Gillespie Economics
Environmental and Resource Economics

Australian Grape and Wine Authority

Economic Contribution of the Australian Wine Sector

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Abbreviations

ABS	Australian Bureau of Statistics
AGWA	Australian Grape and Wine Authority
AWBC	Australian Wine and Brandy Corporation
CGE	Computable General Equilibrium (model)
DoAWR	Department of Agriculture and Water Resources
EU	European Union
FOB	Free On Board
FTE	Full Time Equivalent
GDP	Gross Domestic Product
GI	Geographical Indication
IO	Input Output (model)
OIV	International Organisation of Vine and Wine
TRA	Tourism Research Australia
WFA	Winemakers' Federation of Australia
WGGA	Wine Grape Growers Australia

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Executive Summary

This report is an economic impact assessment of the wine sector's direct and flow-on contribution to the Australian economy. It was prepared for the Australian Grape and Wine Authority (AGWA/Wine Australia).

The Australian wine sector includes grape growing, wine making and wine-related tourism. The wine sector makes a direct and significant contribution to output, gross domestic product (GDP) and employment. In addition to the wine sector's direct economic contribution, the sector also makes a flow-on contribution via strong linkages to other businesses that supply goods and services required for grape growing, wine making and the wine tourism experience, as well as the goods and services demanded by employees.

Wine grapes are grown in every Australian state and territory with South Australia, NSW and Victoria being the largest wine grape producers. Wine grape growing is an efficient user of scarce irrigation water with a high gross value of production per litre of water used. In 2014-15 there were 5,160 wine grape growers with a vineyard area of 135,178 ha generating a gross sales value of $0.773 billion.

Australian wine is export oriented with approximately 60% of output headed for wine markets in Europe, North America and Asia. Wine is Australia's sixth largest agricultural export industry. Recent Australian Government data indicates that there are 2,900 Australian wineries. Total annual wine production has been estimated at 1.2 billion litres with a gross value of $5.9 billion.

International tourists identify 'great food, wine, local cuisine and produce' as a major reason for visiting Australia. Tourism Research Australia estimated that in 2014-15 there were 15.8 million domestic visitor nights and 44.2 million international visitor nights associated with Australian wineries. Overall wine related visitor expenditure totalled $9.2 billion.

Revenue, expenditure and employment profiles were developed for each of grape growing, wine making and wine related tourism. Input-Output analysis was then used to quantify both direct and flow-on output, value-added, income and employment for each of grape growing, wine making and wine related tourism. Total direct and flow-on impact was adjusted to eliminate double counting when each industry within the sector was summed to estimate total economic impact – Table E1.

Table E1 Direct and Indirect Impact of the Total Wine Sector

	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	TOTAL IMPACT
OUTPUT ($'000,000)	13,347	12,417	14,449	26,867	40,214
Type 11A Ratio	1.00	0.93	1.08	2.01	3.01
VALUE-ADDED ($'000,000)	6,224	5,484	7,993	13,477	19,701
Type 11A Ratio	1.00	0.88	1.28	2.17	3.17
INCOME ($'000,000)	3,324	3,233	3,854	7,086	10,411
Type 11A Ratio	1.00	0.97	1.16	2.13	3.13
EMPLOYMENT (No.)	68,395	45,286	59,055	104,341	172,736
Type 11A Ratio	1.00	0.66	0.86	1.53	2.53

Because Input-Output modelling only examines backward linkages this analysis does not capture margins on wine sales through wholesale, retail and restaurant sales. Values for wine sales and grape sales are at the winery/farm gate. Inclusion of wholesale, retail and restaurant sales would

make the estimates of total direct and flow-on contribution higher. For example the domestic wholesale value of Australian wine is $2.4 billion and retail value is $7.4 billion.

Input-Output analysis has shown that the Australian wine sector defined as wine grape growing, wine making and wine related tourism:

- Contributes $40.2 billion in gross output to the Australian economy. Gross output includes $19.7 billion in value (value-added) and $10.4 billion in wages and salaries from full and part time employment.
- Supports 172,736 full and part time jobs[1] most of which are located in regional Australia. Jobs supported by the wine sector include direct employment of 68,395 within the sector and a further 104,341 full and part time jobs due to flow-on effects. Estimates of full and part time employment are associated with economic activity linked to grape growing, wine making and wine tourism and do not include forward linkages such as employment in the retail sector.

Unlike Computable General Equilibrium modelling[2], Input-Output analysis does not generate taxation indicators. Input Output analysis accounts for tax paid on inputs purchased by grape growers, wine makers and the wine tourism sector and this tax paid is captured in estimates of value-added. By way of example of the quantum of tax paid by the wine sector, net Wine Equalisation Tax payments were $792 million in 2014-15 and are forecast to increase to $920 million by 2018-19 (Australian Government, December 2015).

Input-Output analysis has shown that the average effects of a contraction or expansion within the wine sector suggests:

- The economy would gain an extra $2.01 million for every additional $1 million of gross output generated by the wine sector.
- The economy would gain an extra $2.17 million in contribution to value-added for every additional $1 million of value-added generated by the wine sector.
- The wider economy would gain an extra 1.53 jobs for every job gained in the wine sector.

The Australian wine sector grew rapidly through the 1990s and experienced a series of shocks in the new century. There were large declines in prices paid for wine grapes, cuts in the profitability of wine making and an exchange rate induced contraction in wine tourism. Estimates of economic contribution prepared for this study reflect a period of subdued economic activity. In 2015 the outlook for the period to 2021 is for a return to modest growth.

[1] As defined in the Australian National Accounts 2012-13 as 'Full time and part time employees, employers, own account workers and contributing family workers'

[2] Computable General Equilibrium (CGE) analysis is unsuitable for providing a 'snapshot' of an existing industry and its inter-sectoral linkages and is more applicable to assessing the effects of a change or shock to the economy. For instance, NZIER (2014) 'The economic contribution of the New Zealand wine sector, the impact of growth since 2008', used CGE to examine the impact of growth in the wine and grape industry in New Zealand compared to if growth had stagnated at 2008 levels. Consequently, for this Australian study which is focused on providing a 'snapshot' of an existing industry, Input-Output analysis was preferred.

1. Introduction

The Australian wine sector makes a significant contribution to the Australian economy. This includes the economic activity associated with grape growing in vineyards and wine production, and extends to the economic activity from wine related tourism. These three components of the Australian wine sector also have strong linkages to other sectors of the Australian economy, in particular the businesses that supply the goods and services required for grape growing, wine making and the wine tourism experience, as well as the goods and services demanded by employees. Consequently, the contribution of the Australian wine sector to the Australian economy is greater than just its direct effects.

This report is an economic assessment of the wine sector's direct and indirect contribution to the Australian economy. It was prepared by AgEconPlus and Gillespie Economics for the Australian Grape and Wine Authority (AGWA/Wine Australia).

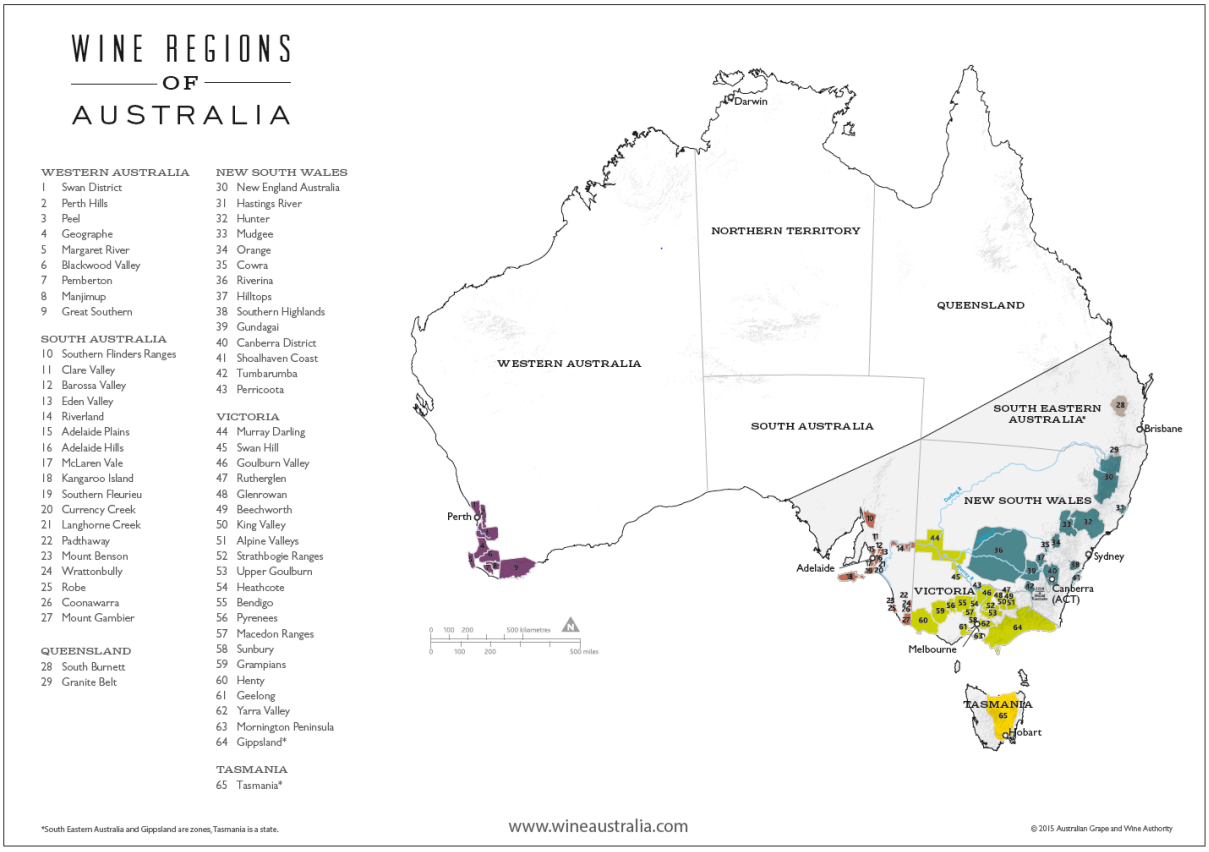
Section 2 of the report locates the industry geographically and provides an overview of the nature and scope of the components of the wine sector. Section 3 outlines the input-output (IO) modelling method used to examine the direct and indirect economic effects of the wine sector. Section 4 combines available data to develop a revenue, expenditure and employment profile for the grape growing, wine manufacturing and wine tourism sectors of the Australian economy. The modelling of these sectors to assess their flow-on effects for the economy is then reported in Section 5. Conclusions are provided in Section 6.

2. Australian Wine Sector Background

2.1 Locality

Wine grape growing, wine making and wine related tourism occurs in all states and territories of Australia. Australia has seventy one wine regions[3]. The main Australian wine regions are shown on Figure 2.1.

Figure 2.1 Wine Regions of Australia

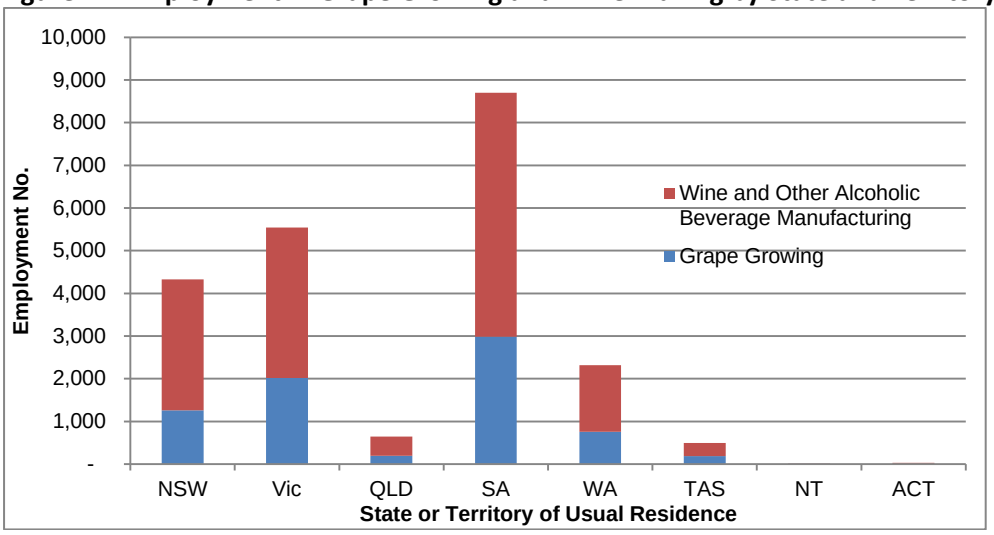


Source: Wine Australia

The relative scale of direct economic activity by state and territory is indicated by Australian Bureau of Statistics (ABS) 2011 employment levels in the Grape Growing Sector[4] and Wine and Other Alcoholic Beverage Manufacturing Sector[5] - see Figure 2.2. From this data it is evident that the wine sector is most significant in South Australia, Victoria and NSW. Employment in the Northern Territory and Australian Capital Territory is 9 and 29, respectively.

