



Agriculture and food and beverage GVC policy considerations

Summary report

NZIER report to NZPECC

January 2016

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NZIER was established in 1958.

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Key points

Global Value Chains are a key driver of global economic integration

The days of thinking about trade policy in terms of tariff barriers at the border increasing the cost of packing things in boxes and sending them to the final consumer are long gone. Modern regional or global economic integration is characterised by fragmented international production networks, where intermediate goods and services cross numerous borders before ending up with the eventual user.

These global value chains (GVCs) are highly dynamic. They change rapidly in response to changing customer preferences, technological change and shifts in supplier-buyer power relationships. This poses challenges for traditional policy and business strategy development.

Kiwi firms and policymakers need to get to grips with their implications

The OECD's Trade in Value Added (TiVA) database has made a hugely valuable contribution to shifting the economic integration debate away from thinking about simple bilateral exports and imports of goods. Instead it emphasises that it is the Domestic Value Added (returns to domestic factors of production) in GVCs that matters.

The database shows that, in contrast to taking a traditional mercantilist viewpoint of trade flows, imported intermediates are welfare-enhancing if they are then processed further before re-exporting.

It also shows that intermediate services inputs, both domestically- and overseas-produced make a significant contribution to the value added of goods trade. The database shows how much more countries and firms are intrinsically interdependent in today's global economy as a result.

NZPECC asked us to help build the GVC evidence base in New Zealand, particularly focused on agriculture and food and beverage

NZPECC tasked us with investigating the TiVA data, particularly related to New Zealand's backward participation (i.e. use of imported intermediates for re-export) GVC rankings in the agriculture and food and beverage (F&B) sectors, and identifying what policy and non-policy factors might be holding New Zealand back from greater participation in GVCs.

We conclude that investigating New Zealand's backward participation rankings is not particularly helpful for policy purposes. Backward participation appears to be largely determined by a country's size, proximity to upstream and downstream markets, export mix (i.e. import-intensity of exports) and export to output ratio. None of these drivers are particularly amenable to policy intervention.

For New Zealand in particular, our goods export mix (e.g. dairy, meat and wine) relies fairly heavily on imported inputs such as fuel and fertiliser for which there are few readily available domestic substitutes. In addition, our small size means that we will always be highly reliant on imported inputs due to a lack of domestic industry structure diversification; and our distance from suppliers and buyers means that the transaction costs associated with producing within New Zealand will be high.

But more importantly, as discussed below, there is little economic rationale for targeting a particular level of GVC participation.

We looked at the data and literature; and spoke to experts

Our initial approach to this project was to identify policy options for enhancing New Zealand’s participation in agriculture and F&B GVCs by triangulating information gleaned from the TiVA data analysis, the literature and international GVC experts’ insights.

Table 1 Gaps in GVC knowledge

Source	Limitations
TiVA	<ul style="list-style-type: none"> The data is highly aggregated, so the TiVA’s “Food and beverage” sector GVC is in fact comprised of thousands of distinct and heterogeneous product-level GVCs. No ability to identify at a detailed level which imports are used for re-export.
Literature	<ul style="list-style-type: none"> Most literature on agriculture and F&B GVCs is focused on developing countries, which is of limited relevance to New Zealand. Most developed country GVC literature targets automobile and electronics GVCs; again of limited relevance to New Zealand’s industry structure. GVCs are highly heterogeneous, and even in closely related GVCs, the policy settings required to best support firms will differ markedly. Few papers take a holistic view of what makes for high quality GVC policy settings.
Experts	<ul style="list-style-type: none"> Neither our EU nor Asian GVC experts were able to provide many specific examples of policies that are specifically designed to promote firms’ GVC participation in the agriculture and F&B sectors.

Source: NZIER

As a result, we needed to draw on these partial sources of information, along with our professional judgement and institutional insights, to form views on:

- What New Zealand’s GVC policy objective should be
- How New Zealand’s policy settings stack up

What’s in a name? Chains or networks?

This task was complicated somewhat by the fact that while a global value “chain” suggests a fairly linear transformation of raw materials into final products, the reality is more complex. It may be more useful to instead think about GVCs as “Global Value Networks”¹ or “International Production Networks”, reflecting the multi-pronged sources of inputs and destinations for outputs, and their dynamic nature.

Our strong sense is that GVC policy analysis is still at a nascent stage. Researchers and policymakers are still coming to grips with the conceptual shift required to think about regional economic integration through a network lens. We are no different!

That said, as the research developed and our thinking shifted, a number of themes emerged. Some themes have a strong empirical or conceptual basis; others are inferred from the information sources we were able to access. We have tried to

¹ A recently-released NZIER report presenting three case studies of Global Value Networks in the New Zealand hi-tech manufacturing and knowledge-intensive services sector provides further insights into the complexities of such networks (NZIER 2015).

highlight throughout where our findings have come from, and how much uncertainty there is around those findings.

Targeting higher participation in GVCs is misguided

An important early finding, for which there is strong empirical support, was that trying to identify an optimal level of participation in GVCs is unlikely to be helpful for policy purposes. Indeed, there is an *inverse* relationship at the aggregate level between participation levels and Domestic Value Added (DVA) as a share of exports.

Countries with very low DVA shares of exports, such as Luxembourg and Singapore, have high levels of GVC participation. And countries with low participation, such as South Africa and Russia, have high shares of DVA to exports. Neither end of the scale is inherently preferable – many factors determine both variables, such as resource endowments (and thus comparative advantage), commodity mix, location, etc.

The policy objective should be lifting Domestic Value Added

Higher levels of DVA mean greater returns to New Zealand-owned factors of production (labour, land, capital). This will boost living standards, which is the ultimate policy aim. This doesn't mean, however, that New Zealand should focus solely on producing goods and services with high DVA. We have to respect comparative advantage and build on it to increase DVA where there are opportunities to do so. The challenge is how to maximise DVA given our resource endowments and geographical isolation.

This means we need to be more nuanced in our consideration of agricultural and F&B GVCs than simply suggesting that New Zealand firms need to have higher participation. Targeting the *level* of participation – as measured by TIVA – is unlikely to be a helpful way of thinking about policy prescriptions to boost household welfare.

Therefore in this report we refer to “enhanced GVC participation” or “improved GVC participation” as a shorthand for changing the way in which New Zealand firms participate in GVCs to deliver higher levels of DVA and thus living standards. We suggest that this is what should sit behind discussions about “moving up the value chain” or “shifting away from commodities to higher value added products”.

There are no simple solutions to boost DVA

We found no silver bullet solutions for improving New Zealand's DVA in agriculture and F&B GVCs. This is in part because of the heterogeneity of GVCs, which in our view warrant being investigated at a much more detailed sector or product level.

As noted above, there is no “food and beverage” GVC – there are thousands, and they change constantly in respond to changing consumer and intermediate user preferences, competing suppliers' actions and technological change.

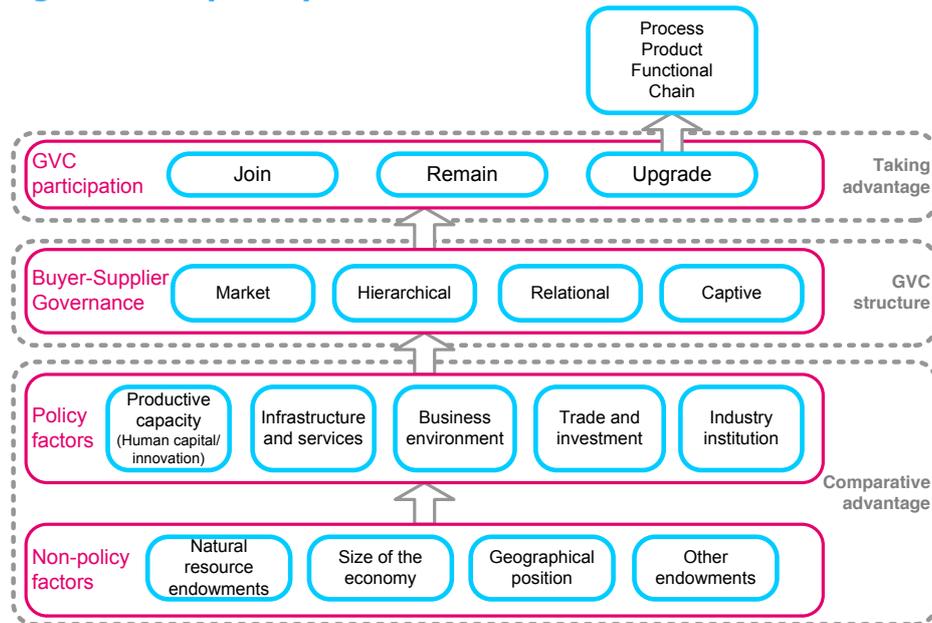
However, we were able to draw some inferences from the wider GVC literature about the key policy and non-policy factors that affect New Zealand firms' GVC participation (Figure 1). We are relatively confident that this provides a useful conceptual basis for further exploring New Zealand's agriculture and F&B GVCs.

In short, where a New Zealand firm fits into a GVC depends on:

- Its comparative advantage, which is influenced by resource endowments, size, geography, and policy settings
- The structure of the GVC and which actors are dominant in it.

These factors determine how well placed a firm is to join, remain or upgrade in any specific GVC.

Figure 1 GVC participation framework



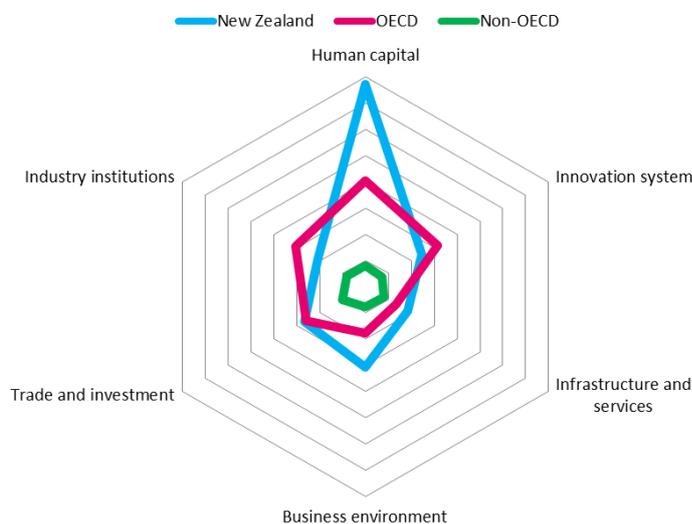
Source: NZIER

New Zealand's policy settings are generally supportive

Based on the policy factors listed in the framework above, we used internationally comparable indicators to compare New Zealand's policy settings to those of broadly similar economies (notwithstanding the usual challenge that New Zealand is unique in being small, distant and agriculture-focused).

Figure 2 GVC policy settings by OECD and non-OECD countries²

Set of countries in this study; the further from the centre, the better the policy setting



Source: NZIER

Figure 2 shows that New Zealand’s general GVC policy settings tend to perform well against the subset of countries in this study.

But improvements can be made in a number of areas

However, there are opportunities to improve our policy settings in two key areas: the national innovation system and industry institutions.³ Two other areas of focus for this research, based on discussions with NZPECC, are standards and logistics.

There is limited international empirical or even anecdotal support for our recommendations below. This largely reflects the nascent state of quantitative GVC research and the fact that our international experts could not point us to many obvious examples of policies that have been specifically designed to support firms’ participation in agriculture and F&B GVCs.

However, based on our professional judgement and the broader GVC literature, we first offer some high level policy implications for consideration. We then drill down to suggest some more specific actions. We note that these are more speculative in nature and are not fully formed – resource constraints prohibited a full exploration of their merits and risks.

High level policy considerations

Simply adopting other countries’ policy settings – no matter who they are – is unlikely to be effective, since most countries have very different industry structures, size and proximity to markets.

Our key high level policy and future work recommendations are:

² OECD: Ireland, Denmark, Netherlands, Iceland, Poland, Portugal, Chile. Non-OECD: Argentina, Viet Nam, Thailand, Brazil.

³ Industry institutions are the linkages and co-operation among private sector firms, government, educational institutions and other industry stakeholders such as sector bodies and loose coalitions of firms that work together for specific purposes.

- The Government’s Business Growth Agenda (BGA) should more explicitly recognise that GVC participation will be the key channel through which export gains and improvements to DVA and living standards will occur over time⁴.⁵ New Zealand **needs a clear policy strategy to deal with the specificities of GVC dynamics**.
- To identify specific policies that will support agriculture and F&B industries’ GVC participation and improved DVA, we must first **find a way to categorise the different GVCs**. We recommend future work be undertaken to map New Zealand GVC structures, perhaps using Keane’s GVC typology at the HS4 level of detail. The next step would then be to understand which policies are most relevant to each GVC.
- Policy-makers should more explicitly **take into account the crucial role that the services sector has** in the exports of New Zealand’s agriculture and F&B exports through GVCs. Indeed, lifting the productivity of the services sector is likely to improve participation in GVCs due to these strong interlinkages (Low and Pasadilla 2015).⁶
- **Innovation and industry institutions, standards and logistics** are the key factors to consider for GVC success, based on our literature review and international comparison exercises. We suggest that business and policymakers work together to focus their attention on these areas first.
- **Placing GVC success at the core of policy development processes and business strategy** will be tough due to the complexity and heterogeneity of GVCs, and the challenges it presents for traditional ways of thinking.

More detailed policy ideas for further exploration

Drawing on the literature, our country comparison and discussions with experts, below we offer some potential policy options for promoting GVC participation to boost DVA. Some are agriculture and F&B-specific, others are more generic. We present these ideas as a way to promote discussion between policymakers, firms and industry associations based on our GVC frameworks above, rather than as a detailed set of prescriptive policy recommendations.

Innovation

- Provide grants or co-funding to thriving F&B exporters or consortia for them to scope and purchase research they expect will strengthen their comparative advantage (and hence market power) in GVCs.

⁴ Some researchers (e.g. Constantinescu, Mattoo, and Ruta 2015) are already suggesting that the GVCs model may already be exhausted in some parts of the global economy, suggesting in turn opportunities to increase trade through GVC participation will reduce over time.

⁵ Indeed, the BGA Export Markets material is almost entirely devoid of any GVC discussion to date.

⁶ In supporting the New Zealand Productivity Commission’s inquiry into the productivity in the services sector, we concluded that “[a]n underperforming market based services sector will retard growth in the rest of the economy” (NZIER, 2013). The connectedness of the market based services (MBS) sector has increased since the mid-1990s, possibly reflecting the diversification of the New Zealand economy and the emergence of complex supply chains that draw on many input industries to produce a final good or service.

As well as being exported directly, services are embodied heavily in the exports of primary and manufactured goods. The most significant MBS inputs used by key export industries are road transport; banking and financing; financial asset investing; and advertising, market research and management services. The value of MBS sector inputs accounts for between 8.3% and 18.0% of the final value of output from these exporting industries. This clearly indicates that productivity performance in these MBS industries could have important implications for the cost competitiveness of New Zealand exporters (NZIER, 2013) and hence their ability to improve their position in GVCs.

- Include more explicitly, or weight more heavily, GVC impacts as one of the criteria for assessing Primary Growth Partnership and other funding schemes' applications. This will help to ensure research contributes to enhanced GVC participation.
- Explicitly shape the research activities, performance measures and incentives of Centres of Research Excellence (CoRES) and other research institutions towards business-facing programmes that promote New Zealand firms' participation in GVCs with the aim of boosting DVA. For example, GVCs have not been thoroughly taken into account in the government's recent National Statement of Science Investment (Ministry of Business, Innovation and Employment 2015).
- Exploring the Danish and Dutch F&B-related innovation systems in more depth to find out what worked, what didn't, and how these learnings might be applied to New Zealand's GVC policy settings.
- Further examine whether the intellectual property regime facing New Zealand firms – both domestically and via our trade agreement obligations – appropriately manages the inherent tension between incentivising innovation and disseminating knowledge along GVCs. This will require consideration of – *inter alia* – the risks associated with 'commoditising' IP by using patents (thus rendering the IP merely valuable rather than imperfectly imitable or non-substitutable) and exploring potential actions to protect business secrets rather than formal IP protection.⁷

Industry institutions

- Collaboration among firms can be a contributor to GVC success – this is a proxy for the upscaling approach to upgrading in GVCs. This includes collaboration by cost sharing or joint investment in offshore marketing, branding or market intelligence. This has occurred recently amongst firms in the New Zealand wine, craft beer and seafood industries.
- There may be value in evaluating the success of these initiatives to identify lessons learned and promoting these findings to other industry associations.
- A 'GVC Influencers Fund' or similar could be designed that allows officials to work closely with industry to promote linkages into international production networks. This Fund could be used to facilitate exchanges with international GVC decision makers through face-to-face interaction in New Zealand and offshore and jointly explore opportunities.
- Establish offshore 'GVC Ambassadors', perhaps akin to the New Zealand Special Agriculture Trade Envoy role. Such Ambassadors might not be easy to find of course, but would not need to be sourced solely from the public sector; the private sector may also offer a potential pool of suitable candidates with appropriate capacity, experience and knowledge. Their role would be to foster better links for New Zealand businesses with other major GVC players and to monitor (including via social media) the constantly shifting links within and between the GVC markets in which New Zealand firms participate.

⁷ See (NZIER 2015), which concluded, based on three case studies, "Examples of immaterial assets include intellectual property, processes that ensure high but constantly evolving quality, and trust relationships. It seems that developing immaterial assets is an effective strategy for New Zealand firms who wish to participate in global value networks (GVNs)".

Standards

- The government could consider supporting businesses through compiling and disseminating information on the different public and private standards that they need to comply with in different GVCs. This could increase the flexibility that New Zealand firms need to respond to changing customer preferences.
- Encourage New Zealand agriculture and F&B firms to explicitly take GVC thinking into account when designing their food safety and provenance strategies and branding. The importance of transparency and evidence-based sustainability, ethical and food safety claims is becoming ever more important.
- Firms and government agencies may need to consider a further rebalancing in resourcing away from monitoring tariffs and traditional non-tariff barriers towards gathering market intelligence around private standards. The success in the use of standards for GVC participation will also rely on ever-closer coordination and consultation between government and industry bodies.

