

Horticulture Innovation Australia

Final Report

Sensitivity study – Impact of increasing vegetable exports on the domestic market

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Deloitte Access Economics

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Contents

Executive summary	vi
Methodology	vi
Key findings	vii
Stakeholder consultation	ix
1 Introduction	11
1.1 Background	11
1.2 Project objectives	11
1.3 Scope	11
1.4 Approach	12
1.5 Structure of report	13
2 Australian vegetable industry	14
2.1 Vegetable production	14
2.2 Vegetable exports	17
3 Methodology	19
3.1 Scenario design	19
3.2 CGE modelling	21
3.3 Top-down regional analysis	23
3.4 Case study selection	23
4 Modelling results	25
4.1 Scenario 1 - Freer trade	25
4.2 Scenario 2 - Wealthier consumers	32
4.3 Scenario 3 - Greater supply chain efficiency	39
5 Stakeholder consultation	46
5.1 Stakeholder views on the three scenarios	46
5.2 Regional case studies	47
5.3 Other insights from stakeholder consultations	57
6 Conclusions and discussion	62
References	65
Appendix 1 Vegetable exports	66
Appendix 2 CGE modelling	67
Limitation of our work	71
General use restriction	71

Charts

Chart 2-1 Levy-paying vegetables by contribution, by state.....	16
Chart 2-2 Total vegetable exports, by destination.....	18
Chart 2-3 Top ten levy-paying vegetables exported by Australia, \$million, 2014-15.....	18
Chart 4-1 Impact of freer trade on state-level output and export of levy-paying vegetables, 2024-25.....	28
Chart 4-2 Sectoral impacts of freer trade on Queensland’s vegetable industry, 2024-25	29
Chart 4-3 Sectoral impacts of freer trade on Victoria’s vegetable industry, 2024-25.....	29
Chart 4-4 Sectoral impacts of freer trade on Western Australia’s vegetable industry, 2024-25	30
Chart 4-5 Five SA4s in Queensland with the largest impacts on levy-paying vegetables from freer trade, 2024-25.....	32
Chart 4-6 Impact of increased wealth in Asian countries on state-level output and export of levy-paying vegetables, 2024-25	35
Chart 4-7 Sectoral impacts of increased wealth on Victoria’s vegetable industry, 2024-25	36
Chart 4-8 Sectoral impacts of increased wealth on Queensland’s vegetable industry, 2024-25	36
Chart 4-9 Sectoral impacts of increased wealth on Western Australia’s vegetable industry, 2024-25	37
Chart 4-10 Five SA4s in Queensland with the largest impacts on levy-paying vegetables from wealthier consumers, 2024-25.....	39
Chart 4-11 Impact of greater supply chain efficiency on state-level output and export of levy-paying vegetables, 2024-25.....	41
Chart 4-12 Sectoral impacts of greater supply chain efficiency on Victoria’s vegetable industry, 2024-25	42
Chart 4-13 Sectoral impacts of greater supply chain efficiency on Queensland’s vegetable industry, 2024-25	42
Chart 4-14 Sectoral impacts of greater supply chain efficiency on Western Australia’s vegetable industry, 2024-25	43
Chart 4-15 Five SA4s in Queensland with the largest impacts on levy-paying vegetables from greater supply chain efficiency, 2024-25	45
Chart 5-1 Sectoral impacts of freer trade on Melbourne South East region, 2024-25.....	48
Chart 5-2 Sectoral impacts of wealthier consumers on Melbourne South East region, 2024-25.....	49

Chart 5-3 Sectoral impacts of greater supply chain efficiency on Melbourne South East region, 2024-25	49
Chart 5-4 Sectoral impacts of freer trade on Lockyer valley region, 2024-25	51
Chart 5-5 Sectoral impacts of wealthier consumers on Lockyer valley region, 2024-25.....	51
Chart 5-6 Sectoral impacts of greater supply chain efficiency on Lockyer valley region, 2024-25.....	52
Chart 5-7 Impact of scenario 1 (freer trade) on WA Wheat Belt region, 2024-25.....	53
Chart 5-8 Impact of scenario 2 (wealthier consumers) on WA Wheat Belt region, 2024-25.....	54
Chart 5-9 Impact of scenario 3 (greater supply chain efficiency) on WA Wheat Belt region, 2024-25.....	54

Tables

Table 2-1 Vegetable production by state (all vegetables), \$million, 2014-15	15
Table 2-2 Vegetable production by state (levied vegetables), \$million, 2014-15.....	17
Table 3-1 Shortlisted case study regions	24
Table 4-1 Simple average tariff schedule for Japan, percentage, 2014-15 to 2018-19.....	25
Table 4-2 Simple average tariff schedule for China, percentage, 2014-15 to 2018-19.....	26
Table 4-3 Simple average tariff schedule for Republic of Korea, percentage, 2014-15 to 2018-19.....	26
Table 4-4 Impact of tariff reductions following FTAs with China, Korea and Japan on Australian vegetable industry, 2024-25.....	27
Table 4-5 Impact of freer trade on state vegetable exports, 2024-25, by commodity group.....	28
Table 4-6 Increase in total demand for vegetables in ASIA5 from 20% increase in GDP, 2024-25.....	33
Table 4-7 Impact of wealthier consumers in Asian countries on Australian vegetable industry, 2024-25.....	34
Table 4-8 Impact of wealthier consumers on state vegetable exports, 2024-25, by commodity group	35
Table 4-9 Impact of greater supply chain efficiency on Australian vegetable industry, 2024-2025.....	40

Table 4-10 Impact of greater supply chain efficiency on state exports in Australian states, 2024-25, by commodity group..... 41

Table 5-1 Impacts of the 3 scenarios in 3 case study regions, 2024-25 ... 56

Table 6-1 Summary of key results 62

Figures

Figure 2-1 Share of the value of vegetable production in Australia..... 14

Figure 3-1 The components of DAE-RGEM and their relationships 22

Executive summary

The vegetable industry is one of Australia's largest horticultural industries. The industry value of all vegetables produced for human consumption was \$3.35 billion in 2014-15, around 6% of the value of all agricultural production. The industry is labour intensive and seasonal, contributing significantly to the prosperity of people living in rural and regional Australia.

However, unlike most other Australian agricultural commodities, exports are currently not a major destination of Australian vegetables. According to the 2014-15 Horticulture Statistics Handbook, the total value of fresh vegetable exports in 2015 was \$173 million, representing 5% of the total vegetable industry's value of production.

Multiple future trends point to growing export potential for particular vegetable categories, especially where Australia has competitive advantage. Examples of these trends include increases in demand from Asia's burgeoning middle class, the growing demand for safe and clean food produced in a sustainable manner, as well as the tariff reductions from recent Free Trade Agreements (FTAs) with China, Japan and South Korea. A renewed focus on food exports, articulated through the Australian Government's National Food Plan, requires the industry to understand the impact of this focus on the domestic industry.

The purpose of this project is to quantify the economic impacts (vegetable production, exports and prices) of current and projected future scenarios of changes in vegetable export activity. This work is intended to inform Horticulture Innovation Australia (Hort Innovation) and Australian vegetable growers to understand the sensitivity of increasing vegetable export activity on the domestic vegetable market and the associated welfare implications. The focus of the project is on vegetable categories that pay levies to Hort Innovation.

Methodology

To assess the sensitivity of different levels of export growth on the domestic vegetable industry, Deloitte Access Economics developed and modelled the impact of three export induced scenarios, each one resulting in different levels of vegetable exports from Australia. These scenarios represent low, moderate or high vegetable export growth respectively in the short and long-term:

- Scenario 1 (freer trade) represents the tariff reductions outlined in the successfully negotiated Free Trade Agreements (FTAs) with China, Japan and Republic of Korea.
- Scenario 2 (wealthier consumers) is where incomes rise faster than current GDP growth in Asian countries.
- Scenario 3 (greater supply chain efficiency) represents a 5% efficiency in the supply chain between the farm-gate and the exporting destination.

The above scenarios were modelled using the Deloitte Access Economics – Regional General Equilibrium Model (DAE-RGEM). DAE-RGEM is a large scale, dynamic, multi-region, multi-commodity CGE model of the world economy that encompasses all economic activity in an economy – including

production, consumption, employment, taxes and trade – and the linkages between them.

For this project, the model has been customised to explicitly include Australia's vegetable industry (and its subsectors). In this model, there is also an explicit representation of Australia's trading partners being the five Asian countries specified in the above scenarios (including China, Korea, Japan, Indonesia and Malaysia), herein referred to as the ASIA5 region (or ASIA5) and the rest of the world.

Key findings

Scenario 1 (freer trade) would result in the *smallest* annual increase in demand for Australian levy-paying vegetable exports (\$4.8 million per year which is a 1.8% increase in total levy-paying vegetable export value), followed by Scenario 2 (wealthier consumers) which would bring about a *moderate* increase (\$9.35 million per year and a 3.5% increase in total levy-paying vegetable export value) and Scenario 3 (greater supply chain efficiency) which would induce the *largest* increase in Australian vegetable exports (\$9.8 million per year and a 3.7% increase in Australian total vegetable export value). These are ongoing annual impacts, provided that the scenarios remain in place.

Scenario 1 – freer trade

Although FTAs with countries like China, Korea and Japan bring about reductions in tariff rates, those reductions might only benefit a small number of vegetable exports. This is because there are technical market access conditions (i.e. biosecurity requirements) currently being imposed by China and Korea on many vegetables. A tariff rate reduction would not be effective unless market access was gained. As a result, the impact of FTAs on Australian exports of many vegetables is likely to be modest. This finding emphasises the importance of further trade negotiations to increase market access alongside reducing tariff rates for vegetables with strong potential in export markets.

Under this scenario, the three states that would gain the most from freer trade are Queensland, Victoria and Western Australia. The main reason is that these are biggest producers of vegetables in Australia. In addition, the largest tariff rate reductions are applied to the vegetable categories that are produced in these states.

Queensland in particular would benefit the most from freer trade. The lower tariff rates would result in an expansion of production and export of vegetables, especially in leguminous vegetables. Of all the SA4 regions in Queensland, Ipswich is the biggest beneficiary of vegetable export growth. Under this scenario, the increase in the output value of vegetables in Ipswich would be \$0.7 million or an increase of 0.5% in its total value of vegetable production which is greater than the 0.1% increase in total value of vegetable production at the national level. This suggests that although the impact at the national level of this scenario is relatively modest, it can be more significant at the regional level. Ipswich will likely gain the most from this scenario because it is a big producer of a mix of vegetables that are all subject to tariff rate reductions under the three FTAs. The ability of the Ipswich growing region to realise this export potential, however, depends on whether growers can expand their production beyond their current capacity and whether there is enough export capacity out of Port of Brisbane to deliver the produce to ASIA5.

Scenario 2 – wealthier consumers

The results under this scenario suggest that as consumers in Asian countries increase their wealth and disposable income, they will increase their demand for more fruits and vegetables, creating an opportunity for Australia to expand its output and exports of vegetables to meet this demand. The increasing wealth in ASIA5 is found to have a moderate impact on Australian vegetable output and export. This is a result of higher demand for Australian vegetables from ASIA5 driven by provenance, clean and safe production, hence, higher prices received. As prices increase, Australian vegetable producers would expand their production to meet the increase in demand. The increase in export value would be due to the combined impact of higher price and more quantity demanded.

At the state level, the states that will gain the most in vegetable exports from this scenario are Victoria, Queensland and Western Australia.

Ipswich, once again, is identified as the SA4 that would gain the most from wealthier consumers. In particular, with greater wealth in importing countries, the Ipswich growing region will likely increase its vegetable output by \$1.1 million or an increase of 0.7% in regional vegetable output. This increase is relatively larger than the percentage increase in output at the national level of 0.27%. The implication here is that although the national impact appears to be relatively modest, its impact at the regional level can be significant. As producers in Ipswich export a large number of vegetables, the gain is distributed widely across the region. The ability for Ipswich to meet the demand of a growing burgeoning middle class depends much on whether producers within the region could expand its output and if the infrastructure within the supply chain is efficient enough to make Australian produce price competitive compared to other exporting countries.

Scenario 3 – greater supply chain efficiency

With greater supply chain efficiency, the Australian vegetable industry would experience the biggest changes to its production and exports as greater supply chain efficiency implies an improvement in Australia's competitiveness. The increase in output value is higher than the increase in export value under this scenario. This result suggests that, as transport costs become lower, the prices paid by consumers would fall leading to higher demand for vegetables domestically and internationally. The increase in output would be absorbed by both domestic consumption and exports.

At the state level, Victoria, Queensland and Western Australia would likely benefit the most from this scenario. The increase in vegetable exports in Victoria and Queensland would account for more than half of the total increase in Australian vegetable exports. This reflects the fact that these two states together produce more than half of Australian vegetable production and they produce most of the vegetable categories that ASIA5 is importing from Australia.

Ipswich is the SA4 region that would likely gain the most from greater supply chain efficiency. Greater supply chain efficiency will likely increase Ipswich's vegetable output by \$2.1 million per annum or 1.3% of its total value of vegetable production. This increase is more than twice the increase at the national level in percentage terms. To harness this export growth opportunity, improvements in productivity as well as supply chain efficiency (that leads to a reduction in transport costs similar to the scenario modelled here) would be crucial for producers in this region. This requires investment in both on-farm production systems and off-farm supply chains.

Stakeholder consultation

To gain a deeper insight on the impacts of increasing vegetable exports on the domestic markets, stakeholder consultations were undertaken in three case study regions, including south east Melbourne, the Lockyer Valley in Queensland, and the region north of Perth. These regions were selected as they were identified as large vegetable producers with strong potential for export growth.

The views of stakeholders in these regions (that were consulted with through this project) align well with the modelling results. For example, businesses interviewed expressed a view that Scenario 1 would deliver the smallest gain to growers in terms of increasing vegetable exports. This is because of the technical biosecurity trade barriers that restrict market entry for most vegetable categories to these markets. For example, in China there is either no market access for most vegetable categories or, where there is an agreed protocol, the required treatments make trade cost prohibitive.

Similarly, the growers in the three regions generally considered the wealthier customer scenario to be inevitable and, in fact, is the main basis for industry optimism about the future of vegetable exports.

There is, however, mixed views regarding Scenario 3 – greater supply chain efficiency. Some believed it could make a considerable difference while others believed it would make little difference. A common view expressed was that a transport saving of 5% would be unlikely to provide a margin gain to make Australian growers competitive enough and that a much larger increase than 5% would be necessary.

Regional case studies

The impacts of the three scenarios on the three case study regions considered in this study, south east Melbourne, Lockyer Valley, and north Perth regions, follow the same trends in the CGE results.

Improvement in supply chain efficiency will be crucial for many regions to be able to expand production to meet higher demand for Australian vegetable exports. This requires further investment in off-farm supply chain and the infrastructure that support these supply chains.

Supply chain dynamics

It was generally thought that Scenarios 1 and 2 would occur gradually and that supply chains would adapt to this organically, while Scenario 3 is itself an improvement in supply chain efficiency. Growers indicated there is unlikely to be much chance of collaboration to achieve cost savings in the supply chain, but that most businesses were concentrating on supply chain improvements within their business because of the high volume/low margin market dynamic in which they operate.

Business model changes

All of the growers interviewed have different business models, approaches and philosophies around exporting. While some of the growers indicated that they intend to simply grow their current business model for exporting, most agreed that increased exports will necessitate new business models, new production lines and new ways of thinking. An example of a new business model adopted by a number of larger growers is to become more dedicated exporters supplying directly to end customers in export markets and gearing their businesses accordingly. Co-investment by Australian businesses with those in lower cost destination markets to produce or pack

vegetables is another new business model that is already believed to be occurring.

Welfare implications

Growers have been operating under extremely tight margins for some years and welcome the relief that export growth could bring from trading with supermarkets or the fresh market agents. However, for small and large businesses alike, exporting is a high risk proposition. This is because in order to be able to export, vegetable businesses need to have the capability in producing volume, product quality, food safety, IT systems, negotiation skills, product development, cultural understanding of export markets, marketing and other professional employees, branding, shipping and transport.

Deloitte Access Economics

1 Introduction

Deloitte Access Economics and McKINNA et al. have been engaged by Horticulture Innovation Australia (Hort Innovation) to undertake a sensitivity analysis of the impacts of increased exports on the Australian vegetable industry.

1.1 Background

The vegetable industry is one of Australia's largest horticultural industries. The industry value of all vegetables produced for human consumption was \$3.35 billion in 2014-15, around 6% of the value of all agricultural production. Of the above total, \$1.82 billion is attributable to vegetables that pay a levy to Hort Innovation under the National Vegetable Levy.

Multiple factors point to growing export opportunities for particular vegetable categories where Australia has competitive advantage. These opportunities stem from a range of factors, such as increases in demand from Asia's burgeoning middle class, the growing demand for safe and clean food produced in a sustainable manner, as well as the tariff reductions from recent Free Trade Agreements (FTAs) with China, Japan and South Korea.

Previous work by Hort Innovation has identified export potential and market development requirements for specific vegetable commodities and associated market impediments. While this previous work has revealed important insights into the specific vegetable commodities most suitable for export, there is limited understanding more broadly of the effect that increased vegetable exports will have upon the domestic market.

1.2 Project objectives

The broad objective of the project is to quantify the direct economic impacts (principally vegetable production, exports and prices) of various export scenarios on the domestic vegetable industry. This work is intended to inform industry stakeholders of the nature and magnitude of changes so it can prepare and plan for a future of increasing vegetable exports.

Specifically the project aims to:

- Quantify the economic impacts of current and projected future scenarios of changes in vegetable export activity (for example supply, price and quality)
- Understand the regional impacts where relevant for key growing regions resulting from increased vegetable export activity
- Consider the associated implications for potential commensurate changes in vegetable imports on the domestic market
- Demonstrate the welfare implications for all vegetable growers from increases in vegetable exports
- Consider the necessary adjustments to current supply chain arrangements for growers
- Examine the impact on size and ownership structure for vegetable growing enterprises.

1.3 Scope

The main focus of the work is on vegetable categories that pay levies to Hort Innovation. The current levy rates, introduced by the Australian

Government from 2013 are 0.5%, which are used to fund research and development, marketing, residue testing, plant and animal biosecurity programs and emergency responses for industry. Several programmes are funded by the revenue generated from the levy, and these include: Horticulture Innovation Australia's vegetable R&D, and Plant Health Australia.¹ The in-scope vegetable categories that pay levies to Hort Innovation under the National Vegetable Levy are:

1. Brassicas (broccoli, brussel sprouts, cabbages, cauliflowers, kohlrabi, kale and similar edible brassicas)
2. Carrots
3. Sweet-potatoes
4. Other root vegetables (turnips, parsnips, daikon, salad beetroot, salsify, celeriac, radishes and similar edible roots)
5. Leafy and stalk vegetables (lettuce and chicory, fennel, leafy Asian vegetables, spinach, silverbeet, celery and other salad vegetables)
6. Leguminous vegetables (beans, peas (including snow and sugar snap) and other leguminous vegetables)
7. Leek and alliaceous vegetables (leeks, shallots and spring onions)
8. Cucurbits (pumpkin, cucumber, zucchini, squash and Asian melons)
9. Solanaceous vegetables (eggplant, capsicums, and chillies)
10. Other vegetables (other levied vegetables, not elsewhere classified vegetables, non-levied vegetables (asparagus, garlic, tomatoes and melons), vegetables paying a separate levy (onions, mushrooms and potatoes) and processed vegetables).

Therefore, some of the larger vegetable categories such as onions, mushrooms and potatoes which pay separate levies (i.e. not part of the National Vegetable Levy), are combined in one category in the modelling, along with non-levied vegetables such as tomatoes, asparagus, garlic and melons. As the focus of this study is on the vegetables that are subjected to the National Vegetable Levy, the results will be presented according to the above categories, with a subtotal for the first nine levy-paying vegetable categories and a total for the ten vegetable categories.

1.4 Approach

To assess the impact of these export-induced scenarios, the *Deloitte Access Economics Regional General Equilibrium* (DAE-RGEM) model has been used.

Three export growth scenarios were developed and modelled:

- Scenario 1 – freer trade represents a situation in which there are tariff reductions under the successfully negotiated FTAs with China, Japan and Republic of Korea. A reduction in tariffs by an importer country for a particular vegetable exported from Australia would mean a lower price for such product, making Australian produce more competitive in the world market, hence, higher Australian vegetable exports.
- Scenario 2 – wealthier consumers is a scenario that is already happening but the implications of a very high wealth increase in Asian countries would bear significant implications for the Australian vegetable industry as the growing group of middle class consumers demand more clean, green and safe produce.
- Scenario 3 – greater supply chain efficiency represents a scenario where a 5% efficiency is achieved in the supply chain between the farm-gate

¹ Vegetables levy information, Department of Agriculture and Water resources, <http://www.agriculture.gov.au/ag-farm-food/levies/rates/vegetables>

and the exporting destination. This scenario represents an improvement above and beyond business as usual efficiency that has occurred elsewhere in the world.

The Australian vegetable profile of the model was built using 2013-14 production and trade data from the Australian Bureau of Statistics (ABS). This is the year in which more detailed data on the breakdown of vegetable categories is available. The trading partners that are included in the scenarios are also explicitly specified for this study, being the ASIA5 region (including China, Japan, the Republic of Korea, Indonesia and Malaysia).

To disaggregate the national and state-wide impacts to the regional level, a top-down regional analysis was also undertaken. The analysis relies on ABS SA4 production data in 2013-14 to provide further insights into the impacts of the three modelled scenarios on production and export for these regions.

Further to the modelling, stakeholder consultation was undertaken in three selected regions of Australia. The purpose of the consultation was to understand what impact producers believed the three scenarios would have on production and exports, and how they would respond to such changes, as well as to canvas views on increasing exports more generally.

1.5 Structure of report

The rest of the report is organised as follows:

- Chapter 2 presents a detailed profile of the Australian vegetable industry
- Chapter 3 discusses the methodology in developing and designing the scenarios, the CGE modelling method, the top-down analysis and the selection of case study regions
- Chapter 4 contains a discussion on the results and the 'so what?' for the Australian vegetable markets
- Chapter 5 includes the in-depth analysis of the stakeholder consultations and specific results for selected case study regions.

