

Prepared by the Economic Division in Wellington.

Executive Summary

The Ministry of Foreign Affairs and Trade (MFAT) commissioned economics consultancy Sense Partners to build a model (STORM) linking international trade to industry inputs and outputs. The intent of the model and analysis is to better understand the reliance on trade, from both an export and import perspective, of different industries. The model traces this reliance to trading partner countries and by detailed product and service, and extends to links into employment and regional output within New Zealand.

This paper presents initial analysis using STORM. The intent of this paper is to:

- Provide a short overview of all industries' reliance on trade;
- Provide standalone short background briefings by industry grouping, selected trade partners, and selected regions that can feed into various Covid-19 response work streams; and
- Demonstrate the sort of analysis that can be undertaken with STORM, with a view that further, more detailed work, can then be commissioned.

Intermediate imports

The reliance on imported intermediate inputs varies considerably across industries, from as low as 2% to as high as 73%, with a national average of 14%. Manufacturing industries tend to be more reliant on imported intermediates, while services and construction are less reliant.

New Zealand's main sources of intermediate imports are similar to the main sources of imports more generally. The top four (EU, China, Australia and the US) are the same. Malaysia, the United Arab Emirates and South Korea are relatively more important as sources of intermediate inputs, while Japan is relatively less important.

More developed economies including the EU, Australia, US and Singapore tend to be relatively more important as sources of intermediate services. Depending on their reliance on cross border people movements to deliver those services, these intermediate inputs may be heavily disrupted in the short term.

Exports

New Zealand's export base is skewed towards primary products, which shows clearly in the share of gross output exported by industry – over 70% of dairy manufacturing and seafood processing, around 60% of forestry and meat manufacturing, and about half of horticultural output is exported. The other big export, tourism, mostly falls under accommodation and food services (43% exported). At the other end of the spectrum, construction and most service industries have relatively small export contributions.

The primary sector skew also shows in the regional distribution of export reliance. The share of regional gross output exported ranges from as high as 41% to as low as 10%, with more rural regions tending to have a higher share of output exported. The share of filled jobs reliant on exports follows a similar pattern.

About 494,000 filled jobs are reliant on exports, about one in four filled jobs overall. About one third of those export jobs are in services sectors, a further quarter in primary production and related manufacturing, and one tenth each in "other manufacturing" and "transport and warehousing".

Relationship between intermediate importing and exporting

Plotting import reliance against export share, three clusters emerge – primary exports which have a high export share and relatively low reliance on imports; non-primary export manufacturing, which have a moderate export share and high reliance on imported intermediates; and construction and services, which have low export share and low reliance on imported intermediates.

Future work

Part of the intent of this paper is to stimulate further analytical questions and to that end we are very interested in commissioning further analysis to align with different Covid-19 policy responses. Some immediate options include:

- Additional country profiles
- Additional region profiles
- More detailed industry profiles

The innovative linking of data also allows us to pose questions such as:

- What intermediate inputs is New Zealand most reliant on? How concentrated are our supply lines for these products?
- How do import sources vary by industry and region? Do any industries/regions have reliance on sources different to the national averages?
- How might volume or price changes for imported inputs affect domestic production, employment and regional economic activity?

The above questions could help us understand the impact if a partner country has a second infection wave or similar event i.e. which source markets do we need to monitor closely/worry about

- How many jobs are potentially at risk, by industry and region, from changes in external trading conditions.
- How many jobs are supplied by regional industries who, in aggregate, are exporting to overseas markets.

The above questions are aimed at assessing policy effectiveness – where might we get most bang for buck if targeting industries or sectors

- Which intermediate imports come through which ports/airports?

This question may assist with supply chain work and transport and infrastructure planning

- What share of intermediate inputs come from countries we have an FTA with?
- What is the average tariff rate by industry and/or region?

The above questions link domestic industry structure to trade agreement architecture

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Background and Purpose

MFAT commissioned economics consultancy Sense Partners to build a model (STORM¹) linking international trade to industry inputs and outputs. The core of the model is based on Stats New Zealand input/output tables and detailed GDP and trade data. Extensions have been made to incorporate regional perspectives, employment outcomes and business demographics. A non-technical summary of the methodology is summarised in the annex to this paper. While commissioned by MFAT, the model and underlying database has been shared with other agencies including Treasury, MBIE, MPI, MoT and the Reserve Bank for use in their own analysis and advice.

This paper presents initial analysis using STORM. The overview section presents some high level results showing the reliance of different industries on imported intermediate inputs, the main sources of these imported intermediates, and the export exposure of different industries. The remainder of the paper presents brief summaries for 12 different industry groupings that share somewhat similar characteristics when it comes to international connections, and have been aligned to different parts of the initial Covid-19 response and the eventual recovery phase (Table 1). Finally, the paper presents brief summaries on selected countries and regions.

The intent of this paper is to:

- Provide a short overview of all industries' reliance on trade in New Zealand;
- Provide standalone short background briefings by industry grouping and selected trade partners that can feed into various Covid-19 response work streams; and
- Demonstrate the sort of analysis that can be undertaken with STORM, with a view that further, more detailed work can then be commissioned.

We hope this analysis proves useful for informing Covid-19 policy responses. This analysis has been completed by the Research and Analysis Unit of the Economic Division. Advice and guidance of John Ballingall and James Hogan from Sense Partners is gratefully acknowledged.

For further information or to commission further analysis using STORM, please contact: DM-ECO@mfat.govt.nz

¹ [Sense Partners Trade Opportunities and Risks Model](#)

Table 1 – Industry aggregations used for brief summaries

Category	Industry Grouping	Industry
Key Exporters	Primary Exports - Food	AA11. Horticulture and fruit growing
		AA12. Sheep, beef cattle, and grain farming
		AA13. Dairy cattle farming
		AA14. Poultry, deer, and other livestock farming
		AA31. Fishing and aquaculture
		AA32. Agriculture, forestry, and fishing support services and hunting
		CC11. Meat and meat product manufacturing
		CC12. Seafood processing
		CC13. Dairy product manufacturing
		CC14. Fruit, oil, cereal, and other food product manufacturing
	CC15. Beverage and tobacco product manufacturing	
	Primary Exports - Other	AA21. Forestry and logging
		BB11. Mining
		CC31. Wood product manufacturing
		CC32. Pulp, paper, and converted paper product manufacturing
Essential Services	Health	QQ11. Health care and social assistance
	Essential Retail and Wholesale	FF11. Wholesale trade
		GH11. Motor-vehicle and motor-vehicle parts and fuel retailing
		GH12. Supermarket, grocery stores, and specialised food retailing
	Transport and Warehousing	II11. Road transport
		II12. Rail, water, air, and other transport
		II13. Postal, courier, transport support, and warehousing services
	Utilities	DD11. Electricity and gas supply
		DD12. Water, sewerage, drainage, and waste services
		JJ11. Information media services
		JJ12. Telecommunications, internet, and library services
	Recovery Phase	Non-Primary Manufacturing
CC41. Printing		
CC51. Petroleum and coal product manufacturing		
CC52. Basic chemical and chemical product manufacturing		
CC53. Polymer product and rubber product manufacturing		
CC61. Non-metallic mineral product manufacturing		
CC71. Primary metal and metal product manufacturing		
CC72. Fabricated metal product manufacturing		
CC81. Transport equipment manufacturing		
CC82. Machinery and other equipment manufacturing		
CC91. Furniture and other manufacturing		
Construction		EE11. Building construction
		EE12. Heavy and civil engineering construction
		EE13. Construction services
Education		PP11. Education and training
Other Retail		GH13. Other store-based retailing and non-store retailing
Services - Private		GH21. Accommodation and food services
		KK11. Finance
		KK12. Insurance and superannuation funds
		KK13. Auxiliary finance and insurance services
		LL11. Rental and hiring services (except real estate)
		LL12. Property operators and real estate services
		MN11. Professional, scientific, and technical services
		MN21. Administrative and support services
		RS11. Arts and recreation services
		RS21. Other services
Services - Public		OO11. Local government administration
		OO21. Central government administration, defence, and public safety