Logistics

- A review of follow-up actions around the Productivity Commission's 2012 report into freight infrastructure would highlight whether progress is being made in removing grit from the engine of the New Zealand tradable sector.
- As a share of New Zealand's total container movements, 15% and 30% of containers exported and imported respectively are empty. Better management and optimisation of empty containers calls for coordination amongst the different transport modes (road, rail, maritime and air). The Ministry of Transport could investigate potential improvements in the coordination amongst transport modes to reduce the number of empty containers that flow through and between New Zealand ports.
- Following the RCEP, India and European FTA agreements, we suggest remaining import tariffs should be removed. They effectively act to increase costs and provide very little tax revenue or effective protection to domestic producers. Removing all tariffs would also send a message to those involved in New Zealand's GVCs that we are open for business and are serious about taking policy steps to reduce transaction costs.
- A system that allows more of our GVC imports to be cleared prior to their unloading on New Zealand ports would improve port performance and free up Customs resources to be redeployed elsewhere.

Limitations of the GVC framework for policy

Some researchers are already suggesting that the GVCs model may already be exhausted in some parts of the global economy. Evidence put forward by the World Bank suggests there is a shortening of GVCs in some parts of the world (Constantinescu, Mattoo, and Ruta 2015). We are not yet convinced this is the case for all GVCs, especially as related to New Zealand's agriculture and F&B sectors.

GVC heterogeneity presents a challenge for policy makers as targeting specific GVCs can be an ineffective approach to supporting wider GVC participation. In our view, GVC related policies are inherently focused on the overall effectiveness of the business environment to support international connections.

As such, it may be unrealistic to expect GVC-focused policies to emerge easily and obviously. However, thinking about policies through a GVC lens may offer a new framework to improve the existing policies that support New Zealand's international connections.

Reflections and next steps

This research has been challenging but highly stimulating. Thinking about GVCs, as a policymaker, researcher or business, is not simple.

While the study of GVCs has a fair conceptual grounding in the economics literature, GVC-related policy development remains at a nascent stage. A better understanding of each GVC structure, its governance and the role of lead firms is necessary for policies to be effective, and we suggest this is where research resources are next directed.

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1. Glossary

Table 2 Report glossary

Concept	Definition
Global value chain	Geographical fragmentation of production processes across the globe.
Domestic value added	Domestic value added in gross exports is an estimation of value added, by an economy, in producing goods and services for export, simply defined as the difference between gross output (i.e. revenue) and intermediate consumption (i.e. cost of inputs) (OECD 2014).
Backward linkages	The index is expressed as a percentage of gross exports and indicates the share of foreign inputs used in a country's exports.
Forward linkages	The index is expressed as a percentage of gross exports and indicates the share of domestically produced inputs used in third countries' exports.
Industry institutions	Set of policies and institutions which promote cooperation amongst business to share knowledge and information. Common examples of industry institutions are industry representative bodies which act as lobbies and actively participate in securing new export markets.

Source: NZIER

2. Context and objectives

Weak international connections hold New Zealand back
(NZ Productivity Commission 2014).

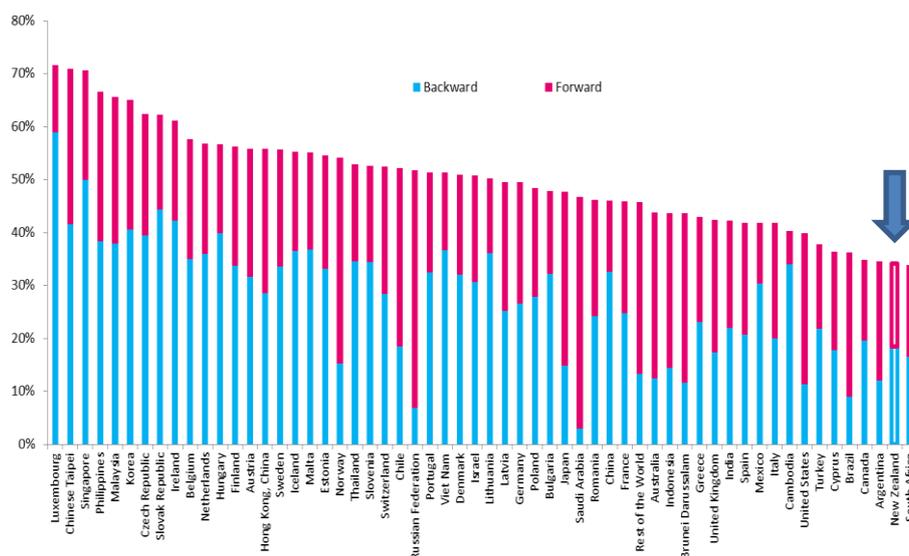
OECD data shows that overall New Zealand participation in GVCs is low

World trade and production are increasingly structured around global value chains (GVCs).⁸ GVCs can be described as the “geographical fragmentation of production processes across the globe” (De Backer and Miroudot 2014).

New Zealand is at the bottom of the OECD in terms of its overall participation in GVCs.⁹ Our GVC participation is still at the same level as it was in 1995.

Figure 3 GVC participation index – all sectors

2009, Includes all economies in the OECD-WTO TiVA database



Source: OECD-WTO TiVA database

However, New Zealand’s participation in GVCs in agriculture and food and beverage production is much higher.

Improved GVC participation will raise living standards, but the focus needs to be lifting our Domestic Value Added

New Zealand stands to gain from enhanced participation in GVCs, including in agriculture and F&B. Enhanced participation would likely increase exports, contribute to the Government’s exports to GDP ratio target of 40%, and – more importantly – lift levels of Domestic Value Added (DVA).

⁸ In several industries, production processes are broken up into several stages or ‘production tasks’. The reorganisation of production at the world level has implied that each task is now being performed in the location that offers the highest comparative advantage (OECD, 2009).

⁹ The aggregate GVC participation index shown here measures the degree to which a country uses foreign inputs in its exports (backward participation) and the extent to which a country’s products are used by other countries as intermediate inputs in producing their exports (forward participation). The index is expressed as a percentage of gross exports.

Higher levels of DVA mean greater returns to New Zealand-owned factors of production (labour, land, capital). This will boost living standards, which is the ultimate policy aim.

It's not how much we're participating; it's the way we're participating

It is important to note at the outset that the relationship between a country's participation in GVCs and the level of DVA is not a simple one. It is not the case that greater participation in GVCs will necessarily make New Zealand better off. Indeed as Figure 4 shows, there appears to be an *inverse* relationship between participation and DVA.

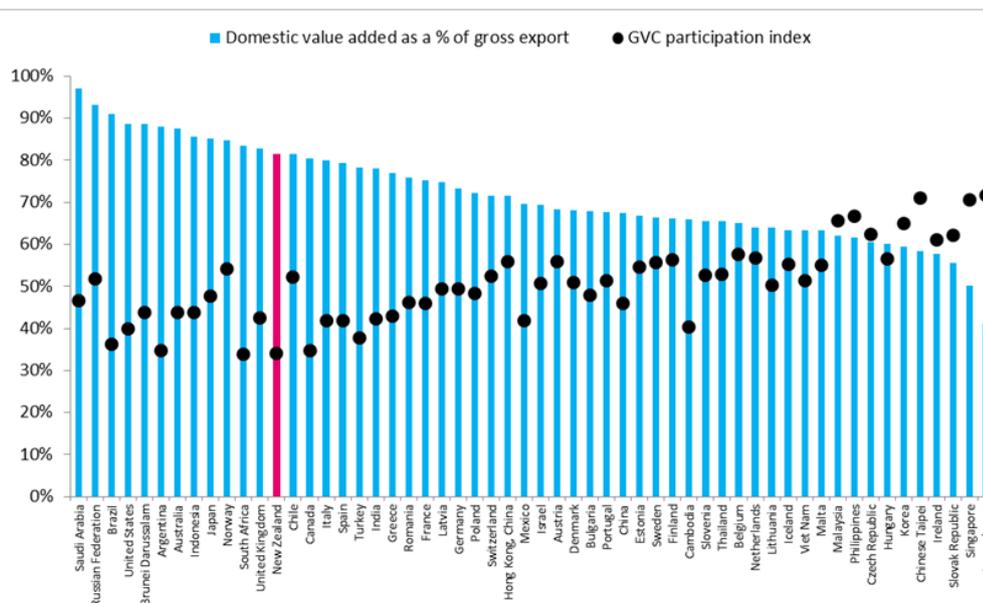
Several countries with very low DVA shares of exports (and GDP per capita) on the right hand side of the chart, such as Luxembourg and Singapore, have high levels of GVC participation. And countries with low participation, such as Saudi Arabia and Russia, have high levels of DVA.

This means we need to be more nuanced in our consideration of agricultural and F&B GVCs than simply suggesting that New Zealand firms need to have higher participation. Targeting the *level* of participation – as measured by TIVA – is unlikely to be a helpful way of thinking about policy prescriptions to boost household welfare.

Therefore in this report we refer to “enhanced GVC participation” or “improved GVC participation” as a shorthand for changing the way in which New Zealand firms participate in GVCs to deliver higher levels of DVA and thus living standards.

Figure 4 GVC participation and DVA

DVA as % of gross exports (blue bars); GVC participation index (black dots)



Source: OECD-WTO TIVA database

We explore New Zealand’s GVC participation with a view to identifying policy options for lifting DVA

NZPECC has asked NZIER to investigate New Zealand’s GVC participation in the agriculture and food and beverage (F&B) sectors. The focus of this research is particularly around three key issues:¹⁰

- Are there regulatory or policy barriers in New Zealand or in our export markets that are preventing New Zealand agriculture and F&B producers from fully exploiting their comparative and competitive advantages and becoming well integrated into GVCs through the export of intermediate inputs?
- Do other governments pursue policies that are more explicitly targeted at facilitating their firms’ participation in agriculture and F&B GVCs?
- What do these findings imply for New Zealand businesses and policy makers?

This report is structured as outlined in Table 3 below.

Table 3 Outline of report

Section	Purpose
3. Data analysis – key results for New Zealand	Explore OECD TiVA data to identify key results for New Zealand’s participation in agriculture and F&B GVCs
4. Literature review	Identify key policy and non-policy factors that affect New Zealand’s participation in GVCs
5. Research questions	Provide answers to detailed questions from PECC Request for Proposal on New Zealand’s relative performance in agriculture and F&B GVCs
6. Focussing on the right challenges	Narrow down potential avenues for policy-makers to explore further when considering GVCs
7. GVC policy settings across countries	Compare key GVC-relevant policy settings (from the literature review) across a range of OECD and non-OECD economies to identify potential areas of opportunity for New Zealand
8. Potential policy options	Suggest options for policy improvements to support enhanced agriculture and F&B GVC participation for New Zealand firms
9. Conclusions and next steps	Pull together key takeaways from this report and options for further GVC research

Source: NZIER

¹⁰ The PECC Request for Proposal posed a series of more specific questions around New Zealand’s relative performance in agriculture and F&B GVCs. These are addressed in section 5.

3. TiVA data analysis – key results for New Zealand

We first reviewed the OECD-WTO Trade in Value Added (TiVA) data to identify trends.¹¹ In contrast to the overall rankings in Figure 3 above, New Zealand’s GVC participation in the agriculture and food and beverage (F&B) sectors is one of the highest in the world and OECD. We note at the outset that this sectoral classification is a broad categorisation that aggregates hundreds if not thousands of individual product-specific GVCs.

Definitions

Forward participation in GVCs refers to the extent to which New Zealand’s exports are used by other countries’ production processes for onwards export sales. This is essentially about how New Zealand slots into international production networks.

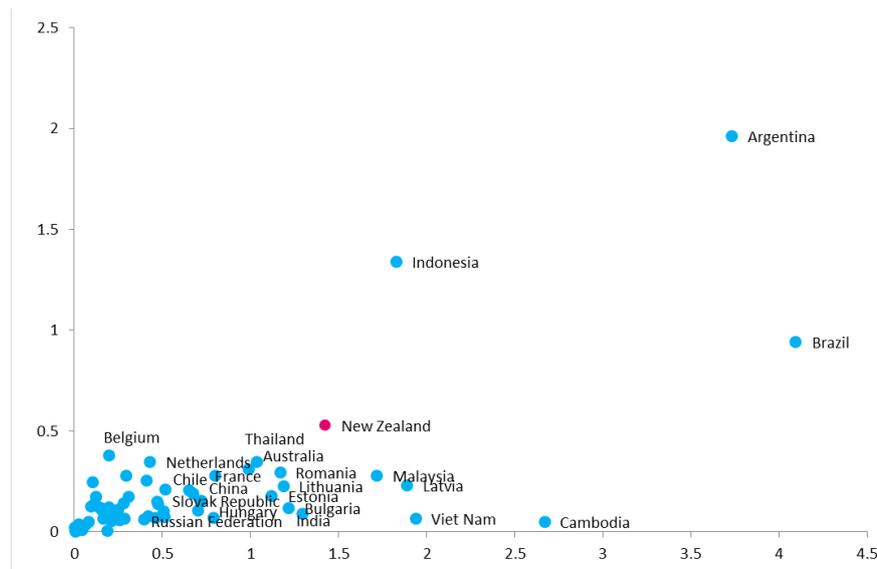
Backward participation in GVCs refers to the extent to which New Zealand firms are able to use imported intermediate inputs and then re-export them to other countries.

New Zealand’s participation in agriculture and F&B GVCs is high

Figure 5 New Zealand’s forward participation in agriculture and F&B GVCs

x-axis: Agriculture participation; y-axis: Food & Beverage participation

Domestically-produced inputs used in third countries’ exports (forward participation) as a share of gross exports (1 = 100%)



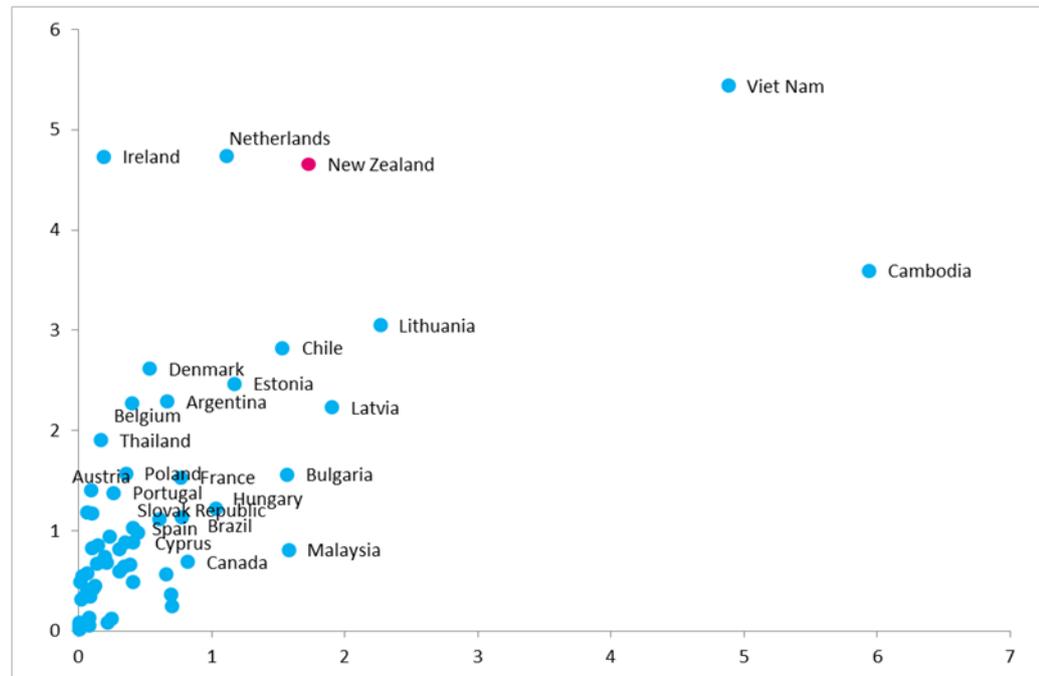
Source: OECD-WTO TiVA database

¹¹ See Appendix B for a brief overview of the OECD TiVA database.

Figure 6 New Zealand's backward participation in agriculture and F&B GVCs

x-axis: Agriculture participation; y-axis: Food & Beverage participation

Foreign inputs (backward participation) as a share of gross exports (1 = 100%)



Source: OECD-WTO TIVA database

DVA is high in agriculture and F&B

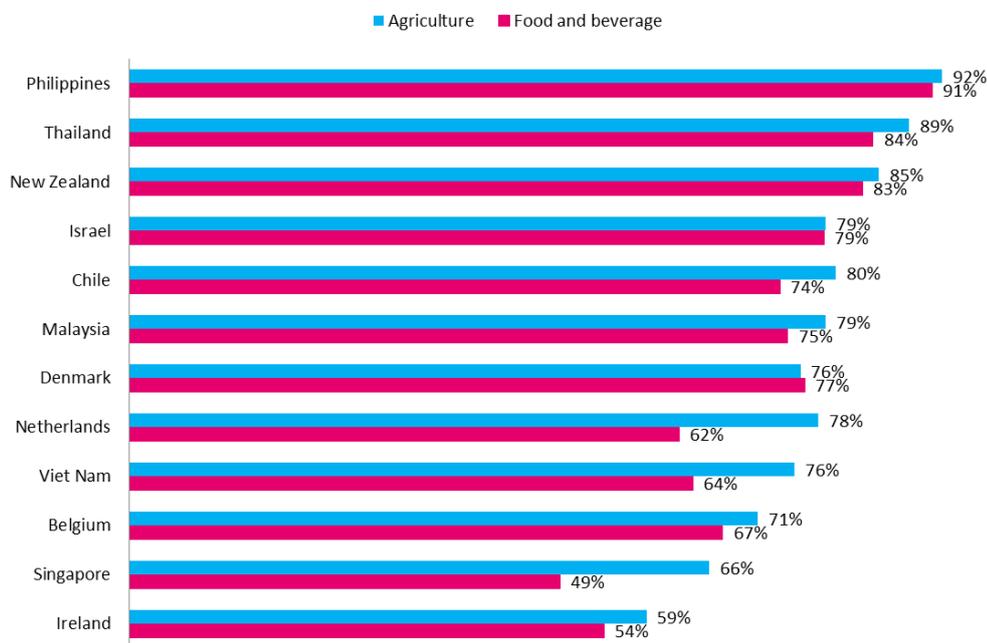
Agriculture and F&B make up 40% of the total DVA from goods and services exports in New Zealand.¹² This is high compared to other OECD countries. That is partly because of the high DVA content of New Zealand's agriculture and F&B exports compared to other countries, at about 85% (see Figure 7).