[3] This includes 63 distinct Geographical Indication (GI) regions plus 8 distinct GI zones that do not have any distinct GI regions attached to them, such as Tasmania and Gippsland (Wine Australia, May 2015)
[4] Employment estimates include wine grape, table grape and dried grape production
[5] Employment estimates include wine making, wine blending, wine vinegar, fermentation of cider and alcoholic beverages not elsewhere classified.

Figure 2.2 Employment in Grape Growing and Wine Making by State and Territory



Source: ABS 2011 Census of Population and Housing - 4 digit employment by

No ABS employment data is available for wine tourism because there is no specific tourism industry sector in the Australian and New Zealand Standard Industrial Classification. The 'tourism sector' is made up of components of several industry sectors, including transportation, accommodation, food and beverage, recreation and entertainment and travel services. Economic activity, including employment, for the tourism sector needs to be generated based on visitation levels and expenditure. This is discussed further in Section 3.

2.2 Wine Grape Growing

Wine grapes are grown and crushed in every Australian state with South Australia, NSW and Victoria being the largest wine grape producers - Table 2.1.

Table 2.1 Grape Crush by State – Tonnes (2014-15)

Fresh Grapes Crushed	Red	White	Total
New South Wales	211,382	284,408	495,790
Victoria	156,436	163,035	319,471
Queensland	615	404	1,019
South Australia	453,913	285,441	739,354
Western Australia	18,172	26,163	44,335
Tasmania	3,732	4,453	8,185
Total	**844,250**	**763,904**	**1,608,154**

ABS Catalogue No 1329.0

In 2014-15 there were an estimated 5,160 grape growers with 135,178 ha of grape growing area (ABS 2015) producing 1,670,000 tonnes of grape crush (WFA, July 2015).

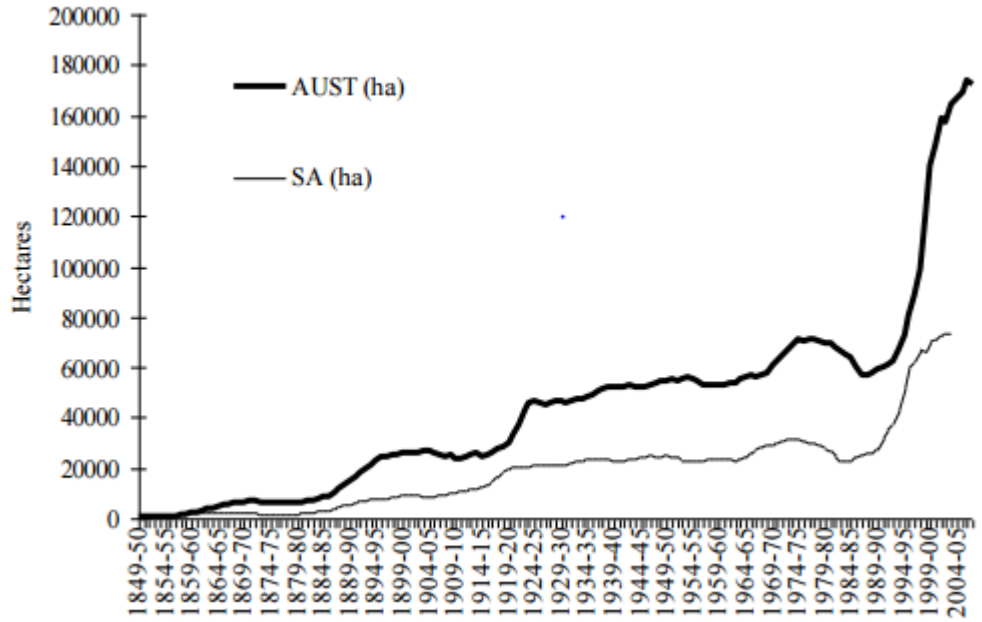
The cost of growing wine grapes varies according to the size of the vineyard, the degree of mechanisation and the method of irrigation. Harvesting can be labour-intensive, although mechanisation is increasing within the industry. The location of the vineyard, fluctuations in yields achieved and prices received also cause variations in cost structure. Approximately 80% of Australian wine grape growing enterprises operate on less than 50 ha (IBIS World, May 2015).

Major grape varieties grown by the Australian industry include Shiraz, Chardonnay, Cabernet Sauvignon, Merlot, Semillon, Pinot Noir, Riesling, and Sauvignon Blanc. In 2015 Shiraz (25% of production) and Chardonnay (21% of production) dominate. The industry can be split on production volume into 60% 'warm inland' and 40% 'the rest'. 'The rest' is dominated by high value cooler

country wine grape production. By value 'warm inland' accounts for between 50% and 55% of industry value. Highest wine grape prices are received in cool climate Tasmania and lower prices are received in the Riverina and Swan Hill (Anderson *et al* 2010). Average national grape prices have been on a general downward trend since 2001 when the national average was $933/tonne. The national average wine grape purchase price in 2014 was $441 /tonne (Wine Australia, May 2015). In 2015 average grape prices were $463/tonne (WFA, July 2015).

Wine grape growing area underwent a rapid expansion in the 1990s increasing from 60,000 ha at the beginning of that decade to approximately 140,000 ha by 2000, increasing again to 145,000 ha in 2012, 148,509 ha in 2013 before contracting to 135,178 ha in 2014. Figure 2.3 shows the historic rapid increase in Australian wine grape growing area through the 1990s.

Figure 2.3 Wine Grape Growing Area – Historical Analysis Australia and South Australia



Source: Anderson *et al* (2010)

Most wine grapes are grown with the assistance of irrigation water and the wine grape industry is an efficient user of this natural resource. Compared with other farm enterprises, water use per litre of production value for grapes is greater than for other fruits or for vegetables but it is much less than for sugar, cotton, rice or dairying. In aggregate terms, grape growers use less water than all those enterprises except vegetable growing - Table 2.2.

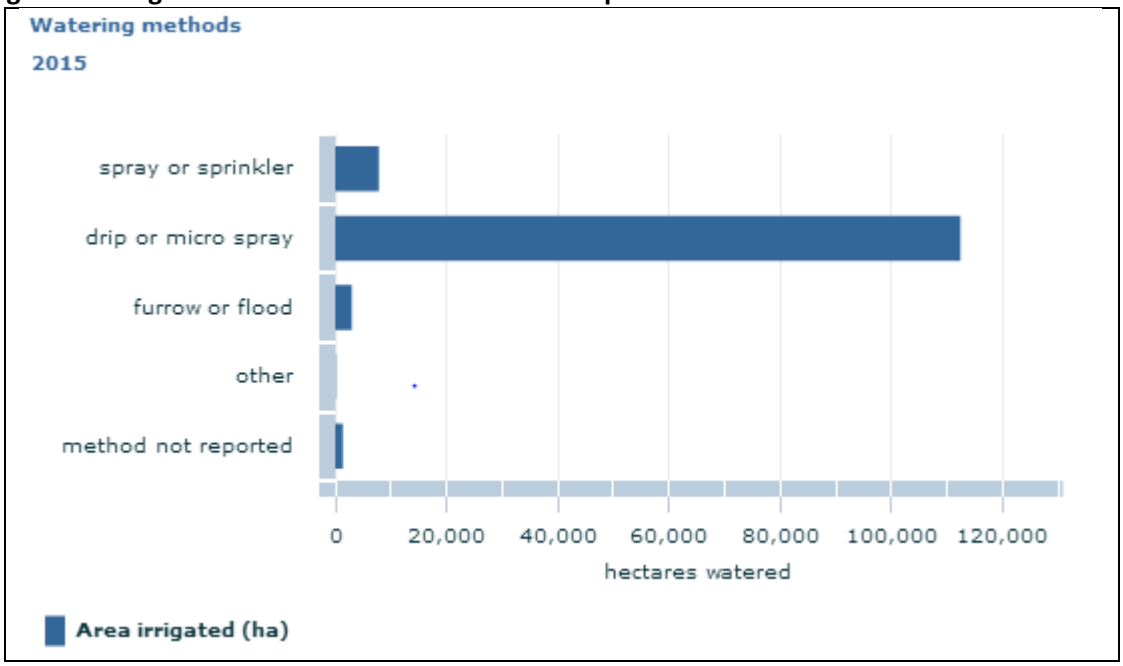
Table 2.2 Water Use per Dollar of GVP, Grapes and Other Agricultural Products (litres)

Commodity	Litres Used per Dollar of GVP Created	Total Water Use (Giga-litres)
Grapes	463	626
Other Fruit	266	675
Vegetables	164	451
Sugar	1,045	1,104
Cotton	1,838	1,746
Rice	4,817	1,230
Milk	859	2,871
Weighted average	**711**	**1,350**

Source: Anderson *et al* (2010)

The grape growing industry has worked hard to improve its water use efficiency and by the mid-2000s had all but phased out flood irrigation. ABS (2015) reports that most wine grapes are now watered with efficient drip or micro spray – Figure 2.4.

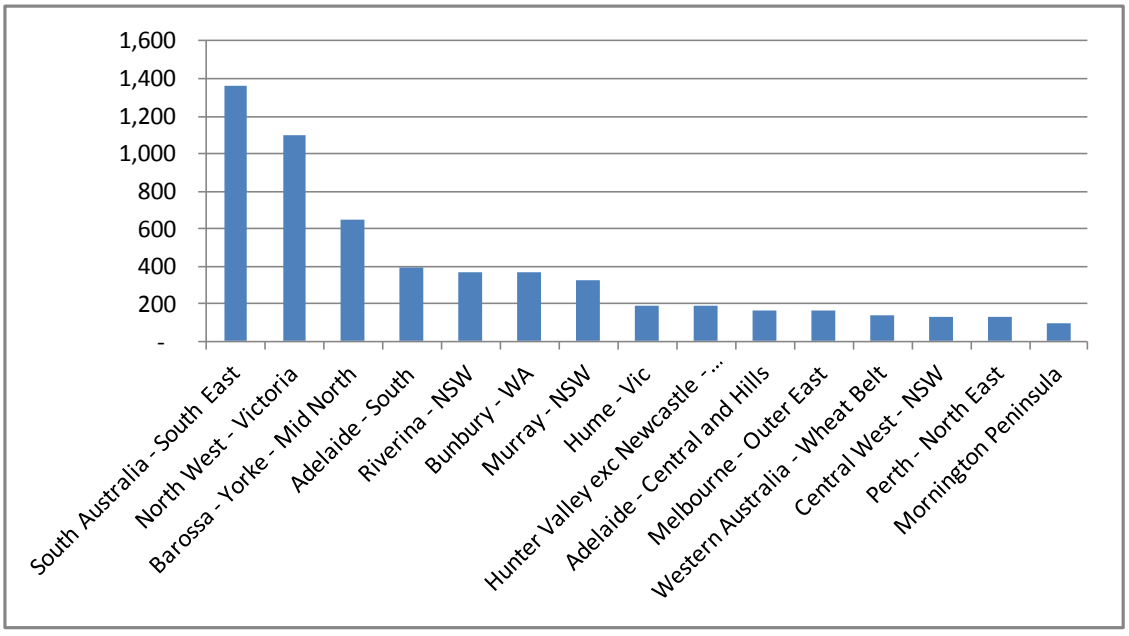
Figure 2.4 Irrigation Method – Australian Wine Grapes



Source: ABS 2015

Figure 2.5 identifies the top 15 regions in Australia (ABS Statistical Area 4, 2011) for employment in grape growing.