Note: The aggregation of industry's into Industry Groupings is solely for analytical purposes.

Overview

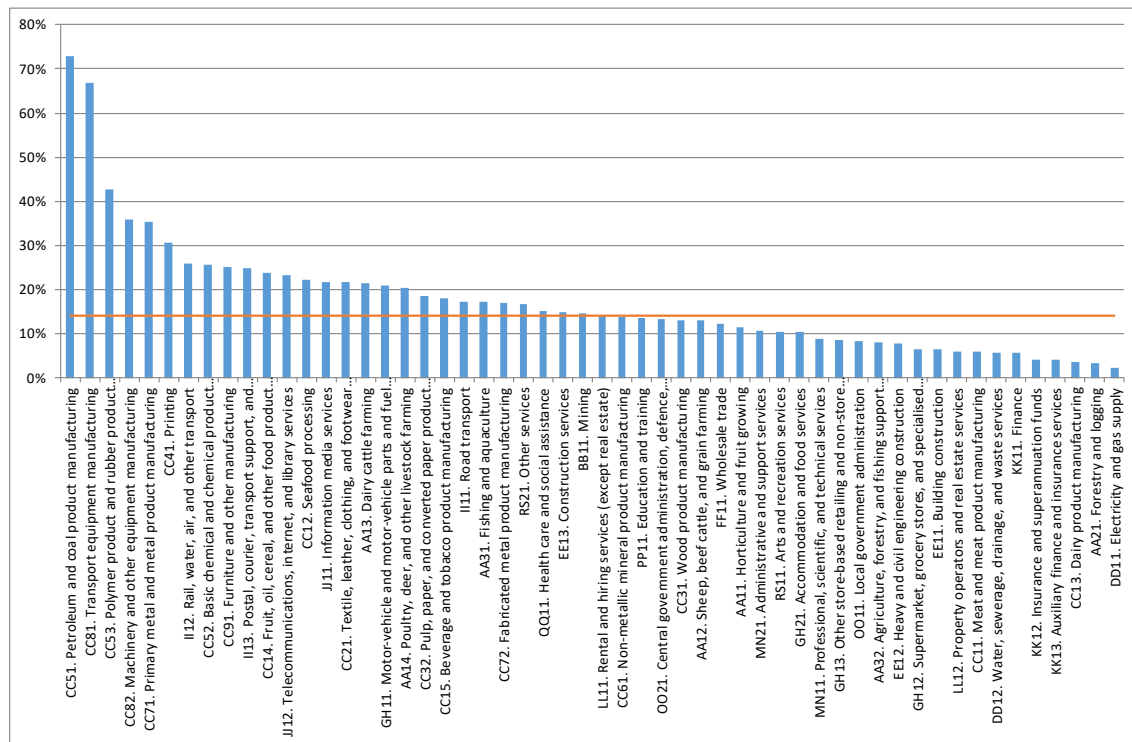
Reliance on Imported Intermediate Inputs by Industry

Imports to New Zealand for the year to June 2019 totalled \$84 billion. Just over half of these imports (\$45 billion) are estimated to be intermediate inputs, both goods and services, which are used in the production process by different industries. This report focusses on these intermediate inputs. A further \$24 billion of imports went into final consumption expenditure, mostly by households and government, and \$13 billion were capital goods used for gross fixed capital formation (investment).

The reliance on imported intermediate inputs varies considerably across industries, from as low as 2% for electricity and gas supply to as high as 73% for petrol and coal manufacturing, with a national average of 14% (Figure 1). Unsurprisingly, manufacturing industries tend to be most reliant on imported intermediate inputs, with all except dairy, meat and wood product manufacturers above the national average. Transport, information media and telecommunications are another key block with high reliance on imports. Finally, some forms of agriculture (dairy, poultry, deer and other livestock farming) and fishing also have a high reliance on imports.

Conversely, services industries tend to have less reliance on imported intermediate inputs, as does construction.