The share of DVA in the primary sector is inherently high due to land requirements and processing facilities within the proximity of farming activities, as well as relatively low shares of imported inputs (around 7-8% of total inputs) compared to manufacturing industries, particularly electronics.¹³

¹² Domestic value added in gross exports is simply defined as the difference between gross output (i.e. export revenue) and intermediate consumption (i.e. cost of inputs).

¹³ The composition of New Zealand's imported intermediate inputs is explored further in section 6.

Figure 7 Domestic value added as a percentage of gross exports
2009



Source: OECD

Agriculture and F&B GVCs are shorter than many manufacturing GVCs

The TiVA data also provides a sense of how many stages there are in GVCs between the production of raw materials to delivery to final consumer – the degree of fragmentation of the supply chain, or how many times intermediate inputs are added to across borders before being transformed into final products.

These GVCs can be quite long – there are many stages of production taking place overseas, progressively adding value to raw materials. The TiVA data (see Figure 8) shows that the longest GVCs are *TV and communications* and *Motor vehicles*. This aligns with expectations: both sectors deliver complex final products that draw on intermediate inputs from many countries. The oft-mentioned iPod supply chain analysis (Dedrick, Kraemer, and Greg Linden 2009), for example, showed how many countries contribute to and benefit from the eventual sale of iPods in the US.

The two shortest GVCs are *Real estate services* and *Education*, as these need to be delivered face to face and have very little by way of imported intermediate inputs (De Backer and Miroudot 2014).

The length of agriculture and F&B GVCs are – on average¹⁴ – about ‘middle of the pack’. However, compared to other largely tradable sectors, they are relatively short.

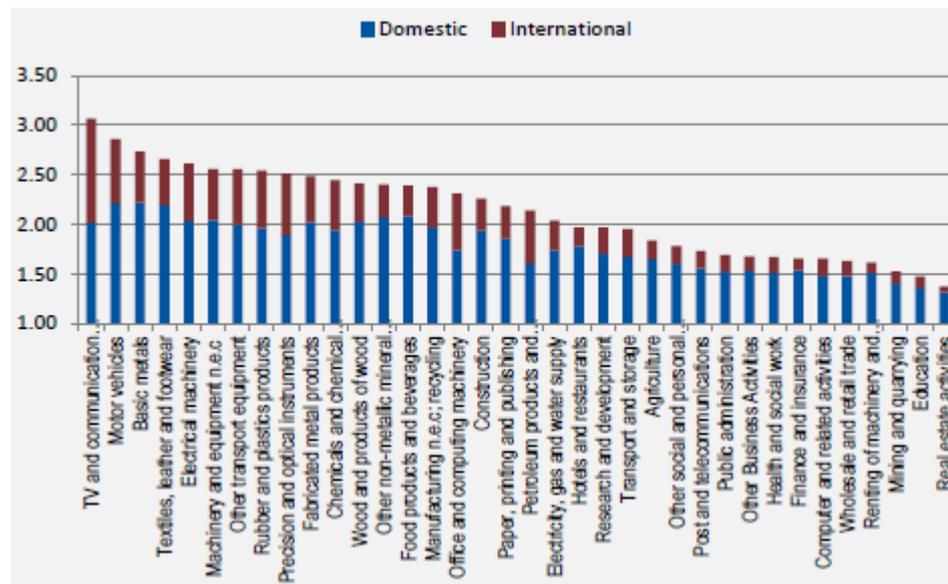
The implication of these relatively short GVCs is that there are relatively fewer discrete steps in the GVCs in which New Zealand specialises. As a consequence, we

¹⁴ Recalling the challenge of aggregation bias in grouping together many product-specific GVCs into composite sectors like ‘food and beverage’ and also the fact that these are OECD averages rather than New Zealand-specific GVC lengths. We suggest that, due to New Zealand’s unique geographical isolation and the high transport costs associated with that isolation, this perhaps means that New Zealand’s agriculture and F&B GVCs would be shorter than the OECD average.

would suggest that this presents Kiwi firms with fewer opportunities to easily move one or two steps up the value chain through vertical integration – there are wide ‘gaps’ in these GVCs.

Figure 8 Length of GVCs by industry

2009; the index takes the value of 1 if there is a single production stage.



Source: De Backer & Miroudot (2014)

Summary of themes from the TiVA data

- New Zealand’s backward and forward participation in agriculture and F&B GVCs is relatively high.
- Levels of DVA are relatively high in agriculture and F&B, largely reflecting the fixed nature of key inputs such as land and water.
- New Zealand’s high GVC participation in agriculture and F&B does not necessarily imply that further gains from GVC participation are limited. By joining new GVCs or upgrading within GVCs, New Zealand can potentially increase its DVA.
- However, agriculture and F&B GVCs are fairly short compared to those of other tradable sectors, perhaps limiting the ease with which New Zealand firms can easily vertically integrate to upgrade in GVCs.
- Aggregation problems limit the usefulness of the TiVA data for detailed primary product GVC analysis or policy analysis.
- Care needs to be taken in reading too much into the TiVA data alone. The data might best be thought of as a discussion starter because it highlights how closely (or not) economies are inter-linked through exports and imports of intermediate goods and services and investment. It shows how countries can generate DVA by importing intermediate inputs, adding value to them and re-exporting them either as intermediates to be further processed elsewhere or to the final consumer. This is a vast conceptual

improvement over more traditional mercantilist ways of thinking that still pervade in some circles, where imports are 'bad' and exports are 'good'.

Better understanding the nature of agriculture and F&B GVCs and their structures will help firms and policy-makers to frame their thinking on how best to take advantage GVC opportunities. Our review of the literature on GVC participation below provides a framework to help our understanding of the policy and non-policy factors that shape GVCs as well as the importance of GVC structure.

4. Literature review

Developed country agriculture and F&B-related GVC literature is scarce

We had hoped to find literature that referred specifically to the policy and non-policy influences on agriculture and F&B GVCs but there has been very little attention paid to these specific issues. That little which has been produced is heavily weighted towards developing countries, with the policy recommendations reading much like those from any standard piece of economic development analysis – improve physical infrastructure, ensure farmers have access to electricity, reduce transport wastage, be careful with subsidies, etc. These findings are not hugely relevant to a New Zealand setting.

Much of the developed country GVC literature to date has instead tended to focus on the manufacturing and electronics sectors, with a distinctly Asian, European and North American flavour.

We identified policy and non-policy factors affecting GVC participation

As a consequence, we cast our net wider and searched instead for more generic literature that identified what drives the structure of, and firms' participation in, GVCs. Again, we found relatively few pieces that took a more generalised approach to this area of research. Papers were frequently product- or country-specific, and often came back to examining the more fundamental influences related to a country's endowments, business environment and comparative advantage.

What follows then is our own synthesis of the key themes of the literature. We are relatively confident that this synthesis provides a useful way of thinking about the agriculture and F&B GVCs of interest to New Zealand.

Comparative advantage and GVC structure are crucial

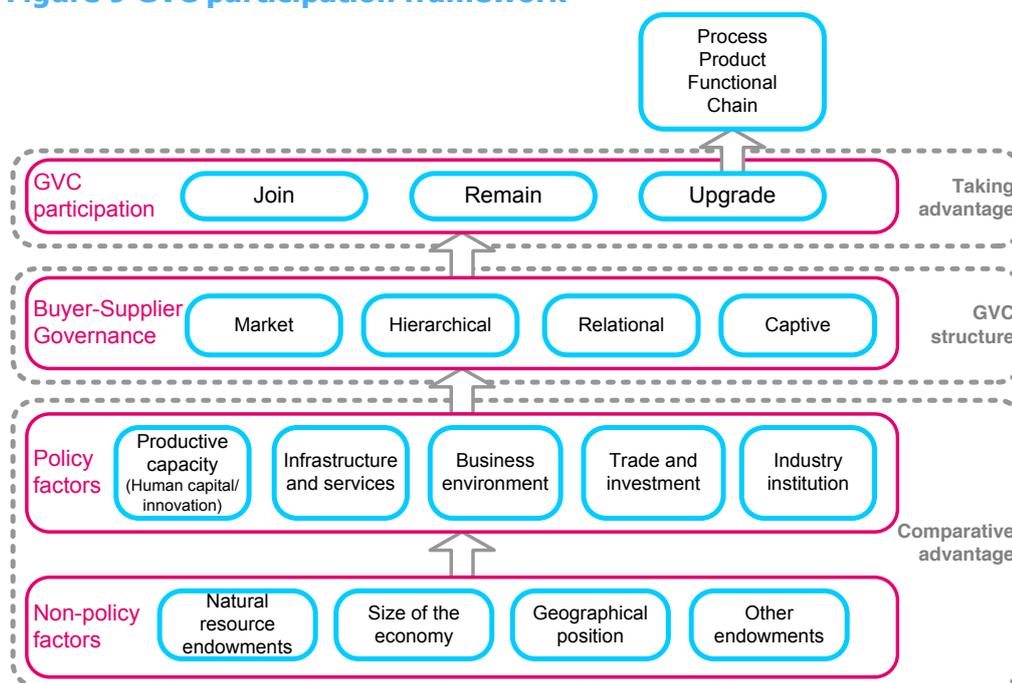
Policy and non-policy factors determine the comparative advantage of an economy. The evidence strongly suggests that non-policy factors are powerful in explaining relative participation in GVCs across countries. Natural resource endowments and the quality of human capital are the most important non-policy factors.

This in turn influences where an economy's firms fit into the various different types of GVCs that have been identified in the literature.

Figure 1 provides an overview of these factors. It shows that GVC participation (how firms join, remain or upgrade in GVCs) is a function of both this **comparative advantage** and the **structure of the GVC**.

A key theme from the literature is that succeeding in entering, retaining or upgrading within GVCs requires a high degree of adaptability and flexibility. This raises the importance of Kiwi firms having ready access to information on changing conditions in GVCs. The role of New Zealand's offshore networks can make a significant contribution here.

Figure 9 GVC participation framework



Source: NZIER

Comparative advantage remains influential for GVC analysis

While the nature of international production is changing rapidly, some traditional constructs hold constant. One key construct to bear in mind when promoting enhanced GVC participation is that it must still be on the basis of comparative/competitive advantage. Cattaneo et al. (2013) succinctly summarise the challenge for businesses and policymakers:

Competitiveness is not measured in terms of a country's capacity to develop an integrated industry, but its capacity to identify its best position in GVCs.

The position of a business in a GVC is determined by its comparative advantage. A business seeking to upgrade must identify what new position in the GVC it seeks to occupy and assess the necessary investment in skills, research or intellectual property required.

Supporting GVC participation calls for an understanding of the business environment and the range of 'behind the border' policies that are summarised in our framework.

GVC structures differ; so too must policy and firm responses

The structure of GVCs strongly influences New Zealand businesses' opportunities to join, remain and upgrade within value chains. The range of opportunities for improved participation, and the means of achieving such participation, will depend on a particular GVC's structure.

The concept of '**lead firms**' and '**governance**' in GVCs is key to understanding how GVCs are structured. The governance structure of GVCs is particularly important and

is defined as the “authority and power relationships that determine how financial, material and human resources are allocated within a chain” (Gereffi, 1994 in Keane, 2014, p. 97).

Keane (2014) distinguishes between four different GVC governance types, which we have adopted in our framework above. The typology is useful as it highlights the different power structures which are often dictated by the degree of complexity of the GVC. Of course, there are no clear delineations between these four types of GVC governance. Any GVC may feature aspects of two or more types, and this will also change over time.

Market GVCs are relatively simple, with price acting as the main driver of who buys from whom. Hierarchical GVCs are more common in, for example, electronics and automobile manufacturing GVCs where vertical integration is more prominent. Relational GVCs are more often related to the service sector, including knowledge-intensive services, and high technology manufacturing where tacit knowledge, trade secrets and trust differentiate between competing firms.¹⁵ Captive GVCs are those dominated by a powerful lead firm, often a major retailer, such as Walmart or Tesco.

Table 4 Keane’s GVC governance typology

Governance	Description
Market	GVCs with arms-length exchanges that require little or no formal cooperation between actors. The central governance mechanism is the price rather than a powerful lead firm.
Hierarchical	GVCs characterised by vertical integration and managerial control within lead firms that develop and manufacture products in-house. This usually occurs when product specifications cannot be codified, products are complex, or highly competent suppliers cannot be found.
Relational	Occurs when buyers and sellers rely on complex information that is not easily transmitted or learned. Such linkages require trust and generate mutual reliance. Lead firms still specify what is needed, but relational linkages take time to build, so the costs and difficulties required to switch to a new partner tend to be high.
Captive	GVC governance associated with types of trade in which producers are heavily dependent on lead firms in order to trade. The power asymmetry in captive networks forces suppliers to link to their buyer under conditions set by, and often specific to, that particular buyer.

Source: Keane (2014)

No one type of GVC structure is inherently ‘better’ than any other. The type of GVCs New Zealand will participate in will depend primarily on our comparative advantage and where we can add value. Rather this typology is useful to differentiate the strategies required to increase DVA in the different types of GVCs.

For example, more hierarchical structures of GVC governance are posited to result in rapid product and process upgrading at each node of production, but fewer opportunities to upgrade functionally (fewer opportunities for a firm to move up the GVC from one activity towards another) (Keane, 2014).

¹⁵ See, for example, NZIER (2015) ‘Global value networks: How to succeed in business without worrying about scale, distance or thin networks’. Report to NZPECC, September 2015.

What governance structures apply to New Zealand's agriculture and F&B GVCs?

The short answer is that much more work would be required to provide a definitive answer. This work would need to look at product-level GVCs rather than use the broad sectoral aggregations in this study.

That said, our initial hypothesis is that New Zealand's agriculture and F&B GVCs such as dairy (e.g. milk powder) and seafood (mussels and oyster) are largely market-based GVCs. New Zealand's meat (sheep and beef) GVCs are likely a mix of market-based and relational, depending on the specific product and the relative importance of large supermarkets in getting that product to market.

While there are certainly players in these GVCs that have a degree of market power, such as supermarket chains, there are many suppliers of these commodities around the world and relative price remains the dominant determinant in where upstream purchasers source their supply. Because relatively little cooperation is required and relationship are kept at arm's length, the cost to change suppliers is lower than in other types of GVCs which require closer links between firms.

The GVC typology strongly influences the opportunities to join, remain and upgrade within value chains. This is because for each type of GVC structure the success strategy will be different. We suggest that policy cannot easily impact the structure of GVCs themselves, as they are primarily related to the type of products involved. However, policy can support the ability of firms to join, maintain or upgrade within GVCs.

Finally, Cattaneo et al. (2013) stress that it is not enough to join GVCs; business strategies must be flexible and be able to adjust quickly to changes in demand (consumers' tastes and spending) and supply (competition among input providers). Participation in GVCs thus contains a number of risks.

Upgrading in a GVC requires greater scale or superior agility

A key concept in the GVC literature – and a concept much beloved by politicians of all hues – relates to moving up the value chain or 'upgrading':

Upgrading, or moving up the value chain, is the best long-term strategy for preserving a country's participation in GVCs (Cattaneo et al., 2013).

Upgrading has also been defined as "the shift in firms' activity in the GVCs to sustain higher earnings" (Humphrey and Schmitz, 2000 in Low and Tijaja, 2013). There are two main upgrading strategies:

- **Scaling up** – upgrading by improving your skills and capability in a few selected GVCs and attempting to gain a greater degree of market power. By scaling up, the strategy is to invest a lot of resources into a few GVCs and potentially achieve a strong and dominant position; the risk is putting 'all your eggs into one basket', so to speak.
- **Atomisation** – spreading participation into myriad of different GVCs by being small and nimble, and perhaps drawing more of relationships and tacit knowledge. Here the strategy is to spread risk across many different sectors and participate in niche GVCs.

Since New Zealand's agriculture and F&B exports are confined to relatively small number of key commodities exported in large volumes (such as dairy, meat and seafood), we suggest that New Zealand's GVC strategy in these sectors is largely about scaling up. Of course, there will be product areas within these sectors that are better suited to atomisation – perhaps related to knowledge-intensive agricultural services, for example.

These different strategies highlight the fact that firms' decisions around GVCs can be thought of as investments, with different risk and return profiles.

The literature review also emphasised the heterogeneity of GVCs: policy analysis ideally needs to be at a detailed product level

A common theme in the literature is that GVCs, including those in agriculture and F&B, are highly complex, fast-moving and heterogeneous. This presents challenges for firms and policy-makers (and researchers): there is no obvious best-practice framework for shaping thinking around specific GVCs – most papers were either very conceptual or very product-specific. The somewhat frustrating answer to all GVC-related questions is almost always “it depends; it's complex”.

That means policy interventions and business strategies to lift DVA need to be considered at a very detailed product level. Even looking at an industry level (e.g. dairy, beef, horticulture, etc.) is unlikely to be targeted enough. The barriers to entry, participation or upgrading vary significantly by individual product, leaning more towards policy analysis at (say) a Harmonised System 4-digit level. This limits the degree to which we are able to provide convincing arguments around New Zealand's relative position in the backward linkages rankings (following section) or detailed GVC policy recommendations (section 8).

5. Research questions

The Request for Proposal posed a number of more detailed questions around New Zealand's relative position in the TiVA rankings, primarily related to backward participation – the use of imported inputs in a country's exports. We address these questions to the best of our ability below.

As discussed in section 6 below, we do not believe that a detailed investigation of New Zealand's relative rankings on this measure is hugely valuable for policy purposes. It is DVA that matters for policy analysis, not the level of participation.

However, the questions *were* useful in helping us to think carefully about what drives backward participation, and thus more broadly about what matters and what doesn't when considering what the TiVA data tells us.

The problem?

As discussed above, New Zealand is relatively well linked into agriculture and F&B GVCs. New Zealand's re-export of imported intermediate inputs in these two sectors is around 50% of total intermediate use. New Zealand ranks 11th and 12th respectively in those sectors out of the 57 countries in the TiVA database.

This suggests that even in sectors where New Zealand is recognised as having a being well ingrained in GVCs, other countries are more intimately linked into relevant GVCs based on this measure. Figure 10 shows the relative TiVA rankings for re-exported intermediates as a % of total intermediate imports.

