The tradable sector and its relevance to New Zealand's GDP

Paper presented at the New Zealand Association of Economists conference,
at Wellington, New Zealand,
3 July 2013

Jason Attewell
Manager, Balance of Payments, Statistics New Zealand

Simon Crossan
Statistical analyst, National Accounts, Statistics New Zealand

P O Box 2922
Wellington, New Zealand
info@stats.govt.nz

www.stats.govt.nz

Liability
The opinions, findings, recommendations, and conclusions expressed in this paper are those of the authors. They do not represent those of Statistics New Zealand, which takes no responsibility for any omissions or errors in the information in this paper.

Citation
Crossan, S & Attewell, J (2013, July). *The tradable sector and its relevance to New Zealand's GDP.* Paper presented at the New Zealand Association of Economists Conference, Wellington, New Zealand.

Abstract

This paper presents a definition of the tradable and non-tradable industries within the production measure of GDP. Previous work is built on using recently published input-output tables to determine which industries are tradable or non-tradable in terms of export orientation and import substitution. We produced chain-volume time series using these definitions.

New Zealand is a small, open economy and as such there is interest in the relative performance of the tradable and the non-tradable sectors. The paper concludes that the stronger growth in the non-tradable sector has been driven by the increasing importance of the service industries to New Zealand.

Introduction

There has been growing interest in the tradable sector of the economy. That is, the sector of the economy that is subject to international competition. This interest is related to the effects of changes in the exchange rate, trade policy, international competitiveness, and the possible effects on the tradables sector.

This paper investigates tradable and non-tradable industries in the context of gross domestic product (GDP). The paper puts forward a definition of what constitutes tradable and non-tradable industries within the production measure of GDP.

As a small, open economy, New Zealand's economic growth is influenced by the global economy, both in terms of quantity of products and services available for consumption and the prices faced by producers and exporters.

Identifying tradable and non-tradable components of GDP is a step towards understanding New Zealand's economic growth and where the influences of the global economy are felt most.

Various unofficial tradable and non-tradable series that mix up GDP concepts are used in debate. The purpose of this work is to help inform the debate about tradable and non-tradable GDP and dispel some misconceptions about what growth in tradable and non-tradable industries actually reflects.

The tradable sector can be fairly well identified with published information from the national accounts. The sector was approximately 20 percent of the New Zealand economy in 2010. It includes agriculture, forestry, and fishing; mining; and manufacturing. The tradable sector has grown at an average annual rate of 1.1 percent since the year ended March 2000. This compares with 2.8 percent average annual growth in the non-tradable sector and 2.4 percent average annual growth in GDP over the same period.

The paper concludes that the growth in non-tradable GDP is driven by the increasing importance of the service industries to New Zealand, like other modern economies. Growth in non-tradable GDP is often mistaken for growth in government activity, but services are much broader than that. Tradable activity may be declining in terms of its contribution to GDP, but that does not mean that those industries are shrinking. It further concludes that in order to understand the drivers of relative growth, the answers can be explained with traditional industry classifications.

Defining tradable and non-tradable industries

What is tradable GDP?

Tradable and non-tradable splits are much more easily applied to products than industries. There are existing definitions of tradable and non-tradable commodities in the consumers price index (CPI):

- tradables: goods and services that are imported or are in competition with foreign goods in domestic or foreign markets
- non-tradables: goods and services that face no foreign competition.

A Statistics NZ paper on tradable and non-tradable inflation in consumer prices (Dixon, Griffiths, & Lawson, 2004) noted:

"Dwyer defines export orientation as the extent to which total supply from a given industry is exported, and import substitution as the extent to which total usage of goods within a given industry are competing imports. The calculation is done by taking the value of imports or exports as a percentage of total supply or total use."

By adapting the CPI definitions and applying them to GDP industries we get:

- tradable industries: industries where the majority of the output faces international competition
- non-tradable industries: industries where the majority of the output faces no international competition.

An industry is classified as tradable based on how subject it is to international competition. Non-tradable industries can still be subject to domestic competition.

In practice, for the purposes of this paper, we have defined industries as tradable if:

- 10 percent or more of that industry's output is exported, and/or
- 20 percent or more of the supply to that industry are imported.

In appendix IV, we include a table showing the sensitivity analysis when the threshold is set at 10, 20, 30, or 40 percent.

In this paper we refer to the tradable sector and non-tradable sector – although strictly speaking they are not sectors. By 'tradable sector' we mean the group of industries that we have deemed to be tradable. Similarly, the non-tradable sector refers to the group of industries that we have classified as non-tradable.

We have used the production approach to GDP to derive our tradable and non-tradable sectors. The production approach to GDP describes the value added of each industry to total GDP. Value added is the gross output of an industry (such as sales) less the intermediate consumption (goods and services used up during production). This approach avoids double counting, as the output of one industry can be the intermediate consumption in another.

Methodology

We used input-output tables for the year ended March 2007 and published in July 2012 to determine the exposure of each industry to international markets.

These input-output tables can be used as a tool to describe the structure of the New Zealand economy at a specific period of time. They show the relationships between industries using the Australia New Zealand Standard Industry Classification 2006 (ANZSIC06), and the goods and services they use and produce using National Accounts 2006 Commodity Classification (NA06CC). Information from these tables about imports and exports of products were used to determine whether an industry is tradable or not.

The values in the input-output tables are given in basic prices. This removes the effect of taxes from producers' prices that are levied as tax payable per unit of output. Alcohol and tobacco excise duty are examples. This removes the upward bias of the tax if it were included in value added.

The United Nations (2008) gives the following overview:

Basic prices

+

Taxes on products excluding invoiced VAT

-

Subsidies on products

=

Producers' prices

The basic prices in the input-output tables are current prices rather than volumes. Current prices are useful as the structure of the economy at a point in time can be estimated. For example, current prices are used as the weights when compiling chain-volume series.

Export industries

We determined which industries face significant international competition based on their exports relative to total output. If an industry's exports are greater than or equal to 10 percent of total output, we deemed the industry to be tradable. This was done using the exports by product data.

An export proportion (T_p) was calculated for each product as the value of exports for each product (E_p) divided by the value of total output of each product (O_p).

$$T_p = E_p/O_p$$

We assumed the export proportion of each product to be the same for each industry. This is the same method used to produce the inter-industry transactions table in the input-output tables. These export proportions (T_p) were applied to the value of output of each product by industry (O_{pi}). The resulting export values were summed by industry for all products. This is the estimate of the value of exported goods and services by industry (E_i).

$$E_i = \sum T_p \, . \, O_{pi}$$

Industries were considered to be exporting industries if their proportion of exports (P_i) to total output (O_i) was equal to or greater than 10 percent. This is consistent with previous methodologies and produces an industry split that would typically be viewed as export industries.

$$P_i = E_i / O_i$$

Import competing industries

We used a similar method for import competing industries. The product supply table was used to determine the proportion (B_p) of each product that was imported (I_p) relative to the total output (O_p).

$$B_p = I_p / O_p$$

These product import proportions (B_p) were applied to the value of output of each product by industry (O_{pi}). The sum of these values ($B_p \, . \, O_{pi}$) is the estimate of the total amount of import competition each industry could face.

$$I_i = \sum (B_p \, . \, O_{pi})$$

If the value of imports that each industry faces (I_i) was equal to or greater than 20 percent of an industries total output (O_i), we considered that industry an import competing industry.

$$P_i = I_i / O_i$$

Tradable GDP

Industries had to satisfy at least one of the two criteria as either exported-oriented or import-competing to be considered tradable. We made a manual adjustment to agriculture, as much of the output from this industry is not exported as is, but goes through other industries and is then exported. Such a large proportion of output of this industry is eventually exported, (nearly 70 percent) that it was included in the tradable series so the split was more meaningful.

This analysis was done on the 106 industries in the input-output tables. The results were compiled at New Zealand Standard Industry Output Categories (NZSIOC) level 1 based on ANZSIC06 industry classifications. These are the 16 industries that are published as part of the quarterly GDP release. These industries had to have most of their sub-industries to meet the above criteria to be included as tradable. Industries typically have some tradable sub-industries, however the overall industry needed to face international pressures to be considered tradable.

We refer to this methodology as the direct method for classifying tradable GDP.

Agriculture: tradable or not tradable?

One of the most significant outputs from the agriculture industry in New Zealand is milk solids. If we followed the strictest definition of tradable and non-tradable in this case, the agriculture industry as a whole would be classified as non-tradable. Why? Because in the case of dairy, the output of the industry is raw milk, and this needs to be processed. The raw milk becomes an input to the manufacturing industry, but as it changes hands, it is not subject to any international competition. Meat manufacturing is similar - sheep and beef slaughters are included as agriculture production, but they are processed in a meat plant before the final products are exported.

The value added approach to GDP is designed to avoid double counting. The value added of an industry is the output of that industry less the intermediate consumption (the goods and services used up in the production process). So the value added of the dairy manufacturing excludes the raw milk purchased from the agriculture industry. And as the raw milk is not subject to international competition, only the finished dairy products (butter, cheese, milk powder, and casein) should be included in our definition of tradable GDP.

However, we make an exception for the agriculture industry, and apply the indirect principle to it. While the output of the agriculture in the strictest sense is not generally facing international competition, the products manufactured using those inputs definitely are. For example global prices for dairy products have a direct impact on what farmers are paid for their milk. As illustrated in table 5 of this paper, the agriculture, forestry, and fishing industry has the highest percentage (69 percent) of output exported according to ultimate disposition.

Classifying industries at ANZSIC division level (NZSIOC level 1)

The input-output tables allow analysis of the openness of industries to be assessed at a relatively low classification level. However, these tables are only available in current prices. Chain-volume GDP data is not available at such low levels. The chain-volume GDP series are predominantly used for quarterly indicators of economic activity, where timeliness is critical, and therefore more detailed data is often not available.

In this paper we classify industries as tradable or non-tradable based on the predominance of the sub-industries that make it up. The rationale for this decision is based on the trade-off between accuracy and comparability with other statistics. For chain-volume GDP, data below NZSIOC

level 2 is not available for design, quality, or data reasons. (See appendix III for the NZSIOC level 2 industry breakdown.) While for some industries there is clearly a mix of tradable and non-tradable elements within it, it is not practical to separate these out for chain-volume analysis.

For the purposes of this paper, we have decided that it is worth the trade-off of accuracy to have comparability with published statistics. For example, classifying at division level allows easy comparisons with labour measures so that labour productivity measures can be derived.

This is similar to the Dwyer approach (1992):

"In practice the split between the tradable and non-tradable sector should be in terms of commodities which are the most basic units of analysis. However, in practice where the required I-O data are only available by industry and the purpose of the project is to analyse prices, productivity, investment, employment and other resource allocations, and industry based classification was deemed appropriate."

An alternative method would be to split chain-volume industries into their tradable and non-tradable elements using current price proportions, and apply these to the volume indicators. This method could give a false sense of accuracy, given that the quarterly indicators are not designed for this purpose.

Results: using the direct methodology

Using the direct method for classifying tradable GDP, as described in the methodology section, results in the following split (shown in table 1) at NZSIOC level 1. The level 4 breakdown is given in appendix IV.