Figure 2.5 Regional Employment in Grape Growing



Source: ABS (Statistical Area 4, 2011)

Grape growing contributes more than 1,300 jobs to the economy of South East South Australia.

2.3 Wine Making

There are approximately 2,900 wineries in Australia (Department of Agriculture and Water Resources (DoAWR) Levies, 2014, data supplied by Wine Australia). Wine makers grow their own grapes and purchase grapes from wine grape growers. Wine makers also sell grapes, bulk wine, and merchandise at the cellar door. Wine makers contract crush and pack for other wineries (Wine Australia & WFA 2007).

Benchmarking guides classify wine making businesses into small, medium and large enterprises on the following basis – Table 2.3. Note the strong relationship between enterprise size and wine processing cost.

Table 2.3 Characteristics of Wine Making Businesses – Small, Medium and Large

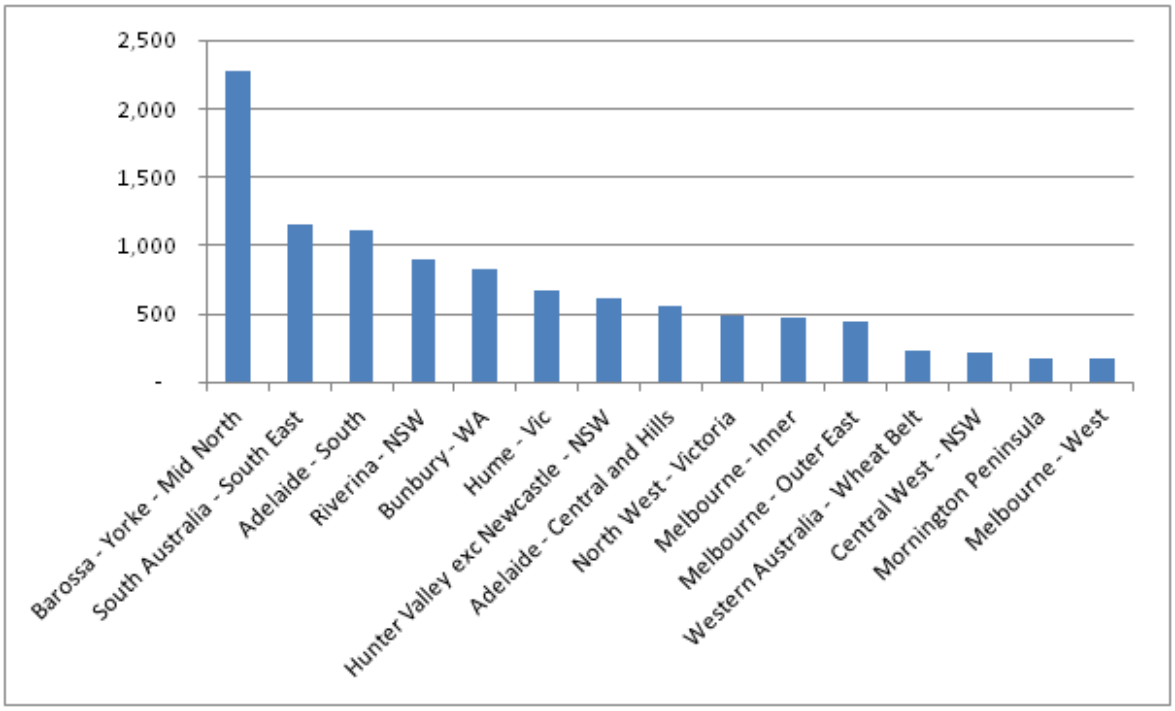
Criterion	Small	Medium	Large
Ownership	Typically an owner operated business	Predominantly owner operated. May have full time employees	Public or private ownership
Production facilities	Single production site producing branded product	The business owns / controls its wine making facility and has a combination of estate vineyards and contracted grape purchases	Single or multiple production sites, some contract crushing, mix between branded production and bulk wine production, mix between own and purchased grapes
Capacity	Annual processing capacity of less than 750 tonnes of wine grapes	Processing capacity is between 750 and 5,000 tonnes of wine grapes	Processing capacity exceeds 7,000 tonnes and may be in excess of 120,000 tonnes
Sales turnover	Wine sales of less than 50,000 cases and $5 million in sales revenue. Does not incorporate revenue from cellar door merchandise, sale of grapes, bulk wine or processing and packaging	Wine sales of between 50,000 and 350,000 cases and between $5 million and $20 million in bottled wine sales revenue. May include income from merchandise, bulk wine, processing and packaging	Gross case sales revenue exceeding $20 million and 200,000 cases. Extra-large winemakers may have sales of 500,000 cases or bulk wine sales in excess of 100 million litres
Market	Direct sales via cellar door, website and local restaurants	Sales targeted to a range of markets. Likely to have a 'marketing team'. Use additional income sources to supplement revenue and profitability	Predominantly a branded production business. Extra-large businesses include bulk wine sales
Processing cost ($/litre)	$3/litre, micro maker $2/litre, small wine maker	$1/litre medium sized wine maker	$0.50/litre, large maker $0.25/litre, extra-large wine making business

Source: Wine Australia & WFA (2007)

Winemaking is characterised by a large number of small businesses. For example, 411 from 523 responses to the Winemakers' Federation of Australia (WFA) 2015 Vintage Survey were from wineries that reported a total crush of less than 500 tonnes (WFA 2015).

Wine making is a regionally significant industry. The top 15 regions in Australia for employment in Wine Making are shown in Figure 2.6.

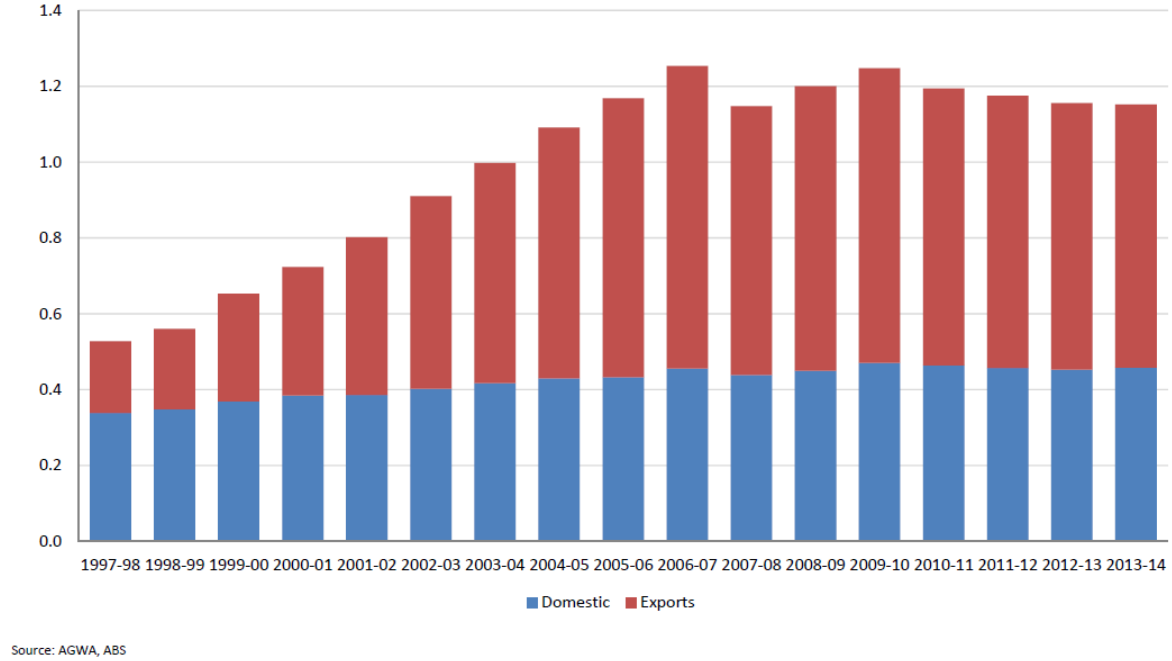
Figure 2.6 Regional Employment in Wine Manufacturing



Source: ABS (Statistical Area 4, 2011)

Australia is the world's sixth largest producer of wine, with production at around 1.2 billion litres per annum (International Organisation of Vine and Wine (OIV) 2015). Australian wine sales increased significantly from the 1990s but have declined marginally since 2006-07 – Figure 2.7.

Figure 2.7 Australian Wine Sales (billion litres)



Source: Wine Australia (February 2015)

Wine production, domestic sales, domestic sales value and average price received by the wine maker are summarised in Table 2.4.

Table 2.4 Domestic Sales of Australian Wine by Wine Making Business (2012-13)

Beverage wine production (million L)	1,231
Domestic sales of Australian wine (million L)	487.7
Domestic sales value of Australian wine ($'million)	2 369.2
Average price per litre ($/L)	4.86

Source: ABS Catalogue No 1329.0

Domestic sales account for approximately 40% of wine industry production and sales have been relatively flat for the period 2010 to 2015. Domestic sales growth has been captured by imports e.g. New Zealand Sauvignon Blanc and French Champagne. The top wine import countries to Australia are listed in Table 2.5.

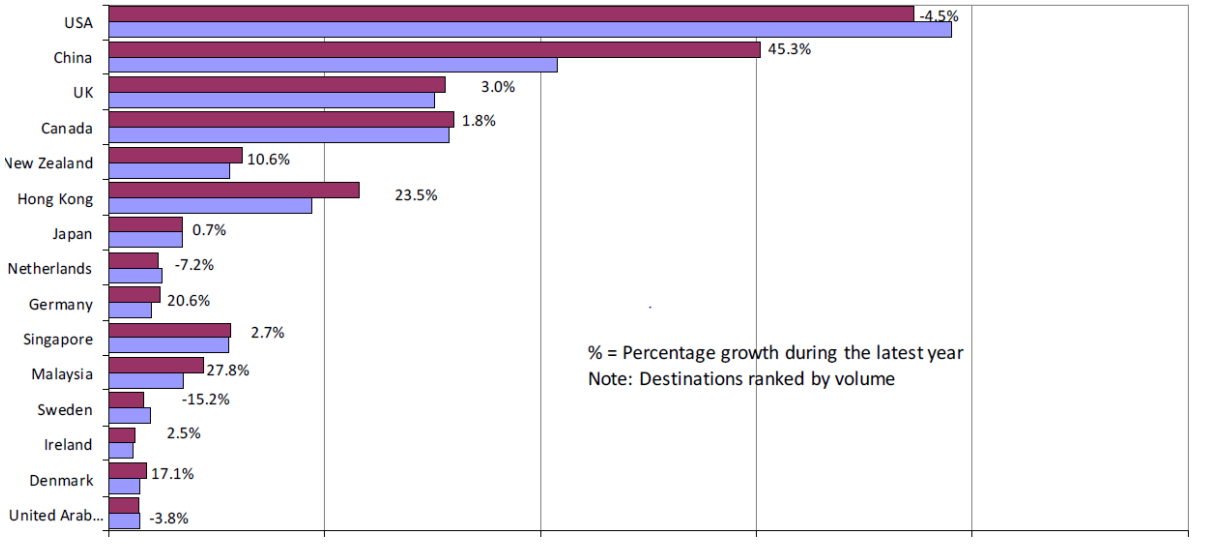
Table 2.5 Australian Wine Imports – Top 5 Countries 2013-14

Import Country	Imports by Value ($'million)	Imports by Volume (million L)
New Zealand	334.9	52.2
France	205.9	13.1
Italy	51.0	8.5
Spain	15.0	2.6
Chile	4.3	1.1
Total (all countries)	**634.3**	**81.8**

Source Department of Agriculture and Water Resources (DoAWR) 2015

The Australian wine making industry is export oriented. More than half of Australian wine exports are destined for Europe, a third for North America, 12 per cent for Asia and the remaining 5 per cent for the rest of the world. Asia, including China, is a growing destination for Australian wine (Wine Australia, May 2015). The importance of individual export markets for bottled wine is shown in Figure 2.8 and bulk wine is shown in Figure 2.9.