Figure 10 Re-exported intermediates as a % of total intermediate imports

2009, selected countries; second column is agriculture, third is F&B

Country	Agriculture, hunting, forestry and fishing	Food products, beverages and tobacco
Ireland	85%	64%
Netherlands	73%	65%
Denmark	60%	49%
Malaysia	67%	40%
Belgium	57%	48%
Viet Nam	57%	48%
New Zealand	54%	45%
Thailand	53%	44%
Singapore	43%	49%
Chile	36%	33%
Israel	19%	17%
Philippines	22%	10%

Source: OECD-WTO TiVA database

Data limitations prevent a more fulsome exploration of these rankings

In searching for an explanation for the relative rankings, the available data does not always allow us to provide a full explanation.

The main limitation is aggregation bias. The issue with aggregation bias is that given a certain level of industry grouping, we cannot fully trace how imported intermediates are used for re-exports below the level the information is available publically. The data that is available only allow us to observe the type and quantity of imports and exports separately, not which imports are used for which export. We cannot, for example, identify which specific export products are intermediate import-intensive, or what types of imported intermediates are re-exported.

In addition, it is not possible to identify the final destination of products that use intermediate imports. Some will be re-exported and some will be directed towards the domestic market for consumption.

This means that we have to make suggestions as to the possible explanation for country rankings, rather than being definitive. We can only infer through the analysis of related but incomplete data sets the reasons for the relative rankings between countries.

We first present our analytical framework for examining these questions.

Four factors can explain backward linkages strength

Countries which rank highly on the backward linkages indicator import relatively high amounts of intermediate inputs that are incorporated in exports rather than being immediately consumed in the domestic economy. There are four key factors that we – and the OECD¹⁶ – suggest explain the relative rankings:

- **Country size and location** – small countries have to rely more on foreign inputs because they cannot produce everything they need domestically. Large economies are more likely to have more diverse industry structures and can supply intermediate inputs from domestic sources (compare the US and Singapore, by way of illustration). In addition, small economies are more export-oriented.
- **Export mix** – import requirements differ across export products. For example, one would expect (say) rice to be less import-intensive than (say) processed dairy or meat products which will require more packaging, more transport for processing and perhaps more use of on-farm inputs such as fertiliser. Therefore countries with a high share of dairy and meat exports in their export mix will tend to rank above countries with less import intensive exports such as rice in the backward participation measure.
- **Export orientation** – the backward participation indicator is higher when a country is producing more for consumption abroad than for domestic consumption. In the case of Ireland, for example, 90% of beef is and 85% of dairy products are exported rather than consumed domestically. This also links with country size.
- **Proximity to markets** – the indicator is high when country is close to other markets from which it can source its imports. Location matters because

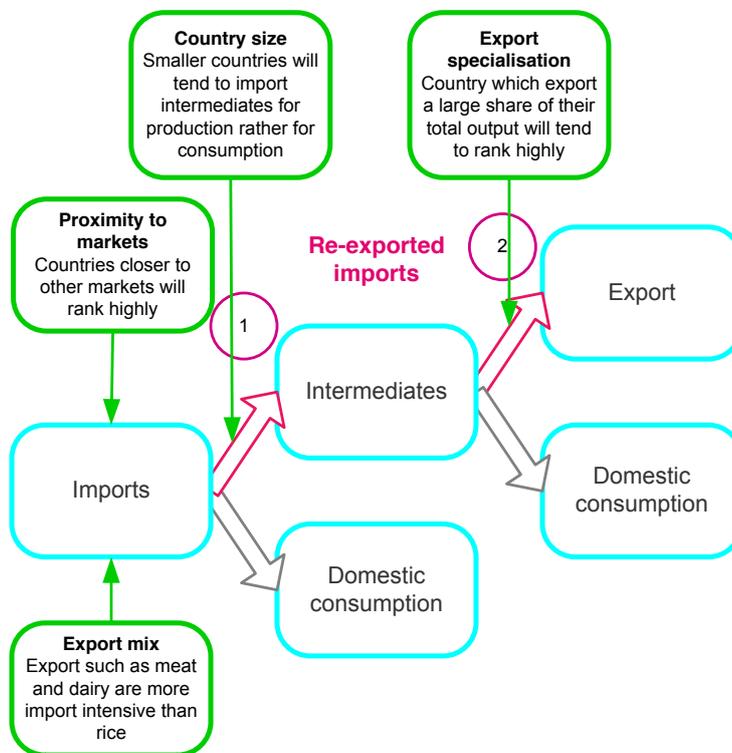
¹⁶ Based on discussions with one of the principal developers of the TIVA data.

proximity to other supplying markets reduces transaction costs, which will in turn encourage greater cross-border activity.

So, in general, a country's backward participation ranking will be higher if it is small, geographically close to our upstream and downstream markets, produces import-intensive exports and directs more of its production towards exports rather than domestic consumption.

Our approach to understanding the relative strength of backward linkages across countries is summarised in Figure 11. This flow chart brings together the four key factors to consider in explaining country rankings. It shows how each factor affects the use of imports in exports.

Figure 11 Four factors that explain backward linkages strength



Source: NZIER

But all four factors have to be taken into account: it is rarely true that a country's ranking can be explained by only one factor.

For instance, country size cannot explain the relative rankings in and of itself. Israel and Singapore's use of imports in their exports is relatively low compared to other countries, even though they are small. This is due to the fact that they do not export vast amounts of agricultural and food and beverage products. Most imports in these sectors appear to be consumed domestically. Hence the relative specialisation in exports must be taken into account as well.

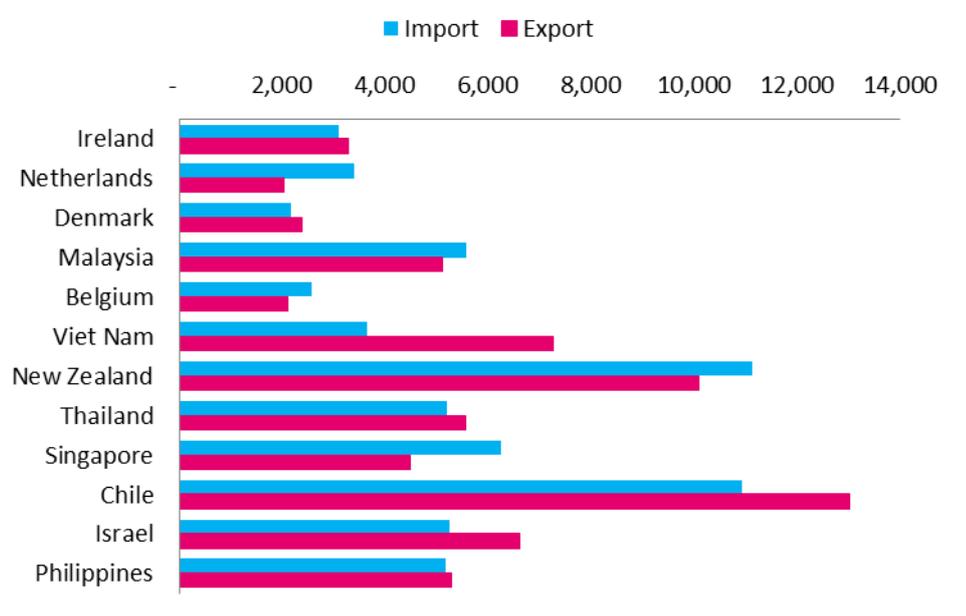
Proximity to markets is particularly important for small and distant countries like New Zealand. A large internal market reduces the need to import inputs for

production and distance increases transaction costs. So the strength of a country’s forward and backward linkages is strongly influenced by size and distance.

Within our country sample we can distinguish three broad groups of countries with regards to their proximity to markets: High proximity (broadly the European countries); Medium proximity which includes Malaysia through to Philippines¹⁷; and Low proximity (New Zealand and Chile).

Figure 12 Proximity to markets

Average trade weighted distance to markets in km



Source: International Trade Center

Pulling these factors together

Table 5 summarises the key factors that explain each country’s backward participation rankings. Countries in the table are listed in order of the strength of their backward participation indicator. Therefore the key factors explain – at least partly – why the country ranks highly (top of the table) or low (bottom of the table).

Note that country size is rarely a factor that explains relative backward linkages strength in this particular sample of countries, because most of the countries we were asked to examine were relatively small in order to be comparable to New Zealand. Hence country size is not shown in our summary table.

The factor scores in the table are indicative only, and are partly based on our professional judgement – especially around the export mix.¹⁸ However, the export

¹⁷ Note Viet Nam has a high average export distance but a relatively low import distance, and the use of imports is the focus of this section.

¹⁸ As noted earlier, the trade and input-output data available to inform this analysis does not provide sufficient detail to allow a fuller investigation. While we can determine the mix of each country’s exports, we cannot assess the extent to which those exports are highly import-intensive. In general, and based on guidance from the OECD, countries exporting a large amount of dairy, meat and beverages are ranked more highly than those exporting rice, fruit and vegetables.

orientation is informed by quantitative estimates of export to GDP ratios and the proximity to markets by Figure 12 above.

Table 5 Country rankings and potential explanatory factor(s)

Country (ranked)	Export mix (import intensity of export)	Export orientation	Proximity to markets
Ireland	High	High	High
Netherlands	High	High	High
Denmark	High	High	High
Malaysia	Medium	High	Medium
Belgium	Medium	Medium	High
Viet Nam	High	Medium	Medium
New Zealand	High	High	Low
Thailand	Medium	Medium	Medium
Singapore	High	High	Medium
Chile	Low	Medium	Low
Israel	Low	Low	Medium
Philippines	Low	Low	Medium

Source: NZIER

Based on Table 5, our answers to the research questions are provided below.

1. Why out of the ASEANs are Singapore, Malaysia, and particularly Viet Nam ranking higher than e.g. Thailand in these sectors? Why is the Philippines ranked so low?

Table 6 summarises the key explanations for the different ASEAN countries ranking across the three key factors.

Table 6 Country rankings and the key explaining factor(s)

Country (ranked)	Export mix (import intensity of export)	Export orientation	Proximity to markets
Malaysia	High	Medium	Medium
Viet Nam	High	Medium	Medium
Thailand	Medium	Medium	Medium
Singapore	High	High	Medium
Philippines	Low	Low	Medium

Source: NZIER

The main reason why Malaysia ranks so highly is its export mix which is relatively more import intensive (namely coffee, tea and other beverages). Its export orientation is about average (see Figure 13 below) and its proximity to market similar to other ASEAN markets.

Viet Nam ranks higher than Thailand, Singapore and Philippines but lower than Malaysia. The main reason is that Viet Nam mostly exports fish which is – according to the OECD – relatively more import intensive than cereals and vegetables. Its export orientation is comparable to most countries and its proximity to markets is also relatively similar.

Thailand’s low ranking relative to Malaysia and Viet Nam is the result of:

- lower import intensive export
- marginally lower export orientation.

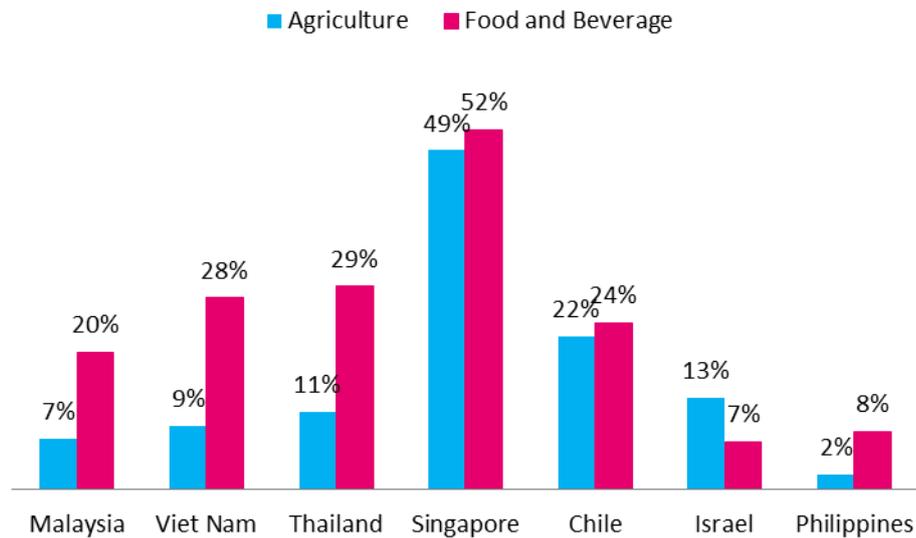
Singapore’s ranking cannot be entirely explained by three factors in Table 4 but we suggest the fourth factor which is not shown, country size, is the key driver here. The reason is even though Singapore exports a large share of its production, it is possible that its imports are largely consumed domestically.

Finally, the main reasons why the Philippines ranks so low is its:

- low import intensive exports (mostly vegetables)
- low export orientation, particularly in agriculture.

Figure 13 Export as % of total output

2009



Source: OECD

2. Why do Chile and Israel rank where they do for agriculture and F&B?

Chile and Israel rank below most countries in our sample because:

- their export mix is less import intensive (largely vegetables)
- Israel has a particularly low export orientation
- they are relatively distant from other markets.

3. What are the major products in the agriculture and F&B sectors where those countries use imported intermediate inputs in their exports?

Table 7 summarises the main exports for the countries we consider for this analysis. Countries which have similar export profiles are

- Ireland, Netherlands, Denmark, New Zealand, Belgium – meat, dairy and beverages (high import-intensity)
- Singapore – beverages and other (high import-intensity)
- Viet Nam, Chile, Thailand, Philippines – fish (medium import-intensity)
- Viet Nam, Thailand – cereals (low import-intensity)
- Israel, Philippines, Chile, Belgium, Netherlands – vegetables and fruits (low import-intensity)

Table 7 Agriculture and F&B export as a % of primary export

2013 merchandise exports

Country	Live animals	Meat	Dairy	Fish	Cereals	Vegetables and fruits	Sugar	Coffee, Tea, spices	Other	Beverages and tobacco
Ireland	4%	30%	19%	5%	3%	2%	1%	4%	19%	12%
Netherlands	4%	13%	14%	4%	4%	22%	2%	7%	17%	13%
Denmark	6%	27%	14%	17%	6%	4%	2%	1%	17%	7%
Malaysia	3%	2%	5%	9%	7%	6%	3%	21%	29%	15%
Belgium	1%	13%	11%	3%	11%	24%	3%	10%	13%	11%
Viet Nam	0%	1%	1%	41%	18%	16%	1%	18%	3%	2%
New Zealand	1%	20%	50%	5%	1%	8%	1%	1%	6%	6%
Thailand	0%	10%	1%	24%	19%	16%	12%	1%	13%	4%
Singapore	0%	1%	4%	3%	3%	4%	2%	12%	31%	40%
Chile	0%	6%	1%	28%	4%	41%	0%	1%	6%	13%
Israel	0%	3%	1%	1%	5%	70%	5%	2%	11%	2%
Philippines	0%	1%	1%	27%	3%	41%	8%	0%	11%	8%

Source: OECD

4. What are the principal factors, including qualitative ones such as IP, affecting the use of imported intermediate inputs by these countries?

It is difficult to draw on the data to answer this question. Indeed it is difficult to even identify what precisely is imported into which sectors, particularly at a detailed level of disaggregation.

Figure 14 and Figure 15 show that, based on OECD data, three broad product groupings account for a large share of total imports in the agriculture and F&B industries. Agriculture, food and beverage and chemical products (oil) are the main imports in most country's agriculture and food and beverage industries, so there is a considerable amount of 'churn' or intra- and inter-industry trade within these broad sectors. Countries import one form of agricultural product, add value to it and then re-export as a different F&B product.

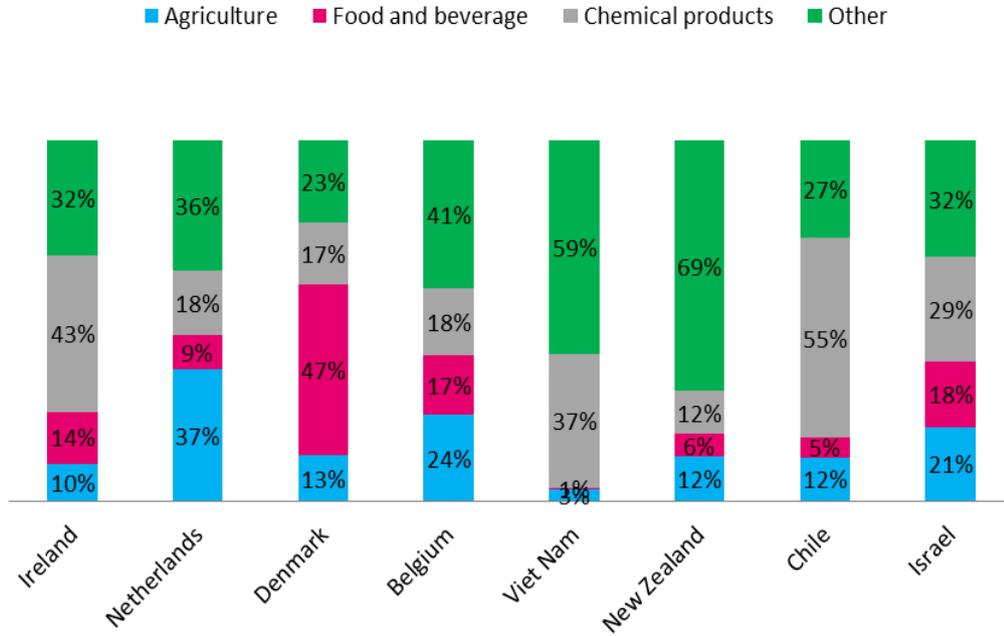
Data for other countries was not available.

Viet Nam, New Zealand and Ireland are the only countries to import a relatively different mix of products for agriculture; respectively wholesale and retail products for Viet Nam and rubber and plastic products for New Zealand. Viet Nam's imports of finished wholesale products is likely to be mainly for domestic consumption. New Zealand's rubber and plastic imports are likely to be partly used for F&B packaging.

Ireland's F&B industry imports more services than other countries. These different set of imports are largely due to small country size and the inability to source those inputs domestically.