Table 1
Tradable / non-tradable split using the direct methodology

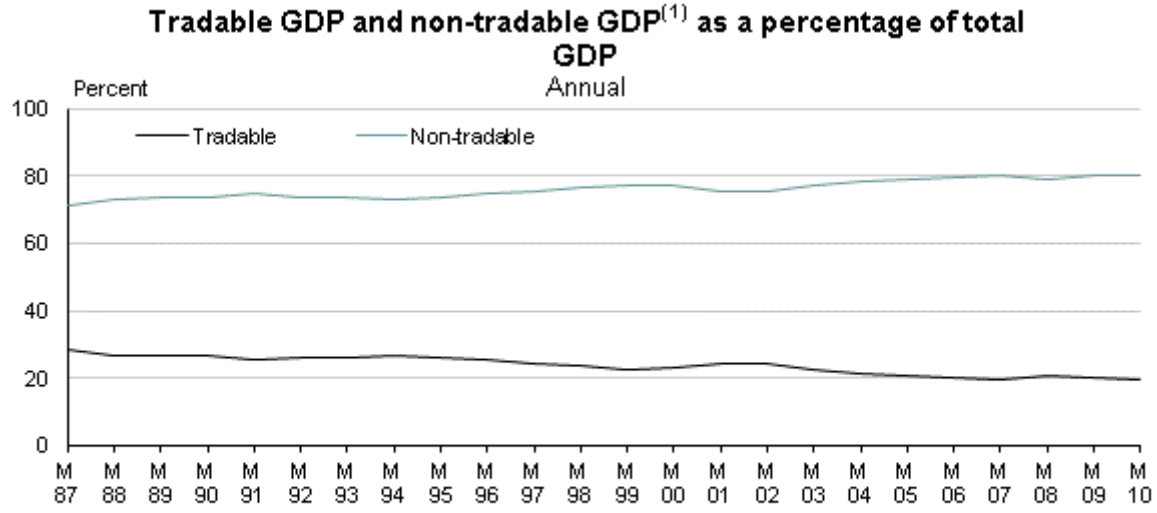
Tradable GDP	Non-tradable GDP
Agriculture, forestry, and fishing	Electricity, gas, water, and waste services
Mining	Construction
Manufacturing	Wholesale trade
	Retail trade and accommodation
	Transport, postal, and warehousing
	Information media and telecommunications
	Financial and insurance services
	Rental, hiring, and real estate services
	Professional, scientific, technical, administrative, and support services
	Public administration and safety
	Education and training
	Health care and social assistance
	Arts, recreation, and other services

Source: Statistics New Zealand

We aggregated these value-added time series via chain-linking using current price weights. This produced tradable and non-tradable time series in actual chain-volume terms expressed in 1995/96 prices. The annually updated chaining weights allow for the change in the relative size of each industry in the economy over time. The chain-volume series were seasonally adjusted to produce quarterly chain-volume seasonally adjusted series.

For the year ended March 2007 the tradable industries contributed 20 percent to total GDP in current prices. The tradable sector has slowly declined as a proportion of GDP – from about 29 percent at the beginning of the series (in 1987), to about 20 percent in 2010.

Figure 1



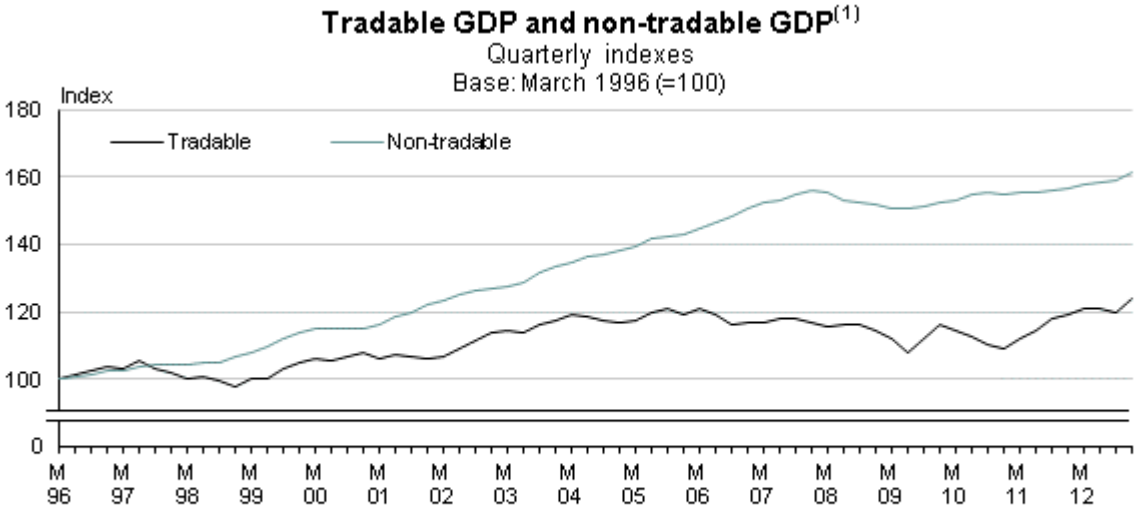
1. Current price annual series expressed in 1995/96 prices.

Source: Statistics New Zealand

The quarterly chain-volume series has a turning point in 2009 where the tradable sector begins to grow faster than the non-tradable sector (see figure 2). This reverses the trend seen particularly in the 2000s, where the gap between the relative proportions was becoming larger.

The March 1996=100 base indexes of the two series in figure 2 illustrate the relative divergence of the tradable and non-tradable sector over the past 17 years. The outward-focused tradable sector suffers to a greater extent during recessions. This is especially true for recessions that occur as a result of a deterioration of international economic conditions. For example the tradable series has noticeable declines during the Asian financial crisis of 1997, the NASDAQ collapse in 2000 and the global financial crisis of 2008. The non-tradable series was not affected to the same extent.

Figure 2



1. Seasonally adjusted chain-volume index

Source: Statistics New Zealand

This method measures the extent to which industries face international pressures in a direct sense. That is, industries that export products that face international competition or industries that compete with imported products. It therefore does not include any industries that are adding value at earlier stages of production.

For example, agriculture and manufacturing are heavy users of electricity, and this contributes a significant proportion of their intermediate consumption. However the electricity generation and electricity transmission and distribution industries are not included in the tradable sector because electricity is not directly exported.

Industries in the tradable sector will source inputs from other domestic industries that are not included in the tradable sector. These industries, while not directly facing international competition, do face it indirectly as their output is included as part of the value of exported products. In an attempt to measure this broader view of international competition, an alternative indirect method was also developed.

Using an indirect methodology to calculate the tradable non-tradable split

New Zealand's small, open economy means changes in the international economic environment affect the whole economy, not just those industries directly exposed to international competition. The proportion of indirect exposure can be estimated using the ultimate disposition table from the series of input-output tables.

The ultimate disposition table estimates the proportion of the output of each industry that is ultimately exported. This includes both direct exports and exports that go through a transformation process or multiple transformations before they are exported. Using this method and retaining the same selection criteria, only four industries at NZSOIC level 1 remain in the non-tradable sector.

Table 2
Tradable non-tradable split using the indirect methodology

Tradable GDP	Non-tradable GDP
Agriculture, forestry and fishing	Construction
Mining	Rental, hiring and real estate services
Manufacturing	Public administration and safety
Electricity, gas, water and waste services	Health care and social assistance
Wholesale trade	
Retail trade and accommodation	
Transport, postal and warehousing	
Information, media and telecommunications	
Financial and insurance services	
Professional, scientific, technical, administrative and support services	
Education and training	
Arts, recreation, and other services	

Source: Statistics New Zealand

The indirect methodology required a more strict set of criteria with higher thresholds to make the industry split useful. We selected a higher proportion of output exported to produce an industry split reflective of those industries typically regarded as facing a significant amount of international competition. Industries had to have a majority of their sub-industries with an export proportion of over 25 percent to be considered tradable.

Using this modified indirect measure, the tradable/non-tradable industry split is considerably different. The tradable sector made up 41 percent of the economy in 2010, compared with 20 percent when using the direct methodology.

Table 3
Tradable/non-tradable split using the modified indirect methodology

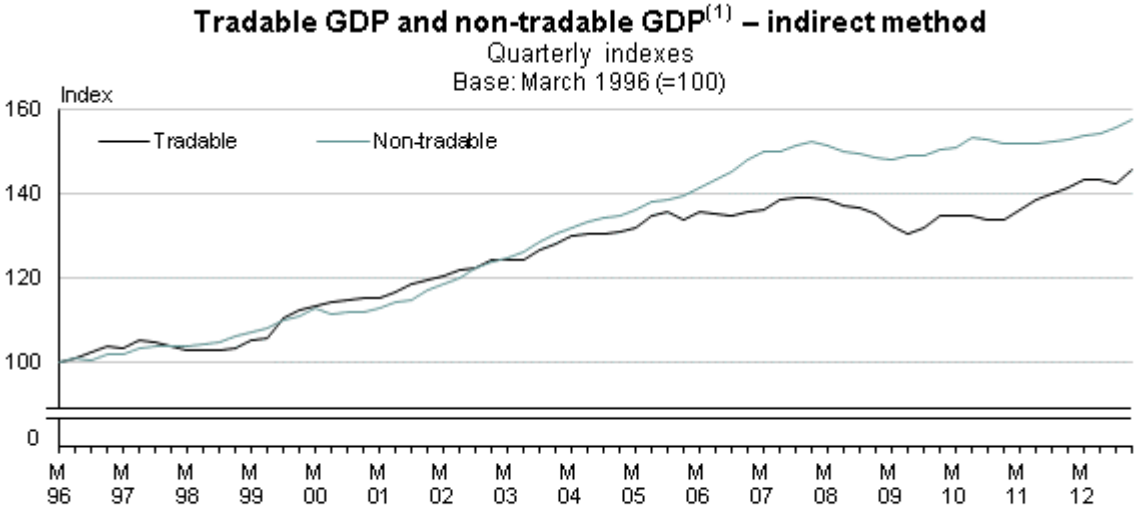
Tradable GDP	Non-tradable GDP
Agriculture, forestry and fishing	Electricity, gas, water and waste services
Mining	Construction
Manufacturing	Retail trade and accommodation
Wholesale trade	Financial and insurance services
Transport, postal and warehousing	Rental, hiring and real estate services
Information, media and telecommunications	Public administration and safety
Professional, scientific, technical, administrative and support services	Education and training
	Health care and social assistance
	Arts, recreation, and other services

Source: Statistics New Zealand

We chained the industries together using the current price annual weights as in the previous method. We then put the aggregated series through seasonal adjustment. This produced quarterly tradable and non-tradable chain-volume seasonally adjusted value-added series.

Figure 3 illustrates the growth of the tradable and non-tradable series using the modified indirect methodology. With this method, the growth in the tradable sector matches that of the non-tradable sector up to 2005. The divergence is also greatly reduced between the two series and the post-2008/09- recession recovery in the tradable sector is stronger.

Figure 3

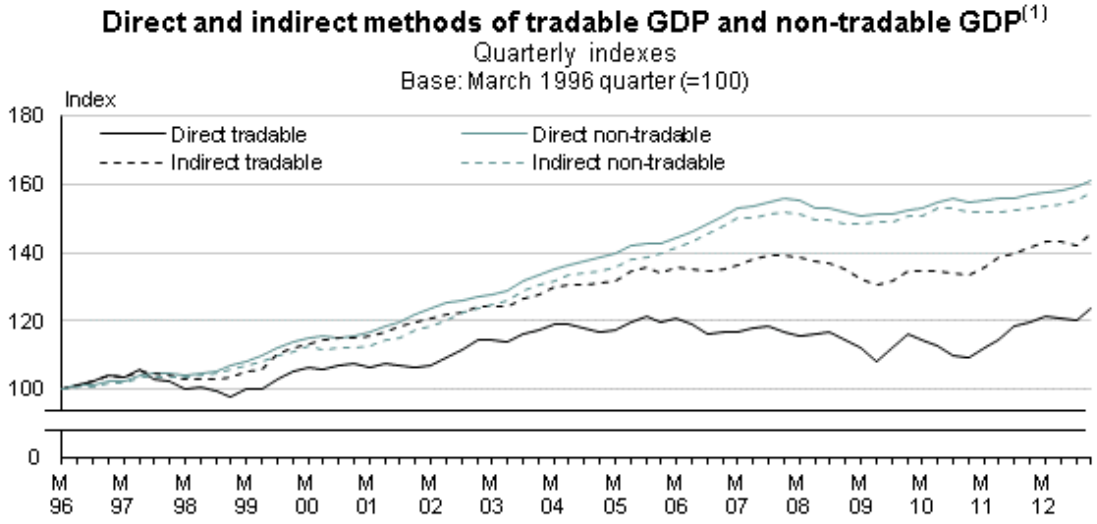


1. Seasonally adjusted chain-volume index

Source: Statistics New Zealand

Figure 4 illustrates the difference between the two methods. The main difference is the stronger growth of the tradable sector and the slightly slower growth of the non-tradable sector using the indirect method. Growth rates using either method have been similar in recent years.