Figure 1 – Import share of intermediate inputs by industry

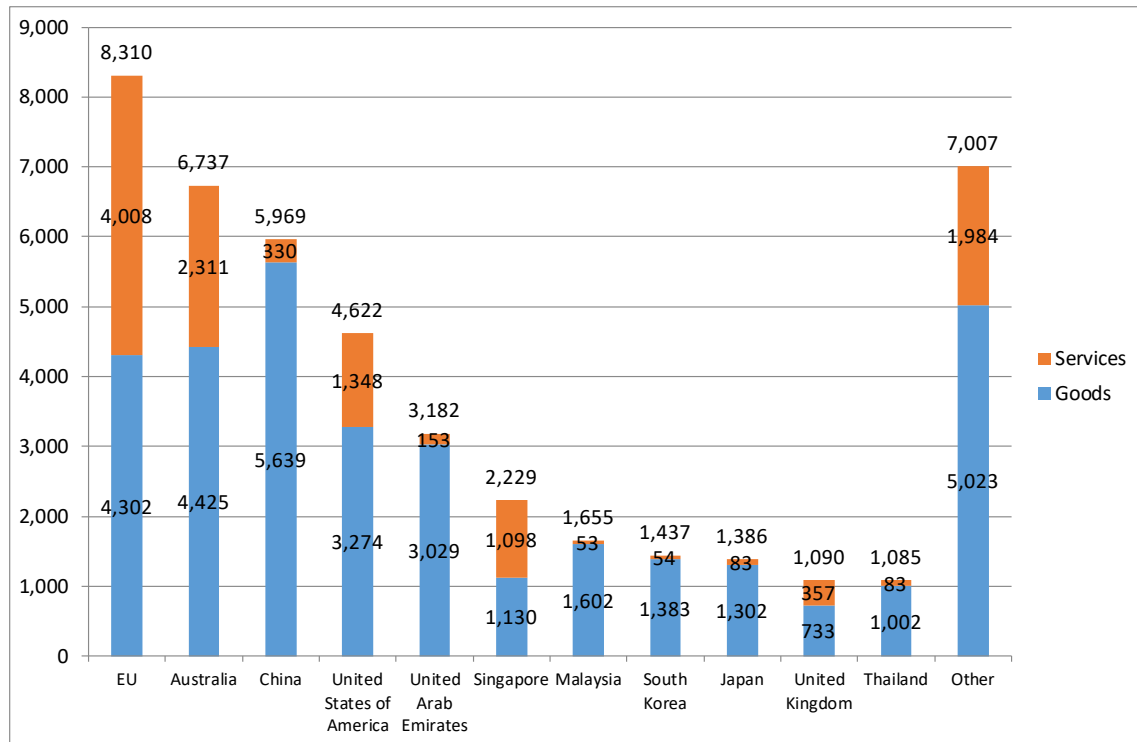


Source: Sense Partners, Stats NZ

Main Sources of Intermediate Inputs by Industry

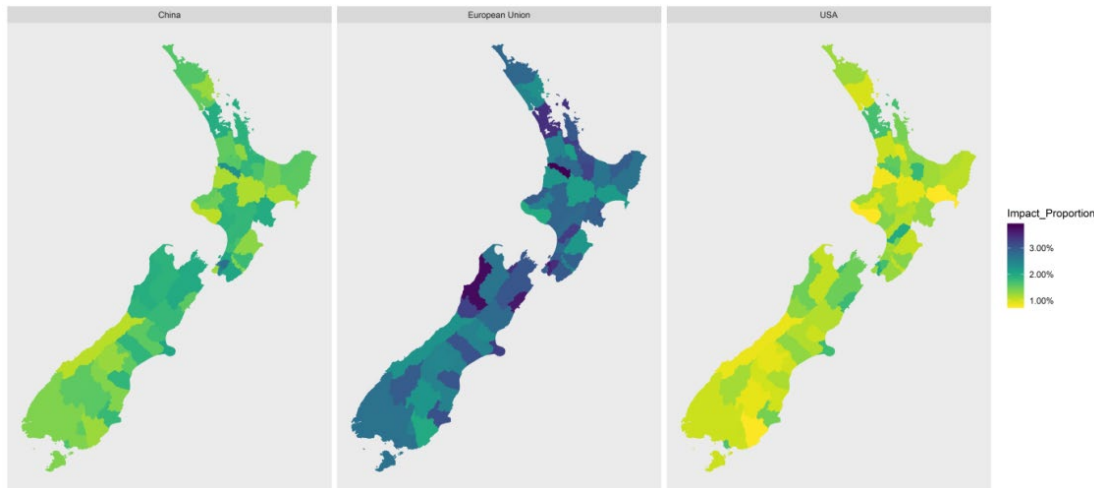
New Zealand’s main sources of intermediate imports are similar to the main sources of imports more generally. The top four (EU, China, Australia and the US) are the same. Malaysia, the United Arab Emirates and South Korea are relatively more important as sources of intermediate inputs, largely reflecting their key roles in supplying crude oil and refined fuel. Japan is relatively less important as an intermediate input supplier, playing a more important role as a vehicle supplier (vehicles are usually capital or consumer goods depending on their final use). More developed economies including the EU, Australia, US and Singapore tend to be relatively more important as sources of intermediate services; and, depending on their reliance on cross border people movements to deliver those services, these inputs may be heavily disrupted in the short term. Figure 3 demonstrates the regional dependence on three of the larger sources of intermediate inputs – EU, China and US.

Figure 2 – Main sources of intermediate inputs (year to June 2019, \$ millions)



Source: Sense Partners, Stats NZ

Figure 3 – Intermediate inputs share from major sources by region

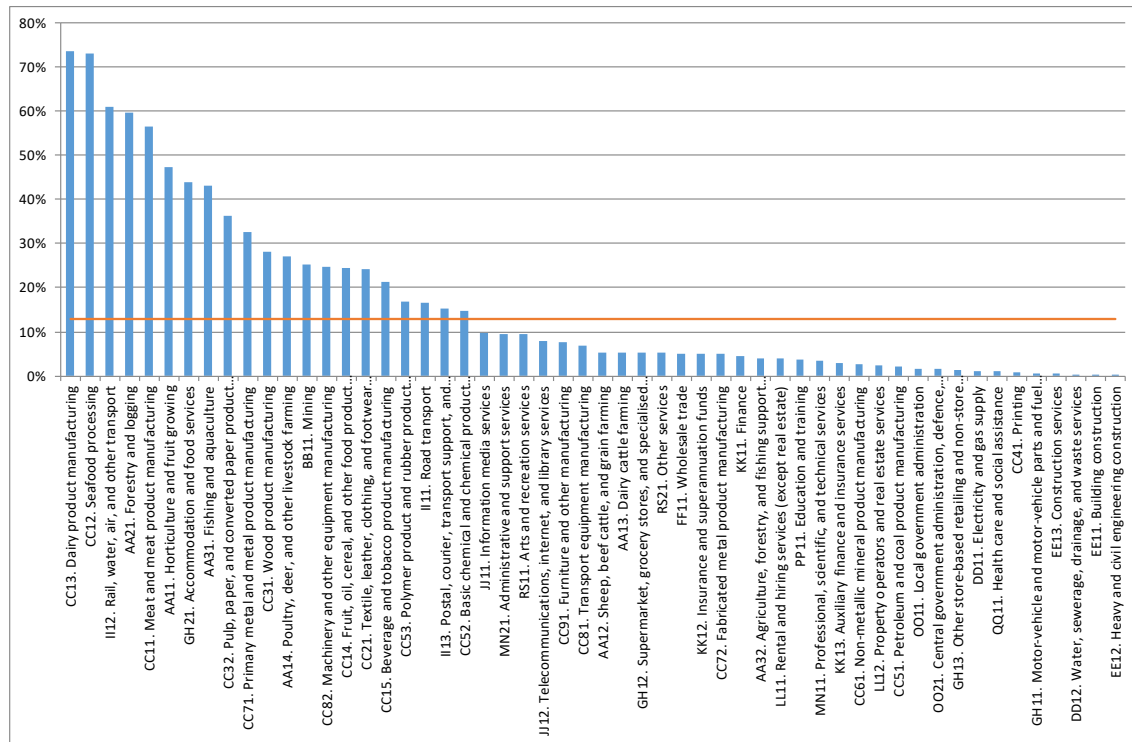


Source: Sense Partners, Stats NZ

Export Exposure by Industry

New Zealand’s export base is skewed towards primary products, which shows clearly in the share of output exported by industry – over 70% of dairy manufacturing and seafood processing, around 60% of forestry and meat manufacturing, and about half of horticultural output is exported (Figure 5). The other big export, tourism, mostly falls under accommodation and food services, where 43% of output is exported. Relatively high shares of other manufacturing industries are also exported. Finally, logistics is a critical enabler of these exports, with a large share (61%) of rail, water, air, and other transport output ultimately attributable to exports. Road transport and warehousing also have non-trivial amounts of output attributable to exports. At the other end of the spectrum, construction and most service industries have relatively small export shares.