Figure 14 Agriculture re-exported imports by type of products

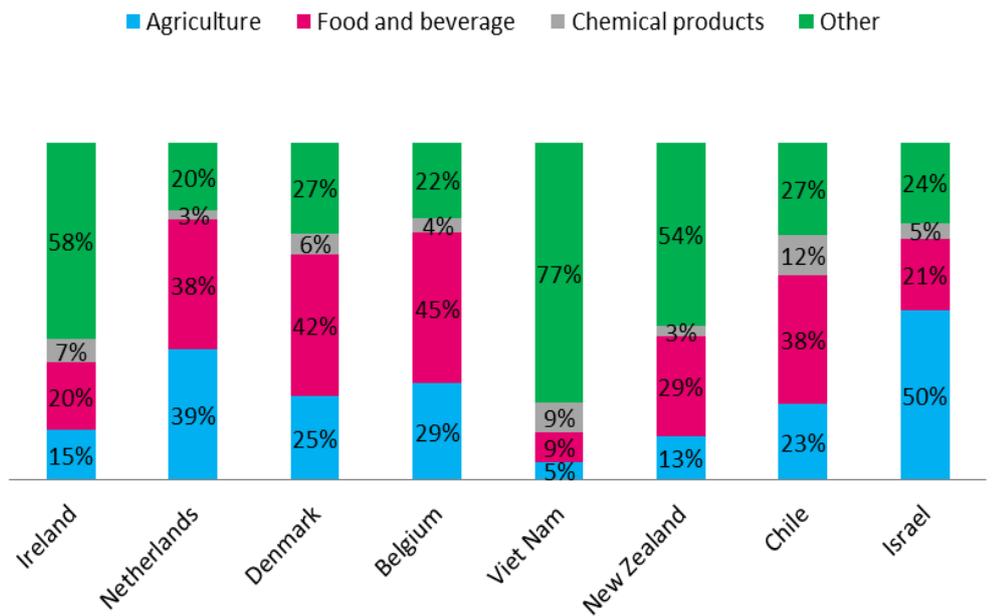
Various years depending on countries, mid 2000s average



Source: OECD

Figure 15 Food and Beverage re-exported imports by type of products

Various years depending on countries, mid 2000s average



Source: OECD

Since the three main imports are agriculture, food and beverage and chemical products (oil), it is likely that the principal factor affecting the use of imported intermediates is the availability of agricultural products, perhaps largely complementary to the products produced domestically for processing. For example, exports such as processed food would require more ingredients and packaging than straight cuts of frozen meat to prepare and sell.

We suggest that it is unlikely that IP plays a significant role in the use of re-exported imports as agricultural inputs make a large share of imports.

5. Are there any particular reasons related to the product-mix that may explain the placement of these countries in the TiVA ranking?

A country's export mix has an impact on the strength of the backward linkage indicators. On average, meat, dairy, fish and beverages are more import intensive than cereals and vegetables exports. Hence export mix contributes to explaining the relatively low ranking of Chile, Israel and Philippines and why the European/OECD countries (which export largely meat and dairy) rank highly.

The export mix also partly explains Belgium's relatively lower ranking compared to the other European/OECD countries as it has relative strength in vegetables and fruit. Viet Nam and Thailand rank middle of the country sample as they have a mix of high and low import intensive exports.

Export mix does not explain Malaysia's or Singapore's ranking, which are largely as a result of export specialisation and location as opposed to export mix.

6. What, if any, significant government policy settings can be isolated that can reasonably be said to facilitate or hamper participation in GVCs in these sectors by these countries?

Figure 14 and Figure 15 show that agriculture, food and beverage and chemical products (oil) are the main imports in most countries' agriculture and food and beverage sectors. We suggest the two most likely policy factors that may affect the imports of these three products are tariffs and logistics.

Table 8 shows – tentatively – that both the average tariff rate and logistics performance are respectively negatively and positively correlated with the use of imports in re-exports. That is, a country is more likely to have a higher import intensity of exports if it has low tariffs and supportive, reliable infrastructure.

But because much of the explanation for the different rankings stem from export specialisation, location, size and export mix, it is not easy to estimate the contribution of those two policy factors to the overall backward linkages indicator.

Table 8 Country re-export of import, tariff and logistics performance

Column 1 and 2: Use of re-exported intermediate imports; Tariff rate: 2009 (Viet Nam 2010); Logistics 2014

Country	Agriculture, hunting, forestry and fishing	Food products, beverages and tobacco	Tariff (weighted average rate)	Logistics (ranking)
Ireland	85%	64%	1.51	11
Netherlands	73%	65%	1.51	2
Denmark	60%	49%	1.51	17
Malaysia	67%	40%	2.81	25
Belgium	57%	48%	1.51	3
Vietnam	57%	48%	5.66	48
New Zealand	54%	45%	1.74	23
Thailand	53%	44%	4.78	35
Singapore	43%	49%	0.07	5
Chile	36%	33%	5.98	42
Israel	19%	17%	3.54	41
Philippines	22%	10%	4.79	57

Source: OECD, World Bank

7. How and why are those countries in Europe at the top of these rankings (Ireland and the Netherlands) using such a high percentage of imported inputs when other similar countries in their immediate region (e.g. Belgium) are significantly lower?

Table 9 summarises the key explanations for the different European/OECD countries' ranking across the three key factors.

Table 9 Country rankings and the key explaining factor(s)

Country (ranked)	Export mix (import intensity of export)	Export orientation	Proximity to markets
Ireland	High	High	High
Netherlands	High	High	High
Denmark	High	High	High
Belgium	Medium	High	High
New Zealand	High	High	Low

Source: NZIER

Ireland, Netherlands and Denmark rank very high all for the same reasons:

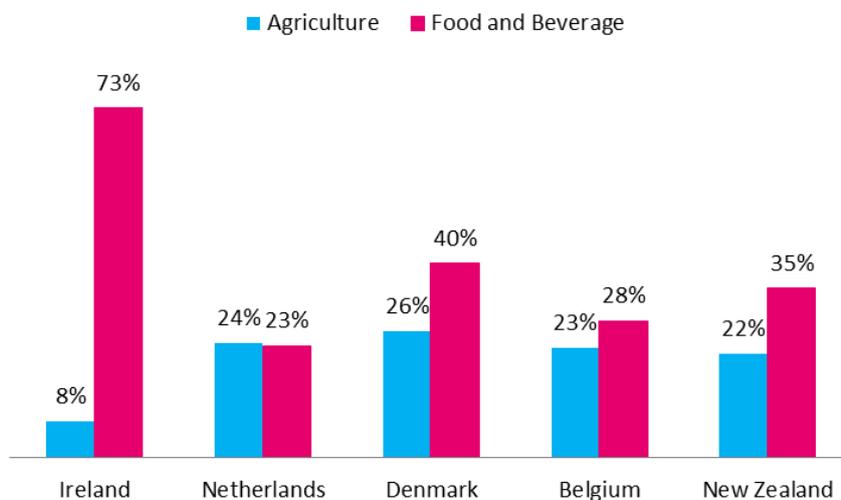
- their export mixes are import intensive
- their export orientation is high

- they are very close to markets, being close to the centre of the European Union.

Belgium ranks lower than the other European/OECD countries mostly because its export mix is less import intensive (mostly vegetables). Its export orientation is somewhat lower (Figure 16) but not significantly enough to explain its lower ranking.

Figure 16 Export as % of total output

Total output is the sum of consumption, investment, government and export expenditure on agriculture and food and beverage, 2009



Source: OECD

8. What are the major reasons that appear reasonably able to explain why the countries identified above rank ahead of New Zealand?

There are two main reasons for New Zealand's ranking.

The main reason is New Zealand's export mix. New Zealand's concentration in dairy and meat increases its use of re-exported imports above that of most ASEAN nations, which have a different export profile.

Secondly the export specialisation explains why New Zealand often ranks below European countries. Belgium, Netherlands, Denmark and Ireland have the advantage of being both at the centre (or close) to the region where a large share of world trade takes place but more importantly, these countries act as integrators of imports in exports. In addition, proximity to markets counts against New Zealand.

9. What are the major differences between those policy settings and New Zealand's domestic settings (this should include consideration of legislation, regulation and policy practice where relevant)?

New Zealand's policy settings are compared with relevant countries in the GVC policy settings across countries section below.

6. Focussing on the right challenges

NZPECC's initial research questions were focused primarily on backwards linkages, i.e. New Zealand's use of re-exported imports compared to other small(ish) countries. While these questions were both curly and interesting, as this research project unfolded our thinking leaned more towards other important considerations that need to be taken into account when considering policy interventions to enhance New Zealand's agriculture and F&B GVC participation.

In addition, we had planned to draw on agriculture and F&B-specific developed country GVC literature and insights from European and Asian GVC experts to inform our thinking. Unfortunately, neither source of information proved to be hugely illuminating. This does not reflect poorly on our experts – it's more that GVC policy development has not tended to focus specifically on agriculture and F&B.

The following sections outline our thinking on what matters and what doesn't for considering GVC policy interventions for New Zealand.

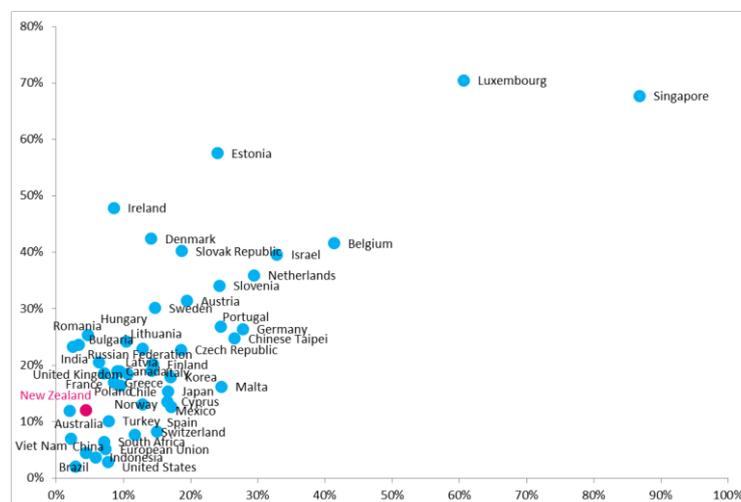
6.1. Forward and backwards linkages

New Zealand's relatively high backward participation index reflects the fact that we export the majority of our primary products rather than serving the domestic market. For example, we export some 95% of our domestic dairy production, including any embedded imported inputs such as fertiliser, fuel and packaging.

Despite New Zealand's high backward participation, the share of imports to the production process in New Zealand's agriculture and F&B sectors is relatively small, respectively 8% and 7%. New Zealand's agriculture and F&B sectors have one of the lowest import contents in the OECD (Figure 17).

Figure 17 Imports as a % of total intermediates

Early to late 2000s; x-axis: Agriculture; y-axis: Food & Beverage



Source: OECD-WTO TiVA database

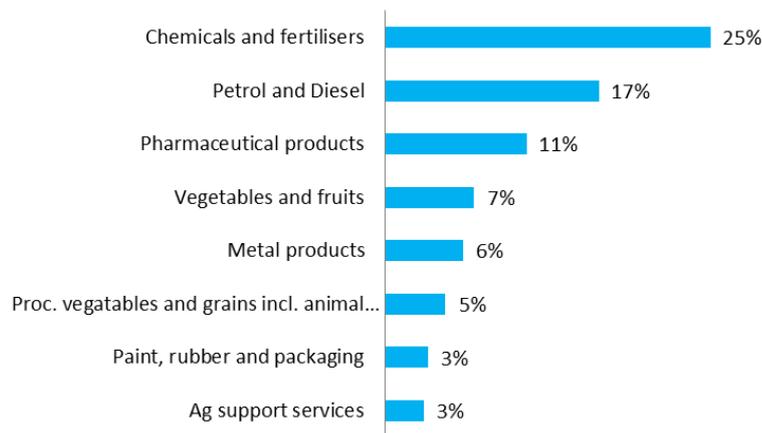
An analysis of the type of imports into New Zealand’s agriculture and F&B sectors (see Figure 18 and Figure 19) shows that around three quarters of the imports for both sectors are made of:

- chemical, fertilisers and pharmaceuticals products
- petrol and diesel
- packaging
- horticulture (processed vegetables, vegetables and fruits).

Most of these imports would only increase with production (i.e. Leontief style fixed proportions) thereby forcing the share of import content and backward participation index to remain constant, no matter what the level of imported inputs is.

Figure 18 Agriculture, forestry and fishing imports

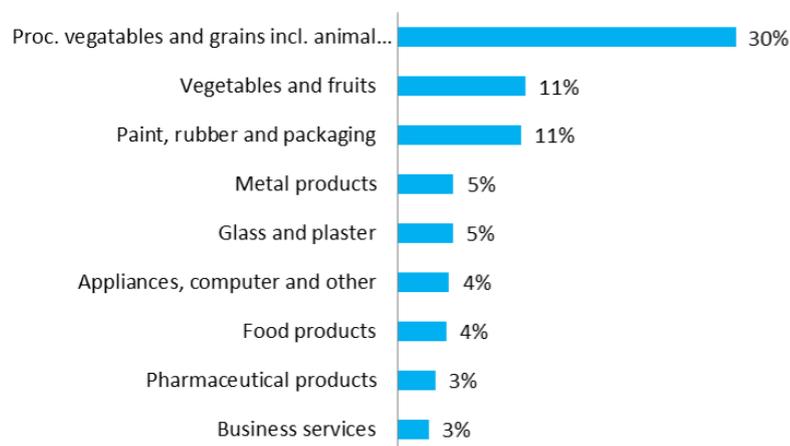
% of total imports, National accounts, 2007



Source: Statistics New Zealand

Figure 19 Food and beverage imports

% of total imports, National accounts, 2007



Source: Statistics New Zealand

One could also argue that decreasing the use of imported intermediates might increase the DVA associated with New Zealand's agriculture and F&B GVC participation. However, this would rely on there being domestically-produced inputs available to substitute for imported inputs.

We suggest that there is very limited scope to reduce imported inputs to boost DVA. There are few domestic substitutions available at this point in time: virtually none for petrol and diesel, and recent attempts to substitute imported fertilizer for imported fertiliser were stymied by the decline of Chatham Rock Phosphate's application to mine phosphate in New Zealand's Exclusive Economic Zone due to environmental concerns.

It is possible that New Zealand businesses could potentially increase their DVA by either encroaching further into the upstream segments of GVCs, for example through using outward direct investment (ODI) to acquire ownership of the input-producing units in the GVC they participate in. However, New Zealand has not traditionally been wildly successful in its ODI efforts, and ODI as a share of GDP is very low relative to most developed countries.

That being said, any policy measures to reduce the cost of imported intermediates such as reduced tariffs and smoother logistics channels are likely to help New Zealand's agriculture and F&B exporters. Or as Hon. Tim Groser, Minister of Trade (Beehive, 2013) has noted:

Now that we can quantify the contribution of imported inputs to value-added exports, there is no escaping the fact that any barriers to imports become barriers to our exports and to our firms engaging internationally.

In short, there is strong empirical evidence to indicate there are limited opportunities to increase New Zealand's backward participation for the agriculture and F&B beverage sectors.

And since, as discussed below, it is DVA rather than the level of participation that matters for policymakers and firms, there is strong conceptual support to our belief that lifting backwards participation is not obviously desirable either. As our literature review flagged, comparative advantage still matters hugely for determining a country's optimal location in a supply chain.

We suggest that policy efforts should instead **focus on lifting the DVA associated with enhanced forward participation** in New Zealand's agriculture and F&B GVCs

6.2. Domestic value added

Increasing gross exports in and of itself will not necessarily benefit New Zealand, particularly if this requires the use of more imported intermediates, although the import content of agriculture and F&B exports is inherently low.

Indeed targeting the level of participation – as measured by TiVA – is unlikely to be a helpful way of thinking about policy prescriptions to boost household welfare. Rather, policies promoting GVC participation must consider the export of domestic value added (DVA).

This is because it is DVA (i.e. returns to New Zealand factors of production) that directly influences living standards. And as Figure 4 showed, there appears to be a negative correlation between DVA and the level of participation.

Agriculture and F&B make up 40% of the total DVA from goods and services exports in New Zealand. This is high compared to other OECD countries. That is partly because of the high DVA content of agriculture and F&B exports compared to other countries, at about 85% of gross exports in these sectors.

We conclude that there is strong theoretical and empirical support for our conclusion that DVA matters much more than the ranking or level of any participation measure.

6.3. Approach to identifying specific policy options

Following the analysis of the TiVA-database and our review of the literature, our intended approach to identifying policy options was to interview GVC experts in Europe and Asia.

Expert interviews

We conducted interviews and had repeated email correspondence with two key experts in the field of agriculture and F&B GVCs:

- Dr Siemen van Berkum, Senior researcher/project manager, International Trade and Markets, at LEI, Wageningen University.¹⁹
- Fukunari Kimura, Chief economist at the Economic Research Institute for ASEAN and East Asia (ERIA) and Professor at Keio University.

Our main objective with these interviews was to gain insights into other countries' policies particularly targeted at promoting enhanced participation in agriculture and F&B GVCs. We were particularly interested in what aspects of GVCs these policies specifically targeted (e.g. research, business cooperation, market intelligence) and whether/why these policies have succeeded.

The key finding was that there are still very few policies that are specifically designed around enhanced participation in agriculture and F&B GVCs. Rather most policies are focused on more generic support to export businesses, although the distinction between generic support and GVC specific policies is sometimes hard to find.

Netherlands agricultural and F&B GVC related policies

The Dutch government have several policies targeted to promote agricultural and F&B exports but fewer specifically designed for GVCs.

Offshore representation

The Dutch government – much like the New Zealand government – supports the agri-food sector in doing international business through its extensive network of agricultural attachés, and by organising fairs and economic missions to key markets in which Ministers takes part. Reducing sanitary and phytosanitary import barriers is

¹⁹ Dr. Van Berkum also tapped into his network of contacts at the OECD, primarily in the trade and agriculture branches.

a key objective for which the Ministry of Economic Affairs has established special market access teams.

Innovation

Dutch government policies aiming at enhancing economic development have always had a strong emphasis on facilitating innovation and business R&D. The Dutch agribusiness sector has gained from this general economic environment that is conducive to innovation and technological progress. The high share of agri-food exports in Dutch total exports and in GDP is partly based on its high levels of land and labour productivity in primary agriculture driven by widespread and continuous adoption of innovation that has increased input use efficiency in recent years. Export revenue has also been boosted due to the composition of its high value production package, resulting from a continuous process of rationalisation, consolidation, mechanisation and specialisation (OECD 2015a).