2 Australian vegetable industry

This chapter provides an overview of the Australian vegetable industry, and a summary of its current state of production and international exports.

Data published in the Australian Horticulture Statistics Handbook 2014-15 released in October 2016² and from AUSVEG was used to profile the vegetable industry.

The scope of this report includes all Australian vegetable categories, however the focus is on the production and export of vegetables that pay a levy to Hort Innovation.

2.1 Vegetable production

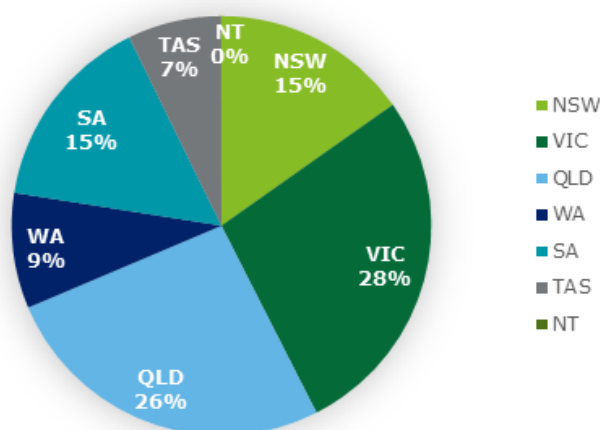
Australian agricultural production accounts for a significant proportion of gross domestic product, as well as being an integral part for future food security in both Australia and the Asian region.³

2.1.1 Total vegetable production

The vegetable industry is one of Australia's largest agricultural industries with a value of \$3.35 billion in 2014-15, which represents 6% of the value of all agricultural production.

Figure 2-1 below shows the proportional share of Australian vegetable production. The primary vegetable producing states are Queensland and Victoria accounting more than half the total output of Australia (53%).

Figure 2-1 Share of the value of vegetable production in Australia



Source: Horticulture Innovation Australia (2016)

²<http://horticulture.com.au/wp-content/uploads/2016/10/Australian-Horticulture-Statistics-Handbook-Vegetables.pdf>

³ Langridge and Prasad, Australia can't feed the world but it can help, 01/2013, <http://theconversation.com/australia-cant-feed-the-world-but-it-can-help-11269>

Table 2-1, provides a breakdown of the value of vegetable production by category and by state. The largest categories of vegetables are tomatoes, potatoes, leafy salad vegetables, and mushrooms. These four categories combined constitute nearly 50% of the total value of Australian's vegetable production.

Table 2-1 Vegetable production by state (all vegetables), \$million, 2014-15

	Total Production	NSW	VIC	QLD	WA	SA	TAS	NT
All vegetables	3,526.8	522.7	938.6	897.2	305.6	523.7	247.8	1.3
Artichoke	0.8	0.0	0.6		0.1	0.0		
Asparagus	40.4	0.6	39.6		0.2			
Beans	74.2	0.7	11.1	58.6	1.5	0.7	1.5	
Beetroot	10.6	0.6	0.2	9.0	0.7			
Broccoli	122.5	6.1	58.8	33.1	13.5	6.1	4.9	
Brussel Sprouts	21.1		4.9	0.8	0.6	11.4	3.4	
Cabbage	44.1	9.3	13.2	10.6	7.5	3.1	0.4	
Capsicums	144.7	112.9	7.2		10.1	10.1	4.3	
Carrots	190.4	3.8	36.2	20.9	64.7	30.5	34.3	
Cauliflower	48.9	7.3	13.2	12.7	7.3	4.4	3.9	
Celery	50.2	0.5	29.1	12.0	7.0	0.5	1.0	
Chilies	9.6	0.1	0.5	7.6	1.3			0.1
Cucumbers	183.5	16.5	1.8	69.7	14.7	80.4	0.4	
Eggplant	16.2	3.6	1.8	8.3	1.3	0.8	0.5	
English Spinach	15.5	2.0	7.0	5.0	0.8	0.2	0.6	
Fresh herbs - combined	121.0	22.7	37.3	54.9	2.4	2.4	1.2	
Garlic	7.5	1.6	5.0	0.3	0.2	0.2	0.3	
Ginger	26.3	0.5		25.8				
Leafy Asian vegetables	62.5	26.9	15.0	17.5	1.9	0.6	0.6	
Leafy salad vegetables	315.3	22.1	141.9	88.3	9.5	22.1	31.5	
Leeks	19.9	0.6	12.1	1.4	3.4	2.0	0.4	
Head lettuce	131.2	13.1	42.0	45.9	21.0	6.6	2.6	
Mushrooms	349.0	108.2	122.2	20.9	31.4	59.3	7.0	
Onions	135.5	6.8	10.8	14.9	6.8	56.9	39.3	

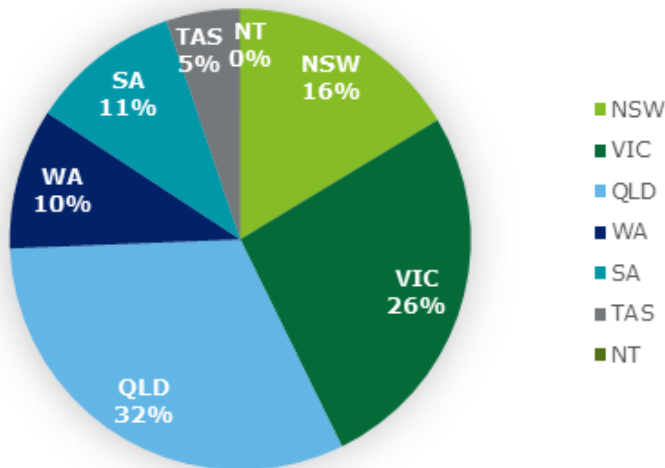
	Total Production	NSW	VIC	QLD	WA	SA	TAS	NT
Parsnips	9.2	0.5	4.0	0.7	2.4	0.6	1.0	
Peas	42.0	2.5	19.3	16.4	1.7	2.1		
Potatoes	445.3	35.6	93.5	17.8	22.3	169.2	106.9	
Pumpkins	58.0	20.9	2.9	25.5	4.1	2.9	0.6	1.2
Sweet corn	66.7	17.8	15.1	26.5	4.5	1.7	1.1	
Sweet potatoes	64.6	12.3	0.6	49.1		2.6		
Tomatoes	548.0	54.8	175.4	213.7	60.3	43.8		
Zucchini	62.0	11.8	16.1	29.1	2.5	2.5		
Other vegetables	90.0							

Source: Horticulture Innovation Australia (2016)

2.1.2 Hort Innovation levy paying vegetable production

In 2014-15, Hort Innovation levy-paying vegetables production value was \$1.82 billion, which represents nearly 52% of total vegetable production value. Chart 2-1 below shows the breakdown of production value by state. Again, the primary levy paying vegetable producing states are Queensland and Victoria accounting for 58% of Australian production.

Chart 2-1 Levy-paying vegetables by contribution, by state



Source: Deloitte Access Economics analysis using data from Horticulture Innovation Australia (2016)

Table 2-2 provides a breakdown of the value of levy paying vegetable production by category and by state. The largest categories of vegetables are leafy salad vegetables, carrots, cucumbers, capsicums and broccoli.

Table 2-2 Vegetable production by state (levied vegetables), \$million, 2014-15

	Total Production	NSW	VIC	QLD	WA	SA	TAS	NT
Beans	74.2	0.7	11.1	58.6	1.5	0.7	1.5	
Beetroot	10.6	0.6	0.2	9.0	0.7			
Broccoli	122.5	6.1	58.8	33.1	13.5	6.1	4.9	
Brussel Sprouts	21.1		4.9	0.8	0.6	11.4	3.4	
Cabbage	44.1	9.3	13.2	10.6	7.5	3.1	0.4	
Capsicums	144.7	112.9	7.2		10.1	10.1	4.3	
Carrots	190.4	3.8	36.2	20.9	64.7	30.5	34.3	
Cauliflower	48.9	7.3	13.2	12.7	7.3	4.4	3.9	
Celery	50.2	0.5	29.1	12.0	7.0	0.5	1.0	
Chilies	9.6	0.1	0.5	7.6	1.3			0.1
Cucumbers	183.5	16.5	1.8	69.7	14.7	80.4	0.4	
Eggplant	16.2	3.6	1.8	8.3	1.3	0.8	0.5	
English Spinach	15.5	2.0	7.0	5.0	0.8	0.2	0.6	
Fresh herbs - combined	121.0	22.7	37.3	54.9	2.4	2.4	1.2	
Garlic	7.5	1.6	5.0	0.3	0.2	0.2	0.3	
Leafy Asian vegetables	62.5	26.9	15.0	17.5	1.9	0.6	0.6	
Leafy salad vegetables	315.3	22.1	141.9	88.3	9.5	22.1	31.5	
Leeks	19.9	0.6	12.1	1.4	3.4	2.0	0.4	
Head lettuce	131.2	13.1	42.0	45.9	21.0	6.6	2.6	
Parsnips	9.2	0.5	4.0	0.7	2.4	0.6	1.0	
Peas	42.0	2.5	19.3	16.4	1.7	2.1		
Pumpkins	58.0	20.9	2.9	25.5	4.1	2.9	0.6	1.2
Sweet potatoes	64.6	12.3	0.6	49.1		2.6		
Zucchini	62.0	11.8	16.1	29.1	2.5	2.5		
Total	1824.7	298.4	481.2	577.4	180.1	192.8	93.4	1.3

Source: Horticulture Innovation Australia (2016)

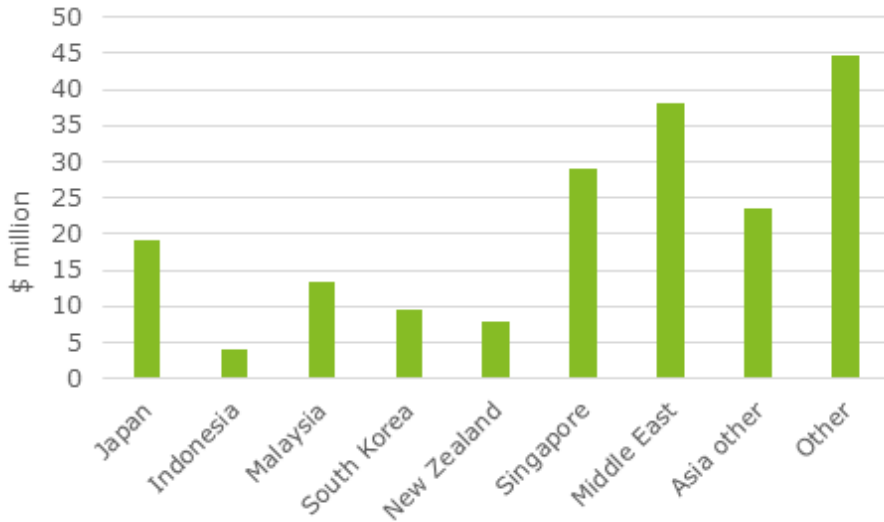
2.2 Vegetable exports

The large majority of vegetables produced in Australia are consumed domestically with fresh vegetable exports making up 5% of the vegetable industry's total value of production in 2014-15.⁴ The biggest regions for Australian exports are Asia and the Middle East. Within Asia, the biggest

⁴ Horticulture Innovation Australia (2016)

importers of Australian vegetables are Japan, Singapore, and Malaysia. This, accompanied by exports in Qatar, Hong Kong, and New Zealand, enable Australia to serve a diverse and varied market. More detailed data is provided in Appendix 1.

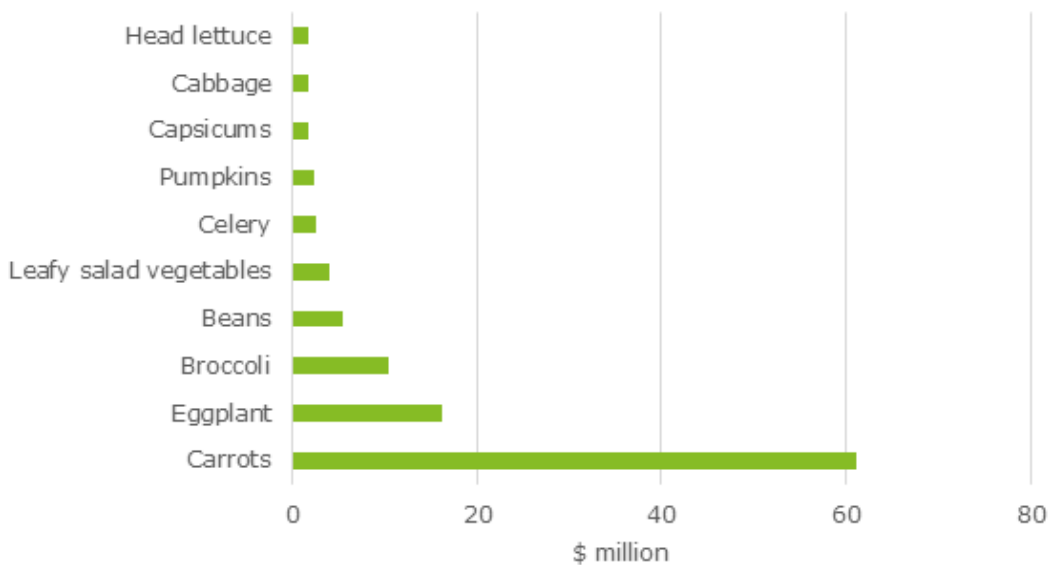
Chart 2-2 Total vegetable exports, by destination



Source: Deloitte Access Economics analysis using data from Horticulture Innovation Australia (2016)

Among the levy-paying vegetables, the top ten vegetables in export value are presented in Chart 2-3. In 2014-15, carrots are the most exported vegetables in value terms from Australia, totalling \$61.1 million (35% of the total value of all Australian vegetable exports).

Chart 2-3 Top ten levy-paying vegetables exported by Australia, \$million, 2014-15



Source: Deloitte Access Economics analysis using data from Horticulture Innovation Australia (2016)

3 Methodology

In this chapter, the methodology for the analysis is discussed. In particular, the discussion focuses on:

- The design of the modelling scenarios
- The CGE modelling method used to assess the high-level impacts of increased vegetable exports under the chosen scenarios
- The top-down regional analysis
- The selection of the case studies.

3.1 Scenario design

To undertake the sensitivity analysis, Deloitte Access Economics specified three scenarios that result in different levels of export growth. In order to determine the export levels that are meaningful to industry, the following scenario design process was undertaken to ensure that the chosen scenarios are realistic, able to be quantified and have long-lasting effect.

3.1.1 Factors affecting demand for Australian vegetable exports

Through desktop research and internal workshop, Deloitte Access Economics have identified a list of factors that are likely to affect vegetable export demand in the future. These are categorised as factors that either result in:

- Induced (or derived) demand increase for vegetables from Australia
- Increases to absolute global demand for vegetables
- Improvements in Australia's vegetable export supply competitiveness, such as a cost advantage.

Induced demand for Australian vegetables can occur where there are:

- Changes to market access or export protocols
- Tariff reductions in export destinations
- Food safety scares in competing exporting countries – reducing Australia's pool of market competitors
- A biosecurity outbreak in competitor countries – reducing Australia's pool of market competitors
- Drought in Australia's competitor countries reducing overall vegetable supply
- Pressure on the availability and cost of water (as well as other input costs) in competitor's countries
- Climate change events (such as extreme weather) in certain exporting or importing countries
- Agri-political issues, such as political conflicts between trading partners leading to agricultural trade embargoes.

Absolute demand is the demand that occurs when consumers want more of some vegetables. This type of demand can occur when:

- Income in importing countries grows resulting in demand for safe, green and higher quality vegetable products from Australia
- Population in importing countries grows increasing aggregate demand for more vegetable exports in the event that domestic production cannot keep pace with population growth

- Demographic shifts occur, such as an ageing populations seeking healthier and higher convenience food (such as ready-made meals and fast food)
- Other trends such as urbanisation occur, resulting in less land available for agriculture on the fringe of cities and consumption patterns shifting to more dining out and supermarket shopping.

Improvements in the competitiveness of Australia's supply chain are those improvements that improve the cost competitiveness of Australian vegetables (rather than those that increase demand) and include:

- Exchange rate falls where Australian produce becomes more affordable in destination export markets
- Australia being declared as a pest free area which is recognised by importers
- In-market supply chain improvements (e.g. better cold chain management) which opens up market possibilities through improving speed to market and shelf life
- Improved airport infrastructure for exports such as cold storage which would increase air freight capacity and/or lower air freight cost
- More direct marketing of vegetable products and simplification of vegetable supply chains
- Improved efficiency through freight consolidation or scale economies by a number of growers/exporters working as a cluster.

3.1.2 Scenario selection criteria

The selection of three plausible scenarios involved consideration of four key selection criteria:

- The scenario should be predominantly an **export issue** rather than a production issue. For example, the establishment of new export protocols is directly an exporting issue whereas a reduction in labour costs is a production issue.
- The scenario should have a **lasting effect**, or result in a step change (rather than a one-off event or spike). For example, a scenario with tariff reductions achieved in FTAs under negotiation has a long lasting effect while fluctuations in the exchange rate is more short term.
- The scenario should be **realistic**, as distinct from a scenario that is more speculative. For example, the scenario of wealthier consumers in the growing middle class in Asia is a likely scenario while a scenario of natural disaster affecting global supplies (while possible) is more speculative.
- The scenario needs to be **able to be quantified** in the model. It is possible to quantify the increase in openness of vegetable trade between Australia and other countries whereas it is more difficult to quantify the demographic shifts such that an aging population seeking healthier, convenience food.

Furthermore, it was considered that the three scenarios should be different from each other and cover the types of demand mentioned above (i.e. increase, namely induced demand increase, absolute demand increase, and supply chain competitiveness increase).

3.1.3 Shortlisted scenarios

The above criteria were used to reduce the long list of factors to the following three scenarios:

- **Scenario 1** – Elimination or reductions in tariffs for the three recent FTA that were successfully negotiated:
 - The three FTAs considered in this study are China (ChAFTA), Korea (KAFTA) and Japan (JAEPA)
 - A reduction in tariffs by an importing country for a particular vegetable exported from Australia would mean a lower price for such product, making Australian produce more competitive in the world market. Such an effect can be relatively long lasting
 - The scenario can be quantified in the CGE model through a reduction in tariffs for Australia.

- **Scenario 2** – Wealthier consumers in the growing middle class in Asia:
 - Wealthier consumers will increase demand for vegetable exports assuming domestic production is not able to satisfy demand from population growth
 - Increasing wealth is a trend that has already been observed and is likely to continue
 - In the CGE model, the effect of wealthier consumers can be quantified through a shock to external export demand for a number of vegetables from a number of Asian countries.

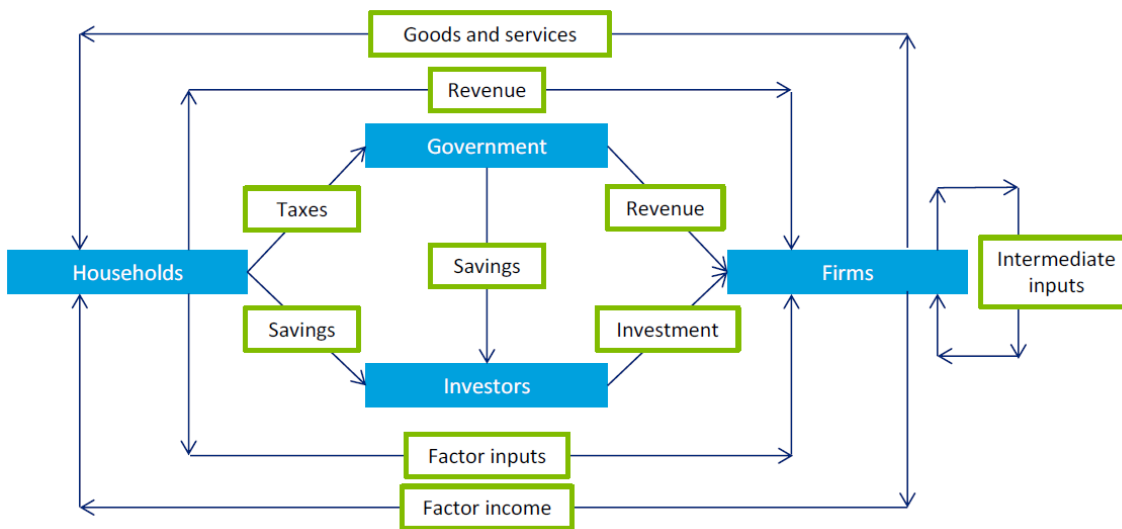
- **Scenario 3** – Lower vegetable transport costs enabling increased exports and more efficient supply chains:
 - The reduction in supply chain costs come from being able to move vegetables from farm-gate to destination port at a lower cost, reducing the export price at the final destinations
 - Once the improvement in the supply chain is achieved, it can have a long lasting effect
 - The CGE model can represent this scenario as a reduction in transport costs.

3.2 CGE modelling

This project utilises the Deloitte Access Economics – Regional General Equilibrium Model (DAE-RGEM). DAE-RGEM is a large scale, dynamic, multi-region, multi-commodity CGE model of the world economy that encompasses all economic activity in an economy – including production, consumption, employment, taxes and trade – and the linkages between them.

Figure 3-1 is a stylised diagram showing the circular flow of income and spending that occurs in DAE-RGEM. To meet demand for products, firms purchase inputs from other producers and hire factors of production (labour and capital). Producers pay wages and rent (factor income) which accrue to households. Households spend their income on goods and services, pay taxes and put some away for savings. The government uses tax revenue to purchase goods and services, while savings are used by investors to buy capital goods to facilitate future consumption. As DAE-RGEM is an open economy model, it also includes trade flows with other regions, states, and foreign countries. More details are provided in Appendix 2.

Figure 3-1 The components of DAE-RGEM and their relationships



For this project, the model has been customised to explicitly include Australia’s vegetable industry (and its subsectors) and Australia’s trading partners being the five Asian countries specified in the above scenarios (including China, Korea, Japan, Indonesia and Malaysia), herein referred to as the ASIA5 region (or ASIA5) and the rest of the world.