Figure 5 – Export share of gross output by industry



Source: Sense Partners, Stats NZ

Note: Retail and wholesale margins have been deducted from exports

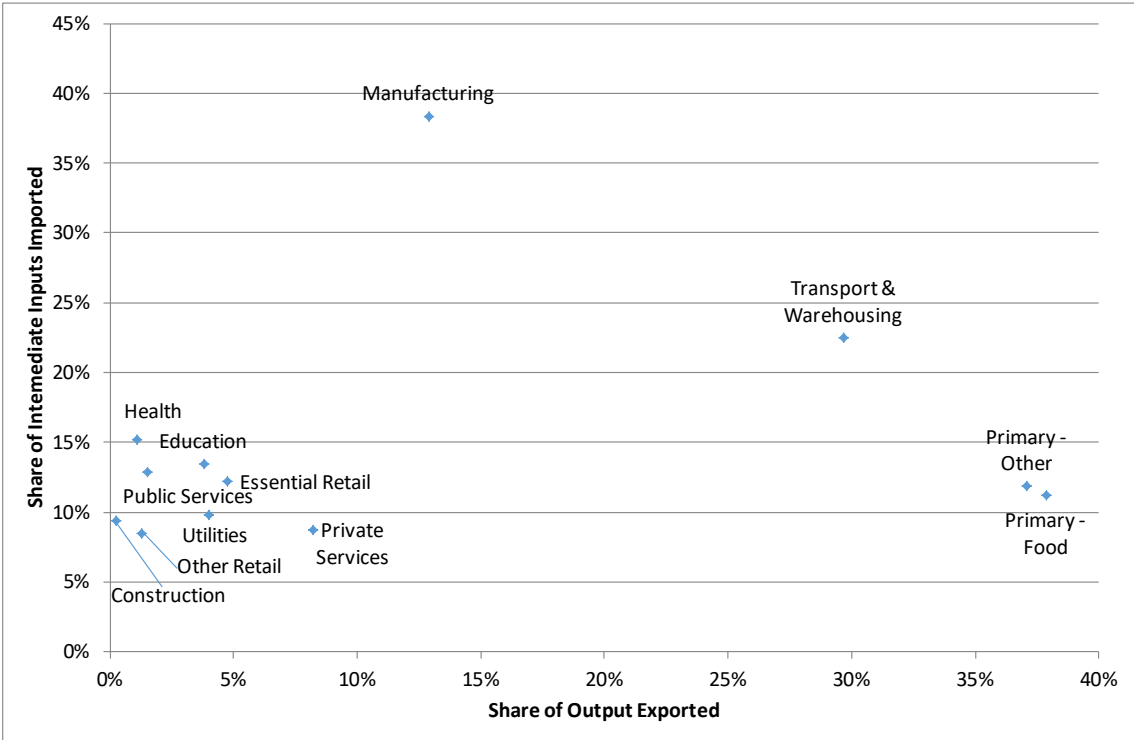
Figure 6 shows these trends even more clearly based on the slightly aggregated industry groupings we have adopted. Essentially, three clusters emerge – primary exports which have a high export share and relatively low reliance on imports; non-primary export manufacturing which have a moderate export share and high reliance on imported intermediates; and retail, construction and services which have low export share and low reliance on imported intermediates. Transport and warehousing, a critical enabler of the export-oriented primary and manufacturing clusters, sits somewhere between these two clusters.

About 494,000 filled jobs, one in four, are dependent on exports (Figure 7).² About one third of those export jobs are in the services sector, a further quarter in primary production and related manufacturing, and one tenth each in “other manufacturing” and “transport and warehousing”.

² STORM analysis uses the Linked Employer-Employee Data (LEED) filled jobs measure. This is roughly equivalent to the Household Labour Force Survey (HLFS) “Paid Employee” measure, which makes up around 80% of total HLFS employment. Ministers and MFAT commonly quote an export jobs figure (currently around 620,000) that is based on total HLFS employment. The HLFS estimate includes self-employed

The primary sector skew also shows in the regional distribution of export reliance. The share of regional gross output exported ranges from as high as 41% to as low as 10%, with more rural regions tending to have a higher share of output exported. The share of filled jobs reliant on exports follows a similar pattern.

Figure 6 – Intermediate input reliance and export share of gross output

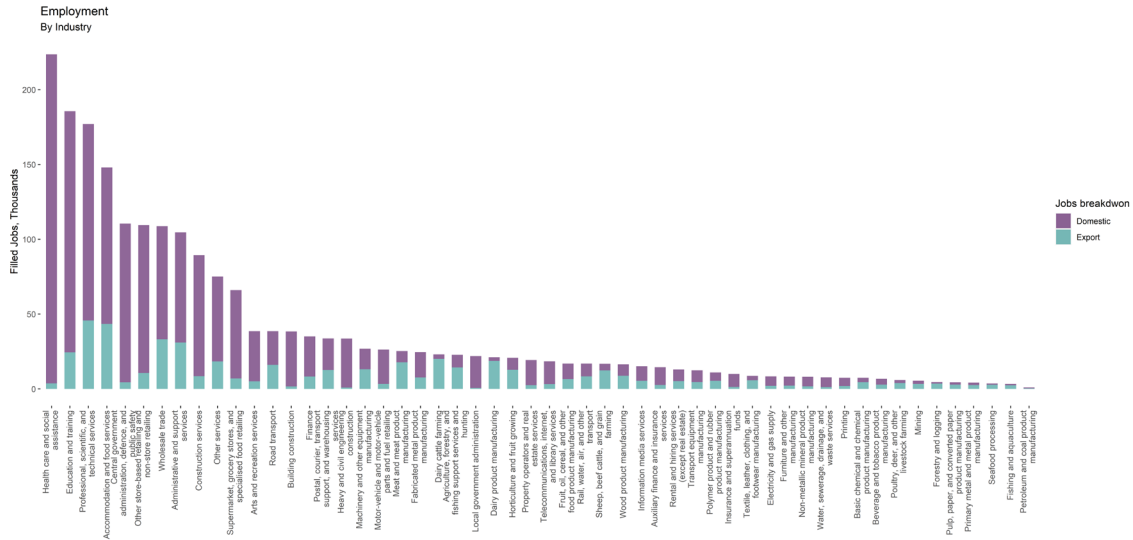


Source: Sense Partners, Stats NZ

Note: Retail and wholesale margins have been deducted from exports

and employers (including owner-operators), amongst others, as well as those in paid employment (or filled jobs) in the export jobs estimate. Allowing for the different measurement definitions, the two export jobs estimates are consistent.