Figure 4



1. Seasonally adjusted chain-volume index

Source: Statistics New Zealand

Table 4 shows that during most of the 2000s, there was divergence between the tradable and non-tradable series using either method. However, since 2008, the growth rate for the two non-tradable series has slowed considerably. Over the past couple of years the growth in the two tradable series has increased. The changes in the growth rates of these series mean that they have been growing at approximately the same rate over the past four years.

Table 4
Growth patterns in the tradable and non-tradable GDP series

Annualised growth (%)	Direct		Indirect	
	Tradable	Non-tradable	Tradable	Non-tradable
2000–08	1.1	2.8	2.0	2.7
2009–12	0.3	0.3	0.3	0.2

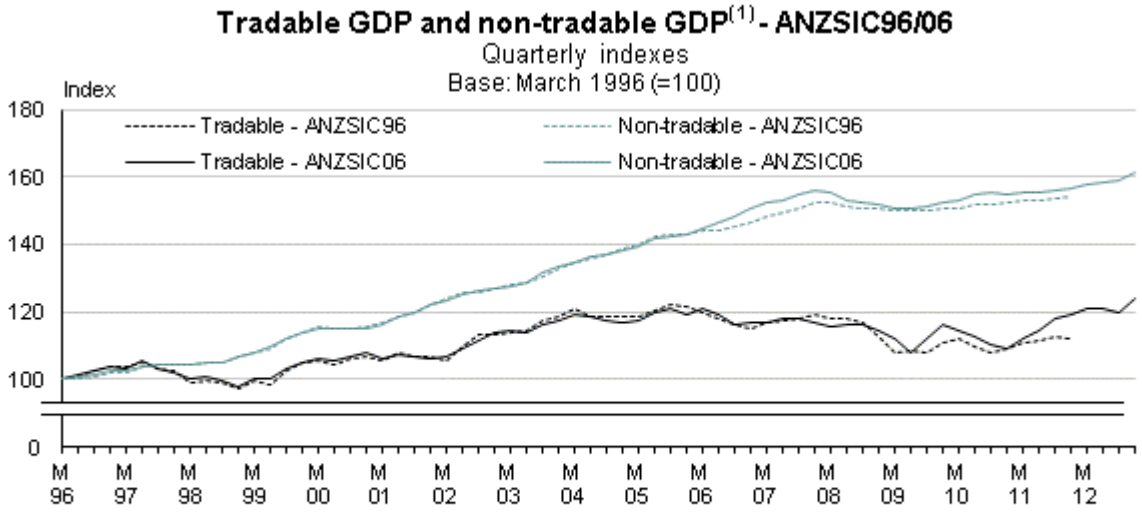
Source: Statistics New Zealand

Inter-temporal analysis

For this analysis we used the new input-output tables, for the March 2007 year. Previous analyses were completed using tables from March 1996. Although the time period between these is significant, there were no significant changes between the products bought from and sold to each industry to make a difference to the tradable sector. Therefore, the split that was used for previous analysis is the same as the current industry split. This is not surprising as the products produced by the industries that make up the tradable sector and the industries that use of these products are fairly consistent over time.

Figure 5 shows the previous tradable series produced from the older input-output tables and under the older Australia New Zealand Standard Industry Classification 1996 (ANZSIC96). This series is a sum of the tradable industries agriculture, forestry, and fishing; mining; and manufacturing. The differences between the two series are the changes to the industry classifications under ANZSIC06 (Statistics New Zealand, 2012b), the improvement of some industry methodologies, the updating of seasonal adjustment, and the effect of chain-linking (see Statistics NZ, 2013, for more information).

Figure 5



1. Seasonally adjusted chain-volume index

Source: Statistics New Zealand

Discussion

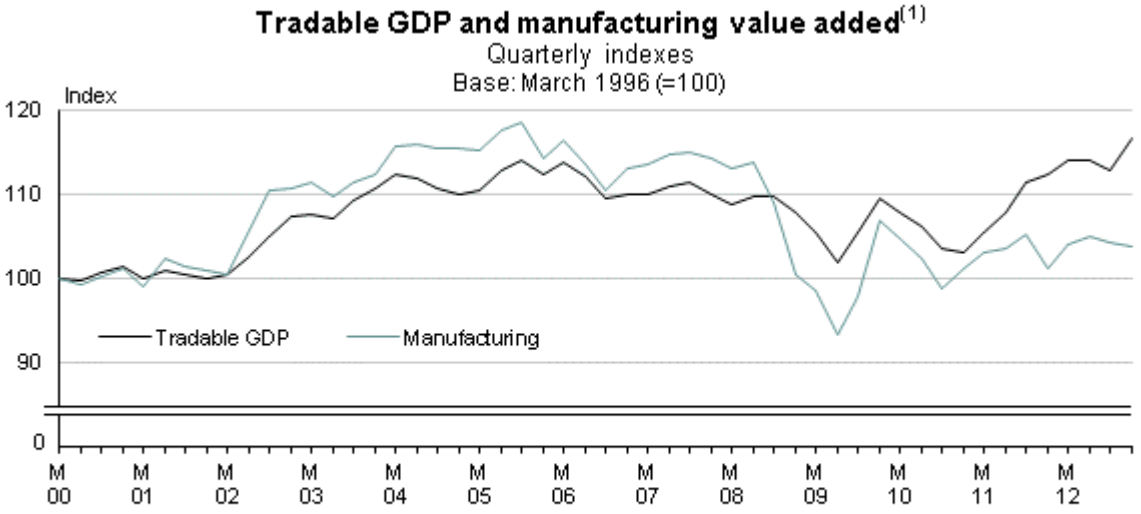
The industry split using the direct method results in a tradable sector which makes up about 20 percent of the economy for the year ended March 2010. This has slowly reduced over time, as the tradable sector has grown at a slower pace than the non-tradable sector. The divergence between the growth rates of the two series occurs mostly in the ten-year period from 1997 to 2007.

The tradable sector is composed of fewer industries and those industries are heavily exposed to shocks. As a result the tradable sector time series is more volatile than the non-tradable sector. Careful interpretation is needed when looking at specific periods of time.

In the quarterly time series, the peak in manufacturing value added was in September 2005. After this point, manufacturing declines to levels seen in 2002. Manufacturing is the largest component of the tradable sector at about 70 percent. Therefore the divergence between the tradable and non-tradable sectors increases from 2005, with the declining growth in manufacturing being the main driver.

Figure 6 illustrates how the growth in the tradable sector closely reflects the growth in the manufacturing value added series. The divergence in the past couple of years is due to the increasing influence of agriculture, forestry, and fishing, and mining industries.

Figure 6



1. Seasonally adjusted chain-volume index.

Source: Statistics New Zealand

Summary

Table 5 describes the international exposure of NZSIOC level 1 industries for the March 2007 year in current prices. The industries that exported the greatest proportion of their output were agriculture, forestry, and fishing; manufacturing; and transport, postal, and warehousing. The industries that faced the greatest proportion of imports as a proportion of total supply were manufacturing; transport, postal, and warehousing; and mining. Overall, in current prices exports were 28.6 percent of GDP for the year ended March 2007. In the year ended March 2012, exports were 30.3 percent of GDP.

Table 5

Exports and imports as a proportion of total output
Year ended March 2007
NZ$ (millions)

Industry	Percentage of GDP	Percentage of output exported[1]	Percentage of imported supply
Agriculture, forestry, and fishing	6.4	69.8	2.4
Mining	0.8	43.1	13.2
Manufacturing	12.6	51.4	20.7
Electricity, gas, water, and waste services	2.2	21.2	0.2
Construction	4.6	5.4	1.1
Wholesale trade	5.6	29.9	7.1
Retail trade and accommodation	6.7	15.8	4.6
Transport, postal, and warehousing	5.1	41.3	8.8
Information media and telecommunications	6.0	23.2	7.1
Financial and insurance services	4.9	23.1	3.2
Rental, hiring, and real estate services	12.4	6.9	1.4
Prof, scientific, technical, admin, and support	8.1	26.9	6.2
Public administration and safety	4.2	3.9	0.9
Education and training	3.2	11.9	2.2
Health care and social assistance	5.4	1.4	0.5
Arts, recreation, and other services	3.0	15.9	4.0
Gross domestic product[2]	100.0	28.9	5.9

1. This is the proportion of output exported as per the ultimate disposition table
2. Includes unallocated taxes on production and imports.

Australia and New Zealand tradable and non-tradable sectors

In 1996 the Australian Bureau of Statistics (ABS) produced an experimental tradable series using a method similar to our direct method. The industry split was also similar. Their series ranges from 1974 to 1990. The ABS made the split at a lower level and the proportion of total industry included in the tradable sector is given in parentheses in table 6.

Table 6
The tradable and non-tradable sectors for Australia and New Zealand

Tradable GDP	New Zealand	Australia
	Agriculture, forestry and fishing	Agriculture, forestry and fishing (89%)
	Mining	Mining (89%)
	Manufacturing	Manufacturing (92%)
		Transport
		Other services (6.7%)

Source: Statistics New Zealand

Notable differences are that the ABS have included some services as tradable and have excluded parts of agriculture, forestry, and fishing; mining; and manufacturing. Although their

analysis makes the split at a lower level, the final size of the tradable sector and the growth rates are similar.

The main conclusions are also similar. For example the ABS notes that the manufacturing industry dominates the tradable sector and that the tradable sector declines as a percentage of GDP over their time series. The relative size of the tradable sector in each country was also similar at 25.8 percent of Australia's GDP in 1990, and 25.0 percent of New Zealand's GDP in the same year.

The global financial crisis and the 2008/09 recession

The global financial crisis and the recession of 2008/09 had a large effect on the tradable sector. In quarterly chain-volume seasonally adjusted terms, the December 2007 to June 2009 peak-to-trough fall was 5.7 percent. The non-tradable sector's decline was relatively smaller, at 1.8 percent.

Table 7
2008/09 economic recession and recovery

December 2007 to June 2009	Tradable sector	Non-tradable sector
	%	%
Peak-to-trough percent fall	5.7	1.8
Post-recession recovery	11.6	8.0
Growth above December 2007	5.2	6.1

The tradable sector faces variable conditions, including changes in commodity prices. The commodity price index fell sharply in the latter part of the recession, but rebounded strongly in 2010 and 2011. The NZD/USD exchange rate was also volatile through 2008 and 2009.