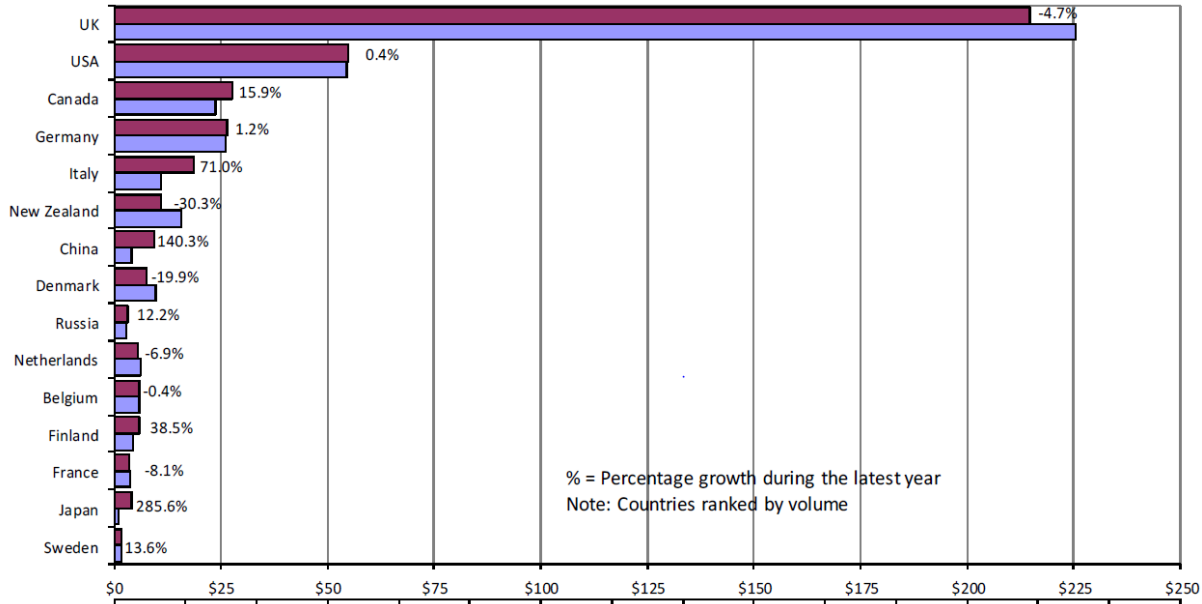
Figure 2.8 Australian Bottled Wine Exports by Top 15 Destinations ($'million) for MAT# Sept. 2015



	United Arab Emirates	Denmark	Ireland	Sweden	Malaysia	Singapore	Germany	Netherlands	Japan	Hong Kong	New Zealand	Canada	UK	China	USA
2015	14.0	17.2	12.1	16.4	44.1	56.9	24.3	22.6	34.4	115.9	61.7	160.2	155.5	301.9	372.8
2014	14.6	14.7	11.8	19.3	34.5	55.4	20.1	24.4	34.1	93.9	55.8	157.3	151.0	207.8	390.5

Source: Wine Australia, Export Report, September 2015 # Moving Annual Total

Figure 2.9 Australian Bulk Wine Exports by Top 15 Destinations ($'million) for MAT# Sept. 2015



	Sweden	Japan	France	Finland	Belgium	Netherlands	Russia	Denmark	China	New Zealand	Italy	Germany	Canada	USA	UK
2015	1.8	4.0	3.4	5.9	5.9	5.6	3.2	7.7	9.5	10.9	18.5	26.4	27.5	54.9	214.7
2014	1.5	1.0	3.7	4.2	6.0	6.0	2.9	9.7	3.9	15.6	10.8	26.1	23.7	54.7	225.4

Source: Wine Australia, Export Report, September 2015 # Moving Annual Total

Increasingly Australia's wine exports are shipped in bulk shipping containers. In 2015 approximately 60% of Australia's wine exports were shipped as bulk and the balance was exported in bottles. Analysis of export data shows that the average price for export wine is lower than in the past but this is partially explained by bulk shipping of a lower value product - wine without the cost of a bottle and bottling. Bulk shipping and bottling in-market is particularly characteristic of sales to the United Kingdom where bulk wine accounts for 85% of Australia's export sales (Wine Australia, May 2015).

Average Free On Board (FOB) price for export wine is approximately $3/litre (Wine Australia, Export Report, September 2015).

Wine is Australia's 6th largest agricultural export industry – Table 2.6.

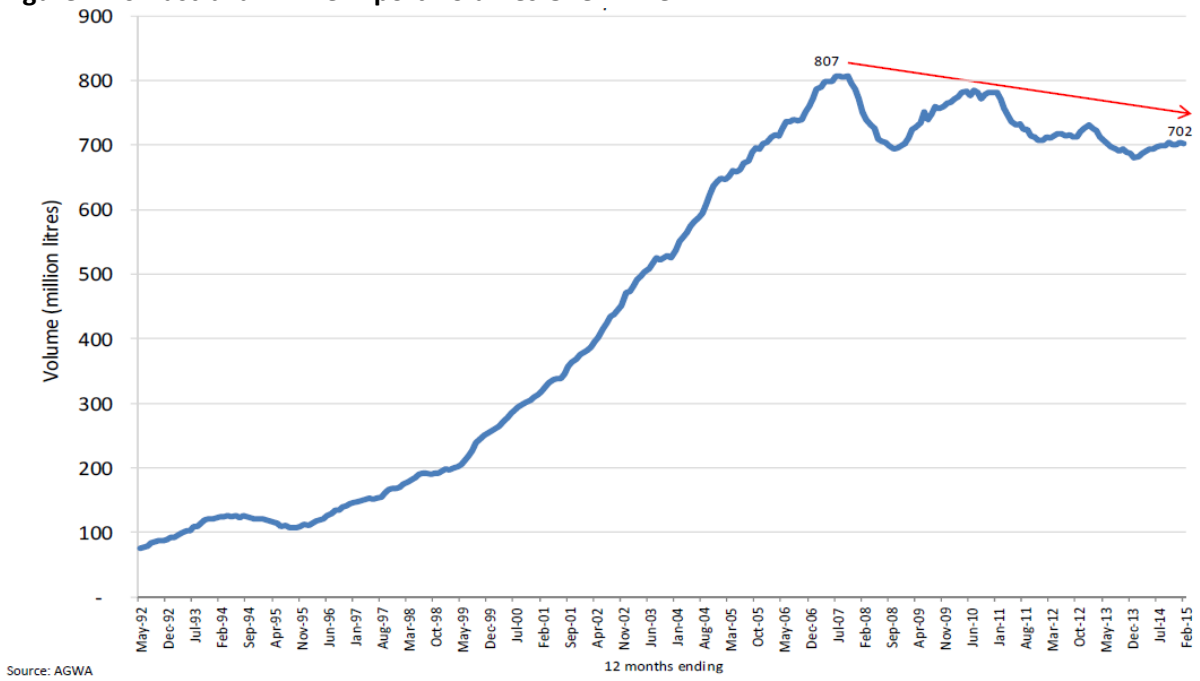
Table 2.6 Australia's Top 10 Agricultural Exports (by value) – 2012-13 financial year

Agricultural Commodity	$' million	%
Wheat	6,749	17.6
Beef	5,051	13.2
Cotton	2,695	7.0
Wool	2,470	6.4
Canola	2,094	5.4
Wine	**1,865**	**4.8**
Lamb and mutton	1,637	4.2
Sugar	1,480	3.8
Barley	1,266	3.3
Milk and cream	996	2.6
Total of Australian Agriculture exports	**38,268**	**100%**

* * Based on the WTO definition of agriculture, which excludes fisheries, forestry and rubber. The value of Australian fisheries, forestry and rubber exports in 2013 was respectively: $1,024, $1,089 and $234 (million).
http://dfat.gov.au/trade/topics/pages/agriculture.aspx

Export wine volumes grew rapidly over time from the 1990s to 2007 and have since declined from a peak of 807 million litres in July 2007 to 734 million litres in September 2015. The decline in exports reflects a marginal decline in Australian production – Figure 2.10.

Figure 2.10 Australian Wine Export Volumes Over Time



Source: Wine Australia September 2015

Encouragingly, in the twelve months to September 2015, Australian wine exports recorded their strongest period of growth since the export value peaked in July 2007 (Wine Australia, Export Report September 2015).

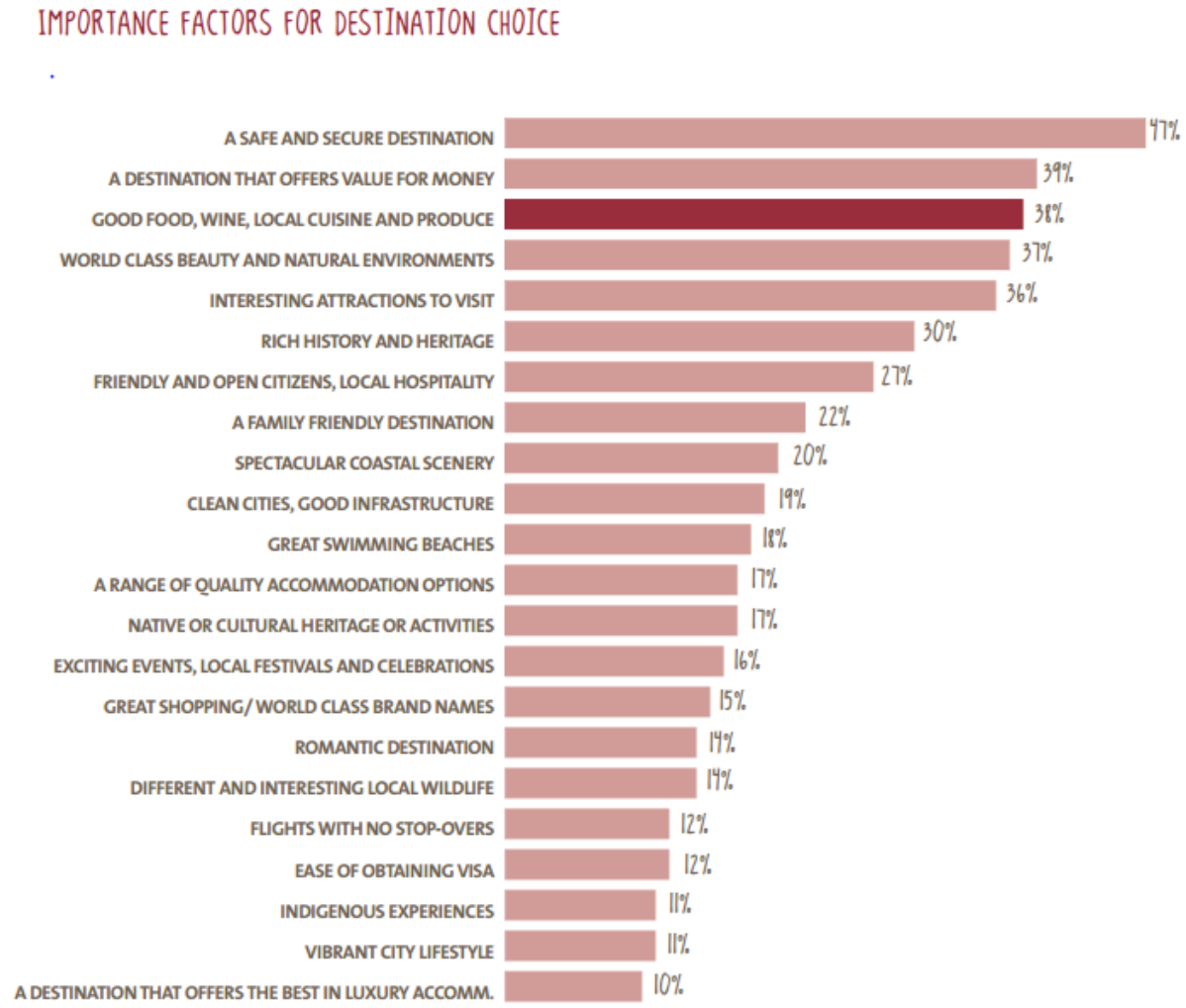
The economic status and outlook for Australian wine is briefly reviewed in Section 2.5.