Because Australia’s vegetable industry is not explicitly represented in the database underlying DAE-RGEM, sectoral details were customised in the model. Australia’s vegetable industry is divided into the following categories:

1. Brassicas (broccoli, brussels sprouts, cabbages, cauliflowers, kohlrabi, kale and similar edible brassicas)
2. Carrots
3. Sweet-potatoes
4. Other root vegetables (turnips, parsnips, daikon, salad beetroot, salsify, celeriac, radishes and similar edible roots)
5. Leafy and stalk vegetables (lettuce and chicory, fennel, leafy Asian vegetables, spinach, silverbeet, celery, other salad vegetables)
6. Leguminous vegetables (beans, peas (including snow and sugar snap) and other leguminous vegetables)
7. Leek and alliaceous vegetables (leeks, shallots, and spring onions)
8. Cucurbits (pumpkin, cucumber, zucchini, squash and Asian melons)
9. Solanaceous vegetables (eggplant, capsicums, and chillies)
10. Other vegetables (other levied vegetables, not elsewhere classified vegetables, non-levied vegetables (asparagus, onions, garlic, potatoes, tomatoes, mushrooms and melons), and processed vegetables)

Vegetables of similar families have been classified into individual groups. Some vegetables which are either significant in gross value of exports or have significant tariff rates imposed have their own group, such as carrots and sweet-potatoes. It is noted that the focus of the modelling and analysis here is on levy-paying vegetables, as defined by AUSVEG.⁵

⁵ AUSVEG (2016), Vegetable Levy Frequently Asked Questions, available at <http://www.ausveg.com.au/rnd/thelevysystem/vegetablelevy.htm>

The baseline scenario in which the three above scenarios are compared to is the business as usual scenario in which normal rates of growth are applied to the Australian and its trading partners' economies. The 2013-14 ABS data on vegetable production and trade data was used to construct the sectoral details for the vegetable industry in the DAE-RGEM database.

3.3 Top-down regional analysis

CGE modelling results are reported at the national level. For vegetable producers, the translation of the national impacts into what it might mean at the regional level is of particular importance.

Using 2013-14 ABS production data at the SA4 level⁶, the national impacts of output and export were disaggregated to the regional level allowing the identification of:

- The states that would gain the most from increased vegetable exports
- Within those states, the top five SA4 regions and the vegetable categories that would benefit the most from greater export growth.

3.4 Case study selection

While the CGE modelling and the top-down regional analysis will provide the quantitative impacts of the three scenarios on Australian vegetable production and exports, the case studies provide an opportunity to ground truth the modelling results as well as to capture the views of industry stakeholders on the likely impacts of each scenario.

3.4.1 Case study selection criteria

In selecting three case study regions for stakeholder consultation, a number of criteria were considered including that each case study region should:

- Have the ability to be profiled from ABS data (e.g. built up from LGAs or SA2 level using ABS census data)
- Have a high proportion of vegetables included in the vegetable industry levy (i.e. not potatoes (other than sweet-potatoes), tomatoes, onions, mushrooms, melons, garlic, herbs (other than fresh shallots and parsley), seed sprouts and asparagus)
- Have vegetable categories that have had strong existing export performance and/or potential for export growth
- Be different with regard to their geography, vegetable categories and seasonal supply
- Be significantly positively impacted by one or more of the three modelled scenarios – i.e. increasing wealth in Asia, tariff reductions and supply chain cost reductions.

3.4.2 Shortlisted case studies

Taking into account the above criteria, the following three regions were selected as case studies and form the focus of stakeholder consultations (see Table 3-1).

⁶ ABS (2015), Value of Agricultural Commodities Produced, Australia, 2013-14, cat. no. 7503.0, available at <http://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/0FBF8B514881656ACA257F7E000F81EF?opendocument>

Table 3-1 Shortlisted case study regions

Region	Comment
North Perth region	<ul style="list-style-type: none"> • Significant carrot producing region • Already export-oriented • Scenarios 1 and 2 may result in increased demand for premium WA carrots • Scenario 3 likely to impact exports as already exporting
Lockyer valley region (Qld)	<ul style="list-style-type: none"> • Produces a variety of vegetables included in vegetable industry levy such as brassica (broccoli and broccolini), beans, spring onions and lettuce • The two SA4 regions of Toowoomba and Ipswich combined consist of 16% of total value of levy paying vegetables in Australia • Sub-tropical region • Likely to be impacted by all three scenarios
South East Melbourne region (Casey, Cardinia and Mornington)	<ul style="list-style-type: none"> • High proportion of leafy vegetables (37% of total Australian value) – lettuce, celery and baby spinach • High proportion of brassicas, namely broccoli, cabbage and cauliflower • Has a high proportion of levy paying vegetables in Australia • Export-oriented and increasingly export focused • Likely to be impacted by all three scenarios

3.4.3 Consultation objectives

The key objectives of stakeholder consultations were to:

- Canvas the three modelling scenarios and understand their impact on the region, in particular how the scenarios would increase exports
- Discuss potential changes to supply chain dynamics and any necessary adjustment required by industry and growers when adapting to modelled scenarios
- Examine whether there would be impacts on the size and ownership structure for vegetable growing enterprises in the region from increased vegetable export activity
- Discuss the welfare implications (direct and indirect) for vegetable growers as a result of increased vegetable export trade
- Understand the wider regional impacts resulting from increased vegetable export activity
- Understand the impact on vegetable exports from other possible market changes (i.e. un-modelled scenarios).

4 Modelling results

In this chapter, the economic impacts of three vegetable export growth scenarios are estimated. The chapter will describe how each scenario was quantified and present both the national CGE results and the state and SA4 level regional impacts. As the focus of the study is levy-paying vegetables, results for these vegetables are highlighted as a sub-total alongside the total value of vegetable output and exports. Unless otherwise stated, all results are presented in 2015-16 Australian dollars (\$AUD).

4.1 Scenario 1 - Freer trade

4.1.1 Quantifying the scenario

Following the successful negotiation of three recently negotiated FTAs with Japan, China and the Republic of Korea, tariff reductions are specified for a number of vegetables that Australia currently exports and potentially could export. These tariff schedules are obtained from the DFAT FTA portal⁷.

Using the tariff schedules specified in the three FTAs, the weighted average tariff schedule for each of the vegetable groups is calculated (see Table 4-1, Table 4-2 and Table 4-3). The export shares of individual vegetables in a commodity group are used as the weights.⁸

Table 4-1 shows that the relatively low tariff rates that Japan imposed on various imported vegetables will be phased out in 2015-16, with the exception of some vegetable categories within the 'other vegetables' group.

Table 4-1 Simple average tariff schedule for Japan, percentage, 2014-15 to 2018-19

Commodity group	2014-15	2015-16	2016-17	2017-18	2018-19
Brassica	3.0	0.0	0.0	0.0	0.0
Carrots	3.0	0.0	0.0	0.0	0.0
Sweet-potatoes	0.0	0.0	0.0	0.0	0.0
Other root vegetables	3.0	0.0	0.0	0.0	0.0
Leafy and stalk vegetables	3.0	0.0	0.0	0.0	0.0
Leguminous vegetables	3.0	0.0	0.0	0.0	0.0
Leek and alliaceous vegetables	1.5	0.0	0.0	0.0	0.0
Cucurbits	3.0	0.0	0.0	0.0	0.0
Solanaceous vegetables	3.0	0.0	0.0	0.0	0.0
Other vegetables	5.8	3.7	3.2	2.7	2.1

Source: Deloitte Access Economics analysis using data sourced from DFAT FTA portal

For China, the tariff rates imposed on most vegetable categories were around 10% in 2014-15 and will be phased out incrementally over the 5-year period to 2018-19 (see Table 4-2).

⁷ <https://ftaportal.dfat.gov.au/>

⁸ For China and the Republic of Korea, the simple average tariff rate for each vegetable group is used, given the low level of Australian exports for many vegetable categories.

Table 4-2 Simple average tariff schedule for China, percentage, 2014-15 to 2018-19

Commodity group	2014-15	2015-16	2016-17	2017-18	2018-19
Brassica	9.8	7.4	4.9	2.5	0.0
Carrots	10.4	7.8	5.2	2.6	0.0
Sweet-potatoes	10.4	7.8	5.2	2.6	0.0
Other root vegetables	10.4	7.8	5.2	2.6	0.0
Leafy and stalk vegetables	9.2	6.9	4.6	2.3	0.0
Leguminous vegetables	9.6	7.2	4.8	2.4	0.0
Leek and alliaceous vegetables	10.4	7.8	5.2	2.6	0.0
Cucurbits	10.4	7.8	5.2	2.6	0.0
Solanaceous vegetables	10.4	7.8	5.2	2.6	0.0
Other vegetables	10.4	7.8	5.2	2.6	0.0

Source: Deloitte Access Economics analysis using data sourced from DFAT FTA portal

The Republic of Korea currently has high tariff rates on most vegetables imported, averaging around 25% in 2014-15 (see Table 4-3). Under KAFTA, these rates will reduce gradually, to an average tariff of around 14% in 2018-19.

Table 4-3 Simple average tariff schedule for Republic of Korea, percentage, 2014-15 to 2018-19

Commodity group	2014-15	2015-16	2016-17	2017-18	2018-19
Brassica	25.0	22.0	19.0	17.0	14.0
Carrots	24.0	22.0	19.0	16.0	14.0
Sweet-potatoes	28.0	26.0	24.0	22.0	20.0
Other root vegetables	26.0	24.0	21.0	19.0	17.0
Leafy and stalk vegetables	23.0	20.0	16.0	13.0	10.0
Leguminous vegetables	24.0	20.0	17.0	14.0	11.0
Leek and alliaceous vegetables	25.0	23.0	21.0	19.0	17.0
Cucurbits	25.0	23.0	22.0	20.0	18.0
Solanaceous vegetables	24.0	22.0	19.0	16.0	14.0
Other vegetables	25.0	23.0	22.0	20.0	18.0

Source: Deloitte Access Economics analysis using data sourced from DFAT FTA portal

From these tariff schedules, the year-on-year tariff reductions for each vegetable group in each country are calculated. To be consistent with the other scenarios and the model construction, a composite tariff reduction schedule for the ASIA5 region is derived. The Australian export shares to each of the countries in the ASIA5 region were used as weights in the calculation of the composite tariff reduction schedule. The composite tariff rate reductions are used as shocks in the CGE model.

Where there are no current exports (due to Australia not being price competitive or because there is no technical market access), the composite tariff rate reductions are 0%. Implicit in this is the assumption that Australia will continue to be not price competitive (or will not have gained market access) after the tariff reductions have taken place for the categories of vegetables where there is no current exports. This is particularly true for a number of vegetables under ChAFTA and KAFTA, falling in the vegetable groups of cucurbits, solanaceous vegetables and other vegetables.

The treatment of the composite tariff in this manner in the modelling is considered conservative. While there is no current export in some vegetable categories from Australia to these countries, new export markets might emerge should market access be granted. The tariff reductions would then be realised for these vegetable categories. Therefore the results presented in the following sections can be viewed as lower bound estimates of what might happen under this scenario.

4.1.2 CGE results

The overall impact of tariff rate reductions on the Australian vegetable industry is relatively modest (see Table 4-4). In the year 2024-25, the tariff rate reductions will have increased Australia's total value of vegetable production by \$4.7 million and its value of exports by \$4.8 million (above the baseline, in 2015-16 dollars). These are ongoing annual impacts, provided that the agreements remain in place.

Table 4-4 Impact of tariff reductions following FTAs with China, Korea and Japan on Australian vegetable industry, 2024-25

Commodity group	Output change		Export change		Australian price change	Import price from Australia change
	\$m	%	\$m	%	%	%
Brassicas	0.61	0.17	0.59	1.86	0.01	-2.67
Carrots	1.05	0.54	1.10	1.56	0.04	-2.60
Sweet Potatoes	0.00	0.00	0.00	0.00	0.00	0.00
Other root vegetables	0.45	0.83	0.45	5.04	0.04	-7.51
Leafy and stalk vegetables	0.00	0.00	0.00	0.00	0.00	0.00
Leguminous vegetables	2.38	1.37	2.52	3.77	0.09	-6.00
Leek and alliaceus vegetables	0.16	0.18	0.16	0.68	0.01	-1.26
Cucurbits	0.00	0.00	0.00	0.00	0.00	0.00
Solanaceous vegetables	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	4.65	0.21	4.83	1.82		
Other vegetables	0.00	0.00	0.00	0.00	0.00	0.00
Total	4.65	0.10	4.83	0.96		

Under this scenario, vegetable exports will increase as Australian vegetable producers are able to increase their output following the improvements in price competitiveness for some vegetable categories. The increases in output and the increases in export are similar suggesting that the additional production is destined for export markets.

As tariff rates are reduced for brassicas, carrots, other root vegetables, leguminous vegetables and leek and allaceous vegetables, Australia's production and exports for these vegetables would increase. Most notably, leguminous vegetables will experience the largest increase in output and exports. This is because the tariff reductions for leguminous vegetables are relatively large and include beans which is the fourth largest export vegetable from Australia. The differences in percentage increase (1.4% for outputs and 3.8% for exports) reflect that a lot of leguminous vegetables are consumed domestically.

The reduction in tariff rates means that the import prices paid by the ASIA5 region will decrease. The lower price will then result in increased demand for Australian vegetable exports and, as a result, the Australian supply price

of vegetables will increase. The results show, however, that these price increases will be minor (ranging from 0.01% to 0.09%).

4.1.3 Regional analysis

This section disaggregates the national CGE results into state and SA4 levels.

State-level results

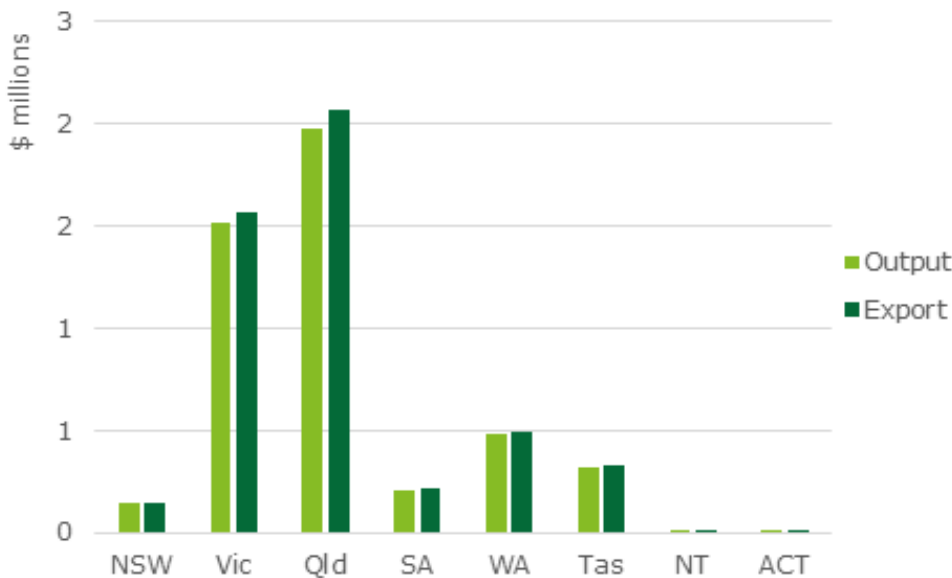
At the state level, Queensland, Victoria and Western Australia are set to gain the most from the FTA tariff reductions (see Table 4-5 and Chart 4-1). This is mainly because these states are the biggest producers of those vegetables that are most affected by tariff reductions.

Table 4-5 Impact of freer trade on state vegetable exports, 2024-25, by commodity group

Commodity group	Australia	NSW	Vic	Qld	SA	WA	Tas	NT	ACT
Brassica	0.59	0.03	0.3	0.14	0.05	0.06	0.01	0	0
Carrots	1.1	0.05	0.26	0.15	0.13	0.36	0.14	0	0
Sweet-potatoes	0	0	0	0	0	0	0	0	0
Other root vegetables	0.45	0.06	0.23	0.07	0.02	0	0.08	0	0
Leafy and stalk vegetables	0	0	0	0	0	0	0	0	0
Leguminous vegetables	2.52	0.01	0.73	1.61	0	0.07	0.09	0	0
Leek and alliaceous vegetables	0.16	0	0.05	0.1	0	0	0	0	0
Cucurbits	0	0	0	0	0	0	0	0	0
Solanaceous vegetables	0	0	0	0	0	0	0	0	0
Subtotal (\$M)	4.83	0.15	1.57	2.07	0.22	0.5	0.33	0	0
Other vegetables	0	0	0	0	0	0	0	0	0
Total (\$M)	4.83	0.15	1.57	2.07	0.22	0.5	0.33	0	0

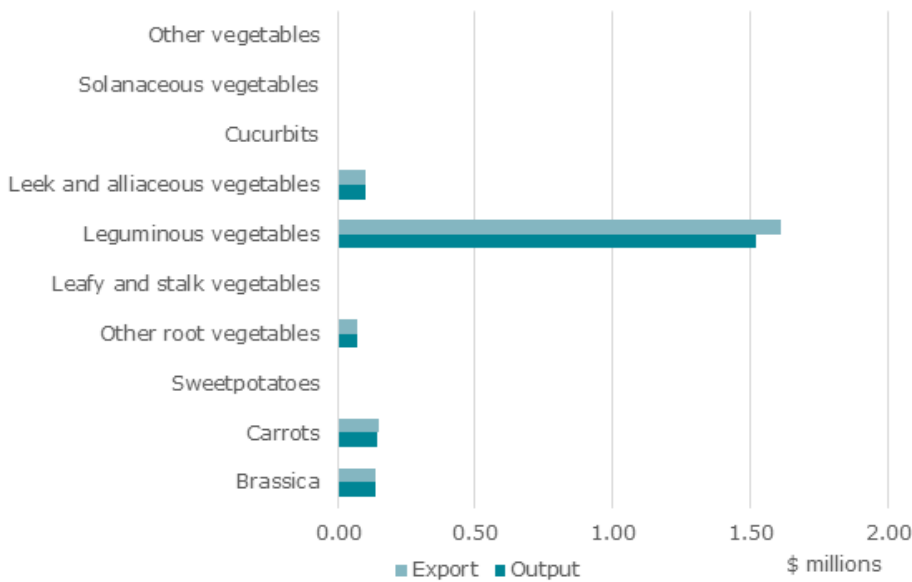
Note: value figures are in 2015-16 \$AUD

Chart 4-1 Impact of freer trade on state-level output and export of levy-paying vegetables, 2024-25



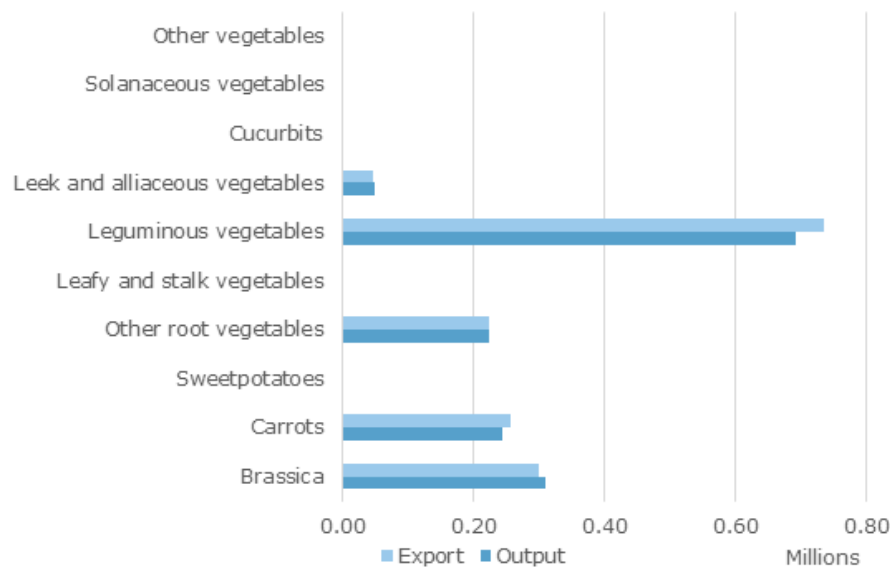
Queensland is likely to be the state that benefits most from freer trade. In particular, leguminous vegetables (in particular beans) will likely increase Queensland exports by \$1.6 million in 2024-25 (and ongoing) following the reductions in tariff rates.

Chart 4-2 Sectoral impacts of freer trade on Queensland’s vegetable industry, 2024-25



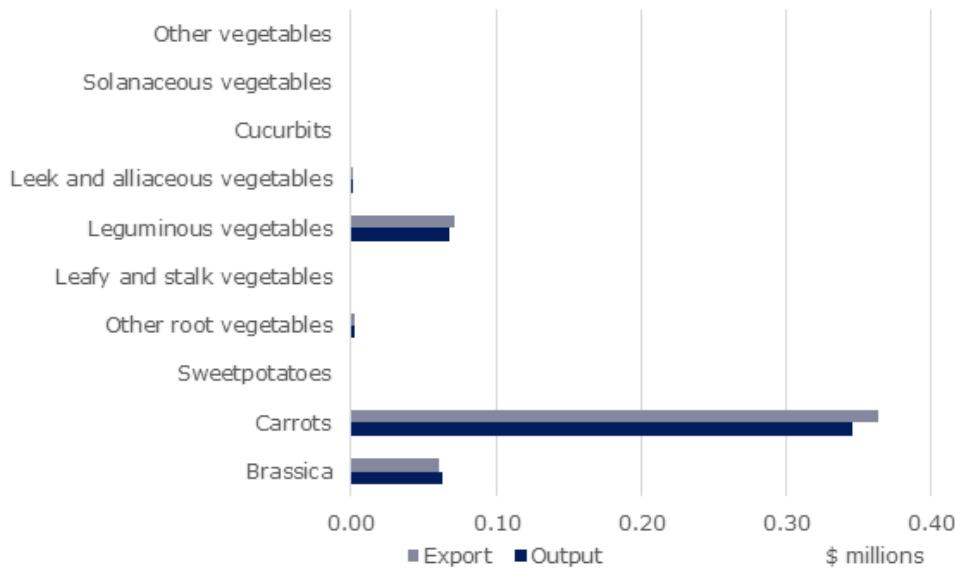
Victoria accounts for a third of Australia’s total increase in exports under this scenario of freer trade. The impact of tariff rate reductions is the biggest for leguminous vegetables (beans and peas), with an increase of around \$0.7 million exports in 2024-25 (and ongoing).