Industry institutions

Four institutions and programmes are currently in place to encourage international business relations are highlighted below:

- The Netherlands Enterprise Agency is part of the Ministry of Economic Affairs. It is a general counter for entrepreneurs who want to engage in international business, helping with grants, finding business partners, know-how, market intelligence and compliance with foreign laws and regulations.
- The Dutch Good Growth Fund (DGGF), a programme by the Dutch Ministry of Foreign Affairs, provides finance and insurance to Dutch SMEs doing business through trade and investment in developing and emerging markets.
- The Dutch CBI (Centre for the Promotion of Imports) supports exports from 48 developing countries in 27 sectors (many of them in the agri-food area). CBI export programmes focus on training and knowledge transfers (export coaching, institutional development, human resource development) and by providing market information showing the opportunities for exporters in the EU market. CBI also uses a company database for matching Dutch businesses with those in developing countries.
- The Sustainable Trade Initiative accelerates and upscales sustainable trade by building impact-oriented coalitions of front running companies, civil society organisations, governments and other stakeholders.

ASEAN agricultural and F&B GVC related policies

We had limited input from our ASEAN expert. He was not able to easily identify agriculture and F&B-specific GVC policy settings in the region which we could draw on.

Research and policy thinking is catching up to GVC data availability

Our strong sense is that policymakers overseas are probably in the same position as New Zealand policymakers. They are actively aware of the TiVA data and the growing importance of GVCs for global and regional economic integration, but appear to be

struggling with the transition into designing policies to support enhanced GVC participation with the aim of lifting DVA.

While GVCs are rapidly becoming part of the lexicon of informed discussions around regional economic integration, the precise policy implications of GVCs are far from clear.

This is not a surprise to us – as this project has evolved, it has become clear to us at least that thinking about GVCs is highly complex, non-linear and not at all easily aligned with traditional ways of conceptualising economic integration policies. It will take time to build the international and domestic research base on which to start changing policy thinking.

6.4. Focus on 'behind the border' policies

In light of the absence of agriculture and F&B-specific GVC policy settings coming from our expert interviews, we instead drew on our GVC policy framework to compare New Zealand's GVC-relevant policy settings with those of comparable countries (comparison is in the following section). Our focus is on 'behind the border' policies.

We started our analysis of New Zealand's policy settings by first asking: what is the difference between traditional export promotion, structural policies and GVC promotion?

When assessing policies relevant to GVCs, two comparisons are interesting to make:

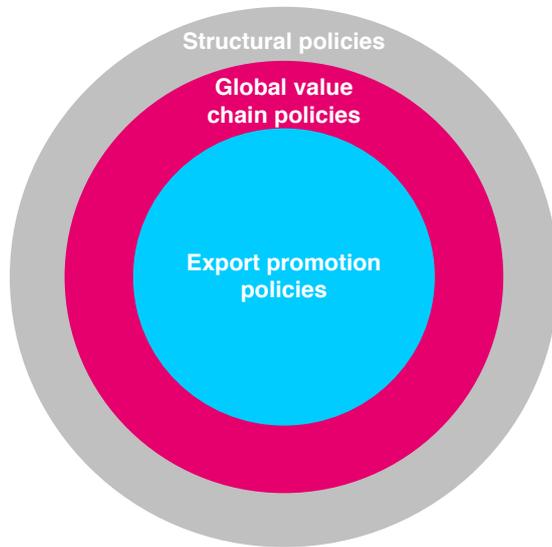
- **GVC and structural policies:** Because GVCs are driven primarily by business strategies, increasing adaptability must be a key policy focus which again calls for a high quality general business environment: policies must promote an environment that is conducive to participation in GVCs.
- **GVC and export promotion policies:** Putting a GVC lens on trade promotion means taking into account the dynamic nature of GVC structures. This increases the importance of focusing on behind the border policies.

To illustrate the difference made by taking a GVC lens to policy, we need to consider the different learnings from this research and what it means for policy. New Zealand's agriculture and F&B GVCs are largely market GVCs, so business strategies and policy settings to support upgrading within these GVCs are different to those required to succeed in captive GVCs for instance.

Taking a GVC lens also emphasises the need for flexibility, particularly in labour and capital markets, so that firms can adapt swiftly to changes in GVC structure.

Essentially we see GVC policies as a subset of broader structural policies to enhance the competitiveness of New Zealand firms. Traditional export promotion policies are in turn a subset of GVC policies, although the lines between them are necessarily blurry.

Figure 20 Structural, export promotion and GVC policy settings



Source: NZIER

7. GVC policy settings across countries

New Zealand’s GVC policy settings are generally supportive

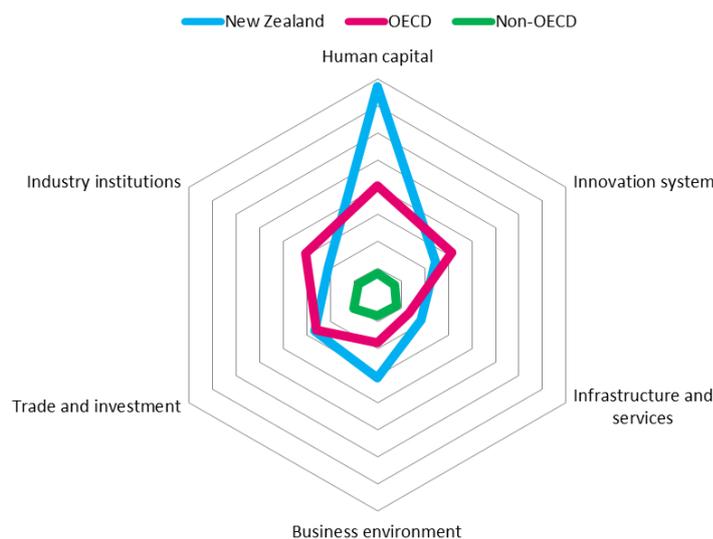
The lack of obvious GVC policy examples overseas led us to compare New Zealand’s broader policy settings relevant to GVC participation with that of other countries. While our comparison is potentially biased towards structural settings, we find that New Zealand’s policy settings are significantly different in two key areas that can be reasonably measured using international data.

Based on the findings of our data analysis and literature review, and discussions with NZPECC, we selected a small number of countries,²⁰ based on their export profile and size, against which to compare New Zealand’s GVC policy settings and non-policy factors. Using our GVC participation framework (Figure 1 above) we have compiled a set of indicators to compare GVC policy settings.²¹ While these are not policy settings that are specific solely to the agriculture and F&B sectors, we used this gap analysis to highlight potential areas where specific policy and business initiatives could then be developed.

Figure 2 shows that New Zealand’s general GVC policy settings tend to perform well against the subset of countries in this study.

Figure 21 GVC policy settings by OECD and non-OECD countries²²

Set of countries in this study; the further from the centre, the better the policy setting



Source: NZIER

²⁰ Namely Iceland, Denmark, Netherlands, Ireland, Poland, Portugal, Chile, Argentina, Brazil, Viet Nam and Thailand.

²¹ We acknowledge that our comparison relies on indicators from global surveys and collations of measures that are subject to some degree of criticism. Nevertheless, in the absence of any superior alternative, they remain useful for comparing countries’ policy factors.

²² OECD: Ireland, Denmark, Netherlands, Iceland, Poland, Portugal, Chile. Non-OECD: Argentina, Viet Nam, Thailand, Brazil.

But other countries' settings are improving faster than New Zealand's

New Zealand policy settings historically were superior to many countries: our scale and distance disadvantages were compensated for by less restrictive regulation, flexible and efficient markets. This advantage is fading as policy settings amongst OECD and non-OECD countries are meeting ours.

New Zealand performs particularly well on two dimensions: human capital and the broad business environment, but there are opportunities to improve our policy settings in two other key areas: the national innovation system and industry institutions. Two other areas of focus for this research, based on discussions with NZPECC, are standards and logistics.

High-level policy implications

The peculiarity of New Zealand's primary-dominated export structure and its geographical location mean that we have to assess all potential implications using a distinctly Kiwi lens. Simply adopting other countries' policy settings – no matter who they are – is unlikely to be effective, since most countries have very different industry structures and proximity to markets.

Our key high level policy and future work recommendations are:

- The Government's Business Growth Agenda (BGA) should more explicitly recognise that GVC participation will be the key channel through which export gains and improvements to DVA and living standards will occur over time.²³ New Zealand **needs a clear policy strategy to deal with the specificities of GVCs**, although we appreciate the complexity of this challenge, given GVC heterogeneity and dynamism.
It may be that a GVC focus does not necessarily result in a raft of new policies, but rather a re-framing and re-prioritising of existing policy settings through a GVC lens.
- To identify specific policies that will support agriculture and F&B industries' GVC participation and improved DVA, we must first **find a way to categorise the different GVCs**. We recommend future work be undertaken to map New Zealand GVC structures, perhaps using Keane's GVC typology at the HS4 level of detail. The next step would then be to understand which policies are most relevant to each GVC.
- Policy-makers should more explicitly **take into account the crucial role that the services sector has** in the exports of New Zealand's agriculture and F&B exports through GVCs. Indeed, lifting the productivity of the services sector is likely to improve participation in GVCs due to these strong interlinkages (Low and Pasadilla 2015).²⁴

²³ Indeed, the BGA Export Markets material is almost entirely devoid of any GVC discussion to date.

²⁴ In supporting the New Zealand Productivity Commission's inquiry into the productivity in the services sector, we concluded that "[a]n underperforming market based services sector will retard growth in the rest of the economy" (NZIER, 2013). The connectedness of the market based services (MBS) sector has increased since the mid-1990s, possibly reflecting the diversification of the New Zealand economy and the emergence of complex supply chains that draw on many input industries to produce a final good or service.

As well as being exported directly, services are embodied heavily in the exports of primary and manufactured goods. The most significant MBS inputs used by key export industries are road transport; banking and financing; financial asset investing; and advertising, market research and management services. The value of MBS sector inputs accounts for between 8.3% and 18.0% of the final value of output from these exporting industries. This clearly indicates that productivity

- **Innovation and industry institutions, standards and logistics** are the key factors to consider for GVC success, based on our literature review and international comparison exercises. We suggest that business and policymakers work together to focus their attention on these areas first. **Placing GVC success at the core of policy development processes and business strategy** will be tough due to the complexity and heterogeneity of GVCs, and the challenges it presents for traditional ways of thinking.

performance in these MBS industries could have important implications for the cost competitiveness of New Zealand exporters (NZIER, 2013) and hence their ability to improve their position in GVCs.

8. Potential policy options

The objective: boost DVA by adjusting GVC-relevant policy settings

Recall that our objective here is to improve New Zealand's DVA by enhancing our participation in GVCs, rather than targeting any particular level of participation. This is not a binary decision about whether to participate or not: it is about identifying how best New Zealand firms can participate in GVCs to boost DVA, given our geographical challenges and industry structure (i.e. comparative advantage)

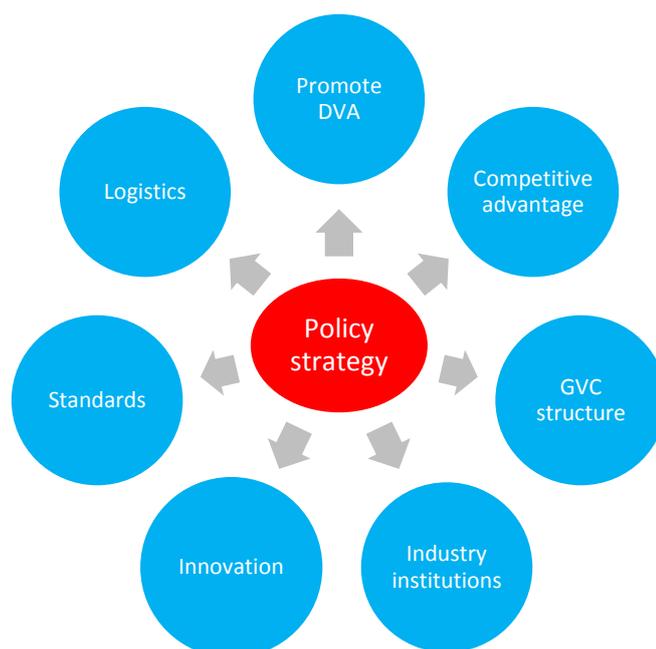
Our suggestions are based on only limited knowledge of what works

We provide specific policy options for each, drawing from the relevant general GVC literature and our NZIER's tacit knowledge and experience around New Zealand's policy settings with regards to GVCs.

We acknowledge here that the evidence base around agriculture and F&B GVC policy settings is relatively light: the literature did not throw up any highly detailed analyses that we could hang our hats on; neither did our discussions with international experts. And the TiVA data, while very interesting, is not able to help us to determine any causative relationships that offer clear insights into what policymakers should focus on.

We know that GVC structure and comparative advantage are important factors to consider when designing policies to enhance the DVA associated with New Zealand firms' GVC participation. Based on our comparison of countries and discussions with experts, we have identified innovation, industry institutions, logistics and standards as potential areas where policy changes might be beneficial.

Figure 22 Policy framework key factors



Source: NZIER

The interactions between the various factors in Figure 22 are also important – policies cannot be designed in silos. For example, standards when designed and enforced appropriately, can create incentives to innovate. Industry institutions, through collaboration and knowledge sharing, support innovation, perhaps through a reorganisation of capability and resource to better adapt to consumer demand and the structure of the GVC. A well-developed GVC strategy will therefore take these interactions into account.

These interactions matter particularly because of the heterogeneous nature of GVCs. Understanding the interrelationship between policies and how they affect different GVCs with different structures will allow government to better support individual GVC participation but also create policies that will have multiple benefits to a wider number of businesses.

Drawing on the literature, our country comparison and discussions with experts, below we offer some potential policy options for promoting GVC participation to boost DVA. Some are agriculture and F&B-specific, others are more generic. We acknowledge that they are not fully formed – resource constraints prohibited a full exploration of their merits and risks. And as noted above, ideally policy analysis needs to take place at a detailed product level.

As such, we present these ideas as a way to promote discussion between policymakers, firms and industry associations based on our GVC frameworks above, rather than as a detailed set of prescriptive policy recommendations.

8.1. Innovation

The IMF's key recommendation for achieving greater DVA content in exports is the implementation of a wide range of knowledge-and technology-enhancing policies, including investing in human capital as well as measures to encourage innovation and R&D (Cheng et al. 2015). Given the IMF's focus, and New Zealand's relatively weak performance on innovation measures in Figure 2, we suggest that there is a relatively strong case for policymakers to look carefully at these issues.

In the New Zealand context we outline potential policy options to promote innovation for GVC participation.

Helping firms to investigate GVCs through co-funded research

For GVC purposes, business needs should drive the focus of scientific research for it to contribute to improving our comparative advantage.

One option to achieve this would be to provide grants or co-funding to thriving F&B exporters, or groups of exporters if there are concerns over suggestions about 'corporate welfare', for them to scope and purchase research they expect will strengthen their comparative advantage (and hence market power) in GVCs.

As always, there will always be trade-offs between promoting new research and the development of new IP and encouraging knowledge sharing, but an appropriately-designed scheme that promotes industry dissemination of research findings rather than individual firm capture should be able to manage this trade-off.

Explicitly consider GVCs in PGP funding decisions

One of the key themes from the international literature and recent NZIER research (NZIER, 2015) is that successful firms in GVCs have a strong understanding of the needs of their purchasers, be they final consumers or the next intermediate processing stage of the GVC (Blyde 2014). If differentiation and understanding product users is to be one of the main GVC participation strategies used by New Zealand firms, particularly under the atomisation approach described above, we need to ensure research increases our ability to target changing purchaser preferences.

Therefore a potential option to ensure research contributes to GVC participation is that Primary Growth Partnership research funding (or other forms of business assistance funding) allocation criteria more explicitly consider (or more heavily weight) the potential impact on GVCs as part of the assessment.

Get GVCs at the core of industry oriented research

We wonder if publicly funded research in New Zealand could be better targeted at improving GVC participation. For example, GVCs have not been thoroughly taken into account in the government's recent National Statement of Science Investment (Ministry of Business, Innovation and Employment 2015).

The recent government announcement to create four new Centres of Research Excellence by the current government is likely to offer further opportunities to bring GVC thinking in business-focused research to the forefront.

There may be a chance to actively shape these institutions' – particularly the Riddet Institute and Bioprotection Research Centre – research activities, performance measures and incentives around business-facing programmes that promote improved New Zealand participation in GVCs with an aim of boosting DVA.

Smart specialisation and cluster activities – can we learn from Europe?

Of course, innovation is much more than R&D. A conference by the Innovation Policy Network (6CP n.d.) highlighted the increasingly globalised system of innovation:

Due to factors such as clustering of neighbouring activities and the increasingly collaborative nature of innovation, internationalisation of innovation is becoming a topic of public interest and a topic for regional policymaking.

Table 10 summarises different innovation policy strategies adopted by OECD countries.

Most OECD countries promote a cluster-based approach to innovation. Argentina, Belgium, France and Portugal have made cluster policies an integral element of their national innovation strategies or plans. Other countries have programmes to promote the creation of new clusters or to strengthen existing clusters.

Recently, Belgium, Germany and the Netherlands have developed specialisation policies to boost innovation. We know from addressing NZPECC's research questions in section 5 that the degree of a country's industry specialisation impacts upon the extent of their GVC participation (albeit not necessarily their DVA). These European

countries have explicitly targeted specific sectors/industries in their national innovation strategies or plans.