2.4 Wine Tourism

Tourism Research Australia (TRA 2015) estimate that there were 15.8 million domestic visitor nights and 44.2 million international visitor nights to Australian wineries in 2014-15. Overall their expenditure totalled $9.2 billion.

BDA Marketing conducted consumer research across 15 key Australian tourist markets for Tourism Australia. The research showed that 'great food, wine, local cuisine and produce' was a major factor influencing holiday decision-making (38%), ranking third ahead of 'world class beauty and natural environments' (37%) – Figure 2.11.

Figure 2.11 International Tourist Reasons for Visiting Australia



Source: http://www.tourism.australia.com/documents/Food_and_Wine_Fact_Sheet.pdf

Tourism Australia has responded to this research with a major international marketing campaign highlighting Australia's food and the wine travel experience.

2.5 Industry Status and Outlook

From the 1990s Australia led a wave of wine exporters who transformed world wine markets. Australia produced and delivered well priced wine of consistent quality. In so doing Australia secured its place as a major wine exporter. New world countries, especially those in the southern hemisphere adopted the 'Australian model', the EU expanded production and the world wine supply grew.

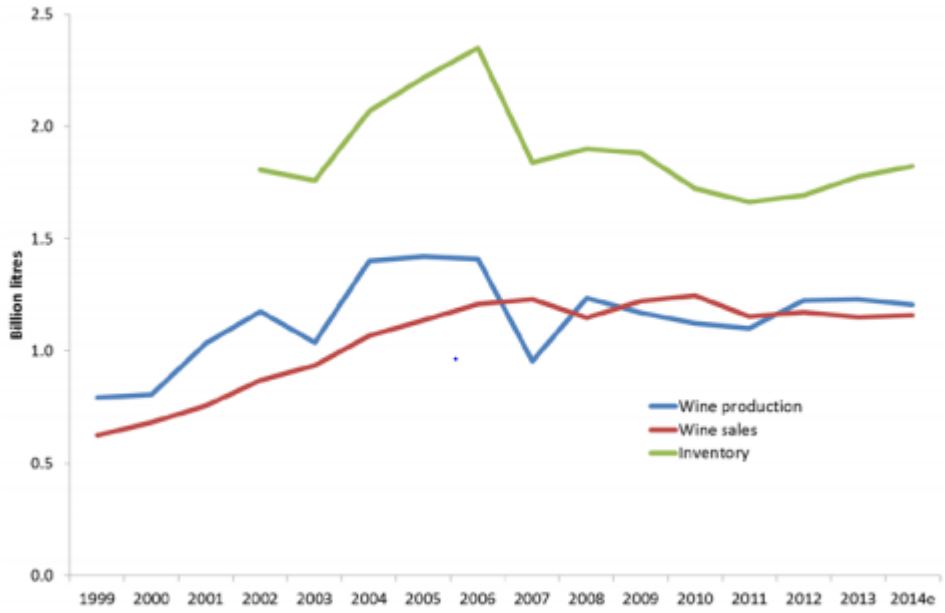
In the new century a series of shocks hit the Australian wine sector. Anderson (2015) identified these shocks as including:

- A decade long, mining induced appreciation of the Australian dollar – making Australian wine relatively expensive in export markets
- A multi-year drought with severe consequences for the availability and cost of essential irrigation water
- The global financial crisis that began in 2008 and curtailed export demand
- The tightening of wine distribution regulations in Canada, the US and Scandinavia
- The launch of an austerity and anti-corruption drive in 2012 by a new Chinese Government that effectively reduced government-funded banqueting and gifting of wine
- The rise of supermarket retailing of wine and their preference for bulk purchased and 'own brand' labelled wine
- Wine fashion swings that worked against Australian wine in UK and US markets and for NZ Sauvignon Blanc in the domestic market.

As a consequence of these shocks, the Australian wine sector experienced large declines in the prices paid to grape growers for their wine grapes, cuts in wine making profits and an exchange rate induced contraction in wine tourism.

Inventories of Australian wine peaked at 2.4 billion litres in 2006 and production and sales are now more closely aligned – Figure 2.12. Of note is an upward trend in Australian wine inventory post 2011 and a closing inventory of 1.8 billion litres in 2014.

Figure 2.12 Australian Wine Supply, Demand and Inventories Over Time



Source: Wine Australia May 2015

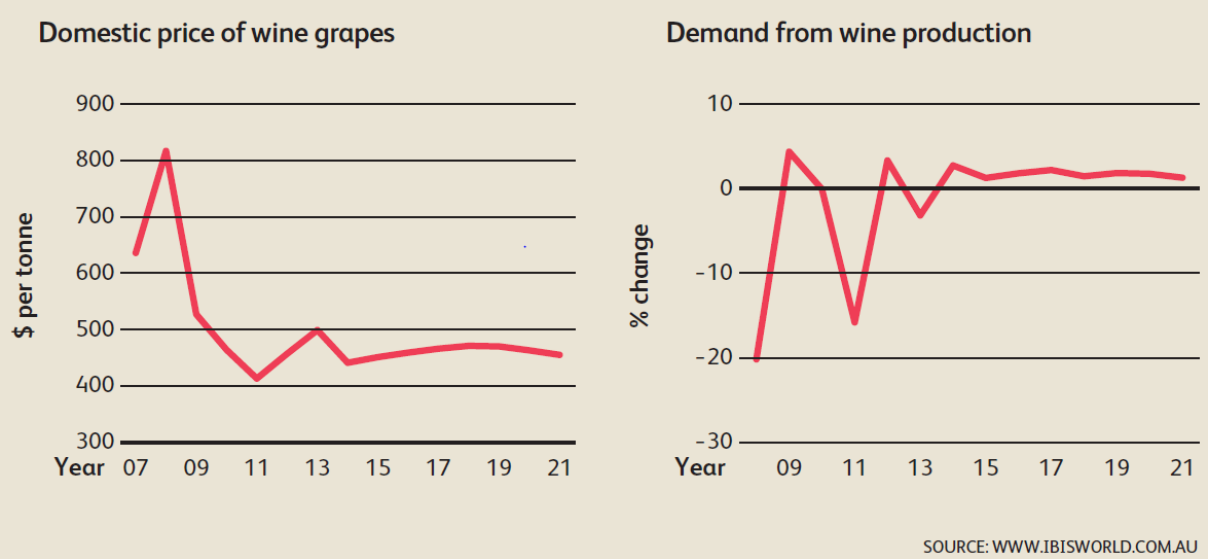
Despite twenty first century setbacks, the Australian wine sector has cautious reason for optimism and there are several positive signs emerging. One is economic recovery in the US and parts of the recessed economies in the EU. A second encouraging sign was the substantial take-up of the EU's offer to pay wine grape growers to remove vines during the period 2009 to 2011. There has also been some removal of vines in the warm irrigated areas of California as well as in Australia (Anderson 2015).

Third, expected demographic changes in the US over the longer term suggest wine consumption will grow faster than overall population. Fourth, the Asian market is growing steadily. Not only is the population expected to increase by 700 million people by 2030 but Asia's share of global income is expected to double. Already the middle class in emerging Asian economies are consuming medium priced and high priced fine wines. During the period 2011 to 2014 Australian wine exports to Asia averaged $6.40/litre compared to less than $2.20/litre for all other destinations. Even Australian exports to China, by far the biggest Asian wine market, averaged $5.70/litre during this period (Anderson 2015).

Australia's export prospects depend on exchange rate movements. With the recent devaluation of the Australian dollar, prospects for export wine sales have brightened and imports of wine into Australia have become less competitive. Finally it needs to be remembered that the slowdown in domestic growth following the end of the mining investment boom will also slow Australia's per capita income growth and dampen the growth in domestic demand (Anderson 2015).

IBIS World (May 2015a) forecasts stronger wine sector growth for the five-year period through to 2020-21 than has been experienced in the five years to 2015-16 – Figure 2.13.

Figure 2.13 Outlook for Australian Wine Sector to 2021 (IBIS World, May 2015)



2.6 Industry Statistics

Key Australian wine industry statistics assembled with the assistance of Wine Australia are summarised in Table 2.7.

Table 2.7 - Australian Wine Sector Statistics (various years)

Measure	Year	Quantity	Unit
Wine Grape Growing			
Wine grape growers	2014-15	5,160	number
Wine grape vineyard area	2014-15	135,178	hectares
Wine grape crush	2014-15	1,670,000	tonnes
Gross value of wine grape sales	2014-15	773,210,000	$
Direct employment in grape growing	2011	7,567	number
Wine Manufacturing			
Wine making enterprises	2014	2,900	number
Wine production	2012-13	1,231,000,000	litres
Domestic sales of Australian wine	2012-13	2,369,200,000	$
Domestic sales of imported wine	2013-14	634,300,000	$
Export sales of Australian wine	2012-13	1,865,000,000	$
Direct employment in wine making	2011	14,814	number
Wine Tourism			
Domestic visitor nights	2014-15	15,801,000	number
Domestic visitor expenditure	2014-15	3,466,800,000	$
International visitor nights	2014-15	44,178,000	number
International visitor expenditure	2014-15	5,740,800,000	$

Source: various

Summary statistics provide a foundation for analysis of the economic contribution of the Australian wine sector.

3. Input Output Modelling

There are two main methods that can be used to analyse the economic contribution of an industry, they are:

- Input-output (IO) analysis; and
- Computable general equilibrium (CGE) analysis.

However, the most appropriate method to use depends on what type of impact is being examined.

IO analysis can be used to:

- Develop a snapshot of an existing industry in a particular year including its direct and indirect linkages; or
- Assess the effects of a change or shock to the economy e.g. an expansion or contraction or a new activity.

CGE analysis is unsuitable for providing a snapshot of an existing industry and its inter-sectoral linkages and is more applicable to assessing the effects of a change or shock to the economy. For instance, NZIER (2014) 'The economic contribution of the New Zealand wine sector, the impact of growth since 2008', used CGE to examine the impact of growth in the wine and grape industry in New Zealand compared to if growth had stagnated at 2008 levels. Consequently, for this Australian study which is focused on providing a snapshot of an existing industry, IO analysis is used.

IO is primarily concerned with the effect of an impacting agent e.g. an individual business or sector, on an economy in terms of a number of specific economic activity indicators, such as gross regional output, value-added, income and employment.

These indicators can be defined as follows:

- **Gross regional output** – the gross value of business turnover;
- **Value-added** (gross regional product) – the difference between the gross value of business turnover and the costs of the inputs of raw materials, components and services bought in to produce the gross regional output;
- **Income** – the wages paid to employees including imputed wages for self-employed and business owners; and
- **Employment** – the number of people employed (including full-time and part-time).

An impacting agent may be an existing activity within an economy e.g. an ongoing tourism venture, or may be a change to a local economy e.g. a new tourism development. In this study the impacting agent is the existing grape growing, wine making and wine tourism sectors.

The economy on which the impact is measured can range from a township to the entire nation (Powell *et al*., 1985). This study is concerned with examining the impacts of the grape growing, wine making and wine tourism sectors on the Australian economy.

Input-output analysis essentially involves two steps:

- Construction of an appropriate IO table (regional transaction table) that can be used to identify the economic structure of a defined region and multipliers for each sector of the economy; and
- Identification of the initial impact or stimulus of an industry in a form that is compatible with the IO equations so that the IO multipliers and flow-on effects can then be estimated (Jensen and West, 1986).

For this study, the latest National IO Table produced by the Australian Bureau of Statistics for 2012-13, adjusted to 2015 values, was used.