Chart 4-3 Sectoral impacts of freer trade on Victoria’s vegetable industry, 2024-25



For Western Australia, carrot producers will benefit the most in this freer trade scenario as the industry will likely expand its production to meet an increase in export of around \$0.4 million per annum (see Chart 4-4). As there are only a few producers in Western Australia who export carrots, the impact of this scenario would have important implications for them.

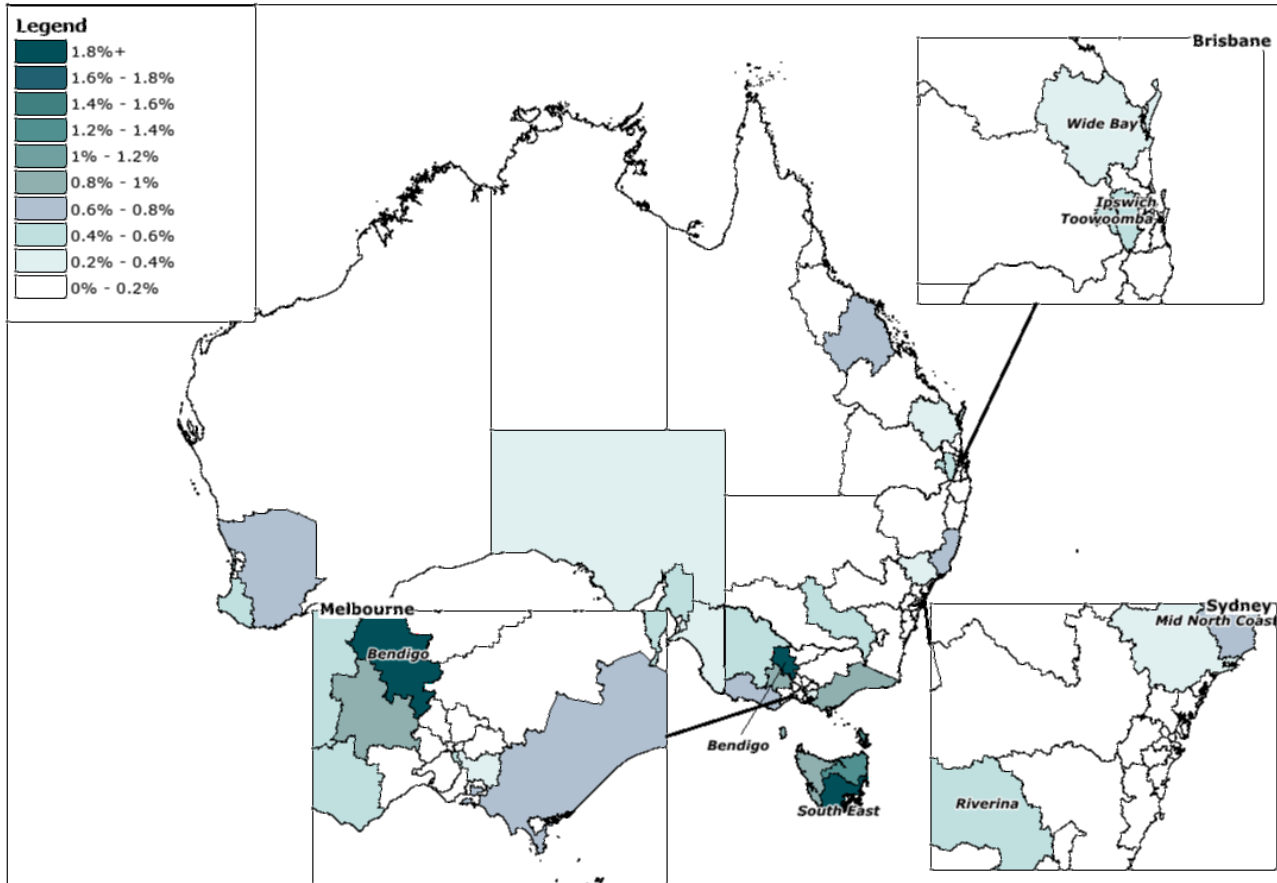
Chart 4-4 Sectoral impacts of freer trade on Western Australia’s vegetable industry, 2024-25



SA4 regional level results

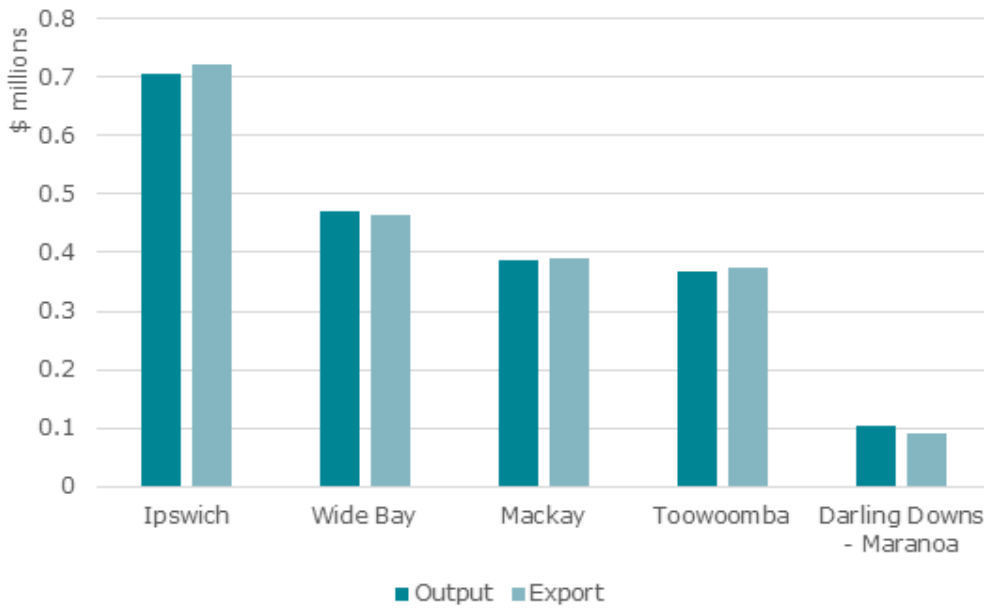
Map 4-1 shows the impacts of freer trade on levy-paying vegetable export as a percentage of the total value of current levy-paying vegetable production for all SA4 regions in Australia. The map shows that Bendigo (Vic.), South East (Tas.), Launceston and North East (Tas.) and Ballarat (Vic.) are the regions likely to have the strongest growth potential in export, compared to its current vegetable production.

Map 4-1 Impact of freer trade on levy-paying vegetable exports at the SA4 level (% of current regional production of levy-paying vegetables), 2024-25



Within Queensland (the state showing the largest impact in value terms), the SA4 regions that will experience the biggest change in vegetable output and export are presented in Chart 4-5. Ipswich is identified as the biggest beneficiary of vegetable export growth. This is due to the fact that this SA4 is a big producer of a mix of vegetables that are all subject to tariff rate reductions under the FTAs considered in this study. In 2013-14, Ipswich produced close to \$30 million of brassicas (5% of state total production), \$15 million of carrots (9% of state total production), about \$20 million of leguminous vegetables (26% of state total production) and \$29 million of leek and alliaceous vegetables (8% of state total production). A reduction in tariff rates for these vegetable categories will encourage ASIA5 to demand more of them from Australia. The higher output value is, therefore, a result of both the higher price received and higher output volume. The ability for Ipswich to realise this export potential, however, depends on whether growers can expand their production beyond their current capacity and whether there is enough export capacity out of Port of Brisbane to deliver the produce to ASIA5.

Chart 4-5 Five SA4s in Queensland with the largest impacts on levy-paying vegetables from freer trade, 2024-25



4.2 Scenario 2 - Wealthier consumers

4.2.1 Quantifying the scenario

This scenario represents a change in the mix of vegetables demanded when countries in the Asian region become wealthier. As income grows, consumers in countries such as China, Indonesia and Malaysia will increase their consumption of fruit and vegetables.⁹

Within the vegetable category, as the population in a country becomes wealthier, the mix of vegetables is likely to move away from starchy roots.¹⁰ In addition, wealthier consumers tend to increase the frequency of dining out occasions and their demand for higher value and value-added premium foods.

Another impact of increased wealth is that a rising share of consumers will be prepared to pay a premium for fruit and vegetables that have assured integrity and food safety. This tendency will favour Australia, which in most vegetable categories are significantly more expensive than comparable local and Chinese vegetable products. Australia enjoys a reputation for superior product integrity and food safety in most developed markets that also command a price premium.

Another benefit to Australia of an increasing affluent middle class is that consumers are more likely to shop for fresh foods in supermarkets or

⁹ ABARES (2013), What Asia wants: Long-term food consumption trends in Asia, Research by the Australian Bureau of Agricultural and Resource Economics and Sciences, October, Canberra.

¹⁰ ABARES (2013), What Asia wants: Long-term food consumption trends in Asia, Research by the Australian Bureau of Agricultural and Resource Economics and Sciences, October, Canberra. Kearney, J. (2010), Review: Food consumption trends and drivers, Philosophical Transactions of the Royal Society B, vol. 365, pp. 2793-2807.

hypermarts rather than traditional wet markets.¹¹ The nature of the supply chain (e.g. logistics and cold storage) of supermarkets make them more suitable to supplying exported vegetable products. These consumers would also be more likely to dine at higher end and western chain eating establishments, which usually stock premium imported product because of perceived quality/product integrity benefits and because of a fear of reputation damage should a food safety incident occur.¹²

For the scope of this project, the increase in wealth in the ASIA5 region is chosen to illustrate the increase in wealth of the Asian region. These countries provide a reasonable representation of wider Asian growth as all have rising GDP per capita, they collectively represent a large population, and countries in ASIA5 (with the exception of China) are within the biggest destinations for Australian vegetable exports (see Chart 2-2).

Using the FAOSTAT data¹³ on production, imports and exports for the 23 years to 2013-14, the per capita vegetable consumption patterns of China, Indonesia and Malaysia were tracked. By aligning these consumption trends with real per capita GDP over the same period, point estimates of income elasticities were derived. These elasticities indicate the change in the quantity demanded of a particular vegetable group given a dollar change in income.

Using these income elasticities, the increasing wealth scenario is modelled by assuming a 20% increase in GDP for ASIA5 over the 10 years to 2024-25 (above baseline growth).

Table 4-6 Increase in total demand for vegetables in ASIA5 from 20% increase in GDP, 2024-25

Commodity group	Change in ASIA5's domestic use
Brassicas	3,930.10
Carrots	2,651.90
Sweet Potatoes	998.4
Other root vegetables	445.4
Leafy and stalk vegetables	4,307.80
Leguminous vegetables	2,044.30
Leek and alliaceous vegetables	677.5
Cucurbits	2,381.20
Solanaceous vegetables	2,889.20
Subtotal (\$M)	20,325.90
Other vegetables	28,939.10
Total vegetable (\$M)	49,265.10

¹¹ Glover, J. (2011), An international retailer's perspective, in The supermarket revolution in food: good, bad or ugly for the world's farmers, consumers and retailers?, proceedings of the Crawford Fund 17th Annual Parliamentary Conference, Parliament House, Canberra, 14-16 August, available at crawfordfund.org/assets/files/conference/conf2011/supermarket_revolution_in_food.pdf.

¹² Regmi, A. et al. (2008), Convergence in food demand and delivery: do middle-income countries follow high-income trends?, available at <http://ageconsearch.umn.edu/bitstream/55621/2/Regmi.pdf>

¹³ FAOSTAT (2016), <http://faostat3.fao.org/home/E>

The total increase in vegetable demand from the ASIA5 region is shown in Table 4-6. This \$49 billion increase in total vegetable demand in 2024-25 might appear large, however this demand will be met by either domestic production in these countries, imports from Australia or imports from the rest of the world.

The DAE-RGEM estimates the precise level of export growth expected in Australia as well as the rest of the world to meet this increase in vegetable consumption as a result of wealth increases in these countries. As such, the increase in export demand for Australian vegetables under this scenario is an outcome of the model.

4.2.2 CGE results

The increasing wealth in ASIA5 has a moderate impact on Australian vegetable output and export. Wealthier consumers in ASIA5 will demand more fresh vegetables from Australia and the rest of the world.

Under this scenario, Australian vegetable output is expected to increase by \$13.35 million in the year 2024-25 when the shock is fully realised (see Table 4-7). Australian vegetable exports are expected to increase more than output, estimating at around \$17.7 million per annum. These are annual ongoing impacts assuming average income per capita does not decline.

These results are due to the higher demand for Australian vegetables from ASIA5, hence, higher prices received (as shown by the price change). As prices increase, Australian vegetable producers would expand their production to meet the increase in demand. The increase in export value would be due to the combined impact of higher price and more quantity demand. The difference between output and export values might also suggest that there could be some displacement of domestic consumption in favour of exports.

Table 4-7 Impact of wealthier consumers in Asian countries on Australian vegetable industry, 2024-25

Commodity group	Output change		Export change		Price change	
	\$m	%	\$m	%	%	
Brassicas	0.82	0.21	1.15	3.59	0.37	
Carrots	2.91	1.19	3.14	4.44	0.44	
Sweet Potatoes	0.11	0.09	0.20	2.73	0.36	
Other root vegetables	0.17	0.28	0.22	2.43	0.37	
Leafy and stalk vegetables	0.55	0.11	0.95	2.96	0.36	
Leguminous vegetables	2.27	1.03	2.47	3.69	0.42	
Leek and alliaceous vegetables	0.35	0.31	0.44	1.89	0.38	
Cucurbits	0.19	0.07	0.41	2.86	0.36	
Solanaceous vegetables	0.16	0.06	0.37	3.77	0.36	
Subtotal	7.52	0.34	9.35	3.52		
Other vegetables	5.83	0.20	8.33	3.60	0.37	
Total	13.35	0.27	17.69	3.56		

At the sectoral level, carrots and leguminous vegetables experience relatively bigger increases in output and export values than other vegetable categories. However, the percentage increases in output value for carrots and leguminous vegetables are less than those of export value, indicating that these vegetables are mainly consumed domestically.

4.2.3 Regional analysis

As with Scenario 1, the national CGE results are further disaggregated into the impacts on output and export at the state and SA4 levels.

State-level results

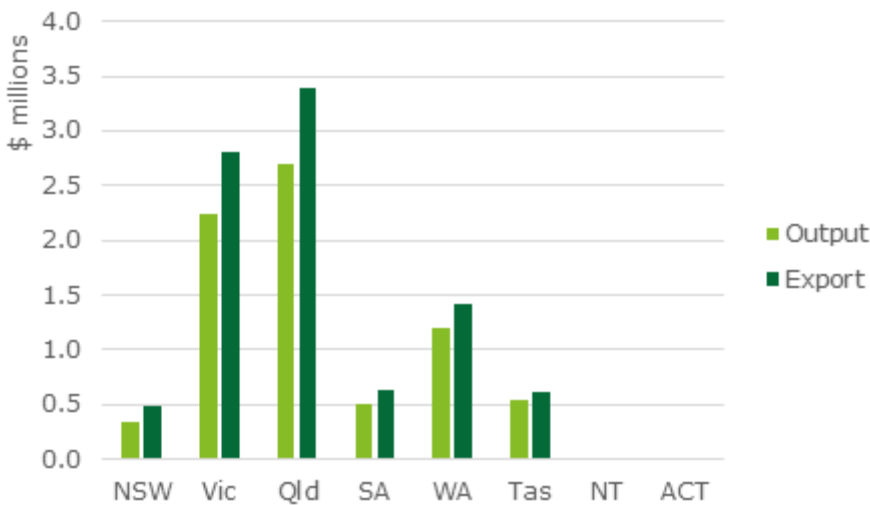
At the state level, the impacts on exports are shown in Table 4-8. The states with the largest gains in exports include Victoria, Queensland and South Australia. However, the three states that would increase their production the most as a result of this scenario are Victoria, Queensland and Western Australia (see Chart 4-6). This shows that South Australia is slightly more export-oriented in a number of vegetables than Western Australia.

Table 4-8 Impact of wealthier consumers on state vegetable exports, 2024-25, by commodity group

Commodity group	Australia	NSW	Vic	Qld	SA	WA	Tas	NT	ACT
Brassica	1.15	0.06	0.58	0.26	0.11	0.12	0.02	0	0
Carrots	3.14	0.15	0.74	0.43	0.38	1.04	0.41	0	0
Sweet-potatoes	0.2	0	0	0.2	0	0	0	0	0
Other root vegetables	0.22	0.03	0.11	0.03	0.01	0	0.04	0	0
Leafy and stalk vegetables	0.95	0.1	0.46	0.25	0.03	0.07	0.04	0	0
Leguminous vegetables	2.47	0.01	0.72	1.58	0	0.07	0.09	0	0
Leek and alliaceous vegetables	0.44	0.01	0.13	0.28	0.01	0	0.01	0	0
Cucurbits	0.41	0.11	0.04	0.18	0.02	0.04	0	0.01	0
Solanaceous vegetables	0.37	0.02	0.03	0.18	0.08	0.07	0	0	0
Subtotal (\$M)	9.35	0.49	2.80	3.39	0.63	1.42	0.61	0.01	0.00
Other vegetables	8.33	1.34	2.33	1.9	1.44	0.55	0.69	0.08	0
Total (\$M)	17.69	1.83	5.13	5.29	2.07	1.97	1.3	0.09	0

Note: value figures are in 2015-16 \$AUD

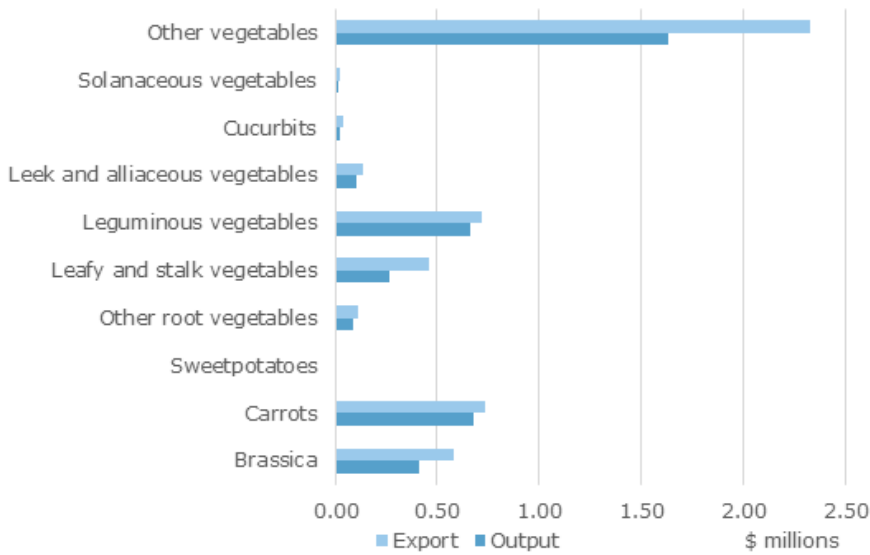
Chart 4-6 Impact of increased wealth in Asian countries on state-level output and export of levy-paying vegetables, 2024-25



In Victoria, additional wealth in ASIA5 leads to an increase in demand for a mix of vegetables. Among these, vegetables in the "Other vegetables"

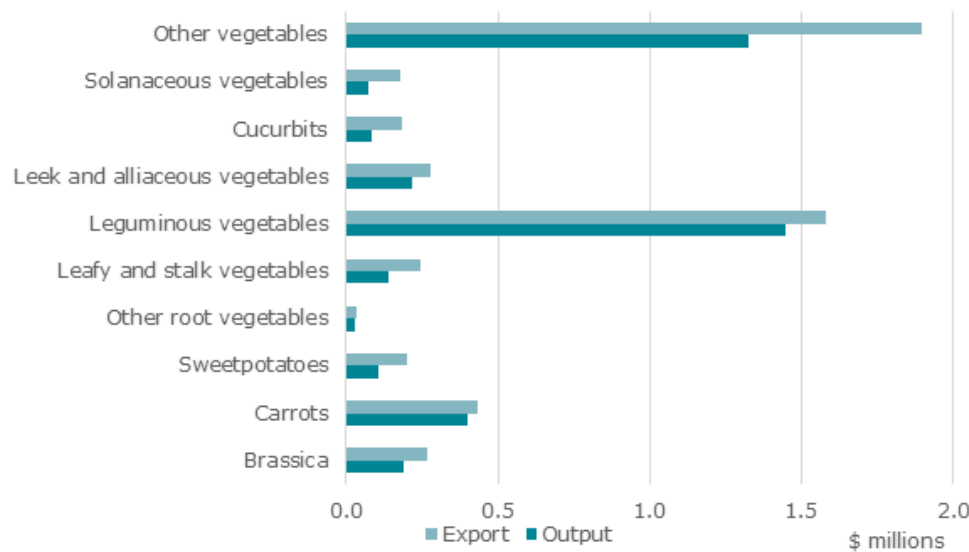
group would likely increase the most. Vegetables in this group contains both levy-paying and non-levying vegetables.