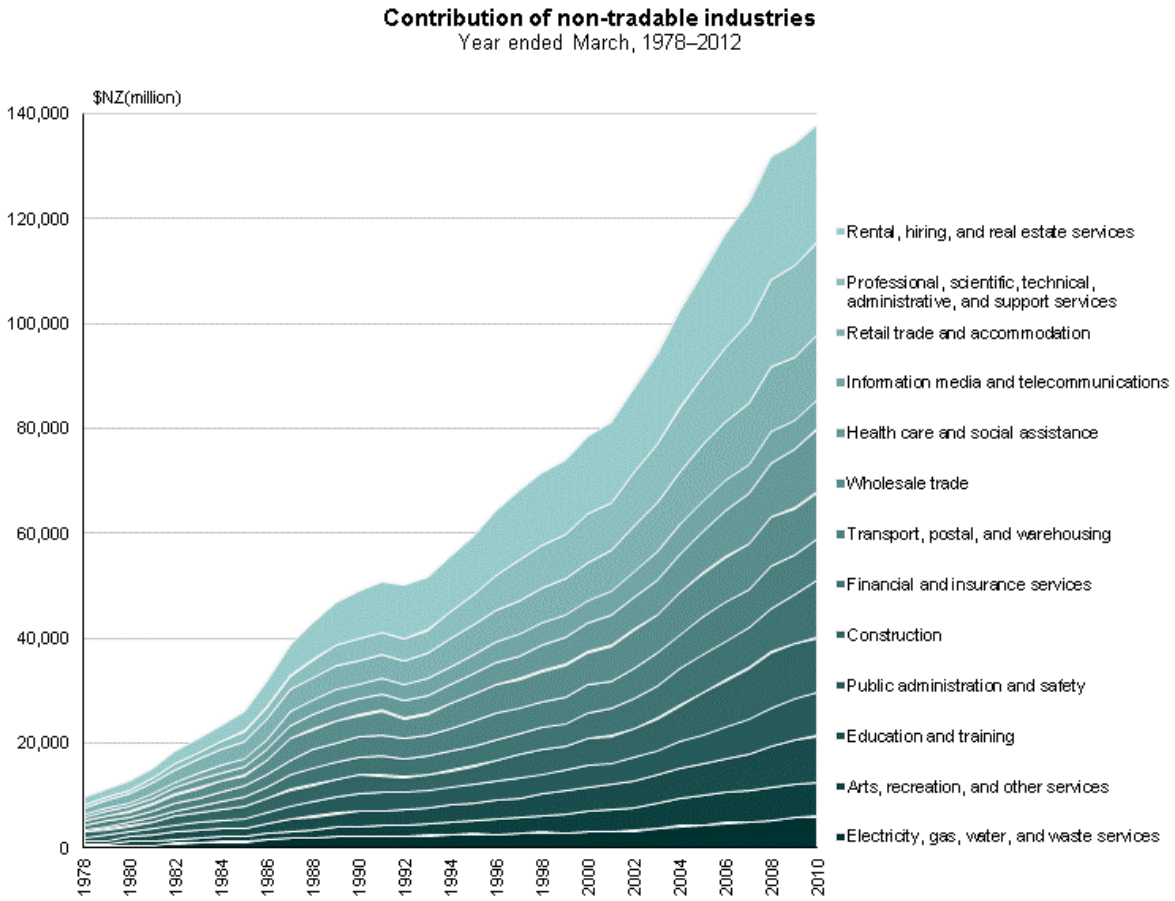
The general trend in commodity prices has also been positive, with an average annual growth of 3.7 percent since March 2000. The tradable sector has recovered from the recession, and in December 2012 surpassed the highest level from September 2007 by 4.7 percent.

The non-tradable sector

The non-tradable sector is made up predominately of service industries. This sector has been growing at a faster rate than the non-tradable sector and as a result there has been a shift in the relative importance of each sector with regards to GDP.

This shift away from goods production and into services is a common phenomenon in advanced economies as they move towards activities that add more value.

Figure 7



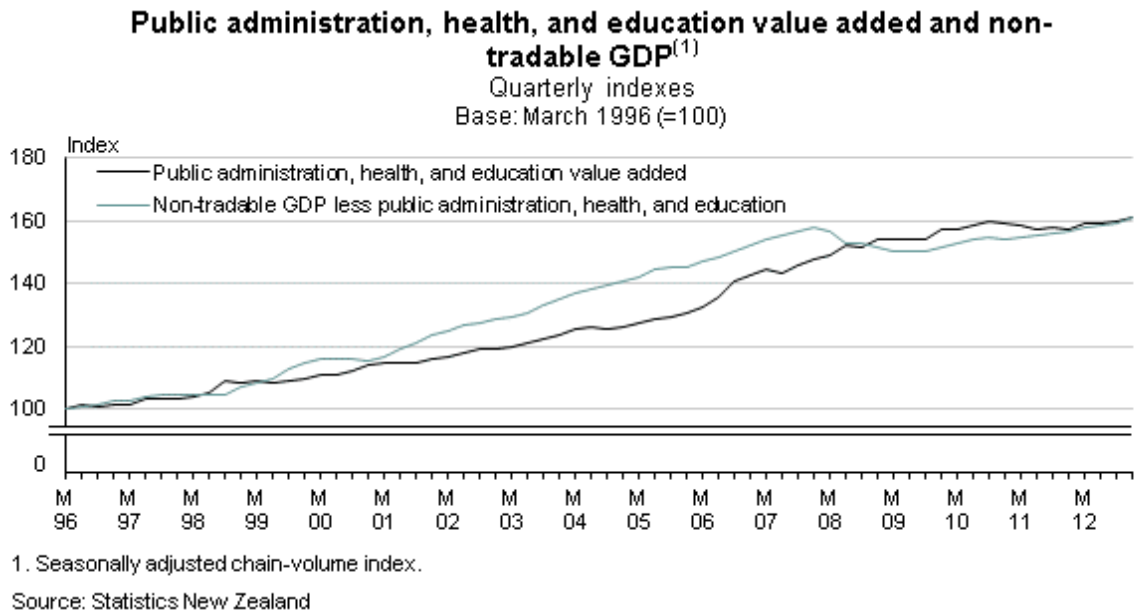
Source: Statistics New Zealand

Non-market services – public administration, health, and education

The growth in public administration and safety, health care and social assistance, and education and training value added has been typical of growth in the non-tradable sector. These three industries combined have grown from 13.6 to 16.6 percent of the economy from 2000 to 2010, with much of that growth occurring after 2003. This indicates that there has been a slightly higher growth in these services relative to the entire economy in the past 10 years.

Figure 8 shows growth in these primarily non-market (there is a market component) industries relative to non-tradable GDP. The March 1996 base index shows that growth in non-market services has generally been lower. The 2008/09 recession caused negative growth in the non-tradable sector, and an increase in public administration, health, and education activity from 2006 has reduced the difference in overall growth rates from the year ended March 1996 to virtually zero.

Figure 8



1. Seasonally adjusted chain-volume index.

Source: Statistics New Zealand

Since the 2008/09 recession, however, growth in general government has been muted, growing at an annualised rate of 1.9 percent since the year ended March 2008. This compares with 3.7 percent annualised growth from 2000 to 2008. Health care and education are more 'recession proof' as their growth rates are not significantly different before or after the recession.

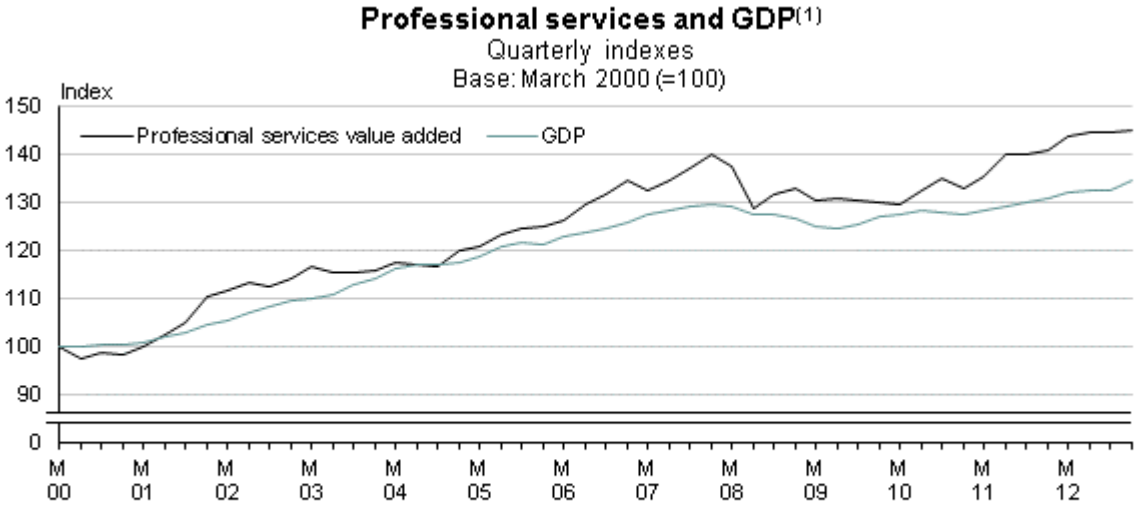
Furthermore, in 2010 the public administration, health, and education industries were only 16.6 percent of the economy, and made up only 21.1 percent of the non-tradable sector. Therefore the relative stability in the rate of growth of these series means that total non-tradables is not heavily influenced by these service industries that are primarily non-market.

Market services

Professional, scientific, technical, administration, and support services

Professional services generally grow at a faster rate than other industries in western economies. In New Zealand, professional services have grown at an average annual rate of 2.9 percent since 2000. In comparison, total GDP has grown at an average rate of 2.4 percent annually.

Figure 9



1. Seasonally adjusted chain-volume index.

Source: Statistics New Zealand

Industries of particular interest

For many of the industries in the New Zealand economy, it is relatively straightforward whether they are tradable or non-tradable. The most obvious examples are the manufacturing industry, because the output produced is subject to international competition, and public administration and defence, where the output clearly isn't subject to international competition.

Some other industries are not quite as straightforward as the examples above, so we will discuss these in more detail and explain the rationale for classifying them as either tradable or non-tradable.

Information media and telecommunications

Information media and telecommunications comprises mostly what used to be communications under the previous industry classification (ANZSIC96). One of the major changes in this industry from the previous classification is that postal services has moved to transportation, postal, and warehousing. This classification now comprises:

- publishing (except Internet and music publishing)
- motion picture and sound recording activities
- broadcasting (except Internet)
- Internet publishing and broadcasting
- telecommunications services
- Internet service providers, web search portals, and data processing services
- library and other information services.

Telecommunication services is the largest contributor to value added in this industry. On the face of it, it may seem that telecommunications is subject to international price pressures. Fast-changing technology means that the price of telecommunications effectively falls as you get more for the same price. For example, the number of gigabytes used, the amount of data in plans, and the speed of the connection has consistently increased while the actual price paid has been relatively stable.

While the pace of technological change is important, to supply telecommunications services such as line rental or cellular phone services, a large amount of domestic fixed capital investment is

needed – which is currently not subject to any foreign competition. Therefore these parts of telecommunications are likely to remain as non-tradable industries.