Identification of the initial impact of the wine sector in a form compatible with the IO table required the development of a specific aggregate employment, revenue and expenditure profile for the grape growing sector, wine making sector and wine tourism sector, based on available industry information. For each of the grape growing sector and wine making sector a specific intermediate IO sector was developed where:

- The estimated gross annual revenue was allocated to the output row;
- The estimated wage bill of employees (including imputed wages for the self-employed) was allocated to the household wages row;
- Non-wage local expenditure was initially allocated across the relevant 114 intermediate sectors in the economy - for the wine making sector the expenditure on grapes was equal to the sale value of the grape sector;
- Purchaser prices for expenditure in each sector in the economies were adjusted to basic values and margins and taxes and allocated to appropriate sectors using relationships in the National Input-Output Tables;
- Allocation was then made between intermediate sectors and imports based on the percentage of imports in each sector of the National IO table;
- The difference between total revenue and total costs was allocated to the other value-added row; and
- Direct employment was allocated to the employment row.

These sectors were inserted into the IO table to facilitate impact assessment.

As identified above, there is no intermediate sector in the IO table for tourism. Tourism relates to final demand expenditure on a range of goods and services across the 114 intermediate sectors of the national economy. An expenditure profile for this final demand expenditure was developed based on the estimated total expenditure of domestic and international tourists, and the main categories of tourism expenditure. Purchaser prices for tourism expenditure in the economies were adjusted to basic values and margins and taxes and allocated to appropriate sectors using relationships in the National Input-Output Tables.

With new intermediate sectors for grape growing and wine making inserted into the IO table and a final demand expenditure for wine tourism developed, the computer program IO7 (Input-Output Analysis Version 7.1) was used to estimate the average annual direct and indirect output, value-added, income and employment[6] impacts for each of the wine sector components.

[6] It is important to understand that the focus of IO analysis is on the economic stimulus provided by wine sector and not on the economic costs and benefits of the wine sector. Consideration of the economic costs and benefits of wine sector would require the undertaking of a benefit cost analysis.

Indirect impacts are disaggregated into:

- Production-induced effects - economic activity from the purchase of goods and services that are used as an input into production or the wine tourism experience; and
- Consumption-induced effects - economic activity from the spending of employees of the wine sector and employees of those supplying inputs into production or the wine tourism experience.

In both cases, in addition to first-round purchases, there will be a series of indirect purchases as waves of second, third and subsequent-round effects make their way throughout the economy.

Ratio multipliers are reported in Section 5 for each of the components of the wine sector. These provide summary measures used for predicting the total impact on all industries in an economy from changes in the demand for the output of any one industry. They express indirect impacts or flow-ons in terms of the initial own sector effects e.g. employment flow-ons in relation to direct employment effects, output flow-ons in relation to direct output etc. Refer to Attachment 1 for a discussion of multipliers and the assumptions underpinning IO analysis.

Consideration is also given to aggregation of the impacts of each component being careful to avoid double counting. IO analysis examines backward linkages only. Consequently, because expenditure by tourists would include some expenditure on wine at the cellar door and expenditure by wine manufacturers would include expenditure on grapes there would be double counting if the economic activity from each of the components of the wine sector were simply added together. Adjustment is required to expenditure profiles to remove double counting if the components of the wine sector are to be aggregated.

Because IO only examines backward linkages, this analysis does not capture margins on wine sales through wholesale and retail outlets. Values for wine sales and grape sales are at the farm/factory gate.

4. Revenue, Expenditure and Employment Profiles of the Wine Sector

Section 4 develops revenue, expenditure and employment profiles for each of the components of the wine sector to enable the subsequent estimation of their direct and indirect impacts on the national economy.

4.1 Wine Grape Growing

Wine grape growing total revenue was estimated for financial year 2014-15 using data from the Australian Wine Sector Survey (WFA, July 2015) at $773,210,000 (total crush of 1,670,000 tonnes at an average value of $463/tonne) with an ABS wine grape growing area of 135,178 ha creating an average gross revenue of $5,720/ha.

The gross revenue estimate of $5,720/ha was aligned to published gross margin budgets to provide a breakdown of industry expenditure. Published gross margin budgets were secured for both 'warm inland' Murray Valley (Retallack 2012) and 'cool climate' Tasmania (DPIPWE 2014). Average gross margin was considered across these production types and total industry revenue and expenditure aggregated from the average gross margin using the industry gross value estimate of $773,210,000. Results are shown in Table 4.1.

Table 4.1 Wine Grape Growing Revenue and Expenditure Profile

	Average Gross Margin ($/ha)	Wine Grape Growing Industry Total Revenue and Expenditure ($'million)
Revenue (A)	**5,720**	**773.2**
Expenditure		
Farm labour	770	104.1
Contract labour	722	97.6
Fruit transport	518	70.0
Levies	75	10.1
Chemicals	582	78.7
Nutrition/fertiliser	246	33.3
Vineyard floor /canopy management	114	15.4
Sundry materials/supplies	116	15.7
Machinery expenses	272	36.8
Machinery fuel	306	41.4
Machinery hire	379	51.2
Water and drainage costs	1,395	188.6
Repairs and maintenance - vineyard	100	13.5
Total expenditure (B)	**5,595**	**756.4**
Net Revenue (A) less (B)	**125**	**16.8**
Employment		**6,807***

* ABS 4 digit census data for grape growing of 7,563 (Table 2.7) less 10% associated with table grape and dried grape growing (IBIS World, May 2015 report table and dried grapes account for 10% of total grape growing industry production).

Wine grape growing industry employment was estimated using the following data:

- 7,567 employed in all types of grape growing (ABS 2011, Census Employment by Industry 4 digit level) less 10% associated with table and dried grape production i.e. 6,807 jobs
- Total wages that exclude contract labour – recorded in the input-output model as 'services to agriculture'. Employment associated with contract labour recorded as a 'multiplier'
- Total wages that include Table 4.1 – 'farm labour' and 'net revenue' to reflect imputed wages from farm owners. Total wages are therefore estimated at $121 million ($104.1 million farm labour plus $16.9 million net revenue)
- Average grape growing industry wage is therefore a modest $17,776 per annum (total wages of $121 million divided by 6,807 jobs). This estimate is broadly consistent with IBIS World (May, 2015) which estimated average grape growing wage for 2014-15 at $17,021.

4.2 Wine Making

Wine making total revenue was estimated at $5.9 billion from the value of 'domestic sales of Australian wine by wine making business' estimate of $2.369 billion for 2012-13 (ABS 2013) and the knowledge that domestic sales constitute 40% of industry total revenue. Export value data was not employed because it is calculated on an FOB basis, is not comparable to the domestic data and includes non-wine making costs. Export value is also affected by the increase in lower value bulk wine exports and the transfer of value to Australian winery owned bottling facilities in export markets.

Wine making production cost (expenditure) was sourced from Palousis (2015) and cross checked with the WFA and Wine Australia Gross Margin Ready Reckoner (http://www.wfa.org.au/resources/financial-ready-reckoner/). It is noted that the Ready Reckoner was last updated in 2010 so greater emphasis has been placed on the more recent Palousis (2015) data.

Table 4.2 provides a summary of average wine maker revenue and expenditure per saleable litre of wine along with the wine making industry total. Industry total revenue and expenditure was developed using a total wine production estimate for Australia, 2012-13 of 1.231 billion litres (ABS 2013).

Table 4.2 Wine Making Revenue and Expenditure Profile

	Average Revenue and Expenditure ($/litre)	Wine Making Industry Total Revenue and Expenditure ($'million)
Revenue (sale price packaged)	4.79	5,900
Cost of packaging#	1.79	2,203
Revenue after packaging (A)	**3.00**	**3,697**
Expenditure		
Winery labour	0.72	886
Grapes	0.63	773
Wine loss / waste treatment	0.13	159
Depreciation	0.22	270
Electricity / gas	0.08	98
Repairs and maintenance	0.10	128
Water	0.07	86
Total cost (excluding packaging) (B)	**1.95**	**2,400**
Net revenue (A) less (B)	**1.05**	**1,297**
Employment		**13,629***

note an estimated 60% of wine exports are shipped as bulk wine i.e. lower packaging cost for bulk
* ABS 4 digit census data for wine and other alcoholic beverage manufacturing (Table 2.7) less 8% associated with cider and other alcoholic beverage manufacture (IBIS World, May 2015a report cider and other alcoholic beverages at 8% of Australian and New Zealand Standard Industrial Classification total).

Wine making industry employment was estimated using the following data:

- 14,814 employed in the wine and other alcoholic beverage manufacturing sector (ABS 2011, Census Employment by Industry 4 digit level) less 8% associated with cider and other alcoholic beverage making i.e. 13,629 jobs
- Total wages that include the self-employed shown in Table 4.2 as $886 million.
- Average wine making industry wage is therefore $65,000 (total wages of $886 million divided by 13,629 jobs). This estimate is broadly consistent with IBIS World (May, 2015a) which estimated average wine making wages for 2014-15 at $60,875.

4.3 Wine Tourism

Wine tourism revenue and expenditure data 2014-15 was sourced from Tourism Australia (Tourism Research Australia, June 2015). Separate estimates are provided for domestic and international visitors. Data is summarised in Table 4.3.

Table 4.3 Wine Tourism Expenditure and Visitation

	Domestic Wine Tourism ($'million)	International Wine Tourism ($' million)	Total ($' million)
Expenditure Item			
Airfares	303.8	1,195.2	1,499.0
Tours	211.0	653.6	864.6
Transportation	428.2	325.7	753.9
Food, drink and accommodation[#]	2,106.3	1,933.5	4,039.8
Shopping	277.0	589.2	866.2
Entertainment	112.5	106.2	218.7
Education	0.4	596.4	596.8
Other	27.7	341.0	368.6
Total	**3,466.8**	**5,740.8**	**9,207.6**
Visitor nights ('000)	**15,801**	**44,178.0**	**59,979.0**

note it is assumed that 3% of wine sales at the cellar door is to wine tourists. The estimate is derived from the AWBC and WFA (2007) Benchmarking Guide for Medium Sized Businesses which estimates that 3% of total sales for business of this size are at the cellar door.

No ABS employment data is available for wine tourism because there is no specific tourism industry sector in the Australian and New Zealand Standard Industrial Classification. Employment data is generated from analysis of the wine tourism expenditure profile using the IO7 software.

5. Direct and Indirect Impacts of the Wine Sector on the Australian Economy

5.1 Grape Growing Sector

Economic Activity

The total and disaggregated impact of grape growing on the Australian economy (in 2015 dollars) is shown in Table 5.1.

Table 5.1 Direct and Indirect Impact of the Grape Growing Sector

	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	TOTAL EFFECT
OUTPUT ($'000,000)	773	1,079	822	1,901	2,674
Type 11A Ratio	1.00	1.40	1.06	2.46	3.46
VALUE-ADDED ($'000,000)	128	483	455	938	1,065
Type 11A Ratio	1.00	3.78	3.56	7.34	8.34
INCOME ($'000,000)	121	252	219	471	592
Type 11A Ratio	1.00	2.08	1.81	3.90	4.90
EMPLOYMENT (No.)	6,813	3,093	3,360	6,454	13,267
Type 11A Ratio	1.00	0.45	0.49	0.95	1.95

The Australian grape growing sector is estimated to make up to the following total annual contribution to the national economy:

- $2,674M in annual direct and indirect regional output or business turnover;
- $1,065M in annual direct and indirect regional value added;
- $592M in annual direct and indirect household income; and
- 13,267 direct and indirect jobs.

Multipliers

Ratio multipliers provide a summary measure of the direct and indirect economic activity relative to the direct economic activity for a particular indicator. The Type 11A ratio multipliers for the grape growing sector range from 1.95 for employment up to 8.34 for value added.

The low ratio multiplier for employment is a reflection of the relatively labour intensive nature of the grape growing sector compared to the sectors that experience flow-on employment. The higher income ratio multiplier reflects the higher wages of those experiencing flow-on employment relative to the low wage in the grape growing sector. The very high value-added multiplier reflects low wages and low profits in grape growing relative to the sectors that experience flow-on effects.