Chart 4-7 Sectoral impacts of increased wealth on Victoria’s vegetable industry, 2024-25



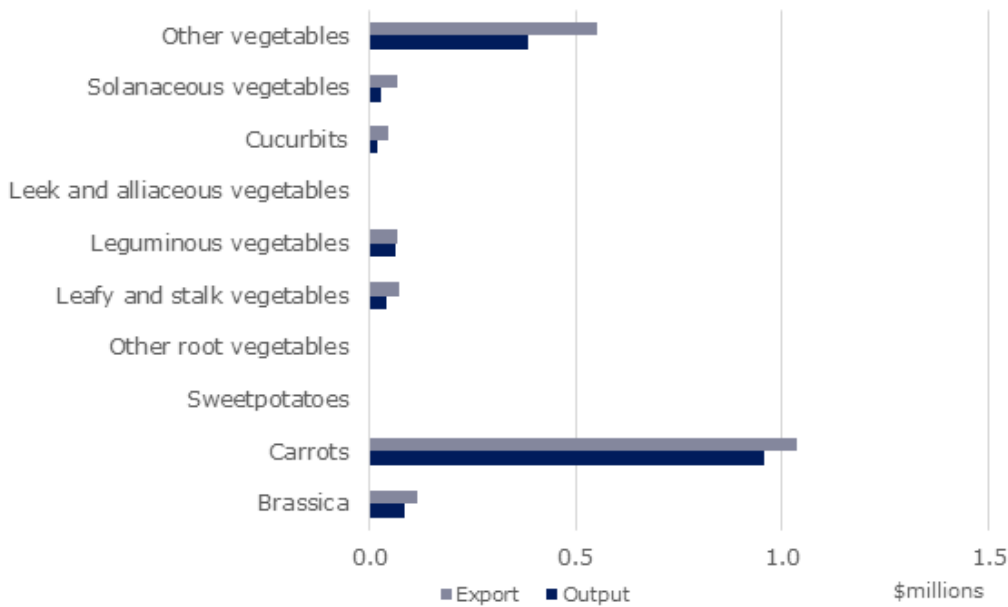
Queensland would likely increase its output and export in a large number of vegetable groups. Most notably, leguminous vegetables and those in the ‘Other vegetables’ group will experience the biggest changes in output and export. As one of the biggest producers of beans in Australia, Queensland is probably well-placed to meet this increase in export demand from a growing middle class in ASIA5.

Chart 4-8 Sectoral impacts of increased wealth on Queensland’s vegetable industry, 2024-25



For Western Australia, wealth increases in Australia’s trading partner countries would likely open up further opportunities to export in quite a number of vegetable categories, notably carrots and those in the ‘Other vegetables’ category.

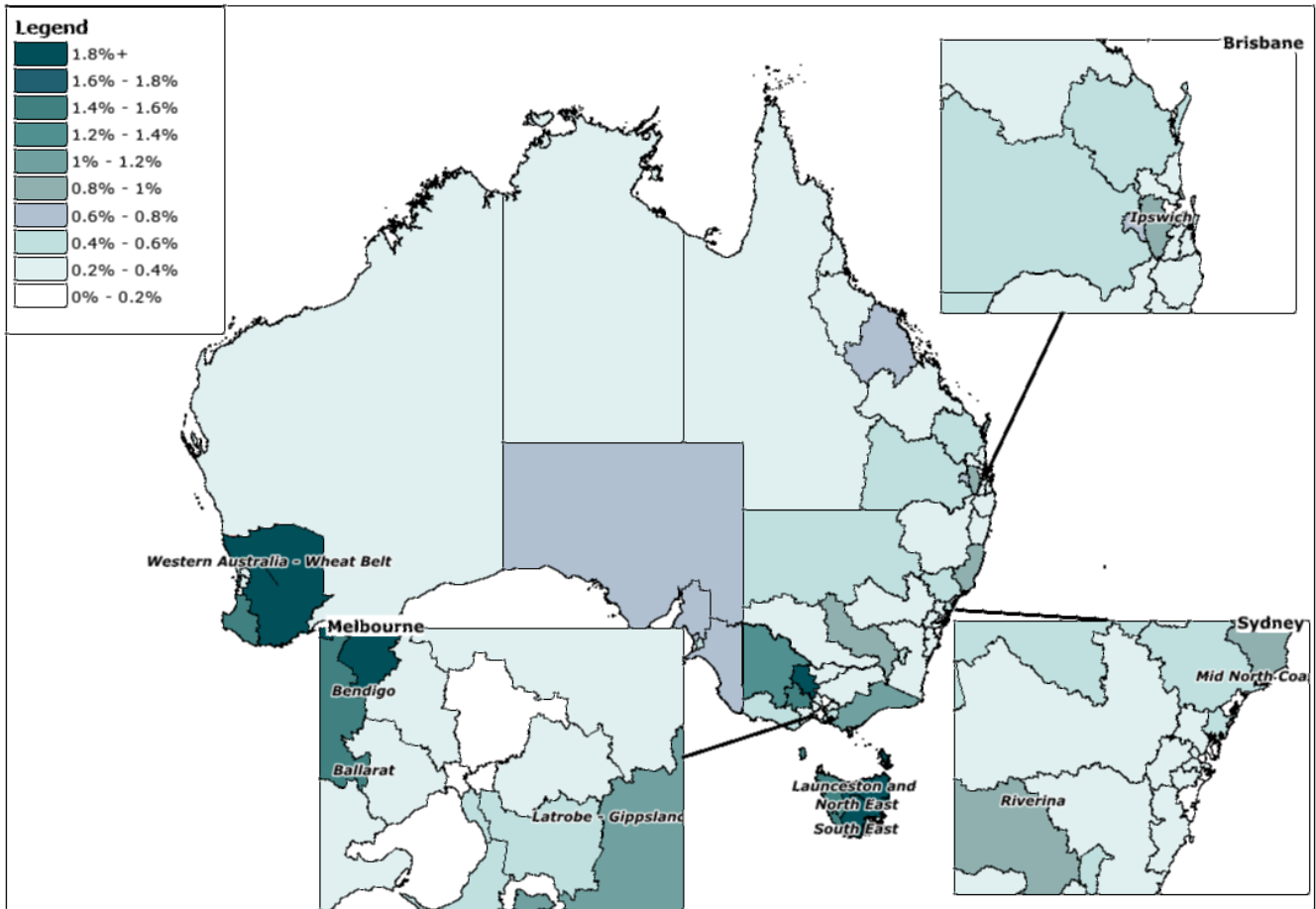
Chart 4-9 Sectoral impacts of increased wealth on Western Australia’s vegetable industry, 2024-25



SA4 regional level results

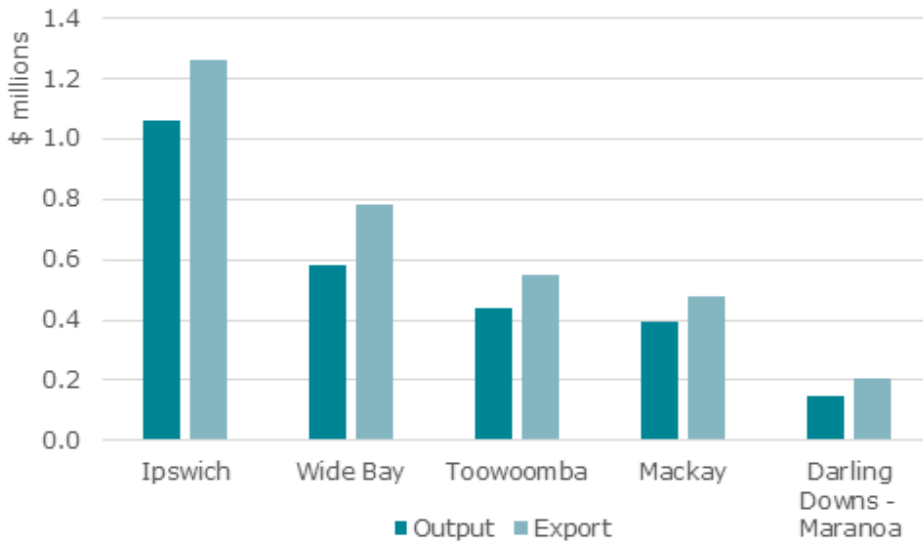
Map 4-2 shows the impacts of wealthier consumers on levy-paying vegetable export as a percentage of the total value of current levy-paying vegetable production for all SA4 regions in Australia. The map shows that Bendigo (Vic.), South East (Tas.), Launceston and North East (Tas.), Western Australia – Wheat Belt (WA) and West and North West (Tas.) are the regions likely to have the highest export growth potential (compared to current vegetable production) from the wealthier consumer scenario.

Map 4-2 Impact of wealthier consumers on vegetable exports at SA4 level (% of current regional production of levy-paying vegetables), 2024-25



Within Queensland, Ipswich is once again the region likely to benefit the most from a wealthier ASIA5. Exports of vegetables in this region is estimated to increase by close to \$1.4 million per annum by 2024-25 (and ongoing). Considering only the major nine levy-paying vegetable categories, scenario 2 could increase the exports of these vegetable categories by about \$1.26 million per annum, compared to the baseline. As producers in Ipswich export a large number of vegetables, the gain is distributed widely across the region. The ability for Ipswich to meet the demand of a growing burgeoning middle class depends much on whether producers within the region could expand output and if the infrastructure within the supply chain is efficient enough to make Australian produce price competitive compare to other exporting countries.

Chart 4-10 Five SA4s in Queensland with the largest impacts on levy-paying vegetables from wealthier consumers, 2024-25



4.3 Scenario 3 - Greater supply chain efficiency

4.3.1 Quantifying the scenario

Improvements in efficiency within the Australian vegetable supply chains ahead of the world would lead to greater competitiveness of Australian exports. Greater supply chain efficiency could come from a number of means such as better road transport, better cold chain management and more airfreight capacity as well as more cold storage capacity at airports. It could also include improvements in labour productivity and production systems.

Hort Innovation's report *VG13107 Benchmarking international road transport regulations* suggests a number of road transport improvements that can significantly lower the costs of transporting vegetables¹⁴:

- The introduction of high performance vehicles to transport vegetables could lead to 20 per cent productivity gain
- Access to increased mass via incremental pricing for heavier loads of vegetables could lead to 10 per cent productivity gain
- Greater access to advanced fatigue management regime on trucks transporting vegetables could lead to approximately 5 per cent productivity gain compared to operations under standard hours
- Removal of duplication in quality assurance schemes could lead to a small productivity gain (less than 1 per cent).

A 5% decrease in transport costs is modelled in this study as it is more achievable without the burden of significant regulatory reform.

¹⁴ Higginson, A. (2015), *Benchmarking international road transport regulations*, VG13107, HGH Consultants, Final Report for Horticulture Innovation Australia, Sydney.

4.3.2 CGE results

The overall impact of greater supply chain efficiency on Australian vegetable output and exports is considerable. Compared to the last two scenarios, the increases in output and exports are much higher. With a 5% reduction in vegetable transport costs, total Australian vegetable output is estimated to increase by about \$28 million in the year 2024-25 while exports would increase by \$18.5 million. These are annual changes and ongoing as long as the scenario holds.

The increase in output value is higher than the increase in export value under this scenario. This result suggests that as transport costs become lower, the prices paid by consumers would fall, leading to higher demand for vegetables domestically and internationally. The increase in output would be absorbed by both domestic consumption and exports.

Table 4-9 Impact of greater supply chain efficiency on Australian vegetable industry, 2024-2025

Commodity group	Output change		Export change	
	\$m	%	\$m	%
Brassicas	1.86	0.47	1.19	3.73
Carrots	3.34	1.37	2.61	3.69
Sweet Potatoes	0.40	0.33	0.26	3.59
Other root vegetables	0.39	0.64	0.31	3.43
Leafy and stalk vegetables	1.97	0.41	1.21	3.76
Leguminous vegetables	3.11	1.42	2.47	3.69
Leek and alliaceus vegetables	1.05	0.94	0.85	3.63
Cucurbits	0.89	0.33	0.54	3.75
Solanaceous vegetables	0.67	0.24	0.36	3.66
Subtotal	13.69	0.62	9.80	3.69
Other vegetables	14.24	0.50	8.69	3.75
Total	27.93	0.55	18.49	3.72

The modelling incorporates the decrease in vegetable transport costs as a 1.1% reduction in the free-on-board (FOB) export prices of vegetables. This is because transport margin is not explicitly represented as a component of FOB price, therefore, it is not possible to show the impact of this scenario on farm-gate prices. However, according to economic theory, as transport margin is lower for Australian vegetables, producers in this industry become more competitive within both the domestic and international markets. As Australian vegetable export prices become lower, there would be higher demand for Australian produce. Higher export demand leads to higher output and higher farm-gate prices. Greater supply chain efficiency (represented as lower transport costs in this scenario), in fact, leads to higher prices to producers.

4.3.3 Regional analysis

As with the previous two scenarios, the national CGE results are further disaggregated into the impacts on output and export at the state and SA4 levels. As such, it is possible to identify the areas where gains are greatest under a situation when there is a 5% cost reduction in vegetable transport.

State-level results

The three states that would likely benefit most from this scenario include Victoria, Queensland and Western Australia (see Table 4-10 and Chart 4-11). The changes in exports for Victoria and Queensland constitute more than half of Australia's total increase in export value. This reflects the fact

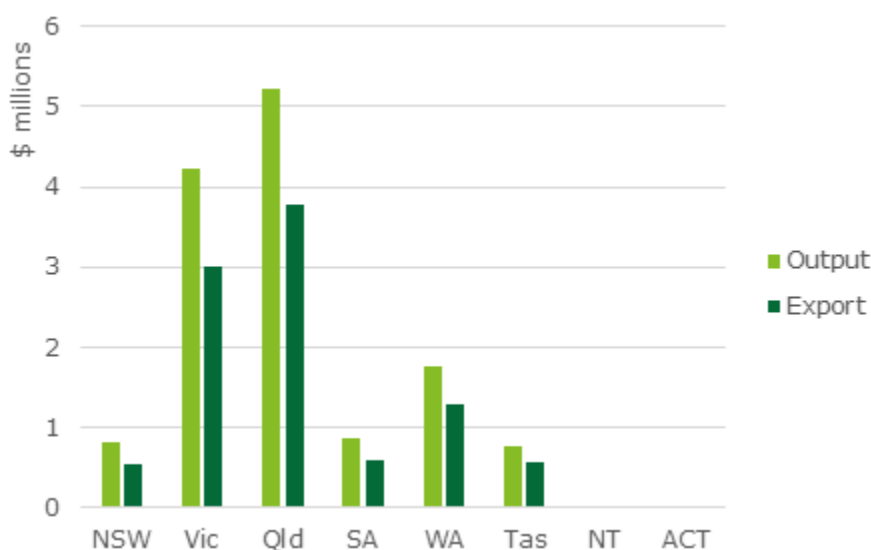
that these states produce more than half of the vegetable output in Australia (see Chapter 2).

Table 4-10 Impact of greater supply chain efficiency on state exports in Australian states, 2024-25, by commodity group

Commodity group	Australia	NSW	Vic	Qld	SA	WA	Tas	NT	ACT
Brassica	1.19	0.06	0.6	0.27	0.11	0.12	0.02	0	0
Carrots	2.61	0.12	0.61	0.36	0.31	0.86	0.34	0	0
Sweet-potatoes	0.26	0	0	0.26	0	0	0	0	0
Other root vegetables	0.31	0.04	0.15	0.05	0.01	0	0.05	0	0
Leafy and stalk vegetables	1.21	0.13	0.58	0.31	0.04	0.09	0.05	0.01	0
Leguminous vegetables	2.47	0.01	0.72	1.58	0	0.07	0.09	0	0
Leek and alliaceous vegetables	0.85	0.02	0.26	0.53	0.01	0	0.03	0	0
Cucurbits	0.54	0.15	0.06	0.24	0.02	0.06	0	0.01	0
Solanaceous vegetables	0.36	0.02	0.03	0.17	0.07	0.07	0	0	0
Subtotal (\$M)	9.80	0.55	3.01	3.78	0.59	1.28	0.58	0.02	0.00
Other vegetables	8.69	1.4	2.43	1.98	1.5	0.58	0.72	0.08	0
Total (\$M)	18.49	1.95	5.43	5.76	2.09	1.86	1.3	0.1	0

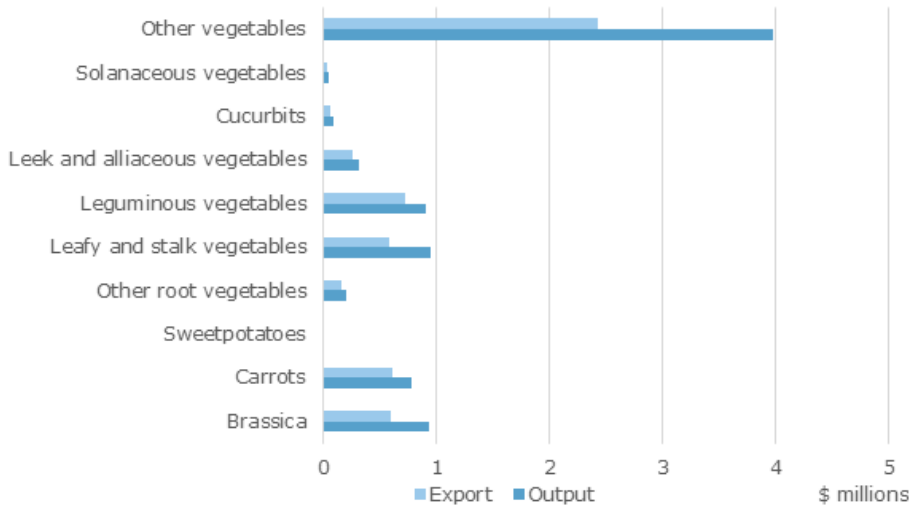
Note: value figures are in 2015-16 \$AUD

Chart 4-11 Impact of greater supply chain efficiency on state-level output and export of levy-paying vegetables, 2024-25



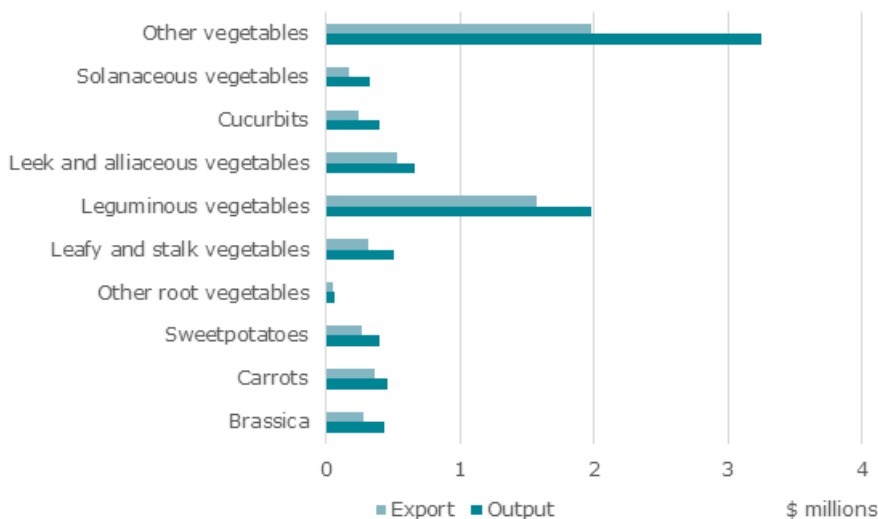
As Victoria produces and exports a number of vegetables, the impacts of greater supply chain efficiency would be across a mix of vegetables. This is reasonable to expect as a gain in supply chain efficiency would benefit the entire industry and not just any particular subsector. Such a finding would have an implication for investment in the off-farm supply chain for the industry in Victoria as well as other states.

Chart 4-12 Sectoral impacts of greater supply chain efficiency on Victoria's vegetable industry, 2024-25



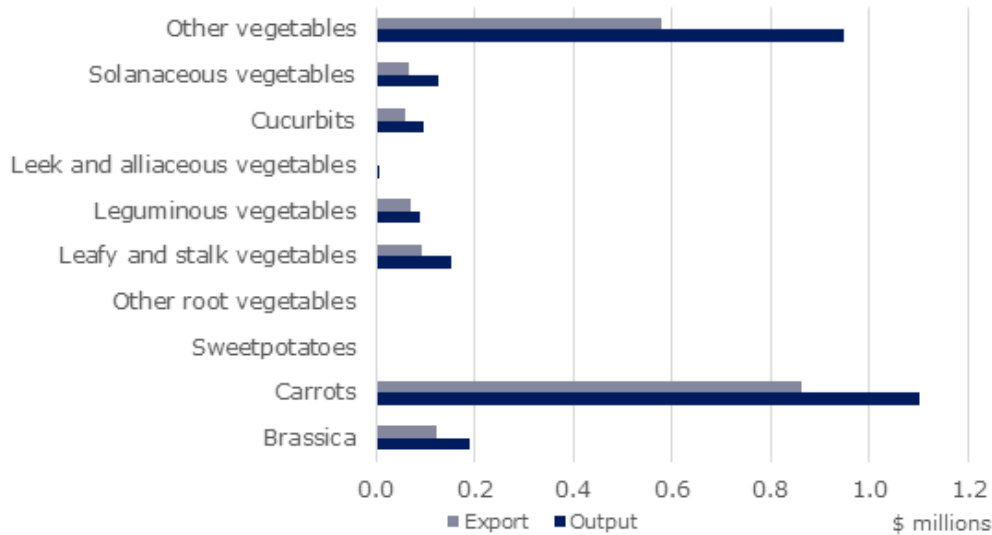
Queensland would likely benefit almost as much as Victoria when it comes to greater supply chain efficiency. Similarly to producers in Victoria, producers in Queensland grow and export a large number of vegetables. The implication of greater supply chain efficiency for Queensland would be similar to that in Victoria. However, where to invest in the supply chain would be state-specific.

Chart 4-13 Sectoral impacts of greater supply chain efficiency on Queensland's vegetable industry, 2024-25



In Western Australia, the impact of greater supply chain efficiency would be similar in its sectoral distribution to that of Scenario 2. However, the magnitude of the changes in output and export under Scenario 3 is higher. Greater supply chain efficiency (even just as a 5% decrease in vegetable transport costs) would lead to widespread benefits to a number of vegetable subsectors in Western Australia.