Table 10 Cluster policies and smart specialisation

High level strategies	Sub-strategies	Country
Creating and consolidating clusters	Creation of new clusters through co-ordinated action for R&D activities (e.g. through public funding programmes).	Argentina, Canada, Chile
	Promotion of network structures, service support for entrepreneurs, cluster co-ordination.	Argentina, Austria, Australia, Belgium, Canada, China, Colombia, Denmark , France, Germany, Greece, Ireland, Japan, New Zealand , Sweden
Networking platforms	Science-science (e.g. promotion of collective research centres, centres of excellence).	Belgium, Canada, France, Norway, South Africa, Spain, Switzerland
	Industry-science (e.g. promotion of public-private networks).	Argentina, Australia, Belgium, Canada, Colombia, Denmark , Finland, France, Germany, Italy, Norway, Poland, Portugal
	Industry-industry: promotion of sectoral networks.	Belgium, Colombia, Denmark, Germany, Poland, Portugal, Spain
Technology specialisation	Relative specialisation in biotechnology and nanotechnology.	Australia, Belgium, Canada, Denmark , Ireland , Israel, Netherlands , New Zealand , Poland, Spain, Switzerland, United States, Singapore
	Relative specialisation in environment-related technologies.	Australia, Austria, Canada, Czech Republic, Denmark , France, Germany, Hungary, Japan, Norway, Poland, Russian Federation, Singapore and Spain
	Relative specialisation in ICTs.	Canada, China, Finland, Ireland , Israel, Japan, Korea, Malaysia Singapore and Sweden
Internationalisation	Cluster competition and cluster excellence programmes.	Austria, Belgium, Germany, France, Ireland , Japan, Netherlands
(Towards) smart specialisation		Australia, Austria, Belgium, Czech Republic, Estonia, Finland, Germany, Ireland , Israel, Poland, Russian Federation, Spain, Turkey, United Kingdom

Source: Cluster policy and smart specialisation, OECD (n.d.)

In addition, many OECD countries and regions are combining cluster policies and specialisation strategies. The table shows that New Zealand has promoted two key cluster policies:

1. Promotion of network structures, service support for entrepreneurs, cluster co-ordination.
2. Relative specialisation in biotechnology and nanotechnology.

New Zealand lacks a networking platform policy of the likes of Denmark. It is noticeable that Denmark and the Netherlands, our two key European country comparators, have adopted a wider range of policies, particularly:

- industry-science (e.g. promotion of public-private networks)
- relative specialisation in environment-related technologies

- cluster competition and cluster excellence programmes
- smart specialisation.

Our European GVC expert has noted that Dutch Government policies aimed at enhancing economic development have always had a strong emphasis on facilitating innovation and business research and development:

The high share of agro-food exports in total exports and in GDP is partly based on its high levels of land and labour productivity in primary agriculture driven by widespread and continuous adoption of innovation that has increased input use efficiency in recent years, and on the composition of its high value production package, resulting from a continuous process of rationalisation, consolidation, mechanisation and specialisation (OECD, 2015, p. 15).

There would be value in exploring the Danish and Dutch F&B-related innovation systems in more depth to find out what worked, what didn't, and how these learnings might be applied to New Zealand.

The importance of intellectual property policies

Intellectual property rights (IPRs) affect international trade and investment flows when knowledge-intensive goods move across national boundaries. While there have been few studies to our knowledge into the precise role of IPRs in helping or hindering firms' participation in agriculture and F&B GVCs, the role of IPRs in creating a supportive business environment *has* been explored.

For example, Maskus reviews how economic development may be promoted or hindered by IPRs. IPRs can play a positive role in encouraging new business development, rationalisation of inefficient industry, and inducing technology acquisition and creation.

But they may also harm development by raising the costs of imitation and permitting monopolistic behaviour by owners of IPRs (Maskus 2000).

IPRs can be effective in overcoming problems that exist in markets for information creation and dissemination. However, their existence could pose problems and be subject to anti-competitive practices (Maskus 2000). Or as (Frankel 2014) notes, “[i]ntellectual property protection has moved from being primarily about incentives to innovate to becoming a tool that frequently over-protects”.

The evidence available suggests the overall impact of IPRs on economic development can be positive but dependent upon other factors that help promote benefits from intellectual property protection. Accordingly, modern IPR systems are not sufficient by themselves to encourage effective technology transition. Instead, they must form part of a coherent and broad set of complementary policies that maximise the potential for IPRs to raise dynamic competition.

Such policies include:

- strengthening human capital and skill acquisition
- promoting flexibility in organisations
- ensuring a strong degree of competition in domestic markets

- developing a transparent, non-discriminatory, and effective competition regime (Maskus 2000).

It seems to us that these policies generally align well with those discussed in this report – they encourage firm and factor market flexibility, adaptability and human capital generation.

But it is also important to be aware of the changing nature of IP protection, which Frankel (2014) notes “should not be the enemy of innovation and creativity”. She also suggests that tighter IPR regimes are likely to present problems for New Zealand firms who are part of a GVC but necessarily in a dominant position – such as many of those in the agriculture and F&B sectors.

This is an area that requires further exploration so that the balance between incentivising innovation and disseminating knowledge and know-how can be appropriately struck in a global economy where GVCs are much more common than when IPR regimes were initially designed.

8.2. Industry institutions

Coordination between key institutions is essential to rapidly identify and overcome challenges to GVC participation (OECD, WTO, and World Bank, 2014).

Based on this OECD, WTO and World Bank research, we judge that there is good reason to suggest that encouraging improved industry institutional settings and strategies will deliver improvements to the way that New Zealand firms participate in GVCs in order to boost DVA.

Industry institutions are the linkages and co-operation among private sector firms, government, educational institutions and other industry stakeholders such as sector bodies and loose coalitions of firms that work together for specific purposes.

This is supported at least partially by our international comparison of GVC-relevant indicators that shows New Zealand lags in this area compared to many other small(ish) economies. Further support comes from the recent efforts of some New Zealand primary sector exporters to join forces with government agencies such as NZTE to share the set-up and marketing costs of entering key markets such as China and thus reduce average fixed costs.²⁵

Collaboration to proxy upscaling

Collaboration among firms can be a contributor to GVC success – this is a proxy for the upscaling approach to upgrading in GVCs (see page 7). This includes **collaboration by cost sharing or joint investment in offshore marketing, branding or market intelligence**.

While government support may be useful, particularly in overcoming initial information asymmetry, finding opportunities for increased collaboration must lie principally with the business community. Successful collaboration requires careful identification of mutually advantageous relationships and this is something that firms must – in the main – work through themselves.

²⁵ Previous New Zealand research has identified that high set-up costs have been a barrier to New Zealand firms becoming more connected with global markets. See, for example, (Simmons 2002) and NZIER (2012).

Scale matters, but this is not necessarily linked to the scale of an individual firm. Cooperatives/producer organisations or associations in which small-scale farmers and processors unite to increase their bargaining power in the supply chain are one example that has worked in some sectors in New Zealand (e.g. kiwifruit), but there are also other ways of joining forces.

Since the recent Commerce Act reforms, it is now easier for firms in an industry to work collaboratively in order to share set-up costs, achieve economies of scale and increase GVC capability. We are already seeing this marketing and brand awareness collaboration (or 'co-competition') in the agriculture and F&B sector in seafood (in China), wine (North America) and craft beer (UK). There may be value in **evaluating the success of these initiatives to identify lessons learned** and promoting these findings to other industry associations.

Hence industry institutions provide firms' managers with the knowledge and capability to join GVCs. Linking with GVCs can require a change in management style from administration to leadership. Leaders can learn from other businesses how to take a global view of their business and manage a new set of risk and opportunities (Yeabsley & al., 2001).

Addressing the GVC information challenge

To adapt to changing market conditions, firms need to have flexibility to change their product and/or process of producing to meet changing consumer preferences and demands. This theme comes through consistently from our review of the GVC-related literature, although what precisely should be done to address this challenge is rarely specified, so our suggestions below are largely speculative.

We wonder if a '**GVC Influencers Fund**' or similar could be designed that allows officials to work closely with industry to promote linkages into international production networks. This Fund could be used to facilitate exchanges with international GVC decision makers through face-to-face interaction in New Zealand and offshore and jointly explore opportunities.

A key theme from the literature is that succeeding in entering, retaining or upgrading within GVCs requires a high degree of adaptability and flexibility. This raises the value of businesses having ready access to information on changing conditions in GVCs. The role of New Zealand's offshore networks can be crucial here – high quality and timely information on the evolution of GVCs (as well as opportunities and risk) is important.

One strategy could be to establish offshore '**GVC Ambassadors**', perhaps akin to the New Zealand Special Agriculture Trade Envoy role. These Ambassadors' knowledge would be GVC specific and they would provide subject matter expertise. Their role would be to foster better links for New Zealand businesses with other major GVC players and to monitor (including via social media) the constantly shifting links within and between the markets in which New Zealand participates.

GVC Ambassadors would act as the 'eyes and ears' on a foreign market, pointing at business opportunities, facilitating business missions and arranging networking meetings. GVC Ambassadors could either be government officials or business representatives (from businesses associations for example) with GVC specific knowledge.

Clearly finding the right people for such a role would be a challenge – they would need to be product or sub-sector experts with a deep knowledge of specific economies or regions, along with an innate ability to spot trends and facilitate business interactions. This might point to experienced businesspeople that are keen for a change in role or challenge, or senior policy analysts who have gained in-depth market knowledge through roles at MFAT, NZTE, MPI, Customs or other externally-focussed agencies.

It is also feasible of course that firms could draw on their own resources to fund such positions, rather than looking towards government for funding, recognising that accessing detailed GVC market knowledge is likely to deliver private benefits if the information is held closely rather than widely disseminated as envisioned above.

8.3. Standards

Our GVC participation framework (Figure 1), based on our review of the relevant literature, showed that firms' GVC participation is influenced by the nature and structure of the GVC in which they operate. Within these different types of structure, the market power of lead firms appears likely to be a strong determinant of where a supplying firm fits into a GVC, how it maintains or upgrades its position and the degree of DVA that can be extracted.

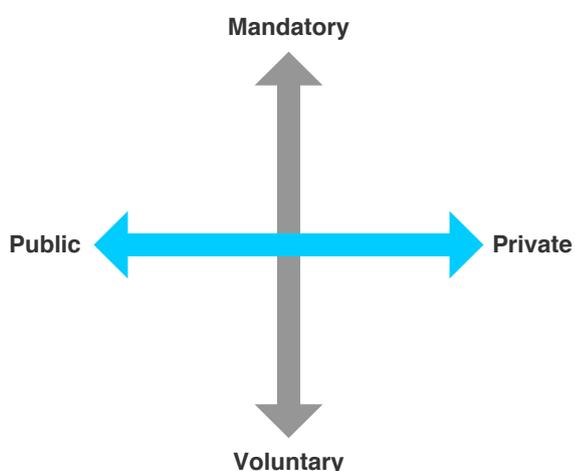
One way in which lead firms can exercise influence over a GVC is through the design and implementation of private standards that determine product requirements that are deemed to be acceptable for use in GVCs. We suggest therefore that there is some justification for further examining the role of private standards in the agriculture and F&B sectors as policymakers consider their responses to a world where GVCs are becoming more common and more complex.

Understanding standards to support upgrading strategies

Standards can be categorised according to the degree to which users have freedom of choice and action regarding compliance.

At one end of the continuum are mandatory public regulations establishing standards and grades for (say) minimum food quality and at the other end voluntary standards where users can decide whether or not to comply and take the associated economic consequences that each decision implies. The combination of different standards creates a product- or sector-specific GVC environment in which business can participate (Smith, 2009).

Figure 23 A framework for standards



Source: Smith (2009)

Table 11 provides example of F&B standards and shows how the government can play a different role in each regime based on the outcome it is trying to achieve.

Table 11 Examples of standards regimes

Role	Regime1 (Geographical indications)	Regime2 (Standards of identity)	Regime3 (Country of origin labels)	Regime4 (Nutritional content labels)
Legal status:	Voluntary	Voluntary	Mandatory	Mandatory
Standard set by:	Private sector	Government	Government	Government
Attribute:	Process	Content	Process	Content
Implementation:	Adoption of production practice	Product reformulation	Segregation and identity preservation	Product reformulation
Conformity assessment				
Accreditation:	Private sector			
Certification:	Private sector			
Testing:		Private sector		Private sector
Documentation:			Private sector	
Inspection/audit:		Government	Government	Government
Legal enforcement:	Private and Government	Government	Government	Government

Source: Smith (2009)

Particular attention must be given to private standards developed by individual firms, groups of firms and business associations. Due to changes in the use of standards, current trends in agricultural trade suggest the need to better understand the impact

of this transition on governance structures (i.e. how private standards can influence lead players and other participants' positions in GVCs) and their ability to upgrade.

Humphrey and Schmitz (2002) identify four different upgrading paths (Table 12).

Table 12 Upgrading paths

Upgrading	Path
Process	Better organisation of production or the introduction of new technologies, and efficiency or sustainability gains.
Product	Production of more sophisticated products.
Functional	Increase in the skill content of the production.
Chain or inter-sectoral	Move from one industry to another.

Source: Cattaneo et al. (2013) adapted from Humphrey and Schmitz (2002)

Historically upgrading was either in terms of improvement in production processes (arising from a combination of new procedures and applying new technologies) and in products (new products, improved products, more differentiated products and higher quality products) (Keane 2008).

However, the increasing expansion of global value chains has added two new dimensions to our understanding of upgrading: functional and chain or inter-sectoral upgrading. These arise because lead firms governing GVCs introduce standards to ensure enhanced product quality and flexibility as they outsource those parts of the production cycle.

As functional and chain upgrading paths become more important, standards policy settings must adapt accordingly. For example, chain upgrading in which the industry seeks to either to diversify or change industry entirely will require all firms in that GVC to comply with a new set of standards that they are not familiar with. The Australia New Zealand Food Standards Code 2003 greatly facilitated the access to markets in Australia for New Zealand exporters.

The government could consider supporting businesses by offering **information compiling services on the different standards to comply with** for the specific GVCs businesses wish to participate in. This would increase the flexibility that New Zealand firms need to respond to changing customer preferences by taking a chain upgrade path.

Another option for better disseminating standards information would be a private sector solution: if businesses increasingly know they need to understand how standards are developing in order to retain or improve their position in GVCs, they may be willing to absorb the cost of obtaining this information through the market.

Food safety as a global driver of standards

Of particular interest for this study into agriculture and F&B GVCs are food safety standards. Increasing awareness of health and food safety risks has led to a tightening-up of agricultural and F&B standards worldwide. For example, in the European Union, controls on pesticide residues have been tightened and a parallel

tightening of pesticide-related regulations has occurred in the United States (Humphrey and Memedovic, 2006).

Many health hazards are expensive to test for and may enter food products at several points in the production process. Therefore, documented production practices that are verified to prevent and control hazards, are becoming accepted as the most cost-effective means of reducing food safety hazards. While testing and verification are essential for establishing good process controls, testing can never be practical as the only means of monitoring safety (Unnevehr, 2000: p. 235 in Humphrey & Memedovic, 2006).

Inspections of produce, particularly at points of export and import, remain an important part of the food safety system. There is growing adoption in the food industry of management practices that focus on prevention and control of food safety hazards (Martin and Anderson, 2000, in Humphrey and Memedovic, 2006).

However, some commentators suggest many New Zealand agri-food companies are still struggling to fully understand the global shift to integrated agri-food value chains (Woodford 2014) and the importance of transparency along the supply chain:

A key driver is the need to have food safety systems in place that span from consumers back to producers. It is not simply a case of the food having to be safe, it is also a case of there being a transparent evidential trail. Food testing is just a small part of this system.

The challenge, then, is to **encourage New Zealand agriculture and F&B firms to explicitly take GVC thinking into account** when designing their food safety and provenance strategies and branding.

Include GVCs more explicitly in standards policy decision making

Public and private Standards have become an increasingly important dimension in global trade. Without the capacity or knowledge to keep pace with this growing body of standards, producers may either have difficulty in entering global markets, or be relegated to unprofitable and low-margin niches.²⁶ We would suggest there is a small country information asymmetry risk here that warrants ongoing and potentially increased government attention to providing timely and detailed information on trends in agriculture and F&B standards in GVCs.

To do so, it is necessary to develop a responsive regulatory regime that is able to adapt rapidly to changes in GVC structures so that standards keep up with technological change.

We must ensure that New Zealand standards do not act as unnecessary barriers to trade, recalling Minister Groser's quote above about import barriers acting as a handbrake on export development. However, at the same time they must also protect New Zealand's reputation as a safe and sustainable primary producer to ensure our GVC partners continue to trust the New Zealand Inc. brand.

²⁶ Of course not all standards, be they private or public, are always barriers to entry. Depending how standards are designed and implemented, standards can facilitate or hinder GVC participation. There is an insider-outsider challenge here: those on the 'inside' of standards design – be they influential governments or lead firms – are more likely to be able to shape standards to promote their own needs.

Two key international agreements seek to limit trade barriers through the use of standards. The Uruguay Round of multilateral trade negotiations established the Agreement on the Application of Sanitary and Phytosanitary (SPS) Measures and the Agreement on Technical Barriers to Trade (TBT) to address the emerging debate over the use of standards in international trade. These Agreements balance the competing demands for domestic regulatory autonomy and the global harmonization of product standards. At the same time, the agreements attempt to prevent standards from becoming a protectionist device.

Likewise, the Technical Barriers to Trade Agreement (TBT) strikes a delicate balance between the policy goals of trade facilitation and national autonomy in technical regulations (Center for International Development, Harvard University).

Get closer to lead firms setting private standards

A distinct feature of the standards environment is the increasing importance of private standards – those set by the dominant players in GVCs (Cattaneo et al. 2013). Standards affect GVC power structures, so it is important that New Zealand isn't restricted in its upgrading potential because of its inability to meet changing private standards set out by lead firms.

Again, this all points to the **importance of having first-rate offshore market intelligence** to partly compensate for our distance from key GVC purchasers, both through official (e.g. NZTE, MFAT, MPI, etc.) channels and through direct New Zealand firm resourcing offshore.

As discussed earlier, the concept of 'lead firms' and 'governance' in global value chains is key to understanding how GVCs are structured. Humphrey and Schmitz (2008) argue that much of international trade is coordinated by the lead firms of GVCs and regulated through global standards. Knowing in advance when potential standard changes are coming and ideally being able to influence their direction in a fashion favourable to New Zealand will help Kiwi firms become more flexible and adaptable, and reduce the risk of being displaced from key GVCs.

For our F&B exporters, this may mean a **rebalancing in resourcing away from monitoring tariffs and traditional non-tariff barriers** towards gathering market intelligence around private standards. This isn't to say that New Zealand exporters are not already focusing on private standards, but that the relative resourcing requirements are likely to continue changing over time. The success in the use of standards for GVC participation will also rely on ever-closer coordination and consultation between government and industry bodies.

The Netherlands government has appointed an agricultural counsellors' network to address this particular issue. New Zealand businesses may benefit from a 'window of foreign market information' to which its agricultural counsellors and potential GVC Ambassadors contribute.