Main Sectors Affected

Flow-on impacts from the grape growing sector impact a number of different sectors of the national economy. The sectors most impacted by output, value-added and income flow-ons are the:

- Water Supply, Sewerage and Drainage Services;
- Ownership of Dwellings;

- Agriculture, Forestry and Fishing Support Services;
- Road Transport;
- Wholesale Trade;
- Basic Chemical Manufacturing;
- Finance;
- Retail Trade;
- Professional, Scientific and Technical Services;
- Rental and Hiring Services (except Real Estate);
- Non-Residential Property Operators and Real Estate Services;
- Employment, Travel Agency and Other Administrative Services; and
- Auxiliary Finance and Insurance Services.

Examination of the estimated direct and flow-on employment impacts gives an indication of the aggregated sectors with employment linkages to the grape growing sector (Figure 5.1).

Figure 5.1 Sectoral Distribution of Grape Growing Employment Impacts on the National Economy

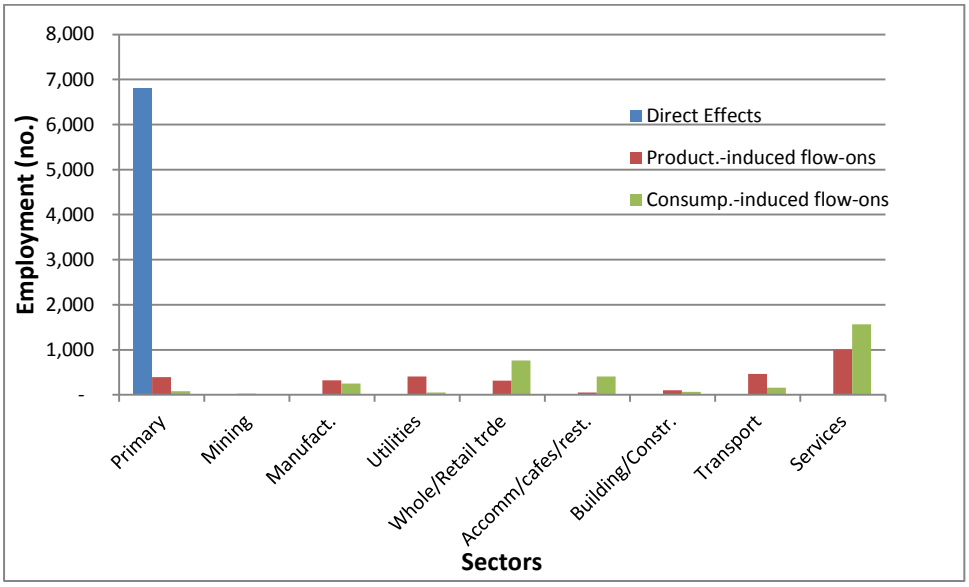


Figure 5.1 indicates that direct, production-induced and consumption-induced employment linkages of the grape growing sector on the national economy are likely to have different distributions across sectors. Production-induced flow-on employment occur mainly in services sectors, transport sectors, utilities sectors, wholesale/retail trade sectors, manufacturing sectors, and primary industry sectors while consumption induced flow-on employment are mainly in services sectors, wholesale/retail trade sectors and accommodation/cafes/restaurants sectors.

5.2 Wine Making Sector

Economic Activity

The total and disaggregated annual impacts of the wine making sector on the Australian economy (in 2015 dollars) are shown in Table 5.2.

Table 5.2 Direct and Indirect Impact of the Wine Manufacturing Sector

	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	TOTAL EFFECT
OUTPUT ($'000,000)	5,900	6,346	5,352	11,698	17,598
Type 11A Ratio	1.00	1.08	0.91	1.98	2.98
VALUE-ADDED ($'000,000)	2,464	2,615	2,961	5,576	8,040
Type 11A Ratio	1.00	1.06	1.20	2.26	3.26
INCOME ($'000,000)	886	1,543	1,427	2,970	3,856
Type 11A Ratio	1.00	1.74	1.61	3.35	4.35
EMPLOYMENT (No.)	13,629	22,990	21,874	44,864	58,493
Type 11A Ratio	1.00	1.69	1.61	3.29	4.29

The Australian wine making sector is estimated to make up to the following total annual contribution to the national economy:

- $17,598M in annual direct and indirect regional output or business turnover;
- $8,040M in annual direct and indirect regional value added;
- $3,856M in annual direct and indirect household income; and
- 58,493 direct and indirect jobs.

Multipliers

Ratio multipliers provide a summary measure of the direct and indirect economic activity relative to the direct economic activity for a particular indicator. The Type 11A ratio multipliers for the wine manufacturing sector range from 3.26 for value-added to 4.35 for employment.

The high ratio multiplier for employment (and income) is a reflection of the flow-on employment (and income) including all direct and indirect employment associated with relatively labour intensive grape growing sector and winemaking itself being relatively capital intensive and hence have relative low levels of employment (and income) for the value of product produced.

Main Sectors Affected

Flow-on impacts from the wine manufacturing sector impact a number of different sectors of the national economy. The sectors most impacted by output, value-added and income flow-ons are:

- Glass and Glass Product Manufacturing;
- Grape growing;
- Ownership of Dwellings;
- Wholesale Trade;
- Retail Trade;
- Finance;
- Professional, Scientific and Technical Services ;
- Electricity Transmission, Distribution, On Selling and Electricity Market Operation;
- Road Transport;
- Water Supply, Sewerage and Drainage Services ;
- Employment, travel agency and other administration services;
- Health Care Services; and
- Public Order and Safety.

Examination of the estimated direct and flow-on employment impacts gives an indication of the aggregated sectors with employment linkages to the wine making sector (Figure 5.2).

Figure 5.2 Sectoral Distribution of Wine Making Employment Impacts on the National Economy

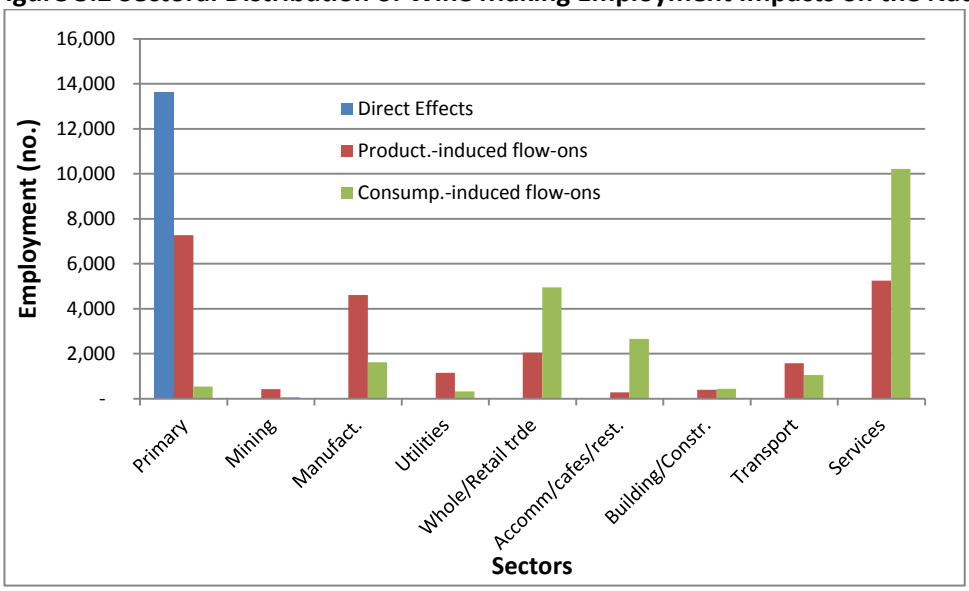


Figure 5.2 indicates that direct, production-induced and consumption-induced employment linkages of the wine making sector on the national economy are likely to have different distributions across sectors. Production-induced flow-on employment occur mainly in the primary industries sector, services sectors and manufacturing sectors while consumption induced flow-on employment are mainly in services sectors, wholesale/retail trade sectors and accommodation/cafes/restaurants sectors.

5.3 Wine Tourism

Economic Activity

The total and disaggregated annual impacts of the wine tourism sector on the Australian economy (in 2015 dollars) are shown in Table 5.3.

Table 5.3 Direct and Indirect Impact of the Wine Tourism Sector

	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	TOTAL EFFECT
OUTPUT ($'000,000)	7,624	6,262	9,258	15,520	23,144
Type 11A Ratio	1.00	0.82	1.21	2.04	3.04
VALUE-ADDED ($'000,000)	3,835	2,947	5,121	8,068	11,903
Type 11A Ratio	1.00	0.77	1.34	2.10	3.10
INCOME ($'000,000)	2,465	1,736	2,469	4,205	6,670
Type 11A Ratio	1.00	0.70	1.00	1.71	2.71
EMPLOYMENT (No.)	55,175	22,986	37,837	60,823	115,997
Type 11A Ratio	1.00	0.42	0.69	1.10	2.10

The Australian wine tourism sector is estimated to make up to the following total annual contribution to the national economy:

- $23,144M in annual direct and indirect regional output or business turnover;
- $11,903M in annual direct and indirect regional value added;
- $6,670M in annual direct and indirect household income; and
- 115,997 direct and indirect jobs.

Multipliers

The Type 11A ratio multipliers for the wine tourism sector range from 2.10 for employment to 3.10 for value-added.

Main Sectors Affected

Impacts from the wine tourism sector impact a number of different sectors of the national economy. The sectors most impacted in terms of output, value-added and income are:

- Accommodation;
- Food and Beverage Services;
- Road Transport;
- Ownership of Dwellings;
- Retail Trade;
- Finance;
- Wholesale Trade;
- Professional, Scientific and Technical Services;
- Arts, sports, adult and other education services (including community education);
- Non-Residential Property Operators and Real Estate Services;
- Employment, travel agency and other administrative services; and
- Health Care Services.

Examination of the estimated direct and flow-on employment impacts gives an indication of the aggregated sectors with employment linkages to the wine tourism sector (Figure 5.3).

Figure 5.3 Sectoral Distribution of Wine Tourism Employment Impacts on the National Economy

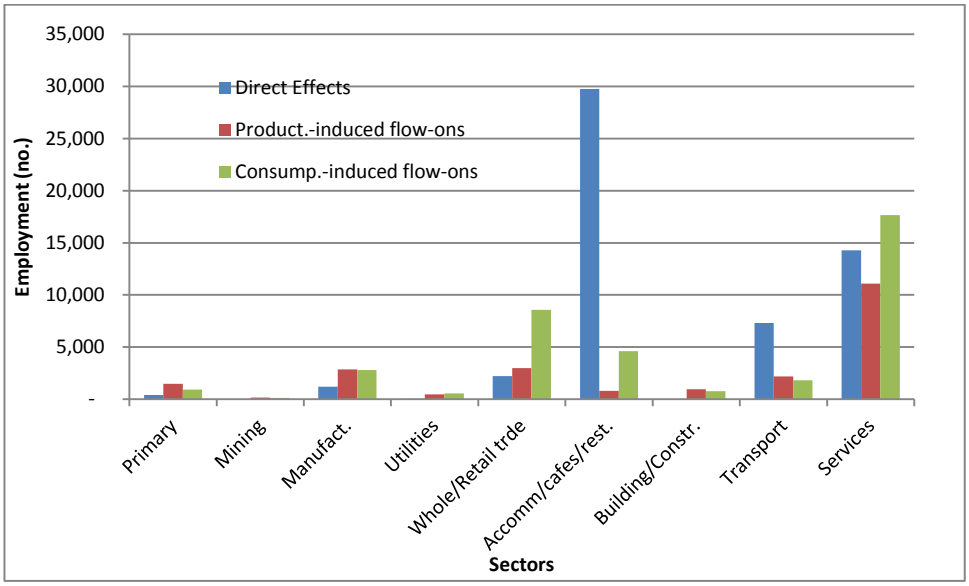


Figure 5.3 indicates that direct, production-induced and consumption-induced employment linkages of the wine tourism sector on the National economy are likely to have different distributions across sectors. Direct employment mainly occurs in the accommodation/cafes/restaurants sectors, services sectors and transport sectors. Production-induced flow-on employment occur mainly in the services sectors while consumption induced flow-on employment are mainly in services sectors, wholesale/retail trade sectors and accommodation/cafes/restaurants sectors.