Figure 7 – Filled jobs by high level industry groupings



Source: Sense Partners, Stats NZ

Industry Summaries

Primary Exports - Food

Key Points

- The primary sector³ is important to New Zealand, contributing to 10% of GDP and 8% of employment
- This sector is export focused with 39% of gross output exported, but uses relatively few imported intermediate inputs
- Key import products include palm kernel expeller, medicines/vaccines, and fertilizer with around 12% of total intermediate inputs being imported. Most imported intermediate inputs in this industry are from developed countries, with China, Malaysia, and Indonesia being the main exceptions.

Insights

The primary sector plays an important role in New Zealand by not only providing food but also accounting for 10% of GDP and 8% of national employment. Employment and GDP are spread around the country with Auckland playing a large role. Auckland is also more reliant on imports for intermediate consumption.

About \$6.2 billion of imported goods and services are used as intermediate inputs into primary food exports sector, with the larger shares of these going to dairy cattle farming (\$1.4 billion) and Fruit, oil, cereal, and other food product manufacturing (\$1.3 billion). About 12% of intermediate inputs are imported.

Imports for pastoral farming account for the majority of imported goods, which include various forms of fertilizer, feed imports, fuel, animal medication, and herbicides. These inputs do vary for non-pastoral based subsectors such as fruit, oil, cereal, and other food manufacturing, and tobacco and beverage manufacturing.

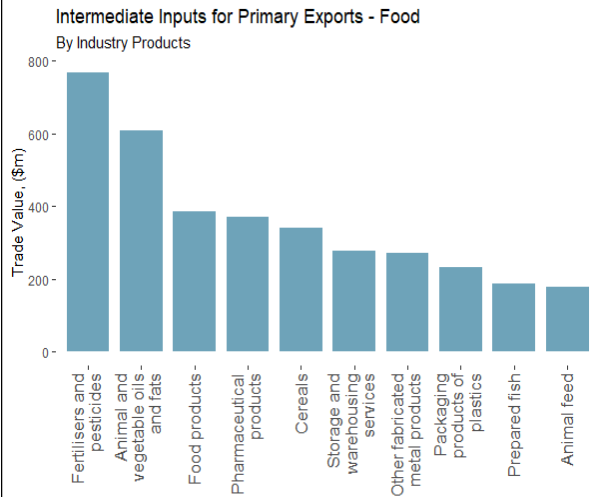
Around 69% of imported intermediate goods come from the top 10 import source countries, with the exception of China for fertilizer, and Malaysia and Indonesia for PKE. For additional inputs in other food production imports are sourced from a vast array of countries, reflecting the diverse nature of product inputs. The top four sources alone (EU, Australia, China, US) account for over half of intermediate inputs.

New Zealand's food export and services destinations are similar to its import source countries, with the top ten export partners accounting for around 50% of exports with the top three going to China (21%), Australia (17%), and the US (11%). If only exports of goods are examined, China accounts for 27%. This data is based on the year ended June 2019, and reflects growth in demand for protein to replace the pork lost as a result of African Swine Fever (ASF).

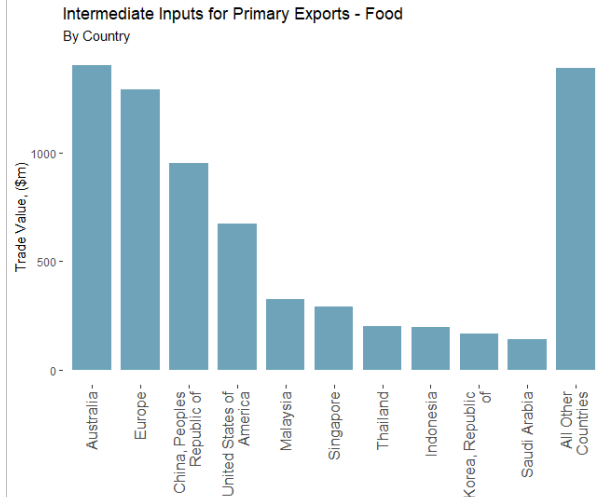
About 166,000 filled jobs are in the primary sector, with 115,000 (70%) of these jobs created through exporting. Given the essential nature of the industry and its importance for exports, significant job losses in these industries as a result of COVID-19 would appear unlikely. However, the severe drought in parts of the country is putting parts of the sector under pressure.

³ Industries covered – AA11. Horticulture and fruit growing, AA12. Sheep, beef cattle, and grain farming, AA13. Dairy cattle farming, AA14. Poultry, deer, and other livestock farming, AA31. Fishing and aquaculture, AA32. Agriculture, forestry, and fishing support services and hunting, CC11. Meat and meat product manufacturing, CC12. Seafood processing, CC13. Dairy product manufacturing, CC14. Fruit, oil, cereal, and other food product manufacturing, CC15. Beverage and tobacco product manufacturing.