8.4. Logistics

World Bank data suggests New Zealand performs relatively poorly (compared to best practice – the levels are fairly high) in four logistics areas:

- Infrastructure – the quality of trade and transport infrastructure.

- Logistics quality and competence – the competence and quality of logistics services such as trucking, forwarding, and customs brokerage.
- Tracking and tracing – the ability to track and trace consignments.
- Timeliness – the frequency with which shipments reach consignees within scheduled or expected delivery times.

This data, along with the literature that shows the role of transactions costs in eroding DVA, especially for a remote economy such as New Zealand, suggests to us that policy interventions around logistics could make a meaningful contribution to supporting New Zealand agriculture and F&B firms succeed in GVCs.

The WEF (2013) estimates that improving logistics performance could increase GDP by nearly 5% and trade by 15% globally, compared to less than 1% and 10%, respectively, for a complete tariff removal (Cattaneo et al., 2013). However, because there isn't one specific area in New Zealand logistics that is particularly underperforming, it is within these four areas that incremental improvements at the different stages of the freight chain could support enhanced participation in GVCs.

The need to get the engine humming

Logistics is the oil in the New Zealand economic motor. High performing logistics systems are therefore vital to New Zealand's successful participation in GVCs. As an isolated economy, efficient logistic infrastructure ultimately 'reduces the distance' to GVCs, cuts transaction costs and potentially lifts DVA.

The most recent comprehensive study on New Zealand's logistics systems was the Productivity Commission's international freight transport services report (2012). It made five key recommendations:

- Ports could enhance their abilities to meet the future freight needs of the country if improvements were made to the governance framework for council-controlled port companies.
- There is scope for a significant lift in workplace productivity at a number of ports. Most New Zealand port companies, their employees and unions have some work to do to fully achieve these benefits.
- Current exemptions for shipping companies from the Commerce Act should be removed so that normal competition laws apply.
- Better coordinate investment in freight infrastructure. Greater use should be made of 'facilitated discussion' models, such as the Upper North Island Freight Plan.
- More information on freight in New Zealand – collected and made available on a regular basis – would have considerable value and help freight organisations make better individual and joint decisions (New Zealand Productivity Commission 2012).

We recommend a review of actions taken by the government and industry in response to those recommendations. To the best of our knowledge this review has not been undertaken, although we are aware that these areas are being considered by government agencies. In areas where recommendations have been acted upon and logistics performance still needs improvement, further work needs to be undertaken to understand the potential sources of inefficiencies.

Better manage the large flow of empty containers within New Zealand's ports

When imports are unloaded and exports loaded on ship containers, not all containers are full and in fact many are empty. As a share of New Zealand's total container movements, 15% and 30% of containers exported and imported respectively were empty in March 2015 (see Figure 24).

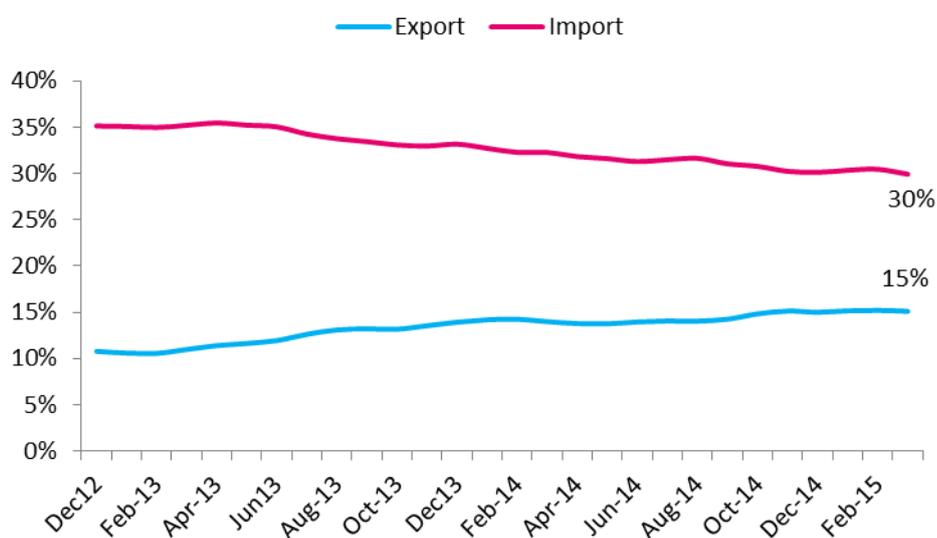
Therefore we suggest there are potentially large gains in logistics performance by better managing the large volume of containers that are currently underutilised (i.e. reducing movements of wasted space).

New Zealand's port infrastructure is also relatively unique. The bulk of New Zealand's imports come through Ports of Auckland while Port of Tauranga is New Zealand's main export port. Hence empty containers have to be moved from Auckland to Tauranga which creates costs and logistical inefficiencies.

Empty containers also reduce the space available for full containers at port terminals, add to port congestion and reduce overall productivity.

Figure 24 Percentage of empty containers

Through all New Zealand ports, TEU containers



Source: Ministry of Transport

The better management and optimisation of empty containers calls for coordination amongst the different transport modes (road, rail, maritime and air). Inland ports, for instance, have the potential to improve the performance of New Zealand's logistics by helping to solve the empty container issue.

The Ministry of Transport could investigate potential improvement in the coordination amongst transport modes to reduce the number of empty containers that flow through and between New Zealand ports.

Border processes can be improved

We suggest that greater efficiency in the logistics chain to support GVC success could be created by two means at the border in the first instance.

First, import tariffs are a clear impediment to GVC participation. The IMF explains

Our empirical analysis finds that tariffs on imports of intermediate goods reduce GVC participation, but also hamper the ability to capture a higher share of value added along a GVC once an economy is a member of a GVC. This is because when intermediate inputs cross borders multiple times it compounds the detrimental effect of a given trade barrier (Cheng et al. 2015).

Following the RCEP, India and European FTA agreements, we suggest remaining import tariffs should be removed. They effectively act to increase costs for those involved in whiteware, textiles and apparel and furniture GVCs and provide very little tax revenue or effective protection to domestic producers. These cost increases may not be large given the low level of tariffs in New Zealand, but it is a cost burden that – in our view – is unnecessary, simple to remove over time and entirely within our own control, if we are serious about improving our participation in GVCs.

Removing all tariffs would also send a message to those involved in New Zealand's GVCs that we are open for business and are serious about taking policy steps to reduce transaction costs.

Removing tariffs would free up border resources by reducing demands on Customs officials. These resources could be better deployed – for GVC purposes – in speeding up other border processes.

Second, the IMF recommends that policymakers should go a step further to reduce costs of trade by implementing trade-facilitating measures such as simplifying port and customs procedures (Cheng et al. 2015).

The OECD makes similar recommendations in a recent report. The OECD assessment focusses on the impact of trade facilitation including measures enhancing the predictability and speed of movement of goods. The report states that a small increase of 0.1 in trade facilitation performance (Trade Facilitation Index values range between 0 and 2, where 2 denotes the best performance possible that can be achieved) could generate increases in a country's value-added imports of between 1.5 and 3.5%, and between 1 and 3% for exports (Moisé and Sorescu 2015).

Hence there may be value in exploring more avenues for pre-clearance for New Zealand's primary sector exports. It would provide certainty to New Zealand exporters about border procedures they must comply with and potentially lower transaction costs. Similarly a system that allows more of our GVC imports to be cleared prior to their unloading on New Zealand ports would improve performance and free up Customs resources to be redeployed elsewhere.

9. Conclusions and next steps

Our participation in agriculture and F&B GVCs is high

New Zealand's GVC participation in the agriculture and F&B sectors is one of the highest in the world and OECD. Both our forward (use of exports in third countries' production processes) and backwards participation (i.e. re-export of imported intermediate inputs) in these sectors are high.

GVCs are responsible for a large share of trade growth worldwide; we need to take advantage of opportunities

Increasing New Zealand's participation in GVCs sits squarely within the Government's Business Growth Agenda objectives of lifting exports to 40% of GDP by 2025 and doubling primary industries' exports. These efforts should be seen as the means to the end of lifting New Zealand's DVA and thus living standards.

New Zealand policymakers must focus on the real challenges

Focusing on New Zealand's backward linkages is unlikely to be helpful for two reasons:

- New Zealand's current ranking is largely due to our export mix and our position in the value chain producing largely raw materials
- There is little opportunity to substitute the mix of imports into New Zealand's agricultural and F&B export sectors.

We therefore suggest the focus should be towards enhancing New Zealand's GVC participation by forward linkages, the increase of the DVA content of our exports and on 'behind the border' policies to support businesses to join, maintain and upgrade their position in GVCs.

There is no silver bullet for GVC policy

Our analysis indicates that while New Zealand's GVC policy settings could be improved in a few key areas, there is no obvious set of policies that are acting as a significant handbrake to New Zealand firms' participation and success in GVCs.

We have not been able to find specific examples GVC specific policies in other countries. European and ASEAN GVC experts interviewed as part of this research were unable to point us towards policies other than promoting exports and innovation more generally.

While the study of GVCs has a fair conceptual grounding in the economics literature, GVC-related policy development remains at a nascent stage. A better understanding of each GVC structure, its governance and the role of lead firms is necessary for policies to be effective.

Many of the challenges to improved GVC participation and improved DVA are related to New Zealand's traditional size and distance challenges, which increase the costs to doing business in international production networks, especially for smaller Kiwi firms.

The specificity of New Zealand's economic structure and its geographical location mean that we have to assess all potential GVC policy implications using a distinctly Kiwi lens.

But there are numerous areas that warrant further examination

Our key high level policy and future work recommendations are:

- The Government's Business Growth Agenda (BGA) should explicitly recognise that GVC participation will be the key channel through which export gains and improvements to DVA and living standards will occur over time. New Zealand **needs a clear policy strategy to deal with the specificities of GVC dynamics.**
- To identify specific policies that will support agriculture and F&B industries' GVC participation and improved DVA, we must first **find a way to categorise the different GVCs.** We recommend future work be undertaken to map New Zealand GVC structures, perhaps using the Keane typology at the HS4 level. The next step would then be to understand which policies are most relevant to each GVC.
- Policy-makers should more explicitly **take into account the crucial role that the services sector has** in the exports of New Zealand's agriculture and F&B exports through GVCs. Indeed, lifting the productivity of the services sector is likely to improve participation in GVCs due to these strong interlinkages.
- **Innovation and industry institutions, and standards and logistics** are the key factors to consider for GVC success, based on our literature review and international comparison exercises. We suggest that business and policymakers work together to focus their attention on these areas first.
- **Placing GVC success at the core of policy development processes and business strategy** will be tough due to the complexity and heterogeneity of GVCs, and the challenges it presents for traditional ways of thinking.

Appendix A Bibliography

- 6CP N.d. Can Policy Follow the Dynamics of Global Innovation Platforms? Papers from a 6CP Conference. *In* Can Policy Follow the Dynamics of Global Innovation Platforms? P. 41. 14-15 April 2014, Stedelijk Museum 's-Hertogenbosch, the Netherlands. http://www.researchgate.net/profile/Carlos_Montalvo2/publication/273323947_Can_policy_follow_the_dynamics_of_global_innovation_platforms_Six_Countries_Programme_2014_Conference_Proceedings/links/54fecbcf0cf2741b69f15a3c.pdf#page=45, accessed April 8, 2015.
- Blyde, Juan S. 2014. What It Takes to Join an International Value Chain: The Firm-Level Evidence. *In* Synchronized Factories. Juan S. Blyde, ed. Pp. 75–104. Springer International Publishing. http://link.springer.com/chapter/10.1007/978-3-319-09991-0_4, accessed April 9, 2015.
- Cattaneo, O., G. Gereffi, S. Miroudot, and D. Taglioni. 2013. Joining, Upgrading and Being Competitive in Global Value Chains: A Strategic Framework. Availability Note: Information provided in collaboration with the RePEc Project: <http://repec.org>.
- Center for International Development, Harvard University N.d. SPS TBT Summary. Global Trade Negotiations Home Page. <http://www.cid.harvard.edu/cidtrade/issues/spstbt.html>, accessed August 27, 2015.
- Cheng, Kevin, Sidra Rehman, Dulani Seneviratne, and Shiny Zhang. 2015. Reaping the Benefits from Global Value Chains. WP/15/204. Working Paper. International Monetary Fund.
- Constantinescu, Cristina, Aaditya Mattoo, and Michele Ruta. 2015. The Global Trade Slowdown: Cyclical or Structural? Working Paper. Washington D.C., USA: World Bank.
- De Backer, Koen, and Sebastien Miroudot. 2014. Mapping Global Value Chains. Working Paper Series, 1677. Competitiveness Research Network. European Central Bank.
- Dedrick, Jason, Kenneth L. Kraemer, and Greg Linden. 2009. Who Profits from Innovation in Global Value Chains?: A Study of the iPod and Notebook PCs. Volume 19, Number 1,. Industrial and Corporate Change. Oxford University Press.
- Frankel, Susy. 2014. Emerging Regulatory Issues Intellectual Property and Global Value Chains. Volume 10, Issue 4. Policy Quarterly. Wellington N.Z.: Institute of Policy Studies.
- Humphrey, John, and Olga Memedovic. 2006. Global Value Chains in the Agrifood Sector. Working Paper. Vienna, Austria: United Nations Industrial Development Organization.
- Humphrey, John, and Hubert Schmitz. 2008. Inter-Firm Relationships in Global Value Chains: Trends in Chain Governance and Their Policy Implications. *International Journal of Technological Learning, Innovation and Development* 1(3): 258–282.
- Keane, Jodie. 2008. A “New” Approach to Global Value Chain Analysis. Working Paper, 293. Overseas Development Institute.

- Keane, Jodie. 2014. Global Value Chain Analysis. ODI Briefing 91. London: Overseas Development Institute. <http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9071.pdf>, accessed April 8, 2015.
- Low, Patrick, and Gloria O. Pasadilla. 2015. Services in Global Value Chains: Manufacturing-Related Services. APEC Policy Support Unit. Singapore: APEC.
- Low, Patrick, and Julia Tijaja. 2013. Increasing Value from Global Value Chain Participation: What Role for Industrial Policy? The Future of the World Trading System: Asian Perspectives: 55.
- Maskus, Keith. 2000. Intellectual Property Right and Economic Development.
- Ministry of Business, Innovation and Employment. 2015. National Statement of Science Investment. Wellington N.Z.: MBIE.
- Moisé, Evdokia, and Silvia Sorescu. 2015. Contribution of Trade Facilitation Measures to the Operation of Supply Chains. OECD Trade Policy Papers, No. 181. Paris, France: OECD.
- New Zealand Productivity Commission. 2012. International Freight Transport Services Inquiry. Final report. Wellington, N.Z.: New Zealand Productivity Commission.
- NZIER. 2015. Global Value Networks: How to Succeed in Business without Worrying about Scale, Distance or Thin Networks. Report to NZPECC. Wellington N.Z.: NZIER.
- NZ Productivity Commission. 2014. An International Perspective on the New Zealand Productivity Paradox. Commission Working Paper 2014/01.
- OECD n.d. Cluster Policy and Smart Specialisation <http://www.oecd.org/sti/outlook/e-outlook/stipolicyprofiles/interactionsforinnovation/clusterpolicyandsmartspecialisation.htm>, accessed July 28, 2015.
- OECD. 2014. Domestic Value Added in Gross Exports. OECD Publishing. http://www.oecd-ilibrary.org/trade/domestic-value-added-in-gross-exports/indicator/english_3959a0c6-en, accessed November 2, 2015.
- OECD. 2015a. Innovation, Agricultural Productivity and Sustainability in the Netherlands. OECD Food and Agricultural Reviews. Paris, France: OECD. <http://www.oecd.org/environment/innovation-agricultural-productivity-and-sustainability-in-the-netherlands-9789264238473-en.htm>, accessed November 2, 2015.
- OECD. 2015b Measuring Trade in Value Added: An OECD-WTO Joint Initiative - OECD. Measuring Trade in Value Added: An OECD-WTO Joint Initiative. <http://www.oecd.org/sti/ind/measuringtradeinvalue-addedanoecd-wtojointinitiative.htm>, accessed November 2, 2015.
- OECD, WTO, and World Bank, 2014, Global Value Chains: Challenges, Opportunities and Implications for Policy. Report prepared for submission to the G20 Trade Ministers Meeting Sydney, Australia, 19 July 2014.
- Simmons, Geoff. 2002. Growing Pains: New Zealand Qualitative Evidence on Hurdles to Exporting Growth. 02/10. Working Paper. Wellington N.Z.: Treasury.
- Smith, G. 2009. Interaction of Public and Private Standards in the Food Chain. OECD Food, Agriculture and Fisheries Working Papers, 15. OECD Publishing.

Woodford, Keith. 2014. Integrated Agri-Food Value Chains. <https://keithwoodford.wordpress.com/2014/06/13/integrated-agri-food-value-chains/>, accessed May 21, 2015.

Yeabsley, J. and New Zealand Institute of Economic Research. 2001. Global Player?: Benchmarking New Zealand's Competitive Upgrade. New Zealand Institute of Economic Research.

Appendix B TiVA database

Material sourced from (OECD 2015b).

The goods and services we buy are composed of inputs from various countries around the world. However, the flows of goods and services within these global production chains are not always reflected in conventional measures of international trade.

The joint OECD – WTO Trade in Value-Added (TiVA) initiative addresses this issue by considering the value added by each country in the production of goods and services that are consumed worldwide. TiVA indicators are designed to better inform policy makers by providing new insights into the commercial relations between nations.

The TiVA database includes 61 economies covering OECD, EU28, G20, most East and South-east Asian economies and a selection of South American countries. The industry list covers 34 unique industrial sectors, including 16 manufacturing and 14 services sectors. The years covered are 1995, 2000, 2005 and 2008 to 2011.

The indicators presented in the TiVA database provide insights into:

- domestic and foreign value added content of gross exports by exporting industry
- services content of gross exports by exporting industry, by type of service and value added origin
- participation in GVCs via intermediate imports embodied in exports (backward linkages) and domestic value added in partners' exports (forward linkages)
- 'global orientation' of industrial activity i.e. share of industry valued added that meets foreign final demand
- origins of value added in final demand, by source country and source industry, including the origin of value added in final consumption (by households and government) and in GFCF (investment by businesses)
- bilateral trade relationships based on flows of value added embodied in domestic final demand
- inter-regional and intra-regional relationships.
-