5.4 Total Wine Sector

Economic Activity

It is not possible to simply add the economic activity from grape growing, wine manufacturing and wine tourism to give the total economic activity from the wine sectors. This is because IO analysis captures backward linkages and so the economic activity impacts from the wine manufacturing sector already captures the backward linkages to the grape growing sector. Similarly, the economic activity impacts from the wine tourism sector captures backward linkages to the wine making sector.

To estimate the economic activity for the total wine sector, comprising grape growing, wine making and wine tourism, additional IO analysis was undertaken for the wine tourism sector net of expenditure at the cellar door of wineries. This was added to the economic activity impacts of the wine making sector (which already captures backward linkages to the grape growing sector). So direct effects include wine making plus final demand expenditure on wine tourism related goods and services (net of cellar door sales to wine tourists). All other effects are reported in production and consumptions induced flow-on effects.

Using this approach the total and disaggregated annual impacts of the total wine sector on the Australian economy (in 2015 dollars) is shown in Table 5.4.

Table 5.4 Direct and Indirect Impact of the Total Wine Sector

	Direct Effect	Production Induced	Consumption Induced	Total Flow-on	TOTAL EFFECT
OUTPUT ($'000,000)	13,347	12,417	14,449	26,867	40,214
Type 11A Ratio	1.00	0.93	1.08	2.01	3.01
VALUE-ADDED ($'000,000)	6,224	5,484	7,993	13,477	19,701
Type 11A Ratio	1.00	0.88	1.28	2.17	3.17
INCOME ($'000,000)	3,324	3,233	3,854	7,086	10,411
Type 11A Ratio	1.00	0.97	1.16	2.13	3.13
EMPLOYMENT (No.)	68,395	45,286	59,055	104,341	172,736
Type 11A Ratio	1.00	0.66	0.86	1.53	2.53

The Australian wine sector is estimated to make up to the following total annual contribution to the National economy:

- $40,214M in annual direct and indirect regional output or business turnover;
- $19,707M in annual direct and indirect regional value added;
- $10,414M in annual direct and indirect household income; and
- 172,736 direct and indirect jobs.

Multipliers

The Type 11A ratio multipliers for the wine sector range from 2.53 for employment to 3.17 for value-added.

Main Sectors Affected

Impacts from the wine sector impact a number of different sectors of the National economy. The sectors most impacted in terms of output, value-added and income are:

- Wine Manufacturing;
- Accommodation;
- Ownership of Dwellings;
- Food and Beverage Services;
- Road Transport;
- Retail Trade;
- Wholesale Trade;
- Finance;
- Professional, Scientific and Technical Services;
- Glass and Glass Product Manufacturing;
- Employment, Travel Agency and Other Administrative Services; and
- Health Care Services.

Examination of the estimated direct and flow-on employment impacts gives an indication of the aggregated sectors with employment linkages to the wine sector (Figure 5.4).

Figure 5.4 Sectoral Distribution of Wine Sector Employment Impacts on the National Economy

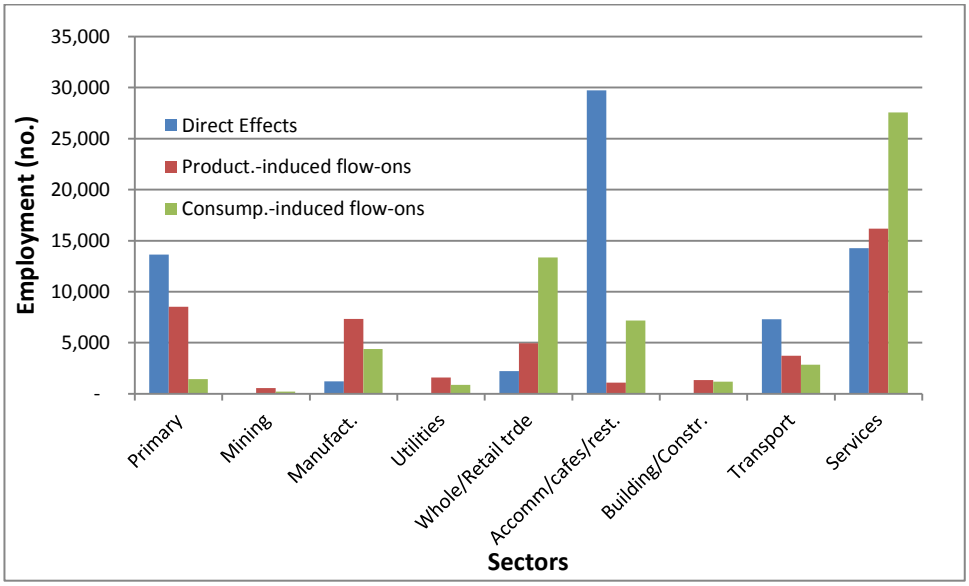


Figure 5.4 indicates that direct, production-induced and consumption-induced employment linkages of the wine tourism sector on the national economy are likely to have different distributions across sectors. Direct employment mainly occurs in the accommodation/cafes/restaurants sectors, services sectors, primary industries sectors and transport sectors. Production-induced flow-on employment occur mainly in the services sectors, primary industries sectors and manufacturing sectors while consumption induced flow-on employment are mainly in services sectors, wholesale/retail trade sectors and accommodation/cafes/restaurants sectors.

5.5 Contribution to Tax Receipts

Wine grape growing, wine making and wine tourism businesses operate in an environment of multiple and complex taxation regulations particularly wine makers dealing with multiple export jurisdictions. Examples of taxes that a wine maker is subject to and must actively manage are:

- Wine Equalisation Tax (WET)
- Goods and Services Tax (GST)
- Stamp duty
- Income tax
- Capital gains tax
- Fringe Benefits Tax (FBT)
- Payroll tax
- Customs and import duties
- Overseas taxes and duties for exporters
- Employee superannuation.

Unlike Computable General Equilibrium modelling, Input-Output analysis does not generate taxation indicators. Input Output analysis accounts for tax paid on inputs purchased by grape growers, wine makers and the wine tourism sector and this tax paid is captured in estimates of value-added. By way of example of the quantum of tax paid by the wine sector, net WET payments were $792 million in 2014-15 and are forecast to increase to $920 million by 2018-19 (Australian Government Mid-Year Economic and Fiscal Outlook, Table 3.10 http://budget.gov.au/2015-16/content/myefo/html/03_part_3-01.htm).

6. Conclusions

The research has quantified the direct and flow-on effects of the Australian wine sector. The key results from the analysis are as follows.

The Australian wine sector defined as wine grape growing, wine making and wine related tourism:

- Supports 172,736 full and part-time jobs most of which are located in regional Australia. Jobs supported by the wine sector include direct employment of 68,395 within the sector and a further 104,341 full time and part time jobs due to induced effects.
- Income from both direct and flow-on employment in the wine sector totals $10.4 billion
- Contributes $40.2 billion to the value of gross output for Australia.
- Adds $19.7 billion in value-added to the Australian economy.

The average effects of a contraction or expansion within the wine sector suggests:

- The wider economy would gain an extra 1.53 jobs for every job gained in the wine sector.
- The economy would gain an extra $2.01 million for every additional $1 million of gross output generated by the wine sector.
- The economy would gain an extra $2.17 million in contribution to value-added for every additional $1 million of value-added generated by the wine sector.

Industry forecasts suggest an expansion of wine sector economic contributions described in this report.

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Attachment 1 Assumptions and Interpretations, Input-Output Analysis and Multipliers

1. "The *basic assumptions* in IO analysis include the following:

    - there is a fixed input structure in each industry, described by fixed technological coefficients (evidence from comparisons between IO tables for the same country over time have indicated that material input requirements tend to be stable and change but slowly; however, requirements for primary factors of production, that is labour and capital, are probably less constant);
    - all products of an industry are identical or are made in fixed proportions to each other;
    - each industry exhibits constant returns to scale in production;
    - unlimited labour and capital are available at fixed prices; that is, any change in the demand for productive factors will not induce any change in their cost (in reality, constraints such as limited skilled labour or investment funds lead to competition for resources among industries, which in turn raises the prices of these scarce factors of production and of industry output generally in the face of strong demand); and
    - there are no other constraints, such as the balance of payments or the actions of government, on the response of each industry to a stimulus.

2. The multipliers therefore describe *average effects, not marginal effects*, and thus do not take account of economies of scale, unused capacity or technological change. Generally, average effects are expected to be higher than the marginal effects.

3. The IO tables underlying multiplier analysis only take account of one form of *interdependence,* namely the sales and purchase links between industries. Other interdependence such as collective competition for factors of production, changes in commodity prices which induce producers and consumers to alter the mix of their purchases and other constraints which operate on the economy as a whole are not generally taken into account.

4. The combination of the assumptions used and the excluded interdependence means that IO multipliers are higher than would realistically be the case. In other words, they tend to *overstate* the potential impact of final demand stimulus. The overstatement is potentially more serious when large changes in demand and production are considered.

5. The multipliers also do not account for some important pre-existing conditions. This is especially true of Type II multipliers, in which employment generated and income earned induce further increases in demand. The implicit assumption is that those taken into employment were previously unemployed and were previously consuming nothing. In reality, however, not all 'new' employment would be drawn from the ranks of the unemployed; and to the extent that it was, those previously unemployed would presumably have consumed out of income support measures and personal savings. Employment, output and income responses are therefore overstated by the multipliers for these additional reasons.

6. The most *appropriate interpretation* of multipliers is that they provide a relative measure (to be compared with other industries) of the interdependence between one industry and the rest of the

economy which arises solely from purchases and sales of industry output based on estimates of transactions occurring over a (recent) historical period. Progressive departure from these conditions would progressively reduce the precision of multipliers as predictive device" (ABS 1995, p.24).

Multipliers indicate the total impact of changes in demand for the output of any one industry on all industries in an economy (ABS, 1995). Conventional output, employment, value-added and income multipliers show the output, employment, value-added and income responses to an initial output stimulus (Jensen and West, 1986).

Components of the conventional output multiplier are as follows:

Initial effect - which is the initial output stimulus, usually a $1 change in output from a particular industry (Powell and Chalmers, 1995; ABS, 1995).

First round effects - the amount of output from all intermediate sectors of the economy required to produce the initial $1 change in output from the particular industry (Powell and Chalmers, 1995; ABS, 1995).

Industrial support effects - the subsequent or induced extra output from intermediate sectors arising from the first round effects (Powell and Chalmers, 1995; ABS, 1995).

Production induced effects - the sum of the first round effects and industrial support effects (i.e. the total amount of output from all industries in the economy required to produce the initial $1 change in output) (Powell and Chalmers, 1995; ABS, 1995).

Consumption induced effects - the spending by households of the extra income they derive from the production of the extra $1 of output and production induced effects. This spending in turn generates further production by industries (Powell and Chalmers, 1995; ABS, 1995).

The *simple multiplier* is the initial effect plus the production induced effects.

The *total multiplier* is the sum of the initial effect plus the production-induced effect and consumption-induced effect.

Conventional employment, value-added and income multipliers have similar components to the output multiplier, however, through conversion using the respective coefficients show the employment, value-added and income responses to an initial output stimulus (Jensen and West, 1986).

For employment, value-added and income, it is also possible to derive relationships between the initial or own sector effect and flow-on effects. For example, the flow-on income effects from an initial income effect or the flow-on employment effects from an initial employment effect, etc. These own sector relationships are referred to as ratio multipliers, although they are not technically multipliers because there is no direct line of causation between the elements of the multiplier. For instance, it is not the initial change in income that leads to income flow-on effects, both are the result of an output stimulus (Jensen and West, 1986).

A description of the different ratio multipliers is given below.

Type 1A Ratio Multiplier = $\frac{\text{Initial + First Round Effects}}{\text{Initial Effects}}$

Type 1B Ratio Multiplier= $\frac{\text{Initial + Production Induced Effects}}{\text{Initial Effects}}$

Type 11A Ratio Multiplier = $\frac{\text{Initial + Production Induced + Consumption Induced Effects}}{\text{Initial Effects}}$

Type 11B Ratio Multiplier = $\frac{\text{Flow-on Effects}}{\text{Initial Effects}}$

Source: Centre for Farm Planning and Land Management (1989).

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