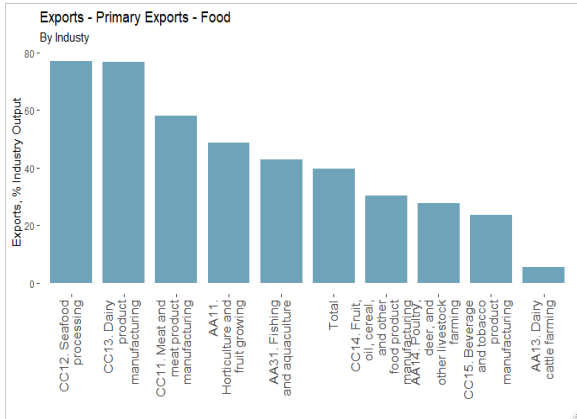
Key Intermediate Inputs



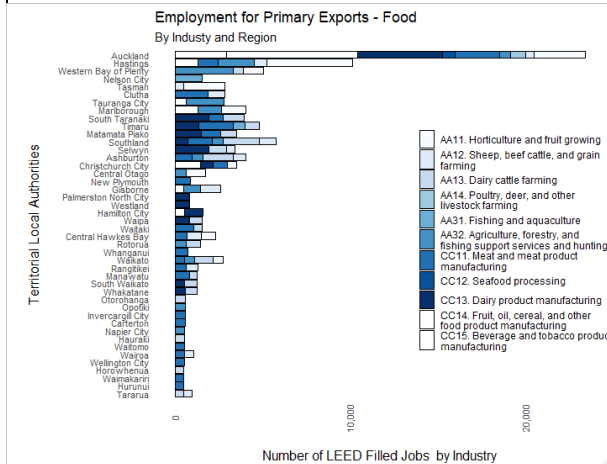
Key Import Sources



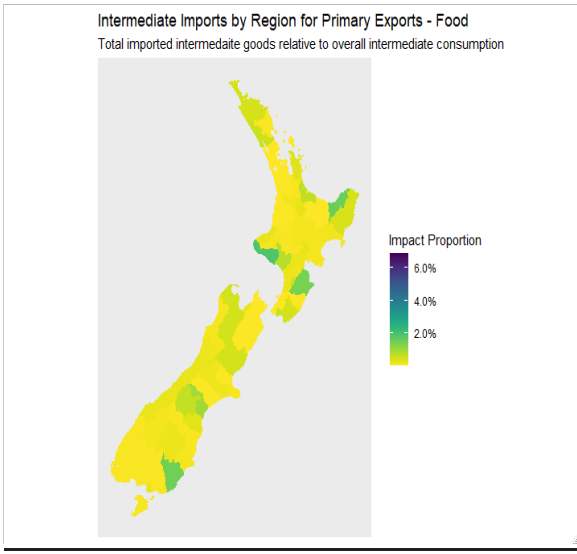
Share of Output Exported



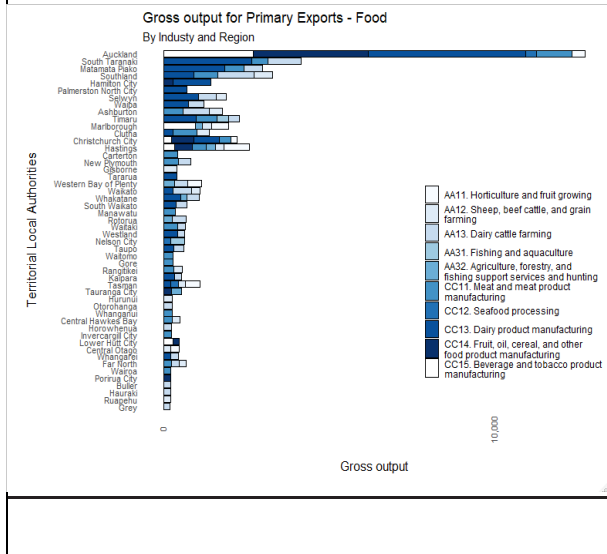
Employment



Regional Import Concentration



Regional Breakdown



Source: Sense Partners, Stats NZ

Primary Exports - Other

Key points

- The primary exports 'other' sector accounts for approximately 3% of GDP and around 31,000 jobs, or 1.5% of the national total
- Approximately 15% of the sector's intermediate inputs are imported, with a particular dependence on Australia, China, the USA and Singapore
- The sector also has a high dependence on exports with approximately 38% of its output being sold abroad, almost the entirety of which is physical goods requiring operational freight services (primarily sea freight)

Insights

The collection of industries⁴ in this sector collectively account for approximately 3% of GDP and around 31,000 jobs, or 1.5% of the national total. About \$1.6 billion of intermediate inputs in the 'other' primary export sector are imported from abroad. The majority of this goes to the pulp, paper and wood product manufacturing industry, which accounts for around 65% of the sector overall. Mining and oil and gas extraction account for a further 20% of these imports.

Approximately 15% of the sector's intermediate inputs are imported. These imports are largely comprised of transport, logistics and storage on the services side, and chemicals, machinery, and material inputs on the goods side. These imports are biased overall towards goods, which account for some 66% of the total.

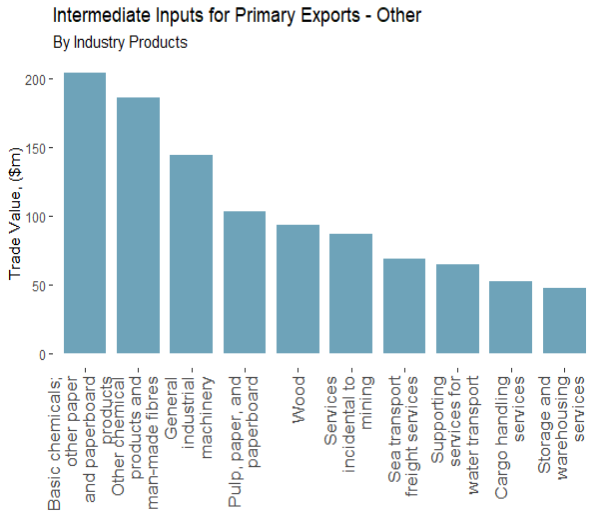
EU is the largest source of intermediate imports in the sector (\$378 m), followed by Australia (\$269 m), China (\$252 m), the USA (\$174 m), and Singapore (\$112 m). Looking at goods specifically, China (\$234 m) is the dominant provider, while EU and Australia (both \$167 m) and the USA (\$121 m) also comprise large shares. EU (\$211 m) is the largest source of service imports, followed by Australia (\$102 m), Singapore (\$64 m), and the USA (\$54 m).

The sector has a relatively high dependence on exports with approximately 38% of its output being sold abroad. In addition to this exposure, the composition of the sector's exports (98% goods) means it is highly reliant on operational transport services to get its products to market. However, as this is likely by way of sea freight, the sector might be able to avoid some of the transport issues that have affected higher value sectors reliant on air travel, which has been severely disrupted in the wake of Covid-19.

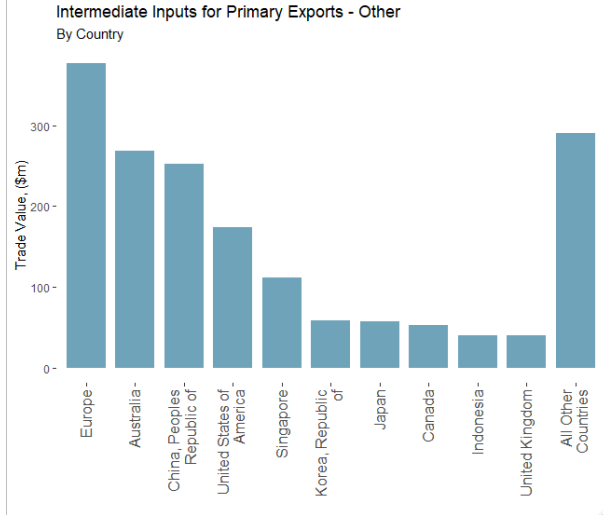
Export volumes across these industries are particularly concentrated in Auckland and New Plymouth, with Rotorua and Christchurch also accounting for large shares. This is roughly the same for employment, with the exception of New Plymouth, which accounts for a much smaller share of total employment than it does for overall output. This reflects the lower labour intensity of the oil and gas industry in comparison with forestry, pulp and paper. This sector provides about 31,000 jobs, of which about 18,600 (60%) are linked to exports.