Retail trade and accommodation

In the input-output tables, the retail trade and accommodation industry has a relatively high proportion of exports (12 percent). At NZSIOC level 2, it is observed that most of these exports of services originate from the accommodation and food services sub-industries. The retail trade component is much larger than the accommodation component, and since the retail component has a very small proportion of exports the industry does not meet the criteria to qualify as a tradable industry

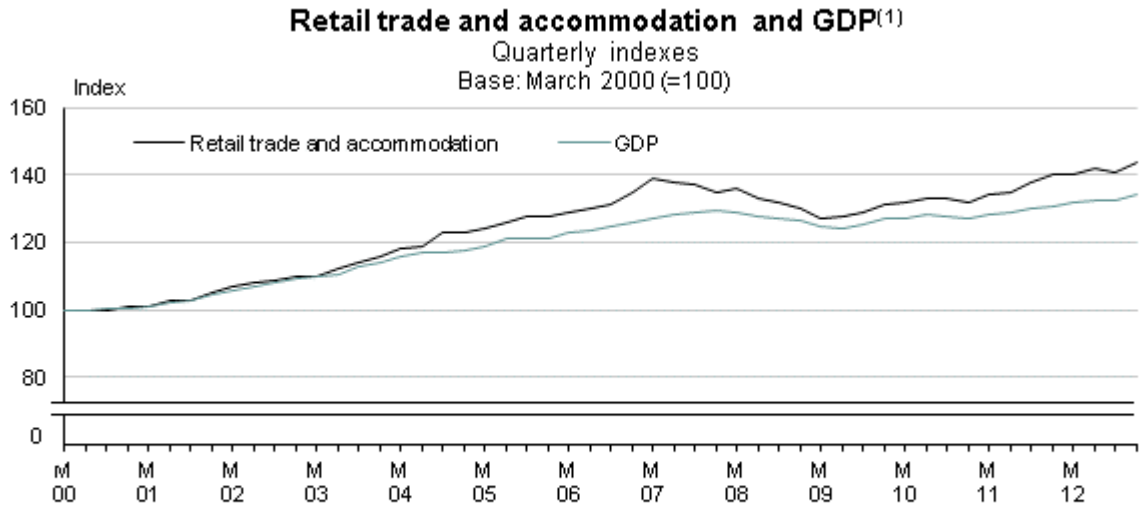
The accommodation sub-industry has a significant proportion of exports because of how visitors to New Zealand are treated in the macroeconomic accounts. In the balance of payments and national accounts, foreign visitors to New Zealand are treated as non-residents, and therefore anything they purchase is treated as an export. The purchaser has to be physically present in the country for New Zealand to export it. This is known as mode 2 of supply.

This is how accommodation services in particular can be shown to have exports. We do not actually export hotels, but the service they provide becomes an export when purchased by a visitor to New Zealand. Since the purchaser has to be physically present, the goods and services are not subject to international competition.

It is true that New Zealand as a tourist destination is subject to international competition – someone may decide to visit Australia instead if they see it as better value for money – but once a visitor is actually here, the prices for accommodation, meals, souvenirs, and such are subject only to domestic competition. For this reason, it could be argued that accommodation services are not truly tradable, even if they export a large proportion of their output.

Figure 10 shows the relative strength in the growth of retail and accommodation relative to the entire economy over the past 12 years.

Figure 10



1. Seasonally adjusted chain-volume index

Source: Statistics New Zealand

Electricity, gas, water, and waste services

Electricity generation is the largest component of this industry. It is driven by demand for electricity.

There is an argument to apply the indirect principle to the electricity industry because New Zealand manufacturers are large consumers of electricity, and their output is subject to global competition. For example the metal product manufacturing industry consumes a relatively large proportion of domestically produced electricity. Therefore indirectly, global competition can affect the national demand for electricity.

For the year ended March 2007 the electricity, gas, water, and waste industry indirectly exported 21 percent of their output. Because this level is relatively low, we have decided not to apply the indirect principle to the electricity, gas, water, and waste industry.

Financial and insurance services

The financial and insurance service industry is also subject to foreign pressures, and therefore arguably tradable. The industry sources much of their funding from abroad. However, the method uses the degree to which the industries output is subject to international competition. There are not significant imports or exports of financial and insurance services.

Education and training

Education and training has a tradable element in foreign fee-paying students. Foreign students studying in New Zealand are treated as a subset of travel exports, regardless of how long they stay. Like retail and accommodation exports, exports of education services to foreign fee-paying students is mostly mode 2 supply (consumption abroad) of services. The students are generally present in New Zealand, although this could change with courses being offered via the Internet.

Education and training is not included in tradable GDP simply because of the small number of foreign fee-paying students compared with overall student numbers.

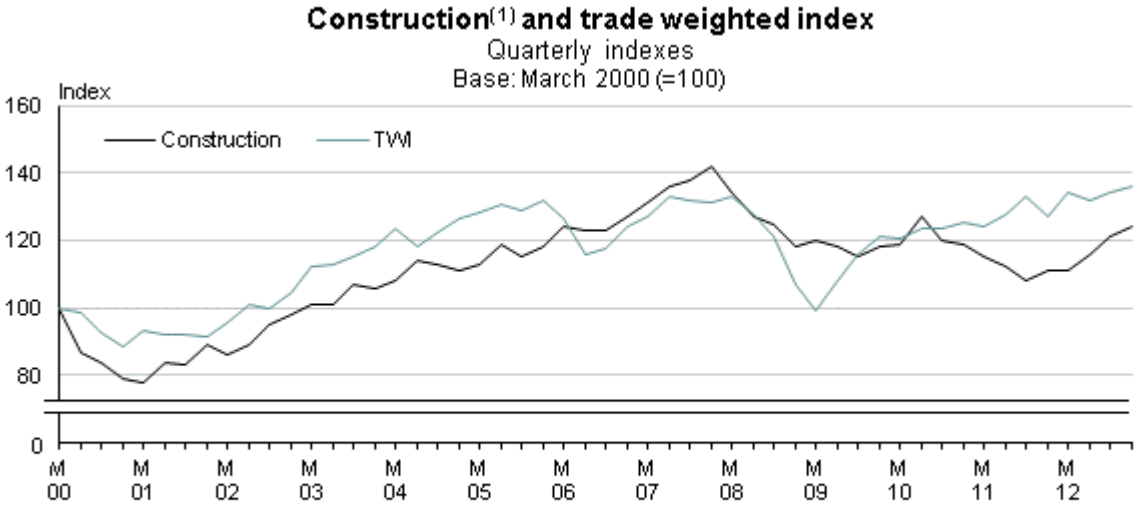
Transport, postal, and warehousing

Transport and supporting services do face some international competition. For example non-resident shipping companies and international air freight services are highly competitive industries. This industry also includes sub-industries that rely on local infrastructure and are therefore not as exposed to international competition, for instance, road transport; postal, courier and delivery services; and warehousing and storage services. Currently the sub-industries that are non-tradable make up a greater share of the total industry, so at NZSIOC level 1 the industry is considered non-tradable.

Construction

The construction industry, while not in the tradable sector, is exposed to international influence. For example, the domestic demand for housing or commercial buildings is influenced by global credit conditions and the value of the New Zealand dollar. Figure 11 shows the level of construction value added and the trade weighted index.

Figure 11



1. Seasonally adjusted chain-volume index

Source: Statistics New Zealand

Exports of services

Exports of services are included in some models of tradable and non-tradable GDP. In this paper, we focus on the value added of industries – also known as the production measure of GDP.

Exports of services are a category in the expenditure measure of GDP, which is a different approach to measuring GDP based on the final use of goods and services produced in an economy.

With the approach that we have taken – to categorise an industry as either tradable or non-tradable based on how subject to foreign competition it is – most service industries are unlikely to be classified as tradable. For most service industries, the level of exports is a much smaller proportion than what is consumed domestically. This is why some models include exports of services in their measures of tradable GDP, noting that this is mixing different conceptual measures of GDP.

Conclusions

Tradable distinction interesting – but industries matter

This paper highlights that no matter what method you use to construct tradable and non-tradable GDP, it is the industry data underneath that explains what is going on. In the absence of industry data explanations the debate of tradable and non-tradable GDP becomes too simplistic.

The industry dimension is crucial to explaining the movements over time in tradable and non-tradable GDP.

Moreover, it is important not to ascribe value judgements to what the size of particular sectors of the economy 'should' be. For example, a common misconception is that non-tradable GDP industries are 'not productive', and in some cases it is argued that increased non-tradable GDP reflects a burgeoning government sector.

In fact, the public administration and defence, health care and social assistance, and education and training industries made up just 16.6 percent of the economy in 2010. These industries do not greatly influence the growth of non-tradable GDP because of their relatively small size and because their growth is similar that of non-tradable GDP over the long term. The growth in non-tradable industries is primarily driven by the market services industries.

Non-tradable industries can still face market competition – the key point is that they don't face international competition directly. The nature of services industries means that currently a much higher proportion of the output of these industries are consumed domestically rather than exported.

A growing services sector and declining manufacturing is common

The data shows that the growth of the services industries is contributing to the growing gap between tradable and non-tradable proportions of GDP. And this phenomenon is totally consistent with a modern economy that has an increasing share of services.

An IMF working paper on the declining importance of tradable goods manufacturing (Hunt, 2009) reiterates that a declining manufacturing sector and increasing services sector is expected in a modern economy:

"A common feature of economic development is the evolving composition of production. Early in the development process, the share of agricultural output in GDP declines and the share of manufactured goods increases (industrialization). Once economies reach a certain level of wealth, the share of goods production in GDP starts to decline and the share of services increases (deindustrialization)."

Is the tradable / non-tradable distinction really relevant?

It is well known that New Zealand is a small and open economy and as such is vulnerable to external shocks.

The distinction between whether an industry is tradable or non-tradable is essentially subjective. In our analysis, we included the value added of agriculture, but could have included financial and insurance services, or information media and telecommunications. The subjective nature of classification, along with the lack of an international definition means the results can be interpreted in a variety of ways. Therefore it would be more objective and more insightful to analyse the performance of industries relative to each other, rather than the performance of an arbitrary tradable non-tradable GDP split.

Another key point that this paper has highlighted, is that if you include all the indirectly tradable industries – their output becomes intermediate consumption for a tradable industry – you would include nearly the entire New Zealand economy. This result merely reiterates that New Zealand is a small, open economy, and in a sense, the whole economy is tradable.

Publishing tradable and non-tradable GDP as a regular output

Based on the results of this paper, it is possible for Statistics NZ to publish regular tradable and non-tradable GDP series if there is demand from users.

The advantage of Statistics NZ producing an official series of tradable and non-tradable GDP is that policy makers can focus on informed decision making and debate instead of producing data.

It makes sense for Statistics NZ to produce this data along with the regular GDP releases to take advantage of existing systems, knowledge, and processes. An example of this kind of benefit is the application of chain-linking to the series. The results published in this paper represent the first time that such a series has been chain-linked, which means that the relative weights of each industry are updated annually.

Further improvements to the tradable and non-tradable GDP series can be introduced as other improvements are implemented in the national accounts.

Future developments

The analysis in this paper was not extended to productivity comparisons between the tradable and non-tradable sectors, but because of industry allocation approach we used this could easily be done. Statistics NZ produces productivity measures by industry. As with value added, it is the industry dimension that would be used to explain any differences in the productivity performance of the tradable and non-tradable sectors.

Statistics NZ is currently researching the feasibility of doing supply–and-use balancing with volume series. Supply-and-use in both current prices and in volumes requires a significant amount of data to be done properly (both for values and prices) but has the advantage of allowing lower level analysis of volume series.

A project to create a prototype for this is currently underway. If formally adopted in the future, it will enable lower-level volume series for GDP. If this becomes available in the future, the tradable and non-tradable split used in this paper will be revisited.

References

Dwyer, J (1992). The tradable non-tradable dichotomy: A practical approach. *Australian Economic Papers, 31*(59), 443–459.

Dixon, H, Griffiths, D, Lawson, L (2004). Exploring tradable and non-tradable inflation in consumer prices (New Zealand Association of Economists conference paper). Available from www.stats.govt.nz.

Hunt, B (2009). The declining importance of tradable goods manufacturing in Australia and New Zealand: How much can growth theory explain? (IMF Working Paper No 90/16(200), 1–15). Available from www.imf.org.

Knight, G, & Johnson, L. (1997). Tradables – developing outputs and price measures for Australia's tradable and non-tradable sectors (Working Paper No 97/1, ABS Catalogue No. 1351.0). Available from www.abs.gov.au.

