stable and export prices rising.
   d. export prices and import prices rising by the same proportion.

10. What is the likely impact If China's demand for minerals and energy increases?
   a. the terms of trade will deteriorate, but the balance of trade will improve.
   b. the terms of trade and the balance of trade will both increase.
   c. the terms of trade will improve, but the balance of trade will fall.
   d. the terms of trade and the balance of trade will both decrease.

11. During the mining boom Australia's terms of trade increased due to
   a. rises in commodity prices.
   b. an increase in the value of the Australian dollar.
   c. rises in the prices of imported manufactured goods.
   d. an increase in Australia's interest rates.

12. A rise in Australia's terms of trade will
   a. cause the Australian dollar to appreciate.
   b. cause a decrease in Australia's export income.
   c. result in a decrease in the trade balance.
   d. lead to an increase in Australia's unemployment rate.

13. If import prices rise while export prices either stay the same, fall or rise by less than import prices, what will have happened to the terms of trade?
   a. They improve.
   b. They deteriorate.
   c. They remain unchanged.
   d. It is impossible to say.

14. If Australia experienced a significant fall in its terms of trade, which of the following (other things being equal) would be most likely to occur?
   a. A fall in the financial account surplus.
   b. A rise in the goods and services balance.
   c. An appreciation of the Australian dollar.
   d. A decline in Australian living standards.

15. Which of the following could cause the terms of trade to increase from 100 to 120?
   a. Export prices increase by 10% and import prices decrease by 10%.
   b. Export prices do not change and and import prices decrease by 20%.
   c. Export prices increase by 20% and import prices do not change.
   d. Export prices decrease by 10% and import prices increase by 10%.

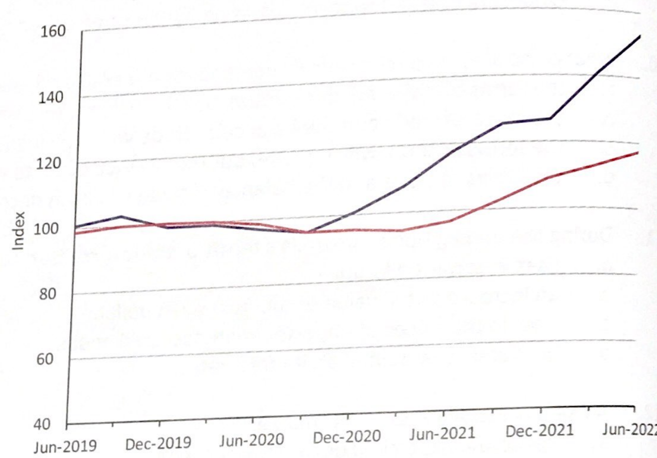
16. A possible disadvantage of a strong rise in the terms of trade is
   a. an increase in the current account deficit.
   b. an increase in export prices which reduces demand for exports.
   c. a rise in the exchange rate which reduces the competitiveness of domestic industries.
   d. an increase in the trade surplus.

17. The main reason for recent changes in Australia's terms of trade is
    a. volatility in the price paid for merchandise imports from Asian manufacturers.
    b. the changing supply and demand for agricultural exports.
    c. variation in the value of the Australian dollar.
    d. changes in the level of demand for the commodities that Australia exports.

Data Interpretation

Refer to the graph showing Australia's export and import price indices.

1. On the graph, label the 'export price index' and the 'import price index'.
2. In which period was Australia's ToT equal to 100?
3. Use the graph to calculate the terms of trade for 2022.
4. Explain why Australia's export price index fluctuates more than the import price index.
5. Describe the changes to the export price index between Sept 2020 and June 2022. Provide two reasons for this change.
6. Describe four effects of a rise in the terms of trade.



Extended responses

Each of the following questions should be answered in 2-3 pages of writing. Include diagrams and examples where appropriate. Pay attention to the allocation of marks when writing your answer.

1. a. Explain what the terms of trade index measures and distinguish between a favourable and an unfavourable movement in the terms of trade. [8 marks]
   b. Explain the effect of each of the following on the terms of trade:
      i. an increase in iron ore and coal prices.
      ii. an increase in oil prices.
      iii. a fall in ICT prices. [12 marks]

2. The terms of trade index in Australia increased from 98 in June 2020 to 131 in June 2022.
   a. Explain what the terms of trade measures, and suggest why it may have risen over this two-year period. [10 marks]
   b. Explain the likely economic effects of this movement in the terms of trade on consumers, businesses and the macro economy. [10 marks]

3. Describe the recent trend in Australia's terms of trade and discuss the likely causes and implications of this trend. [20 marks]