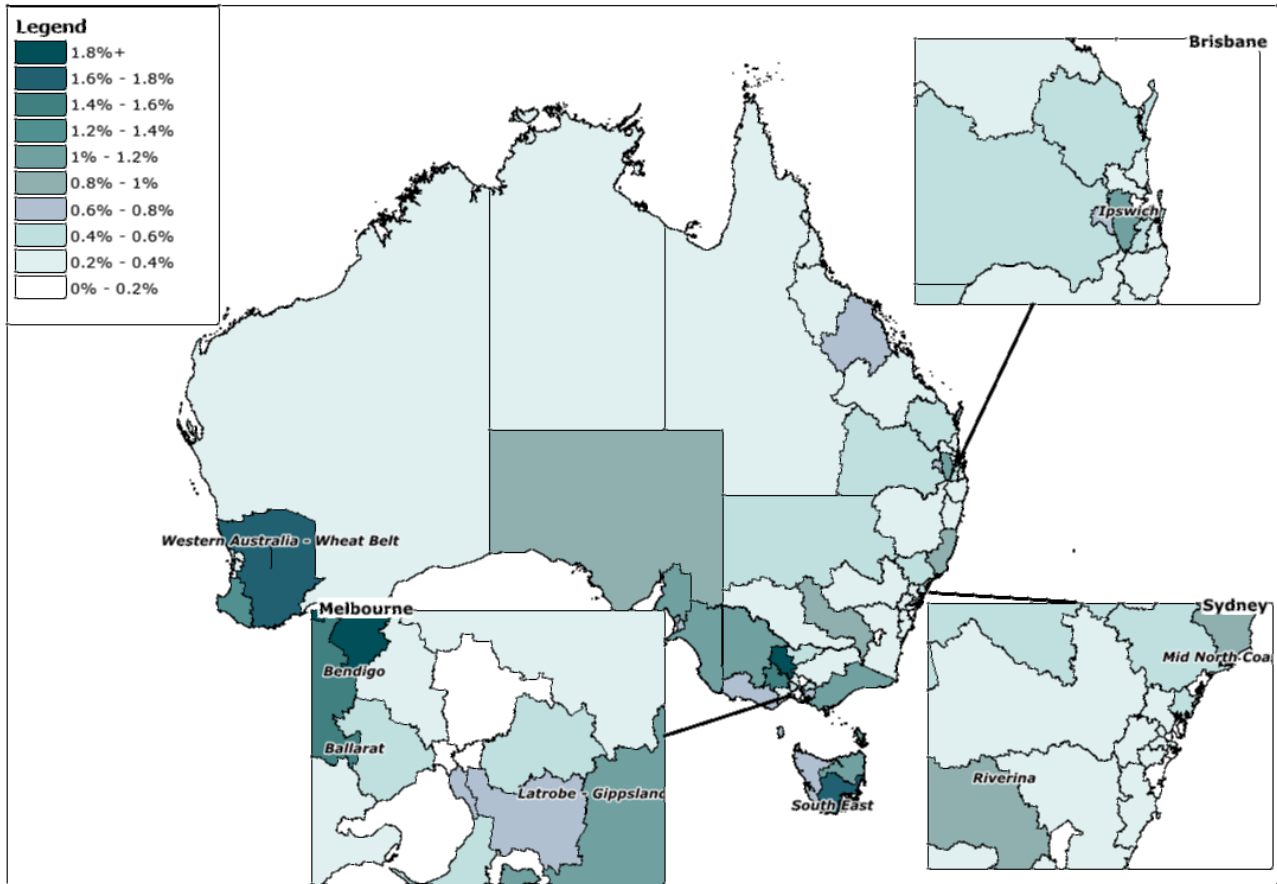
Chart 4-14 Sectoral impacts of greater supply chain efficiency on Western Australia's vegetable industry, 2024-25



SA4 regional level results

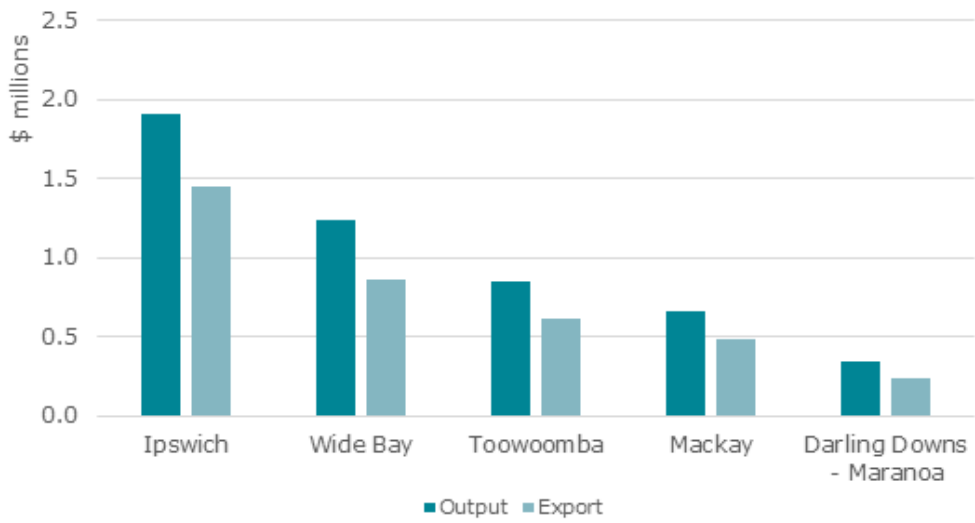
Similar to the previous two scenarios, the map in Map 4-3 shows the impacts of greater supply chain efficiency on levy-paying export as a percentage of the total value of current levy-paying vegetable production for all SA4 regions in Australia. The map shows that Bendigo (Vic.), South east (Tas.), Western Australia – Wheat Belt (WA), Ballarat (Vic.) and Perth – Inner (WA) are the regions likely to experience the highest export growth potential (compared to current vegetable production) from the greater supply chain efficiency scenario.

Map 4-3 Impact of greater supply chain efficiency on levy-paying vegetable exports at SA4 level (% of current regional levy-paying vegetable production), 2024-25



For Queensland (the state with the largest gains in value terms from this scenario), Ipswich is again identified as the SA4 region that would likely gain the most from improvements in Queensland's supply chain efficiency. To harness this export growth opportunity, improvements in productivity as well as supply chain efficiency would be crucial for producers in this region. This requires investment in both on-farm production systems and off-farm supply chains.

Chart 4-15 Five SA4s in Queensland with the largest impacts on levy-paying vegetables from greater supply chain efficiency, 2024-25



5 Stakeholder consultation

To understand the impact that the export modelled scenarios would have on regional communities, the consultants interviewed a small sample of exporting businesses in three key vegetable growing regions of Australia, namely south east Melbourne, the Lockyer Valley region in Queensland and the north Perth region.

The purpose of the consultation was to capture industry views about the social, regional and business-specific impacts that may occur as a result of increased vegetable exports, i.e. those impacts that cannot be captured in economic modelling alone.

This chapter firstly summarises the views of those stakeholders in relation to the three export growth scenarios; their thoughts about how business models or supply chains would need to adapt to facilitate increasing exports; and their opinions on the associated welfare benefits of increasing exports. This feedback provides an important 'sense check' of the CGE modelling results discussed in the previous chapter. The chapter then takes a closer look at the CGE modelling results of the three modelled scenarios for each region and the stakeholder responses that were specific to each region. Lastly, the chapter summarises other major themes that emerged from the consultation relating to opportunities and challenges of increasing vegetable exports.

5.1 Stakeholder views on the three scenarios

Section 5.1 summarises stakeholder views and feedback on the three modelled scenarios.

5.1.1 Scenario 1: freer trade

The growers in the three regions typically thought the FTAs with China, Japan and South Korea would not make a noticeable difference in exports. Essentially, this is because there is currently very limited market access for vegetable products to these markets due to phytosanitary blockers to trade. The likelihood of gaining market access in the short term for most vegetable categories is remote.

Furthermore, most of the tariffs for vegetable categories are not overly high and/or the reductions were considered to be too small to improve Australia's competitiveness. There are exceptions where tariffs are as high as 300% and removal of these would create niche opportunities for certain categories. An example of this is evident in Australian exports of crisper potatoes to South Korea, which enjoy a narrow tariff-free period of two months when the USA cannot supply. Even if all tariffs were eliminated entirely, it is unlikely to increase Australia's overall competitiveness significantly. The view on the South Korean FTA is that it offers no real benefit until tariffs come down to zero, which is some years away.

The technical biosecurity trade barriers that restrict market entry for most vegetable categories to these markets is the pivotal issue. In China there is no market access for most vegetable categories. Where there is an agreed

protocol, the required treatments make trade cost prohibitive. Furthermore, the industry consider that there are low prospects for trade negotiation on market access protocols in the foreseeable future because other more valuable categories are ahead in the queue in the government's market access negotiation process. The reason that these products are low on the negotiating list is because China, Japan and South Korea are largely self-sufficient in most vegetable categories so they are not priorities for their trade negotiators.

5.1.2 Scenario 2: wealthier consumers

The growers in the three regions generally considered the wealthier customer scenario to be inevitable and, in fact, is the main basis for industry optimism about the future of vegetable exports.

It is understood that the growing middle and upper middle class cohorts in these countries will be able to afford better quality or safer food. Increasingly, these higher income consumers shop in supermarkets because of the more comfortable shopping environment, the greater range, access to new and gourmet lines and also because of perceived product integrity.

Therefore, a key opportunity for Australian growers is to trade directly with such supermarkets and to service high end outlets with more western style vegetables (e.g. beetroot or cauliflower) rather than Asian style vegetables, where China is the main supplier to Asian markets. A key enabler of servicing direct contracts with supermarkets is growers with considerable business sophistication (e.g. IT capability).

5.1.3 Scenario 3: supply chain efficiency

There were mixed opinions on the supply chain efficiency scenario with some believing it could make a considerable difference while others believed it would make little difference. A common view expressed was that a transport saving of 5% would be unlikely to provide a margin gain to make Australian growers competitive enough.

Some stakeholders expressed that the competitive culture in the region means growers would be unlikely to collaborate to negotiate on freight buying or to leverage other transport savings. It was the general view that growers are working on supply chain efficiency at the business level but not at the industry level, and for most it is the only option available to them for margin recovery.

One point of view was that most growers simply do not understand export supply chains well enough to know how to approach them or best structure their business model to take cost out of the value chain. However, one particular grower, who is dependent on airfreight, emphasised the importance of improving transport efficiency as a focus area for industry. This was primarily due to the prospect of increasing airfares and the cost and administrative burden of QA compliance.

5.2 Regional case studies

Section 5.2 provides the modelling results of the three modelled scenarios for each of the three selected regions and the stakeholder responses that were specific to each region.

5.2.1 South East Melbourne region

The south east Melbourne region is one of the most rapidly urbanising areas of greater Melbourne with high and fast rising land value and challenges of urban encroachment from residential and/or tourism development.

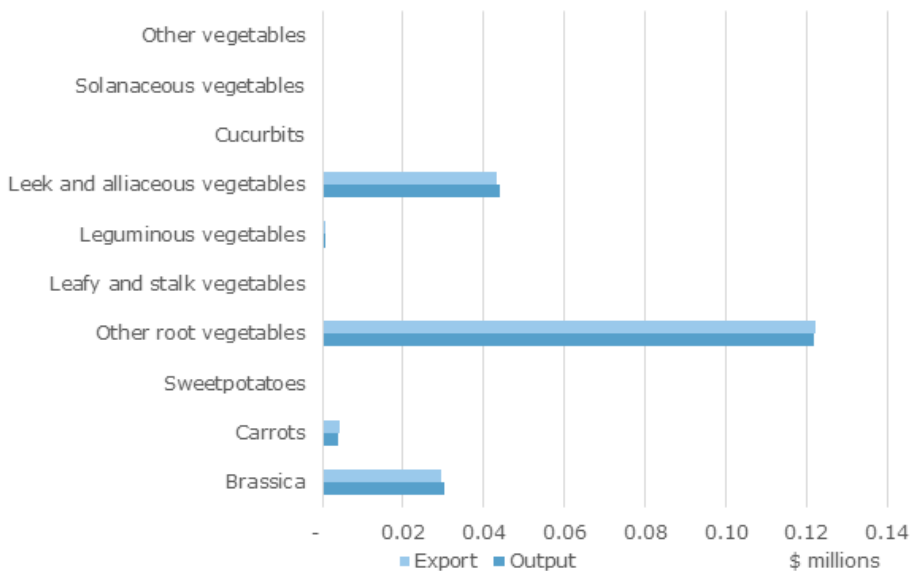
In 2013-14, the SA4 region of Melbourne-South East recorded vegetable production of \$177 million (or 18% of state production). 52% of vegetable production in the region was for other vegetables which consisted mainly of potatoes. 29% of this total was for leafy and stalk vegetables consisting mainly of celery, lettuce and spinach. Brassicas, alliaceeous vegetables, and other root vegetables (parsnips and radishes) consisted of 7%, 8% and 4% respectively. As a proportion of Victorian production, south east Melbourne produces 90% of the state's alliaceeous vegetables, 54% of other root vegetables and 32% of the state's leafy and stalk vegetables.

Modelling results for the South East Melbourne region

The modelling results for the three scenarios show that scenario 3 - greater supply chain efficiency would have the biggest impact on the region and scenario 1 - freer trade would have the smallest impact.

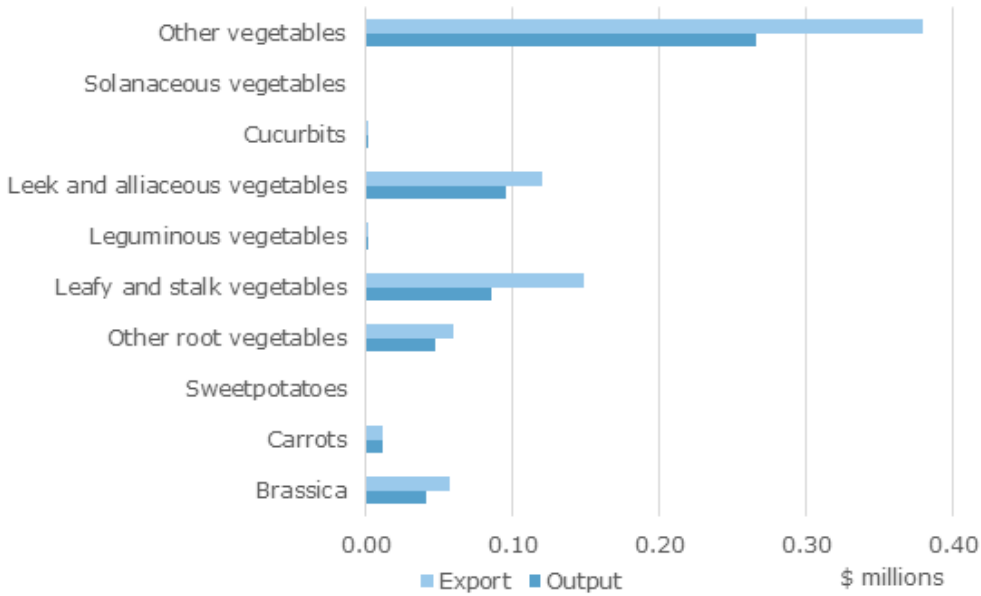
Of the vegetable categories, **Scenario 1** (Chart 5-1) would have the largest impact on other root vegetables in the region resulting in an additional annual output and exports of \$0.12 million in 2024-25. This represents 1.8% of current other root vegetable production. This result is due to other root vegetables having relatively larger tariff reductions of all the vegetables and also the region having a large share (54%) of state production. Scenario 1 would also result in an increase in output and exports of leek and alliaceeous vegetables and brassicas, although these changes represent around 0.3% and 0.2% of current output respectively.

Chart 5-1 Sectoral impacts of freer trade on Melbourne South East region, 2024-25



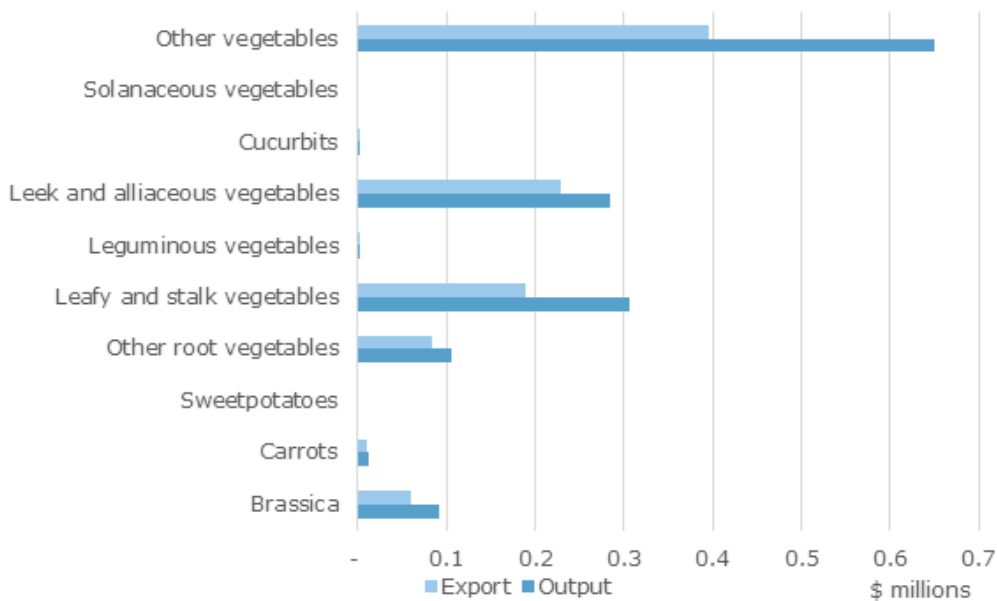
In **Scenario 2** wealthier consumers (Chart 5-2) would have the largest impact on the 'other vegetables' category, resulting in additional annual exports of \$0.38 million in 2024-25. Despite of the relatively large size of the category, this represents only 0.4% of current production. Scenario 2 would also result in an increase in exports to leek and alliaceeous vegetables (of \$0.12m or 0.8% of current production) and leafy and stalk vegetables (of \$0.15m or 0.3% of current production).

Chart 5-2 Sectoral impacts of wealthier consumers on Melbourne South East region, 2024-25



In **Scenario 3**, greater supply chain efficiency (Chart 5-3) would again have the largest impact on the 'other vegetables' category, resulting in additional annual output of \$0.65 million (0.7% of current other vegetable production) and exports of \$0.39 million in 2024-25. Scenario 3 would also result in an increase in output to leek and alliaceous vegetables and leafy and stalk vegetables of around \$0.3 million which would represent 2% and 0.6% of current category production respectively.

Chart 5-3 Sectoral impacts of greater supply chain efficiency on Melbourne South East region, 2024-25



Regional insights from stakeholder consultations

The three businesses consulted in this region were:

- a small organic specialist grower
- a business that was part of an export marketing cluster in collaboration with three other growers
- a business with a corporate structure with established export trade.

These businesses all produced leafy row crops including: organic leaf products, celery, broccoli, cauliflower, kale, leek and lettuce. All Victorian growers operate in a region where the high cost of land is a key consideration in their business model. Most view the land value as a long term asset and make critical investment and family succession decisions around land value. The impact of high land value and urban encroachment is the catalyst for many businesses in these areas to relocate their growing operations further away from urban development. The following sentiments were expressed in the consultation concerning increasing exports:

- Victorian growers are showing a greater willingness to collaborate on collective marketing.
- A shortage of agronomists was noted and it was expressed that labour is hard to get on the urban fringe where workers would rather commute to the city.
- Air freight capacity constraints were noted as a particular concern for one grower, especially in the peak seasons when growers compete for air space against higher value seafood, meat or fruit exports.

5.2.2 Lockyer Valley region

The Lockyer Valley region is located between Ipswich and Toowoomba. The region is well-situated in relation to major transport routes, proximity to Brisbane, distribution facilities, access to labour and affordable land. The Lockyer Valley has a major seasonal advantage in that growers there can supply throughout the winter months when production volumes in southern states are low.

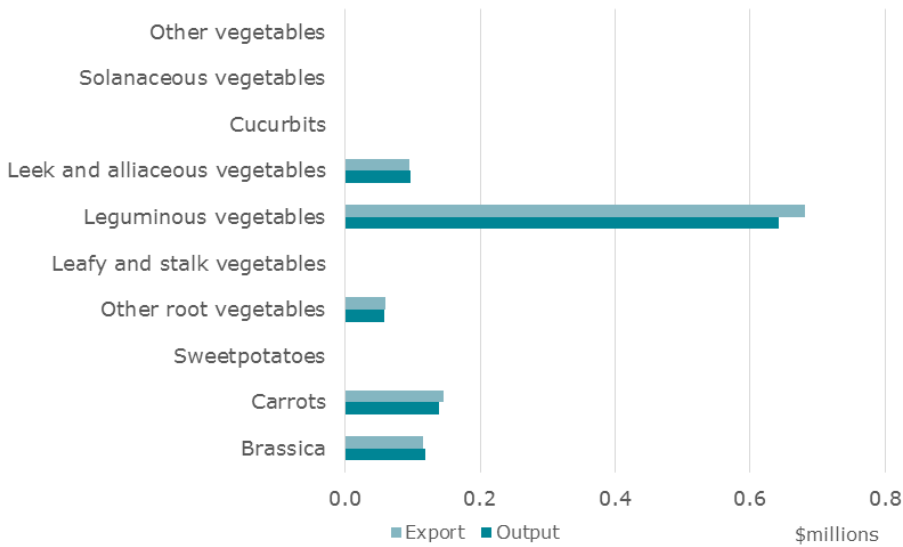
In 2013-14, the SA4 regions of Ipswich and Toowoomba (i.e. Lockyer Valley) recorded vegetable production of \$269 million (or 28% of Queensland production). Dominant categories included leafy and stalk vegetables (\$58 million or 69% of Queensland production), brassica (\$50 million or 80% of state production) and leek and alliaceous vegetables (\$32 million or 95% of state production) and leguminous vegetables, mainly beans (\$31 million or 42% of state production).

Modelling results for the Lockyer Valley region

The modelling results for the three scenarios show that scenario 3 'greater supply chain efficiency', would have the biggest impact on the region and scenario 1 'freer trade' would have the smallest impact.