Officer, LH, & Goldstein, M (1979). New measures of prices and productivity for tradable and nontradable goods. *The Review of Income and Wealth, 25*(4), 413–427.

Organisation for Economic Co-operation and Development (2013a). OECD/WTO trade in value added: (TiVA) concepts, methodologies and challenges. Available from www.oecd.org.

Organisation for Economic Cooperation and Development (2013b). OECD/WTO trade in value added (TIVA) indicators (PDF, 150 kb). Available from www.oecd.org.

Statistics New Zealand (2012a). National Accounts input-output tables: year ended March 2007. Available from www.stats.govt.nz.

Statistics New Zealand (2012b). Gross Domestic Product: December 2011 quarter (new industry classification). Available from www.stats.govt.nz.

Statistics New Zealand (2013). Quarterly gross domestic product: Sources and methods (third edition). Available from www.stats.govt.nz.

Treasury (2012). Special Topic: Tradable sector in New Zealand. Monthly Economic Indicators, April 2012. Available from http://www.treasury.govt.nz.

United Nations (2008). System of National Accounts 2008. Available from http:// unstats.un.org.

Appendix I – input-output tables

This analysis of the tradables and non-tradables sector draws on the information in the input-output tables produced by the national accounts. The latest tables were released in July 2012 and were for the year ended March 2007. These tables are the first to be published under the new ANZSIC06 industry and NA06CC product classifications. These new classifications better reflect the modern New Zealand economy.

Input-output tables describe the structure of an economy. Specifically, they show the relationship between industries, the goods and services the industries produce, and which industries use these goods and services.

Input-output tables are a useful analytical tool, as their uses include:

- estimating the effect of changes in one industry on key economic variables
- estimating the impact of a change in the export sector on the total economy
- exploring the reliance of industries on imports, and estimating their contribution to exports.

These input-output tables cover 106 industries and 205 products. This analysis utilized the supply-and-use tables. The supply table describes the supply of products into the economy including both domestic production and imports. The use table describes how these products are used, including both domestic consumption and exports. The products in these two tables are reconciled in the supply-use framework so that total supply equals total use.

The supply-and-use tables are used to determine the relative exposure to international competition. This is determined either through the proportion of products produced in an industry that are exported or the proportion of products produced by an industry that face competition via imports. Industries that face international competition, either via import substitution and/or export competition over a certain threshold, are included as a 'tradable' industry. Industries that do not meet either of the categories are considered 'non-tradable' industries.

The ultimate disposition table is used to measure the direct and the indirect exposure to export competition. This table allows users to calculate the proportion of each product that is ultimately exported. As this method includes indirectly exported products, the industries included in the tradable sector are different.

For example, raw milk is not exported, but milk powder, butter, and cheese are. Under the ultimate disposition table, the raw milk used in the manufacturing process which produces these exported products is included in exports.

Appendix II – Other approaches to measuring tradable GDP

In the absence of an official series of tradable GDP, users have created their own series.

The Treasury approach

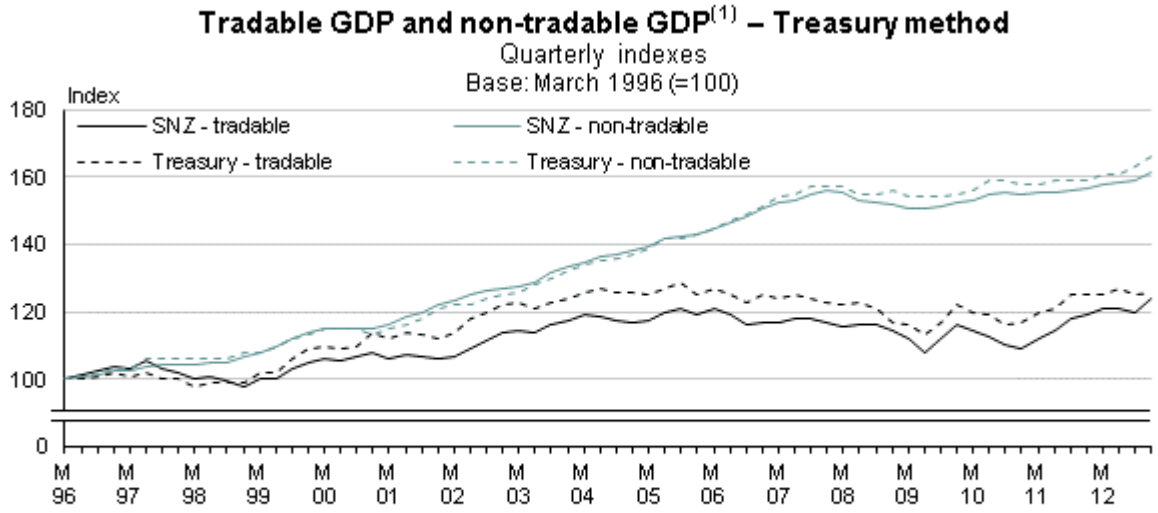
The Treasury has been creating a tradable GDP series for some time.

Using a "... simple approach that tracks changes in tradable sector output based on industries judged most likely to produce tradable output – the primary sector (agriculture, forestry and logging, fishing and mining) and manufacturing. The volume of value-added production GDP in these industries is then added to the volume of service exports (expenditure GDP) using quarterly seasonally-adjusted data." (Treasury, 2012.)

There are some differences between the Treasury series and the series produced in this paper. For example, the treasury methodology includes those industries that "…imported a large share of their inputs". The Treasury series includes the export of services from expenditure GDP as a proxy of tradable services. Also, the Treasury series used the input-output tables from 1996 and the quarterly series under the older ANZSIC96 industry classification as the series was produced before the new industry classifications were available.

Although there are numerous differences, the resulting growth rates are similar. In figure 12 the Treasury series was reproduced using the ANZSIC06 classification. This is the sum of agriculture, forestry, and fishing; mining; manufacturing; and the export of services. The Statistics NZ tradable and non-tradable series using the direct method are included for comparison.

Figure 12



1. Seasonally adjusted chain-volume index

Source: Statistics New Zealand

Appendix III – NZSIOC level 2

Classification - ANZSIC06 New Zealand Standard Industrial Output Categories (NZSIOC)

Level 1	**Level 2**	
AA	**Agriculture, forestry and fishing**	
	AA1	Agriculture
	AA2	Forestry and logging
	AA3	Fishing, aquaculture and agriculture, forestry and fishing support services
BB	**Mining**	
	BB1	Mining
CC	**Manufacturing**	
	CC1	Food, beverage and tobacco product manufacturing
	CC2	Textile, leather, clothing and footwear manufacturing
	CC3	Wood and paper products manufacturing
	CC4	Printing
	CC5	Petroleum, chemical, polymer and rubber product manufacturing
	CC6	Non-metallic mineral product manufacturing
	CC7	Metal product manufacturing
	CC8	Transport equipment, machinery and equipment manufacturing
	CC9	Furniture and other manufacturing
DD	**Electricity, gas, water and waste services**	
	DD1	Electricity, gas, water and waste services
EE	**Construction**	
	EE1	Construction
FF	**Wholesale trade**	
	FF1	Wholesale trade
GH	**Retail trade and accommodation**	
	GH1	Retail trade
	GH2	Accommodation and food services
II	**Transport, postal and warehousing**	
	II1	Transport, postal and warehousing
JJ	**Information media and telecommunications**	
	JJ1	Information media and telecommunications
KK	**Financial and insurance services**	
	KK1	Financial and insurance services
LL	**Rental, hiring and real estate services**	
	LL1	Rental, hiring and real estate services
	LL2	Owner-occupied property operation
MN	**Professional, scientific, technical, administrative and support services**	
	MN1	Professional, scientific and technical services
	MN2	Administrative and support services
OO	**Public administration and safety**	
	OO1	Local government administration
	OO2	Central government administration, defence and public safety
PP	**Education and training**	
	PP1	Education and training
QQ	**Health care and social assistance**	
	QQ1	Health care and social assistance
RS	**Arts, recreation and other services**	
	RS1	Arts and recreation services
	RS2	Other services