⁴ The 'other' primary exports sector includes: AA21. Forestry and logging, BB11. Mining, CC31. Wood product manufacturing, and CC32. Pulp, paper, and converted paper product manufacturing.

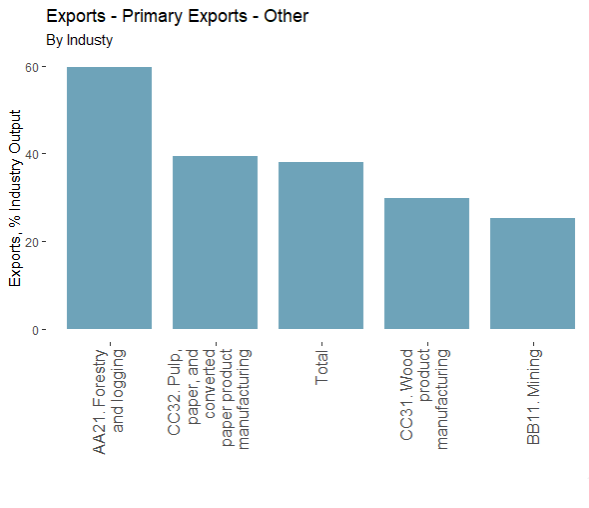
Key Intermediate Inputs



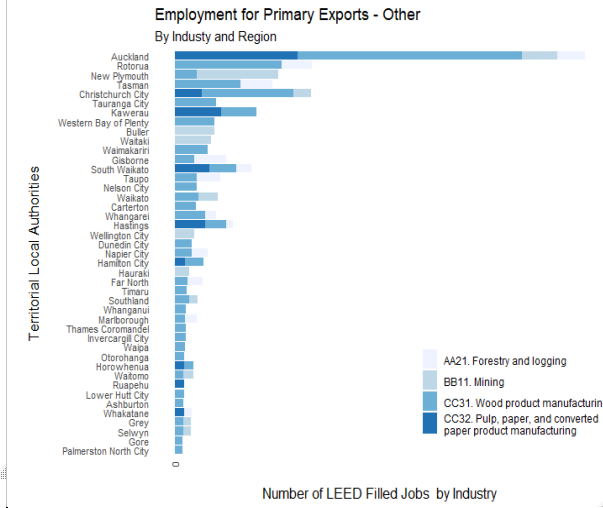
Key Import Sources



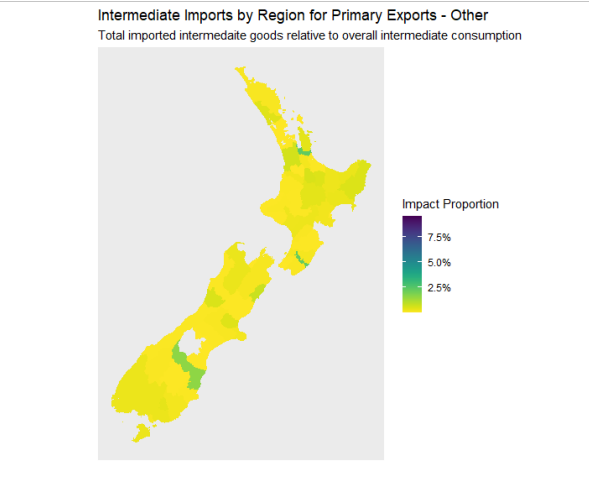
Share of Output Exported



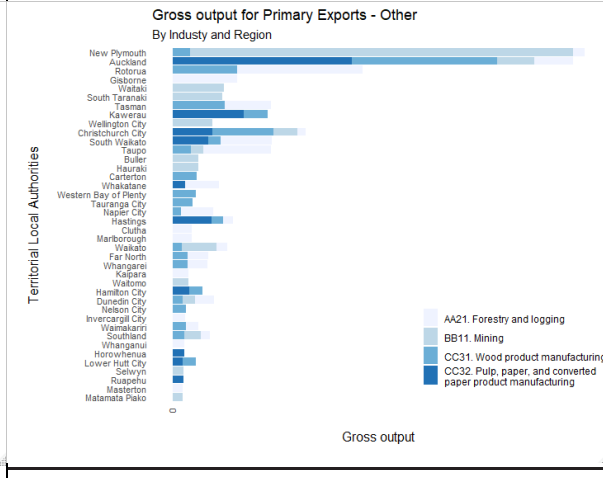
Employment



Regional Import Concentration



Regional Breakdown



Source: Sense Partners, Stats NZ

Health Care and Social Assistance

Key Points

- About 15% of intermediate inputs into the Health Care and Social Assistance industry are imported
- The range of intermediate inputs is diverse, with medical equipment and instruments, medicines and vaccines, artificial parts, and blood the most important
- Most imported intermediate inputs in this industry are from developed countries, with China the main exception

Insights

The Health Care and Social Assistance industry (QQ11. Health care and social assistance) makes up about 7% of GDP. Approximately \$1.6 billion of imported goods and services are used as intermediate inputs into the industry, with the bulk of these going to hospitals (\$0.9 billion) and other health care services (\$0.5 billion). About 15% of intermediate inputs are imported.

As might be expected given the complexity of the industry and the services provided within it, the range of intermediate inputs is very large and diverse. Unsurprisingly, medical equipment and instruments, medicines and vaccines, artificial parts, and blood dominate.

Over four fifths of imported intermediate goods come from the top 10 import source countries, with most of these being developed countries, reflecting the relatively sophisticated nature of the products being imported. The top three sources alone account for around half of intermediate inputs into the Health Sector.

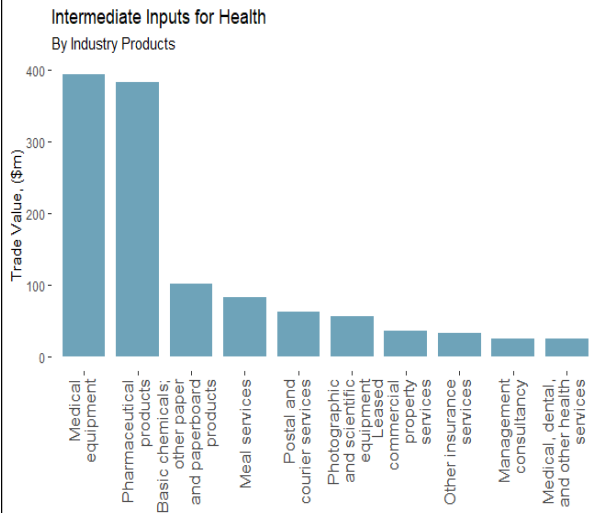
New Zealand has trade agreements with five of the top 10 import source countries (no trade agreements with the US and EU are the main drivers of this relatively low coverage). Imported services are even more concentrated, with a similarly low coverage by existing trade agreements.