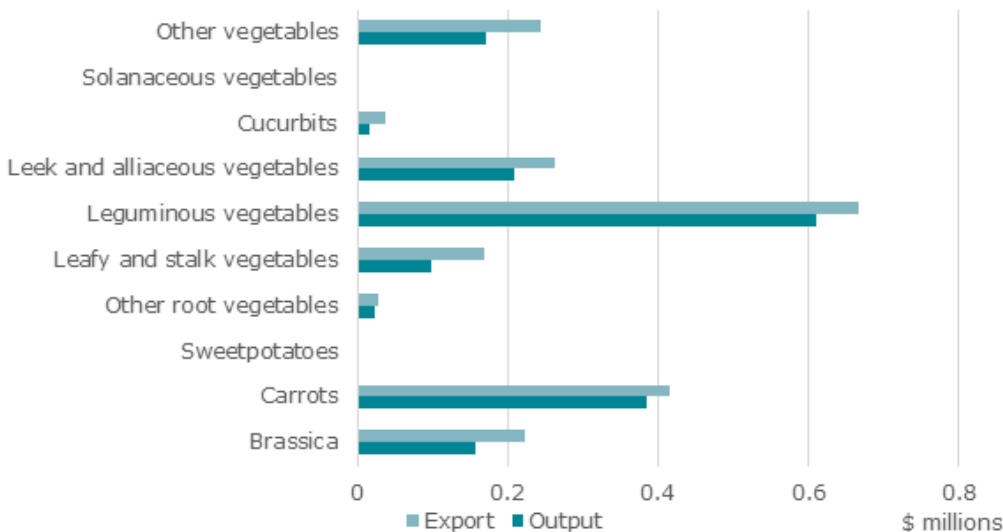
Scenario 1 (Chart 5-4) would impact leguminous vegetables the most out of all the vegetable categories in the region, increasing exports by 2.2% of current production. This result is due to leguminous vegetables having relatively larger tariff reductions than many of the other vegetable categories and also the region having a large production volume of beans which are an important export to New Zealand.

Chart 5-4 Sectoral impacts of freer trade on Lockyer valley region, 2024-25



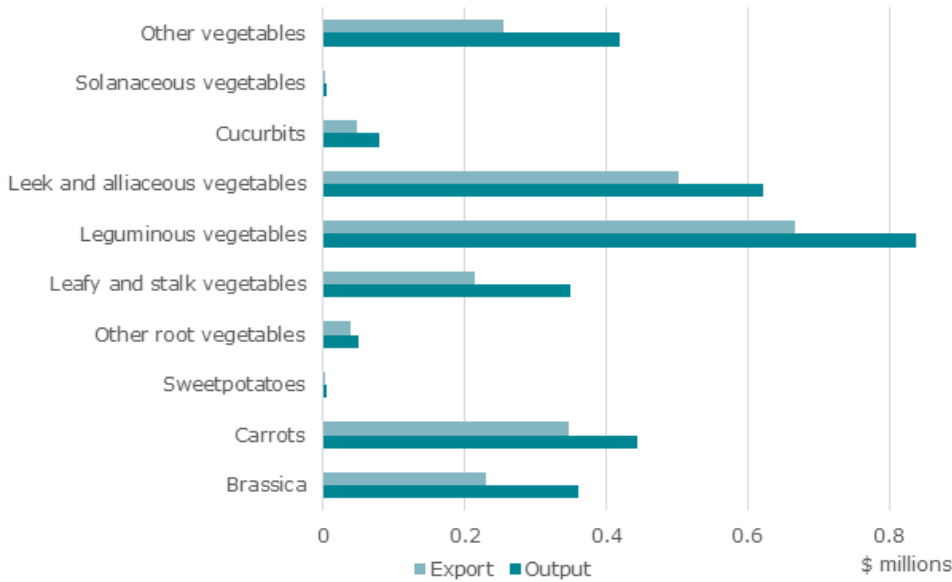
Scenario 2 (Chart 5-5) would also impact leguminous vegetables the most out of all the vegetable categories in the region, increasing exports by 2.2% of current production, followed by carrots (export increase of 2.4% of current carrot production). These results are explained by the relatively higher ASIA5’s demand for these two categories (compared to other categories) and the high production volumes in the region.

Chart 5-5 Sectoral impacts of wealthier consumers on Lockyer valley region, 2024-25



Scenario 3 (Chart 5-6) would again impact leguminous vegetables the most of the vegetable categories in the region increasing exports by 2.2% of current production, followed by leek and alliaceous vegetables (export increase of 1.6% of current production).

Chart 5-6 Sectoral impacts of greater supply chain efficiency on Lockyer valley region, 2024-25



Regional insights from stakeholder consultations

Businesses consulted within the Lockyer Valley were all large volume producers and all managed a number of farms across the wider region. The three businesses were all long-established exporters. The business types included:

- One of Australia’s largest family farming businesses with locations right across the eastern seaboard servicing the major supermarkets
- A vertically-integrated business with a corporate ownership structure
- A family-owned business with a business model that leveraged their export expertise by acting as an export agent on behalf of other local growers.

Crops grown and exported from the businesses in this region include beans, carrots, onions, pumpkins, iceberg lettuce, cauliflower and broccoli.

Growers in the region mentioned that some infrastructure will be required to accommodate growth in exports such as increased accommodation for transient workers. Also, some expressed that a significant growth of the industry may enable the new Toowoomba airport to build direct airfreight routes for vegetables. A further challenge identified in relation to responding to export growth was in getting more experienced horticulturalists on staff.

5.2.3 North Perth region

The North Perth region is Australia’s leading carrot producing region, the production of which is largely geared towards exports.

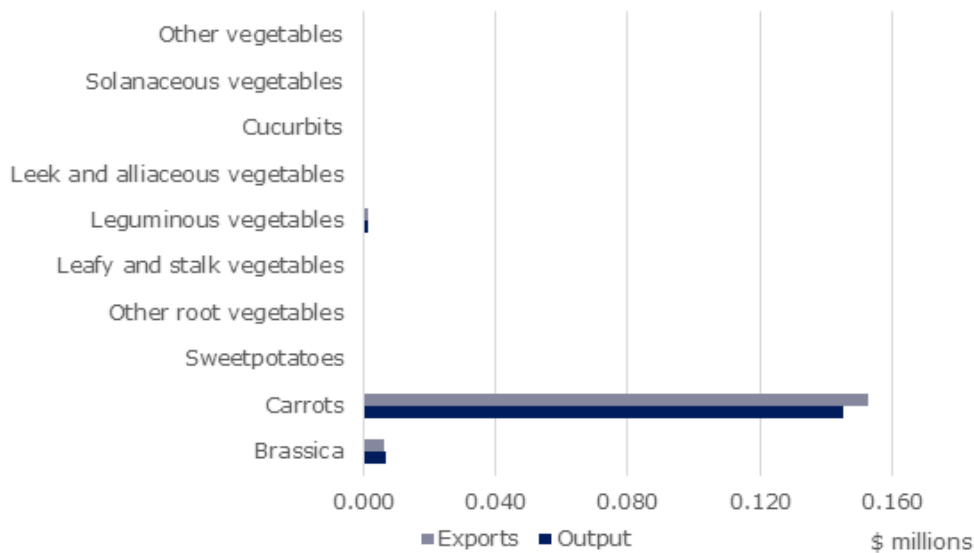
In 2013-14, the SA4 region of the WA Wheat Belt (which incorporates the north Perth region) recorded vegetable production of \$29 million (or 10% of Western Australia’s production). The dominant category is carrots (consisting of 63% of the region’s vegetable production) due to the ideal growing conditions of sandy soils. Other key categories include other vegetables (mainly potatoes) and brassica (mainly broccoli).

Modelling results for the North Perth region

Similar to the other regions, the modelling results for the three scenarios show that scenario 3 'greater supply chain efficiency' would have the biggest impact on the region and scenario 1 of 'freer trade' would have the smallest impact. For all three scenarios, carrots are the dominant vegetable category impacted by the scenarios. The findings of this modelling seem counter-intuitive when carrot exports are dominated by large and highly efficient producers whose low margin/high volume business model depends on their efforts to continually reduce cost. These producers have already invested heavily in technology, plant and equipment to maximise supply chain efficiency. Furthermore, in the consultation findings, some (but not all) of the producers were highly optimistic about the export opportunities that could be opened up if freer trade was achieved, particularly to Taiwan and China.

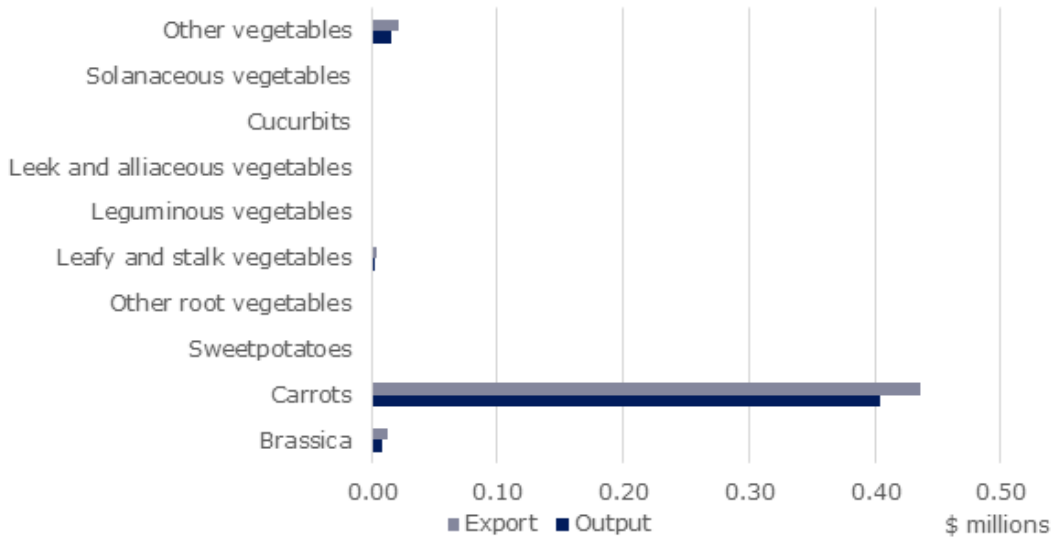
For **scenario 1** (Chart 5-7), carrot exports would increase by \$0.15 million (which is 0.8% of the current level of carrot production in the region).

Chart 5-7 Impact of scenario 1 (freer trade) on WA Wheat Belt region, 2024-25



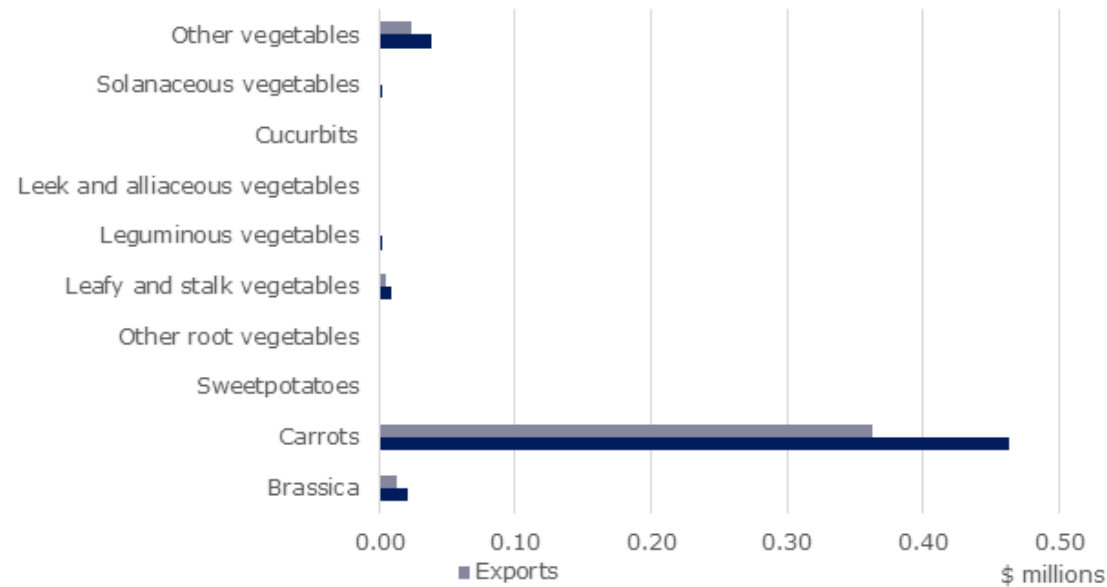
Under **scenario 2** (Chart 5-8), carrot exports would increase by \$0.44 million (which is 2.4% of the current level of carrot production in the region).

Chart 5-8 Impact of scenario 2 (wealthier consumers) on WA Wheat Belt region, 2024-25



Under **scenario 3** (Chart 5-9), carrot exports would increase by \$0.36 million (which is 2% of the current level of carrot production in the region).

Chart 5-9 Impact of scenario 3 (greater supply chain efficiency) on WA Wheat Belt region, 2024-25



Regional insights from stakeholder consultations

The growers consulted included three large or very large privately-owned family businesses, one of which has multiple production locations across Western Australia and another which has multiple sites nationwide. One grower was located outside of the immediate study area but grows comparable crops. There are a very limited number of exporting growers directly in the study area because of the very large size of the incumbents.

Crops grown and exported from the businesses in this region include: carrots, beans, sweet corn, potatoes and onions.

The following sentiments were expressed in consultation concerning increasing exports:

- The export market opportunity is seen as greater for WA growers because they are closer to export markets, which provides advantages in shipping time. The ideal growing conditions also add to the product quality. The vegetable categories produced here are relatively automated (e.g. potatoes, carrots, onions), so labour is less of an impact on cost than with other row crops.
- In general, however, WA growers do face greater challenges with labour as shortages are more acute due to the remoteness of farms and the fact that they are not as close to tourism amenities (which attract 417 visa labour). Also, most local workers do not value the farming sector or consider a career in this industry.
- WA businesses are very large, privately owned and the bigger players already operate with a corporate structure. The bigger growers expressed no interest in external investment, collaborative models or new business structures.
- On some farms, compliance with EPA adds significantly to the cost of water and is noted as a limiting factor to growth.
- The higher cost of sea freight from Perth is seen to be a disadvantage, but the large tonnage means some may buy better rates.

5.2.4 Summary for case study regions

In Table 5-1, a summary of the modelling results for each of the scenarios in the three case study regions is presented.

Table 5-1 Impacts of the 3 scenarios in 3 case study regions, 2024-25

SA4 region	Impact on	Scenario 1 - Freer trade	Scenario 2 - Wealthier consumers	Scenario 3 - greater supply chain efficiency
Melbourne South East	Regional levy-paying vegetable output	\$0.2 million (0.23%)	\$0.3 million (0.33%)	\$0.8 million (0.94%)
	Regional levy-paying vegetable exports	\$0.2 million (0.23%)	\$0.4 million (0.46%)	\$0.6 million (0.67%)
	Sectoral impacts	Freer trade would have the largest impact on other root vegetables, leading to an increase of \$0.12 million in annual vegetable output and \$0.12 million in exports	Scenario 2 would have the largest impact on the 'other vegetables' category, resulting in additional annual exports of \$0.38 million in 2024-25.	Greater supply chain efficiency would have the largest impact on the 'other vegetables' category, resulting in additional annual output of \$0.65 million (0.7% of current other vegetable production) and exports of \$0.39 million in 2024-25.
Lockyer Valley	Regional levy-paying vegetable output	\$1.1 million (0.51%)	\$1.5 million (0.72%)	\$2.8 million (1.31%)
	Regional levy-paying vegetable exports	\$1.1 million (0.52%)	\$1.8 million (0.86%)	\$2.1 million (0.98%)
	Sectoral impacts	Freer trade would impact leguminous vegetables the most out of all the vegetable categories in the region, increasing exports by 2.2% of current production.	Scenario 2 would impact leguminous vegetables the most out of all the vegetable categories in the region, increasing exports by 2.2% of current production, followed by carrots (export increase of 2.4% of current carrot production).	Scenario 3 would impact leguminous vegetables the most of the vegetable categories in the region increasing exports by 2.2% of current production, followed by leek and alliaceous vegetables (export increase of 1.6% of current production).
North Perth	Regional levy-paying vegetable output	\$0.15 million (0.65%)	\$0.4 million (1.78%)	\$0.5 million (2.13%)
	Regional levy-paying vegetable exports	\$0.16 million (0.69%)	\$0.5 million (1.94%)	\$0.4 million (1.64%)
	Sectoral impacts	For the freer trade scenario, carrot exports would increase by \$0.15 million (which is 0.8% of the current level of carrot production in the region).	Under the wealthier consumer scenario, carrot exports would increase by \$0.44 million (which is 2.4% of the current level of carrot production in the region).	Under scenario 3, carrot exports would increase by \$0.36 million (which is 2% of the current level of carrot production in the region).

Note: All value figures are in 2015-16 \$AUD. Each % change in brackets is the value change divided by the total value of current regional output.

5.3 Other insights from stakeholder consultations

This section provides a summary of the further themes that emerged from the consultations. These themes arose in the general discussions with growers about the prospects of increased vegetable exports.

5.3.1 Supply chain dynamics of the three export scenarios

It was generally thought that Scenarios 1 and 2 would occur gradually and that supply chains would adapt to this organically, while Scenario 3 is itself an improvement in supply chain efficiency. Growers indicated there is unlikely to be much chance of collaboration to achieve cost savings in the supply chain, but that most businesses were concentrating on supply chain improvements within their business because of the high volume/low margin market dynamic in which they operate.

The point was made that if freer trade meant improved market access (i.e. new, more workable phytosanitary protocols for vegetable categories) rather than tariff reductions, then trade could increase dramatically. A rapid increase in exports that could arise from this may put a strain on supply chain resources, in particular air freight.

Growers thought that savings through harmonisation of quality assurance and compliance schemes may not provide a direct cost savings, but save considerable indirect cost through time saving and administrative cost reductions.

One respondent speculated that increased vegetable exports may feed the further development of the Toowoomba airport.

5.3.2 Business model changes from the three export scenarios

All of the growers interviewed have different business models, approaches and philosophies around exporting. While some of the growers indicated that they intend to simply grow their current business model for exporting, most agreed that increased exports will necessitate new business models, new production lines and new ways of thinking.

To export effectively requires considerable business maturity, particularly when dealing direct with foreign supermarkets, which will be a major challenge for SME growers in Australia who have business models structured around the metropolitan wholesale markets. A number of larger growers are changing their model to become dedicated exporters supplying directly to end export customers to a set production schedule and gearing their businesses accordingly.

The majority of respondents recognised that the wider industry does not have the level of experience or scale for exporting successfully or the capital resources to acquire it. Exporting was considered a high risk activity, even by the biggest of the businesses, and it requires a range of disciplines beyond growing. Most businesses indicated that in order to grow their export activity substantially, they would need more management and supervisory staff and may need more corporate disciplines to be introduced over time e.g. strategic planning, professional HR resources. Employees with these skill sets are hard to attract to regional locations. The more progressive and larger companies are recognising that if they are to be successful they need to bring in higher level of professionalism and new skill sets in marketing. Most of the larger companies interviewed are now building middle management teams and bringing people from outside of the vegetable industry with such skill sets.

It was noted that exporting commodities requires scale and continuity. Some of the growers had experimented with contract grower models and have found them to be unsuccessful for exports because the margins are so thin that contracting just adds another layer of cost and administration and furthermore, finding willing collaborators is difficult. Some are experimenting with cluster models whereby a number of growers export collectively under a common brand.

It is felt that increased exports will inevitably accelerate the industry consolidation that is currently occurring with large specialist, sophisticated vertically-integrated businesses dominating through acquiring smaller less efficient businesses. The role of market agents in the supply chain may change with increased exports. Some agents could evolve into category supply managers for overseas supermarkets. Instead of buying from the market floor as they do currently, they could specialise more in a more narrow range of products and become expert at these.

Some of the businesses were open to the idea of bringing in external capital to assist in gearing up the business to take advantage of the export opportunity. At least two had already done this, not only to acquire capacity, but in some cases to lock in key managers who they see as being critical to the success of their business. In Queensland and Victoria, the mid-sized growers were open to the idea of external investment and new ownership structures to finance growth. The businesses in Western Australia were notably much larger and one grower felt that the businesses in their particular district were not open culturally to external investment or collaborative strategic alliances.

5.3.3 Impacts of the three export scenarios on vegetable growers

Growers have been operating under extremely tight margins for some years and welcome the relief that export growth could bring from trading with supermarkets or the fresh market agents. Margin recovery would enable them to:

- Reinvest in their businesses
- Hire more professional staff for assistance
- Buy more advanced technology to gain labour savings.

However, for small and large businesses alike, exporting is high risk and very stressful as the loss of one container could mean the loss of the entire year's profit on that product.

5.3.4 Flow on effects to regional economies of increasing exports

The general view amongst stakeholders was that increasing exports would have a beneficial impact on local communities by boosting regional economies through job creation. Some growers are very positive about exports and forecast an economic boom for their region on the strength of this assertion. Others are more tempered and see exports as an important alternative to supermarket channels.

One grower gave an example where, because of exports, he could offer full-time employment to a worker who was previously only part time. This gave the worker financial security to buy a house, which led to other benefits to the community.

Export growth would also require more seasonal backpacker labour, which also provides stimulus to the regional economy through effects such as increased investment in accommodation and hospitality.

Increasing vegetable production in a region due to opening up new export markets could result in a greater economic return per hectare if growers transition to vegetables from less intensive and lower value land uses (e.g. lucerne). One respondent in the Queensland region believes that the local growers could double vegetable production in one year, should export demand be there to make it viable.

It is likely that exports would give growers the margin to be able to invest in more value-adding, which would create even more jobs and add further value to waste streams. It could also improve utilisation of plant and equipment. For example, although there is a current over-supply of carrots, most growers are not utilising their washing gear at full capacity. This means that modest increases in exports could occur without necessarily requiring significantly increased capital costs.

It was expressed that increased exports will force more professionalism in the industry. This is because exporting requires a higher skilled workforce. Having a more upwardly mobile, educated and diverse skill base in the community was seen to have flow-on cultural benefits. The establishment of an export industry is also likely to attract talented local youth back into agriculture rather than moving away to pursue other careers. The growing sophistication of the industry and growing use of technology means there is a constant need for higher skill levels that will create career opportunities in local communities that have never previously existed.

On the downside, some believe that if the vegetable industry became too export oriented it could increase the risk exposure to growers. The evolution to large, vertically-integrated businesses that operate on a high volume/low margin model, in an uncertain global market, could lead to business failures, and in turn have more catastrophic impact in the overall community if they were the main employer.