Appendix IV – Tradable/non-tradable industry breakdown

Industry		% Contribution to GDP	Import competition					Export orientation					
			%	10%	20%	30%	40%	%	10%	20%	30%	40%	
AA	Horticulture and fruit grow ing	0.71	8.68	No	No	No	No	45.32	Yes	Yes	Yes	Yes	Tradable
	Sheep, beef cattle, and grain farming	1.36	2.12	No	No	No	No	5.96	No	No	No	No	Non-tradable
	Dairy cattle farming	1.77	0.30	No	No	No	No	1.03	No	No	No	No	Non-tradable
	Poultry, deer, and other livestock farming	0.17	6.00	No	No	No	No	20.43	Yes	Yes	No	No	Tradable
	Forestry and logging	0.58	0.28	No	No	No	No	22.32	Yes	Yes	No	No	Tradable
	Fishing and aquaculture	0.16	5.20	No	No	No	No	18.96	Yes	No	No	No	Tradable
	Agriculture, forestry, and fishing support services	0.74	1.90	No	No	No	No	4.54	No	No	No	No	Non-tradable
BB	Coal mining	0.14	10.94	Yes	No	No	No	57.72	Yes	Yes	Yes	Yes	Tradable
	Oil and gas extraction	0.63	16.27	Yes	No	No	No	17.10	Yes	No	No	No	Tradable
	Metal ore and non-metallic mineral mining and quarrying	0.30	10.54	Yes	No	No	No	26.72	Yes	Yes	No	No	Tradable
	Exploration and other mining support services	0.15	7.99	No	No	No	No	8.34	No	No	No	No	Non-tradable
CC	Meat and meat product manufacturing	1.27	4.08	No	No	No	No	67.72	Yes	Yes	Yes	Yes	Tradable
	Seafood processing	0.26	9.95	No	No	No	No	77.20	Yes	Yes	Yes	Yes	Tradable
	Dairy product manufacturing	1.17	4.56	No	No	No	No	73.91	Yes	Yes	Yes	Yes	Tradable
	Fruit, oil, cereal, and other food product manufacturing	1.23	18.17	Yes	No	No	No	30.64	Yes	Yes	Yes	No	Tradable
	Beverage and tobacco product manufacturing	0.78	12.88	Yes	No	No	No	30.72	Yes	Yes	Yes	No	Tradable
	Textile and leather manufacturing	0.26	17.21	Yes	No	No	No	52.93	Yes	Yes	Yes	Yes	Tradable
	Clothing, knitted products, and footw ear manufacturing	0.19	52.20	Yes	Yes	Yes	Yes	50.85	Yes	Yes	Yes	Yes	Tradable
	Wood product manufacturing	0.89	4.18	No	No	No	No	31.79	Yes	Yes	Yes	No	Tradable
	Pulp, paper, and converted paper product manufacturing	0.53	19.80	Yes	No	No	No	38.26	Yes	Yes	Yes	No	Tradable
	Printing	0.52	11.76	Yes	No	No	No	9.80	No	No	No	No	Non-tradable
	Petroleum and coal product manufacturing	0.42	33.96	Yes	Yes	Yes	No	13.01	Yes	No	No	No	Tradable
	Basic chemical and basic polymer manufacturing	0.19	39.86	Yes	Yes	Yes	No	43.20	Yes	Yes	Yes	Yes	Tradable
	Fertiliser and pesticide manufacturing	0.17	34.61	Yes	Yes	Yes	No	12.82	Yes	No	No	No	Tradable
	Pharmaceutical, cleaning, and other chemical manufacturing	0.25	37.09	Yes	Yes	Yes	No	30.59	Yes	Yes	Yes	No	Tradable
	Polymer product and rubber product manufacturing	0.72	32.15	Yes	Yes	Yes	No	21.92	Yes	Yes	No	No	Tradable
	Non-metallic mineral product manufacturing	0.61	15.01	Yes	No	No	No	4.48	No	No	No	No	Non-tradable
	Primary metal and metal product manufacturing	0.69	27.73	Yes	Yes	No	No	41.91	Yes	Yes	Yes	Yes	Tradable
	Fabricated metal product manufacturing	1.17	18.24	Yes	No	No	No	14.33	Yes	No	No	No	Tradable
	Transport equipment manufacturing	0.59	35.45	Yes	Yes	Yes	No	28.99	Yes	Yes	No	No	Tradable
	Electronic and electrical equipment manufacturing	0.68	45.35	Yes	Yes	Yes	Yes	45.51	Yes	Yes	Yes	Yes	Tradable
	Machinery manufacturing	0.73	38.26	Yes	Yes	Yes	No	33.94	Yes	Yes	Yes	No	Tradable
	Furniture manufacturing	0.28	30.50	Yes	Yes	Yes	No	13.25	Yes	No	No	No	Tradable
	Other manufacturing	0.12	49.28	Yes	Yes	Yes	Yes	63.44	Yes	Yes	Yes	Yes	Tradable
DD	Electricity generation and on-selling	1.32	0.10	No	No	No	No	0.18	No	No	No	No	Non-tradable
	Electricity transmission and distribution	0.95	0.40	No	No	No	No	0.47	No	No	No	No	Non-tradable
	Gas supply	0.15	0.88	No	No	No	No	0.62	No	No	No	No	Non-tradable
	Water supply	0.24	0.02	No	No	No	No	0.12	No	No	No	No	Non-tradable
	Sew erage and drainage services	0.15	0.00	No	No	No	No	0.00	No	No	No	No	Non-tradable
	Waste collection, treatment, and disposal services	0.25	0.23	No	No	No	No	0.19	No	No	No	No	Non-tradable
EE	Residential building construction	0.87	0.43	No	No	No	No	0.09	No	No	No	No	Non-tradable
	Non-residential building construction	0.54	2.48	No	No	No	No	0.55	No	No	No	No	Non-tradable
	Heavy and civil engineering construction	1.64	0.23	No	No	No	No	0.13	No	No	No	No	Non-tradable
	Construction services	3.18	1.59	No	No	No	No	1.13	No	No	No	No	Non-tradable
FF	Basic material w holesaling	1.03	4.54	No	No	No	No	16.11	Yes	No	No	No	Tradable
	Machinery and equipment w holesaling	1.67	9.62	No	No	No	No	9.74	No	No	No	No	Non-tradable
	Motor vehicle and motor vehicle parts w holesaling	0.38	6.02	No	No	No	No	7.22	No	No	No	No	Non-tradable
	Grocery, liquor, and tobacco product w holesaling	0.73	2.55	No	No	No	No	11.97	Yes	No	No	No	Tradable
	Other goods and commission based w holesaling	1.71	8.46	No	No	No	No	13.84	Yes	No	No	No	Tradable
GH	Motor vehicle and parts retailing	0.73	7.36	No	No	No	No	6.17	No	No	No	No	Non-tradable
	Fuel retailing	0.16	0.32	No	No	No	No	4.45	No	No	No	No	Non-tradable
	Supermarket and grocery stores	1.04	0.62	No	No	No	No	6.55	No	No	No	No	Non-tradable
	Specialised food retailing	0.26	1.49	No	No	No	No	11.28	Yes	No	No	No	Tradable
	Furniture, electrical, and hardw are retailing	1.21	1.58	No	No	No	No	5.19	No	No	No	No	Non-tradable
	Recreational, clothing, footw ear, and personal accessory retailing	0.81	0.76	No	No	No	No	4.21	No	No	No	No	Non-tradable
	Department stores	0.55	0.24	No	No	No	No	4.21	No	No	No	No	Non-tradable
	Other store based retailing; non-store and commission based retailing	0.67	7.18	No	No	No	No	7.05	No	No	No	No	Non-tradable
	Accommodation	0.71	20.31	Yes	Yes	No	No	41.92	Yes	Yes	Yes	Yes	Tradable
	Food and beverage services	1.46	4.56	No	No	No	No	20.14	Yes	Yes	No	No	Tradable
II	Road transport	1.43	4.01	No	No	No	No	4.28	No	No	No	No	Non-tradable
	Rail transport	0.14	10.49	Yes	No	No	No	10.86	Yes	No	No	No	Tradable
	Other transport	0.22	-14.85	No	No	No	No	26.73	Yes	Yes	No	No	Tradable
	Air and space transport	0.59	32.82	Yes	Yes	Yes	No	45.91	Yes	Yes	Yes	Yes	Tradable
	Postal and courier pick up and delivery services	0.58	4.46	No	No	No	No	4.41	No	No	No	No	Non-tradable
	Transport support services	1.36	9.19	No	No	No	No	20.11	Yes	Yes	No	No	Tradable
	Warehousing and storage services	0.17	6.43	No	No	No	No	6.08	No	No	No	No	Non-tradable
JJ	Publishing (except Internet and music publishing)	0.52	7.48	No	No	No	No	6.09	No	No	No	No	Non-tradable
	Motion picture and sound recording activities	0.23	5.61	No	No	No	No	12.15	Yes	No	No	No	Tradable
	Broadcasting and Internet publishing	0.40	4.00	No	No	No	No	10.72	Yes	No	No	No	Tradable
	Telecommunications services Including internet service providers	2.32	7.99	No	No	No	No	6.95	No	No	No	No	Non-tradable
	Library and other information services	0.10	1.36	No	No	No	No	2.27	No	No	No	No	Non-tradable
KK	Banking and financing; financial asset investing	4.86	2.30	No	No	No	No	1.92	No	No	No	No	Non-tradable
	Life insurance	0.21	2.93	No	No	No	No	0.19	No	No	No	No	Non-tradable
	Health and general insurance	0.64	13.18	Yes	No	No	No	2.49	No	No	No	No	Non-tradable
	Superannuation funds	0.01	1.20	No	No	No	No	0.00	No	No	No	No	Non-tradable
	Auxiliary finance and insurance services	0.81	1.18	No	No	No	No	1.09	No	No	No	No	Non-tradable
LL	Rental and hiring services (except real estate); non-financial asset leasing	1.30	13.33	Yes	No	No	No	6.51	No	No	No	No	Non-tradable
	Residential property operation	2.63	0.02	No	No	No	No	1.93	No	No	No	No	Non-tradable
	Non-residential property operation	1.82	0.61	No	No	No	No	0.29	No	No	No	No	Non-tradable
	Real estate services	0.78	0.21	No	No	No	No	0.12	No	No	No	No	Non-tradable
	Ow ner-occupied property operation	7.22	0.00	No	No	No	No	0.00	No	No	No	No	Non-tradable

MN	Scientific, architectural, and engineering services	2.03	7.13	No	No	No	No	5.42	No	No	No	No	Non-tradable
	Legal and accounting services	2.00	4.19	No	No	No	No	4.46	No	No	No	No	Non-tradable
	Advertising, market research, and management services	2.03	7.55	No	No	No	No	4.60	No	No	No	No	Non-tradable
	Veterinary and other professional services	0.25	4.85	No	No	No	No	7.12	No	No	No	No	Non-tradable
	Computer system design and related services	1.31	10.30	Yes	No	No	No	8.44	No	No	No	No	Non-tradable
	Travel agency and tour arrangement services	0.26	13.31	Yes	No	No	No	40.17	Yes	Yes	Yes	Yes	Tradable
	Employment and other administrative services	1.40	3.09	No	No	No	No	4.14	No	No	No	No	Non-tradable
	Building cleaning, pest control, and other support services	0.66	0.75	No	No	No	No	0.75	No	No	No	No	Non-tradable
OO	Local government administration	0.44	1.79	No	No	No	No	1.53	No	No	No	No	Non-tradable
	Central government administration and justice	1.90	1.18	No	No	No	No	1.41	No	No	No	No	Non-tradable
	Defence	0.51	0.05	No	No	No	No	0.84	No	No	No	No	Non-tradable
	Public order, safety, and regulatory services	1.59	0.54	No	No	No	No	1.54	No	No	No	No	Non-tradable
PP	Preschool education	0.27	0.60	No	No	No	No	0.93	No	No	No	No	Non-tradable
	School education	2.46	0.81	No	No	No	No	3.80	No	No	No	No	Non-tradable
	Tertiary education	1.61	4.29	No	No	No	No	19.92	Yes	No	No	No	Tradable
	Adult, community, and other education	0.33	3.53	No	No	No	No	15.59	Yes	No	No	No	Tradable
QQ	Hospitals	2.82	0.34	No	No	No	No	0.63	No	No	No	No	Non-tradable
	Medical and other health care services	1.98	0.28	No	No	No	No	0.44	No	No	No	No	Non-tradable
	Residential care services and social assistance	1.33	0.97	No	No	No	No	1.86	No	No	No	No	Non-tradable
RS	Heritage and artistic activities	0.28	1.54	No	No	No	No	12.27	Yes	No	No	No	Tradable
	Sport and recreation activities	0.52	1.54	No	No	No	No	8.37	No	No	No	No	Non-tradable
	Gambling activities	0.75	0.82	No	No	No	No	4.91	No	No	No	No	Non-tradable
	Repair and maintenance	0.95	11.54	Yes	No	No	No	15.13	Yes	No	No	No	Tradable
	Personal services; domestic household staff	0.73	1.98	No	No	No	No	2.67	No	No	No	No	Non-tradable
	Religious services; civil, professional, and other interest groups	0.42	0.83	No	No	No	No	3.24	No	No	No	No	Non-tradable

Appendix V – Trade in value added

Trade in value added

A similar method used to capture the value of the exports of goods and services is the Trade in Value Added (TiVA) database produced by the Organisation of Economic Cooperation and Development (OECD). This database has essentially produced input-output tables for the world. Using this framework, countries can identify the value they add to their imports. This gives a deeper picture of global value chains, as the value each country adds to a good or service can be identified, rather than the gross export value of those goods or services.

Specifically, the TiVA database provides a decomposition of exports by industry into domestic and foreign content. In addition, the service content of exports is broken down into domestic and foreign origin. Using this data, bilateral trade flows can be understood from a value added perspective rather than that of gross exports.

The latest country notes (OECD, 2013b) released 28 May 2013 indicate that New Zealand (at 82 percent) was above the OECD average for domestic value added in gross exports in 2009. This is partly due to the nature of agriculture and food production, which typically have a large proportion of domestic value added. It also showed that New Zealand's bilateral trade balances with other countries in value added terms are characterised by smaller surpluses and smaller deficits. The percentage value of services in gross exports was 46 percent, just below the 48 percent OECD average.