5.3.5 Export competitiveness

In most markets and most categories, growers noted that Australia cannot compete head-to-head on price because of a higher cost structure, mainly due to labour. Even in highly mechanised categories such as onions and carrots, Australian products can be two or three times more expensive than competitor products.

Australian growers must, therefore, compete on non-price factors such as quality, flavour, food safety, product integrity or seasonal supply windows. This means exporting growers must target premium, niche export markets such as high-end supermarkets and food service customers.

Also relevant to export competitiveness is exchange rates. Australia's vegetable exports are extremely sensitive to exchange rates, particularly the US dollar. Volume of trade dropped significantly when the Australian dollar appreciated but it is now starting to recover with the more favourable exchange rate.

5.3.6 Export arrangements

Growers explained that supplying programed orders direct to an export customer is a major breakthrough point for exporters. Businesses needed to be of a size where they can manage such a contract to supply vegetables

year round to a program. For some, producing to supply a set price contract is the only export model that they will entertain as it reduces risk.

Most of the smaller growers are not capable of exporting in their own right because they cannot produce in scale or year round. Therefore, a likely scenario is that, even if exports increased drastically, these smaller growers would remain trading in the current spot market (i.e. metro wholesale markets via agents). This type of speculative trade disadvantages growers and increases price uncertainty. Those growers will remain reliant on wholesalers and agents. It should be noted that a significant proportion of Australia's current vegetable exports are driven by opportunistic traders operating out of wholesale markets where they source from the market floor to fulfil daily export orders. This type of export trade keeps smaller growers operating as 'price takers'. It can also be damaging to the brand values of Australian vegetables as product on the market floor is not specifically packed for export.

Many smaller growers are sending product to the wholesale markets on consignment so the product is sold at the best price on the day and the agent deducts a commission (circa 7%). Building export markets that allow these growers to produce to order at locked in prices would be a real game changer, because it would give them stable returns to manage to.

Because most growers have a competitive mindset, the respondents believe that the vast majority will be unlikely to be able to collaborate in order to export collectively (where they could build enough scale) and are too small to do so in their own right.

5.3.7 Export price fluctuations

It was suggested that a very real consequence of increased exports may be more peaks and troughs in prices, but within one commodity at a time. More volatility will result and growers will need to be more nimble to respond e.g. a crop failure in the USA could lead to Australian broccoli all going to Japan where prices are higher, so domestic consumers will switch to cauliflower which will then create an artificial spike in that category. Growers will quickly replant to fill market voids and that could create other subsequent oversupply hot spots. With the use of transplants, growers can respond within 6 weeks to these cycles.

Increasingly, the supply and demand dynamic for vegetables is influenced by global factors. In categories like carrots, broccoli or onions, a crop failure in China or California can now alter the supply dynamic in Brisbane or Melbourne wholesale markets.

5.3.8 Labour savings

Questioning about Scenario 3 prompted the immediate response that a 5% reduction in labour would be a far more meaningful goal to aim for. Labour was expressed by all stakeholders as by far the biggest factor impacting the competitiveness and profitability of the Australian vegetable export industry. Australia's labour costs were said to be more than double those in competing countries.

As labour is around 35% of the production cost, a reduction here would make a far greater contribution to bridging the gap in global competitiveness than savings in supply chains costs. One respondent noted that supply chain costs represent a much smaller 10 to 15% of costs.

The big issue with labour is the penalty rates and add-on costs such as superannuation, OH&S compliance and minimum hour restrictions. Under

the Modern Horticultural Award, Sundays and public holidays command triple rates of pay. Because vegetables are a 24/7 operation harvesting and packing on weekends and public holidays staffing becomes prohibitively expensive.

The vegetable industry is heavily reliant on 417 and 457 visa labour which are extremely vulnerable to changes in tax and migration laws. At the time of conducting these interviews the backpacker tax was being discussed in parliament and was a cause of great anxiety to vegetable growers. The speculation about increasing the tax rate for backpackers had already impacted on the availability of labour. Overwhelmingly, the people interviewed indicated that the loss of backpacker labour would have a devastating effect. In early December 2016, the Australian Government has passed the backpacker tax through the Senate. A 15 per cent tax rate up to \$37,000 was announced and would apply to all Working Holiday (417) and Work and Holiday (462) visa holders from 1 January 2017.

6 Conclusions and discussion

Australia’s horticulture industry continues to enjoy a domestic and international reputation as a sustainable producer of premium safe food, primarily due to its high standards across all stages of the supply chain.¹⁵ As one of Australia’s largest horticultural industries, the vegetable industry produces a wide range of fresh vegetables for domestic consumption and exports. However, the vegetable industry only exports about 5% of its production in value terms. With the renewed focus on exports, it is important for industry stakeholders to be informed of the nature and magnitude of changes so the industry can prepare and plan for a future of increasing vegetable exports.

Table 6-1 provides a summary of the modelling results and regional analysis of the three export scenarios considered in this study. The modelling and analysis shows that Scenario 1 (freer trade) would result in the *smallest* increase in demand for Australian vegetable exports, followed by Scenario 2 (wealthier consumers) which would bring about a *moderate* increase and Scenario 3 (greater supply chain efficiency) which would induce the *largest* increase in Australian vegetable exports. However, it is worth noting that the sensitivity in the magnitude of increases in vegetable exports in these scenarios would change if a different set of export markets is considered. In particular, if the increases in wealth in a larger set of countries beyond ASIA5 were modelled, the impacts on vegetable output and exports would be higher.

Table 6-1 Summary of key results

Findings	Scenario 1 - Freer trade	Scenario 2 - Wealthier consumers	Scenario 3 - greater supply chain efficiency
Impact on Australian levied vegetable output	\$4.65 m (0.21%)	\$7.52 m (0.34%)	\$13.69 m (0.62%)
Impact on Australian levied vegetable export	\$4.83 m (1.82%)	\$9.35 m (3.52%)	\$9.8 m (3.69%)
States that benefit the most (in terms of increase in value of output and exports)	Qld., Vic. and WA	Qld., Vic. and WA	Qld., Vic. and WA
SA4s that have the strongest growth in export (based on export value as a percentage of current vegetable output value)	Bendigo (Vic.), South East (Tas.), Launceston and North East (Tas.) and Ballarat (Vic.)	Bendigo (Vic.), South East (Tas.), Launceston and North East (Tas.), Western Australia – Wheat Belt (WA) and West and North West (Tas.)	Bendigo (Vic.), South east (Tas.), Western Australia – Wheat Belt (WA), Ballarat (Vic.) and Perth – Inner (WA)

Note: value figures are in 2015-16 dollars.

¹⁵ Department of Agriculture and Water Resources (2016), Horticulture fact sheet, available at <http://www.agriculture.gov.au/ag-farm-food/hort-policy/horticulture-fact-sheet>

There are several insights from this study that are relevant for the Australian vegetable industry:

- Vegetable export growth can come from various pathways, some of which can be influenced by the Australian vegetable industry (e.g. through more successfully negotiated FTAs or improvements in supply chain efficiency) while some factors are more global and external and therefore uncontrollable (such as increasing global wealth).
- Free trade agreements might not provide as many export opportunities as anticipated until the technical market access conditions that prohibit Australia to export to these trading partners are lifted. Accessing markets from a biosecurity perspective (i.e. through the negotiation of agreed phytosanitary protocols) can be a 'game-changer' for particular vegetable categories and in particular markets where Australia is currently price competitive.
- The overall increase in global demand for vegetables as a result of increasing wealth in Asia 5 would be quite substantial (especially when coupled with population growth). While the modelling suggests that there would be a moderate increase in demand for Australian vegetable exports, in reality greater potential could exist for Australian vegetable growers to capture a greater share of this increase than what was represented in the modelled scenario. Growers need to be alert to the rapidly changing tastes of consumers in Asian countries (which are experiencing increasing wealth) as opportunities may arise where new demand matches a particular factor of competitive advantage of Australia such as a vegetable category, a seasonal window or a particular quality characteristic.
- As a rather modest supply chain efficiency gain of 5% was shown to lead to a considerable increase in Australian vegetable output and exports, this emphasises the importance of investment in both on-farm production systems and off-farm supply chains to achieve further improvements in productivity and the efficiency of domestic and export supply chains.
- The extent to which vegetable growing regions could expand their production to meet the increases in export demand depends very much on whether growers can expand their production beyond their current capacity and whether there is enough export capacity out of nearby ports to deliver the produce to overseas consumers. Furthermore, this also depends on whether the infrastructure within the supply chain is efficient enough to make Australian produce price competitive compare to other exporting countries.
- The stakeholders consulted with in this study noted that Australia cannot globally compete head-to-head on price alone because of a higher cost structure here, mainly due to labour. These same stakeholders suggested that key ways to achieve labour cost reduction is through removing penalty rates and abolishing overtime. It was also believed that a simplification of the regulatory burden imposed on exporters would increase competitiveness.
- While this might improve price competitiveness, Australia will likely still be a high cost producer. Therefore, it is critical that Australian growers compete on non-price factors such as quality, flavour, food safety, product integrity or seasonal supply windows. As such, effort needs to be directed towards appropriate marketing in export markets to continue to position and strengthen Australian vegetable categories as premium produce through the image of the clean, green and safe growing environment of Australia.

- While we have modelled the impact of discrete scenarios, by holding all other factors constant, in reality these three scenarios (as well as many other factors) may occur simultaneously and impact on the vegetable export potential from Australia. The change from the combination of factors is therefore different, likely larger, than the sum of the individual results for each scenario.
- The “other factors” (i.e. in addition to those modelled) have the potential to have a large impact on exports and in some cases can occur suddenly. These factors include those which can be influenced by the Australian vegetable industry (such as improved market access, greater marketing, and collaboration amongst growers to achieve scale and supply consistency) as well as the more external and uncontrollable factors such as biosecurity outbreaks, food safety scares, and supply constraints in importing countries.
- As seen in other parts of agriculture, these factors can converge and impact on Australian exports in dramatic ways. Such real life examples include food safety scares in China which has led to an increased demand for infant formula from Australia, or biosecurity outbreaks of Bovine Spongiform Encephalopathy (BSE) detection in the USA and Brazilian cattle herd which led to bans of exports to China and Japan and allowed Australia to dominate market share in these markets and receive very high prices for a period of time. Similar convergences of global factors (particularly where food safety or biosecurity are concerned) are very possible in the vegetable industry.

References

- ABARES (2013), What Asia wants: Long-term food consumption trends in Asia, Research by the Australian Bureau of Agricultural and Resource Economics and Sciences, October, Canberra.
- ABS (2015), Value of Agricultural Commodities Produced, Australia, 2013-14, cat. no. 7503.0, available at <http://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/0FBF8B514881656ACA257F7E000F81EF?opendocument>
- AUSVEG (2016), Vegetable Levy Frequently Asked Questions, available at <http://www.ausveg.com.au/rnd/thelevysystem/vegetablelevy.htm>
- Department of Agriculture and Water resources (2016), Vegetables levy information, available at <http://www.agriculture.gov.au/ag-farm-food/levies/rates/vegetables>
- Department of Agriculture and Water Resources (2016), Horticulture fact sheet, available at http://www.agriculture.gov.au/ag-farm-food/hort-policy/horticulture_fact_sheet
- Department of Foreign Affairs and Trade (DFAT) (2016), Free Trade Agreement Portal, available at <https://ftaportal.dfat.gov.au/>
- FAOSTAT (2016), Production data, available at http://faostat3.fao.org/download/Q/*/E
- FAOSTAT (2016), Trade data, available at http://faostat3.fao.org/download/T/*/E
- Glover, J. (2011), An international retailer's perspective, in The supermarket revolution in food: good, bad or ugly for the world's farmers, consumers and retailers?, proceedings of the Crawford Fund 17th Annual Parliamentary Conference, Parliament House, Canberra, 14-16 August
- Higginson, A. (2015), Benchmarking international road transport regulations, VG13107, HGH Consultants, Final Report for Horticulture Innovation Australia, Sydney
- Horticulture Innovation Australia (2016), Australian Horticulture Statistics Handbook, available at <http://horticulture.com.au/wp-content/uploads/2016/10/Australian-Horticulture-Statistics-Handbook-Vegetables.pdf>
- Kearney, J. (2010), Review: Food consumption trends and drivers, Philosophical Transactions of the Royal Society B, vol. 365, pp. 2793-2807
- Langridge and Prasad (2013), Australia can't feed the world but it can help, January, available at <http://theconversation.com/australia-cant-feed-the-world-but-it-can-help-11269>
- Regmi, A. et al. (2008), Convergence in food demand and delivery: do middle-income countries follow high-income trends?, available at <http://ageconsearch.umn.edu/bitstream/55621/2/Regmi.pdf>

Appendix 1 Vegetable exports

Table A.1: Total export of vegetables by destination, \$m, 2014-15

	Total Export	Japan	Indonesia	Malaysia	South Korea	New Zealand	Singapore	Middle East	Asia other	Other
All vegetables	173.0	19.0	4.1	13.4	9.6	7.99	29.0	38.0	23.6	44.7
Artichoke	0.1		0.00			0.02		0.01	0.07	0.00
Asparagus	19.8	15.84			0.20		1.98		1.58	0.20
Beans	5.4					5.29				0.11
Beetroot	0.6		0.18	0.07			0.13		0.10	0.12
Broccoli	10.5			0.32			7.25	1.05	0.32	1.58
Brussel Sprouts	1.2	0.22		0.10	0.62		0.14		0.06	0.06
Cabbage	1.7			0.05			0.99		0.39	0.27
Capsicums	1.8					1.31			0.36	0.13
Carrots	61.1			7.33			10.39	32.99		10.39
Cauliflower	0.9									
Celery	2.6			1.40			0.91	0.08	0.10	0.10
Chilies	0.1									
Cucumbers	0.3					0.17	0.04		0.07	0.02
Eggplant	16.2			0.16			1.30		14.74	
English Spinach	1.0		0.09			0.07	0.26		0.38	0.20
Garlic	0.2					0.03			0.16	0.01
Ginger	0.1					0.07			0.03	0.00
Leafy salad vegetables	4.0			0.56			1.32		1.28	0.84
Leeks	0.4	0.06	0.04				0.06		0.12	0.12
Head lettuce	1.7		0.46	0.10			0.71		0.27	0.15
Mushrooms	4.3	0.69		0.30					2.45	0.86
Onions	22.3	2.23		1.78				1.34		16.95
Peas	0.1			0.04			0.01		0.04	0.01
Potatoes	17.9		3.22	1.07	8.77		1.25	1.43		2.15
Pumpkins	2.3		0.07	0.09			1.66	0.25	0.12	0.12
Sweet potatoes	1.3		0.13	0.03			0.23	0.85	0.01	0.05
Tomatoes	2.4					1.03	0.41		0.55	0.41
Other vegetables	9.0									

Source: Horticulture Innovation Australia (2016)

Appendix 2 CGE modelling

The Deloitte Access Economics – Regional General Equilibrium Model (DAE-RGEM) is a large scale, dynamic, multi-region, multi-commodity computable general equilibrium model of the world economy with bottom-up modelling of Australian regions. The model allows policy analysis in a single, robust, integrated economic framework. This model projects changes in macroeconomic aggregates such as GDP, employment, export volumes, investment and private consumption. At the sectoral level, detailed results such as output, exports, imports and employment are also produced.

Detailed description of DAE-RGEM

The model is based upon a set of key underlying relationships between the various components of the model, each which represent a different group of agents in the economy. These relationships are solved simultaneously, and so there is no logical start or end point for describing how the model actually works. However, they can be viewed as a system of interconnected markets with appropriate specifications of demand, supply and the market clearing conditions that determine the equilibrium prices and quantity produced, consumed and traded.

DAE-RGEM is based on a substantial body of accepted microeconomic theory. Key assumptions underpinning the model are:

- The model contains a 'regional consumer' that receives all income from factor payments (labour, capital, land and natural resources), taxes and net foreign income from borrowing (lending).
- Income is allocated across household consumption, government consumption and savings so as to maximise a Cobb-Douglas (C-D) utility function.
- Household consumption for composite goods is determined by minimising expenditure via a CDE (Constant Differences of Elasticities) expenditure function. For most regions, households can source consumption goods only from domestic and imported sources. In the Australian regions, households can also source goods from interstate. In all cases, the choice of commodities by source is determined by a CRESH (Constant Ratios of Elasticities Substitution, Homothetic) utility function.
- Government consumption for composite goods, and goods from different sources (domestic, imported and interstate), is determined by maximising utility via a C-D utility function.
- All savings generated in each region are used to purchase bonds whose price movements reflect movements in the price of creating capital.
- Producers supply goods by combining aggregate intermediate inputs and primary factors in fixed proportions (the Leontief assumption). Composite intermediate inputs are also combined in fixed proportions, whereas individual primary factors are combined using a CES production function.

- Producers are cost minimisers, and in doing so, choose between domestic, imported and interstate intermediate inputs via a CRESH production function.
- The supply of labour is positively influenced by movements in the real wage rate governed by an elasticity of supply.
- Investment takes place in a global market and allows for different regions to have different rates of return that reflect different risk profiles and policy impediments to investment. A global investor ranks countries as investment destinations based on two factors: global investment and rates of return in a given region compared with global rates of return. Once the aggregate investment has been determined for Australia, aggregate investment in each Australian sub-region is determined by an Australian investor based on: Australian investment and rates of return in a given sub-region compared with the national rate of return.
- Once aggregate investment is determined in each region, the regional investor constructs capital goods by combining composite investment goods in fixed proportions, and minimises costs by choosing between domestic, imported and interstate sources for these goods via a CRESH production function.
- Prices are determined via market-clearing conditions that require sectoral output (supply) to equal the amount sold (demand) to final users (households and government), intermediate users (firms and investors), foreigners (international exports), and other Australian regions (interstate exports).
- For internationally-traded goods (imports and exports), the Armington assumption is applied whereby the same goods produced in different countries are treated as imperfect substitutes. But, in relative terms, imported goods from different regions are treated as closer substitutes than domestically-produced goods and imported composites. Goods traded interstate within the Australian regions are assumed to be closer substitutes again.
- The model accounts for greenhouse gas emissions from fossil fuel combustion. Taxes can be applied to emissions, which are converted to good-specific sales taxes that impact on demand. Emission quotas can be set by region and these can be traded, at a value equal to the carbon tax avoided, where a region's emissions fall below or exceed their quota.

Below is a description of each component of the model and key linkages between components

Household

Each region in the model has a so-called representative household that receives and spends all income. The representative household allocates income across three different expenditure areas: private household consumption; government consumption; and savings.

The representative household interacts with producers in two ways. First, in allocating expenditure across household and government consumption, this sustains demand for production. Second, the representative household owns and receives all income from factor payments (labour, capital, land and natural resources) as well as net taxes. Factors of production are used by producers as inputs into production along with intermediate inputs. The level of production, as well as supply of factors, determines the amount of income generated in each region.

The representative household's relationship with investors is through the supply of investable funds – savings. The relationship between the representative household and the international sector is twofold. First, importers compete with domestic producers in consumption markets. Second, other regions in the model can lend (borrow) money from each other.

- The representative household allocates income across three different expenditure areas – private household consumption; government consumption; and savings – to maximise a Cobb-Douglas utility function.
- Private household consumption on composite goods is determined by minimising a CDE (Constant Differences of Elasticities) expenditure function. Private household consumption on composite goods from different sources is determined by a CRESH (Constant Ratios of Elasticities Substitution, Homothetic) utility function.
- Government consumption on composite goods, and composite goods from different sources, is determined by maximising a Cobb-Douglas utility function.

All savings generated in each region is used to purchase bonds whose price movements reflect movements in the price of generating capital.

Producers

Apart from selling goods and services to households and government, producers sell products to each other (intermediate usage) and to investors. Intermediate usage is where one producer supplies inputs to another's production. For example, coal producers supply inputs to the electricity sector.

Capital is an input into production. Investors react to the conditions facing producers in a region to determine the amount of investment. Generally, increases in production are accompanied by increased investment. In addition, the production of machinery, construction of buildings and the like that forms the basis of a region's capital stock, is undertaken by producers. In other words, investment demand adds to household and government expenditure from the representative household, to determine the demand for goods and services in a region.

Producers interact with international markets in two main ways. First, they compete with producers in overseas regions for export markets, as well as in their own region. Second, they use inputs from overseas in their production.

- Sectoral output equals the amount demanded by consumers (households and government) and intermediate users (firms and investors) as well as exports.
- Intermediate inputs are assumed to be combined in fixed proportions at the composite level. As mentioned above, the exception to this is the electricity sector that is able to substitute different technologies (brown coal, black coal, oil, gas, hydropower and other renewables) using the 'technology bundle' approach developed by ABARE (1996).
- To minimise costs, producers substitute between domestic and imported intermediate inputs is governed by the Armington assumption as well as between primary factors of production (through a CES aggregator). Substitution between skilled and unskilled labour is also allowed (again via a CES function).
- The supply of labour is positively influenced by movements in the wage rate governed by an elasticity of supply is (assumed to be 0.2). This implies that changes influencing the demand for labour, positively or

negatively, will impact both the level of employment and the wage rate. This is a typical labour market specification for a dynamic model such as DAE-RGEM. There are other labour market 'settings' that can be used. First, the labour market could take on long-run characteristics with aggregate employment being fixed and any changes to labour demand changes being absorbed through movements in the wage rate. Second, the labour market could take on short-run characteristics with fixed wages and flexible employment levels.

Investors

Investment takes place in a global market and allows for different regions to have different rates of return that reflect different risk profiles and policy impediments to investment. The global investor ranks countries as investment destination based on two factors: current economic growth and rates of return in a given region compared with global rates of return.

- Once aggregate investment is determined in each region, the regional investor constructs capital goods by combining composite investment goods in fixed proportions, and minimises costs by choosing between domestic, imported and interstate sources for these goods via a CRESH production function.

International

Each of the components outlined above operate, simultaneously, in each region of the model. That is, for any simulation the model forecasts changes to trade and investment flows within, and between, regions subject to optimising behaviour by producers, consumers and investors. Of course, this implies some global conditions that must be met, such as global exports and global imports, are the same and that global debt repayment equals global debt receipts each year.

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