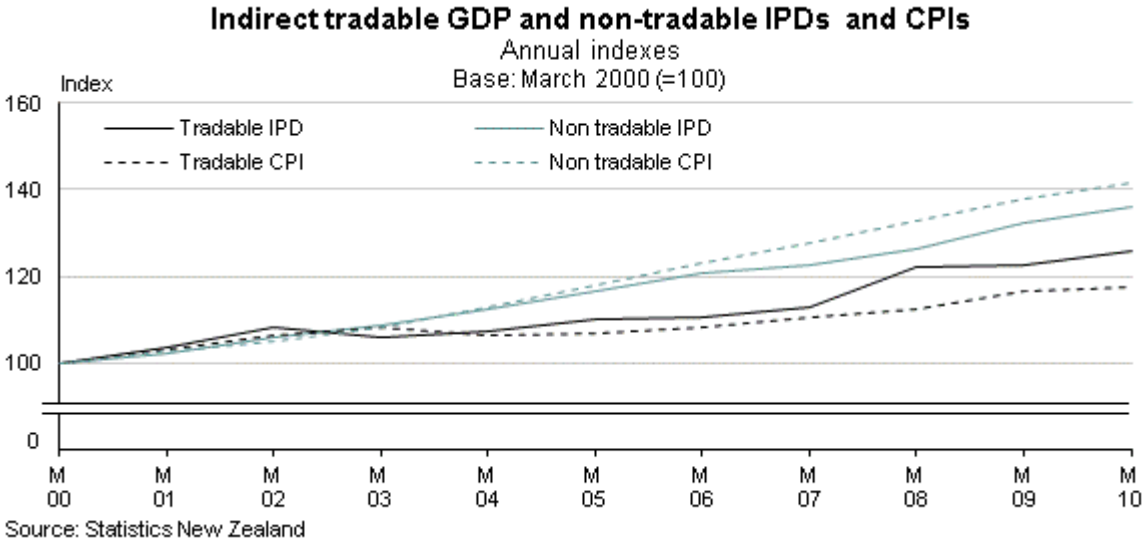
This trade in value added work, while insightful, is different in that their definition of value added differs from the national accounts definition (OECD, 2013a). This is partly because the national accounts are compiled at an industry level, while TiVA is on a national level. However, the two analyses of the tradable sector and trade in value added are good complementary measures of global interconnectedness.

Appendix VI – Implicit price deflators

Implicit price deflators and tradable non-tradable CPI

Statistics NZ produces consumer price indexes (CPIs) for tradable and non-tradable commodities. These are updated every three years as part of the CPI review. As this is done at the commodity level, the split is more precise than using an industry split at NZSIOC level 1. The graph below shows the implicit price deflators (IPDs) from the indirect tradable and non-tradable GDP and the CPI series. The trend is the same for both the direct and indirect method, though the indirect method produced results more in line with the CPI series.

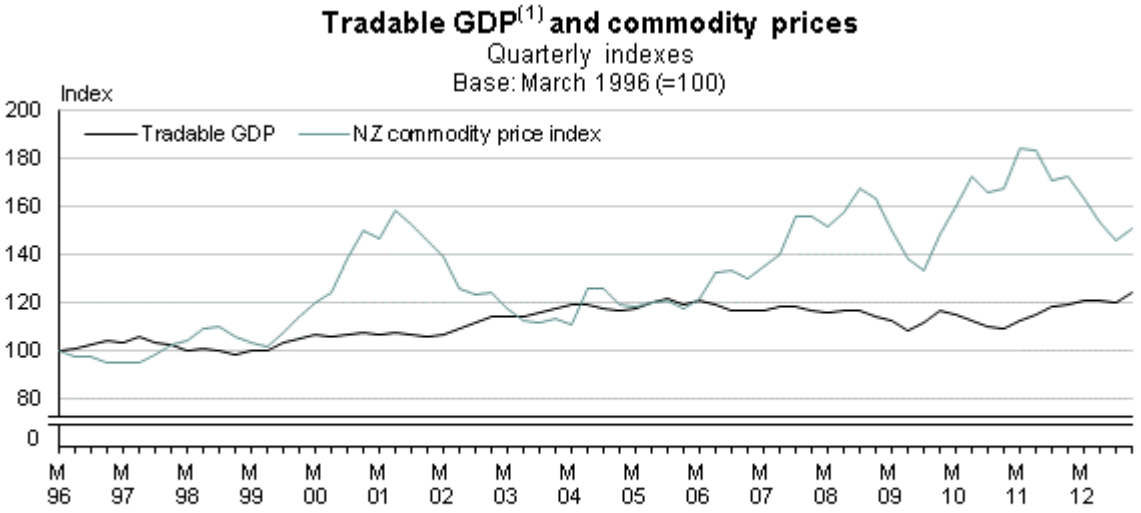
Figure 13



Appendix VII – Additional graphs

Figure 14 illustrates the relationship between tradable sector value added and commodity prices from the ANZ New Zealand commodity price index.

Figure 14



1. Seasonally adjusted chain-volume index.

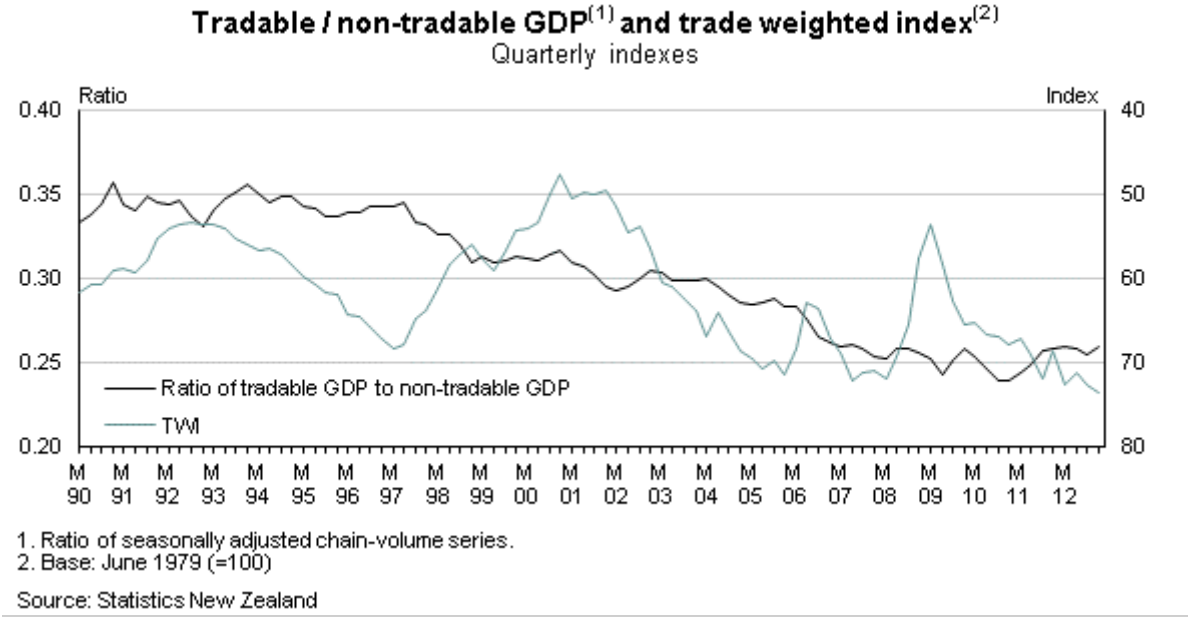
Source: Statistics New Zealand

The external exposure of the tradable sector can also been shown by the relative size of the tradable and non-tradable sectors and the trade-weighted index (TWI). The TWI is a weighted index based on the currencies of New Zealand's largest five trading partners and the size of their economies.

Figure 15 is a reproduction of a graph from the Treasury April 2012 special topic. The TWI axis is inversed, the implication is that series moving in the same direction would have an inverse correlation. The trend line of the TWI indicates that over this 23-year period, the TWI has trended upward and the ratio of tradable/non-tradable value added has trended downward.

It was noted in the Reserve Banks of New Zealand's *Financial Stability Report May 2013* that "New Zealand's elevated exchange rate is also continuing to hinder a rebalancing of domestic activity towards the tradables sector, which would assist in reducing external vulnerabilities."

Figure 15

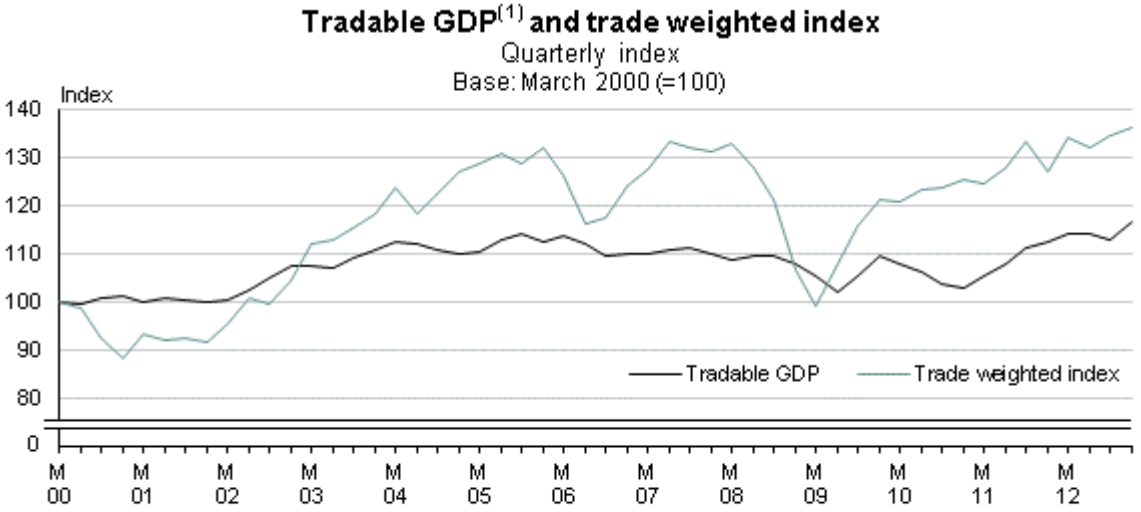


1. Ratio of seasonally adjusted chain-volume series.
2. Base: June 1979 (=100)

Source: Statistics New Zealand

If viewed from the perspective of the growth in value added or gross exports rather than the relative size of each sector the correlation is not so clear. Figure 16 shows the growth of tradable GDP and the TWI.

Figure 16

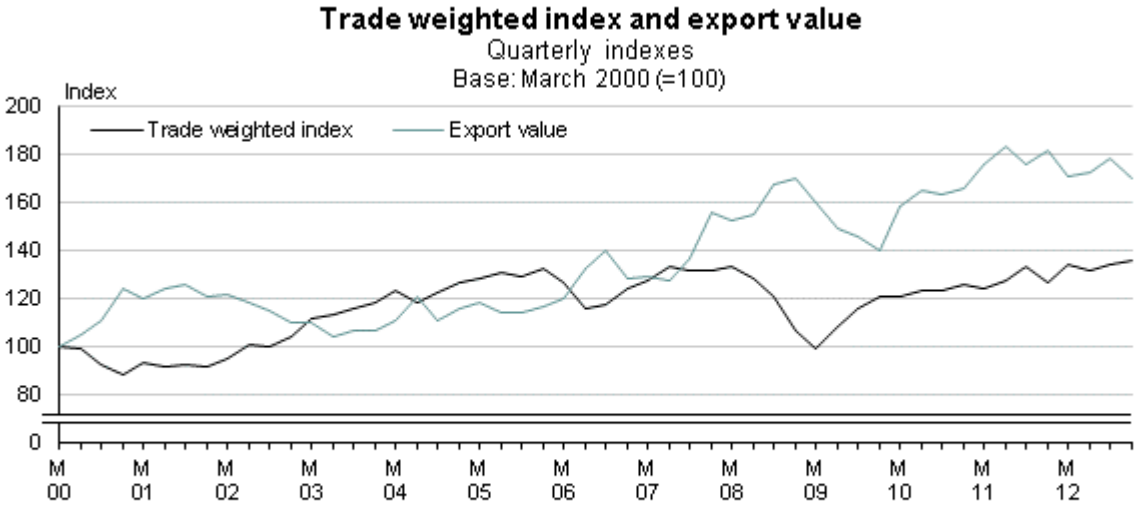


1. Seasonally adjusted chain-volume index.

Source: Statistics New Zealand

Figure 17 shows the growth in export earnings (this includes both price and volume changes) and the TWI over the past 12 years.

Figure 17



1. Seasonally adjusted chain-volume index.

Source: Statistics New Zealand