Separate analysis has identified that New Zealand imports about \$1.2 billion of Covid-19 related products (based on WCO definitions). Not all of this will go into the healthcare industry e.g. some PPE is used in food manufacturing processes. The source for these products is similar to those noted in the preceding paragraph, although the greater weighting towards PPE and some cleaning products means that there are more developing countries involved (notably Mexico and Malaysia).

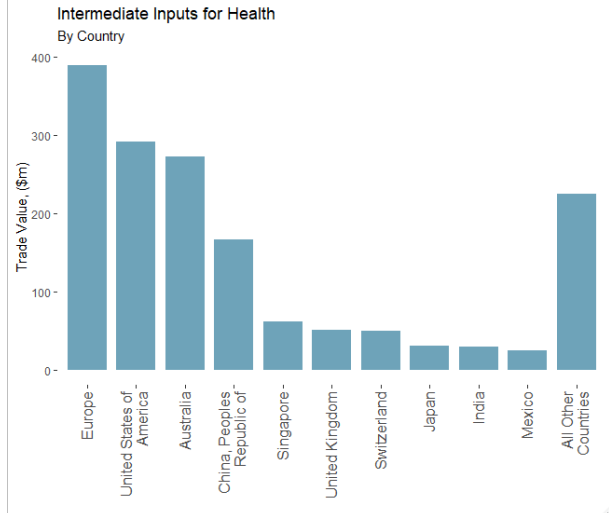
About 224,000 people (11% of total filled jobs) are employed in the Health Care and Social Assistance industry, of which only a small amount (3,800 jobs) are linked to the export sector. Given the nature of the industry (with a high share of public funding) and its importance in dealing with Covid-19, significant job losses in this industry would appear unlikely .

Regional employment and output is distributed broadly in line with the overall population.

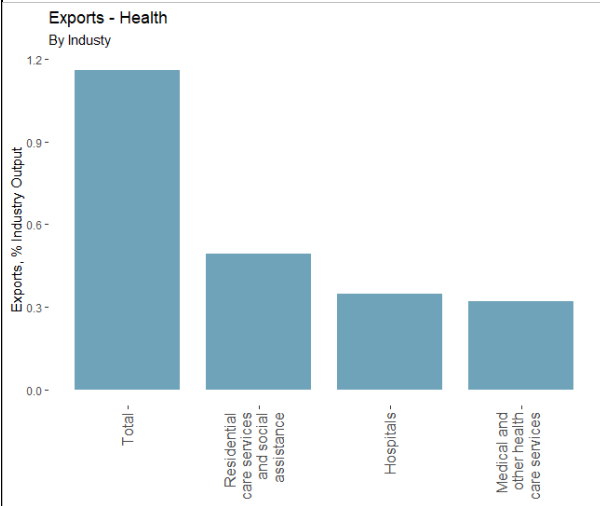
Key Intermediate Inputs



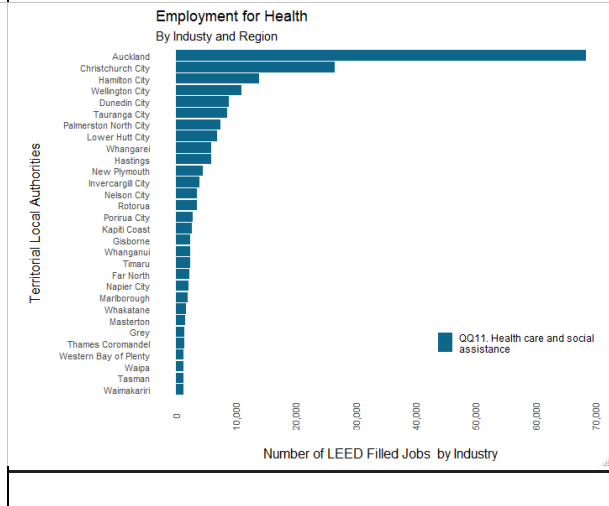
Key Import Sources



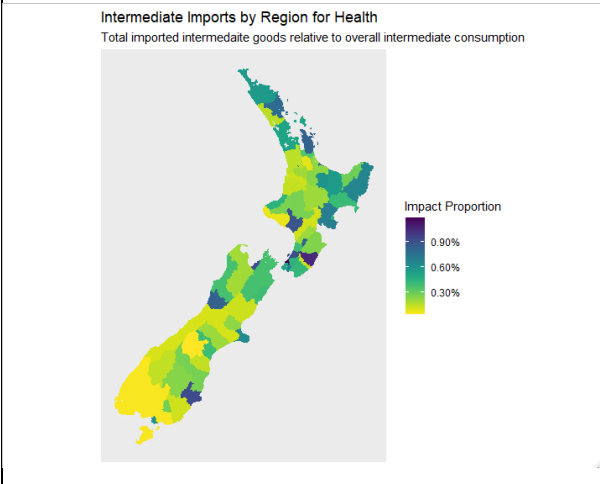
Share of Output Exported



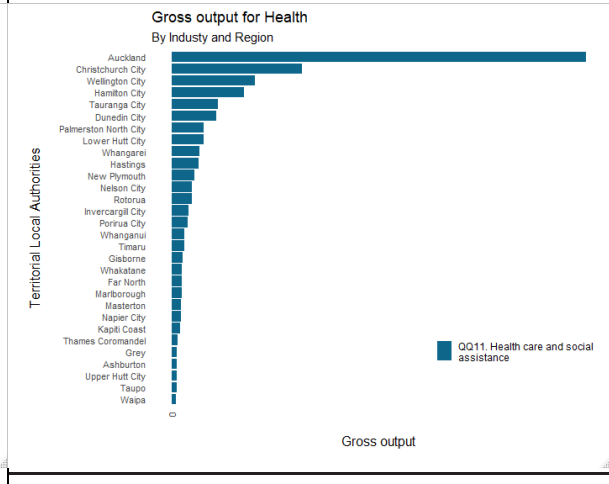
Employment



Regional Import Concentration



Regional Breakdown



Source: Sense Partners, Stats NZ

Essential Retail and Wholesale

Key Points

- About 13% of the retail sector's intermediate inputs are imported and around 5% of its output is exported
- The range of exported products is diverse and biased towards services
- Key export destinations for the sector are Australia, Europe and China

Insights

Collectively these industries⁵ make up 8% of GDP and within the context of Covid-19 alert levels are largely considered 'essential'. A key challenge for this sector will be maintaining the links required to service the market. Just over 5%⁶ of the industry's total gross output is exported.

Across the sector, \$2.2 billion worth of imports are used as intermediate inputs, 55% of which are goods with the remainder being services. About 13% of intermediate inputs are imported overall, including large amounts of transport services, general industrial machinery and food products. These imports are disproportionately used in the transportation of wholesale and retail trade.

It is worth noting that most of the \$24 billion of imports used in final consumption by households will be sold via the various retail industries. However, the STORM model does not attribute final consumption imports to an industry.

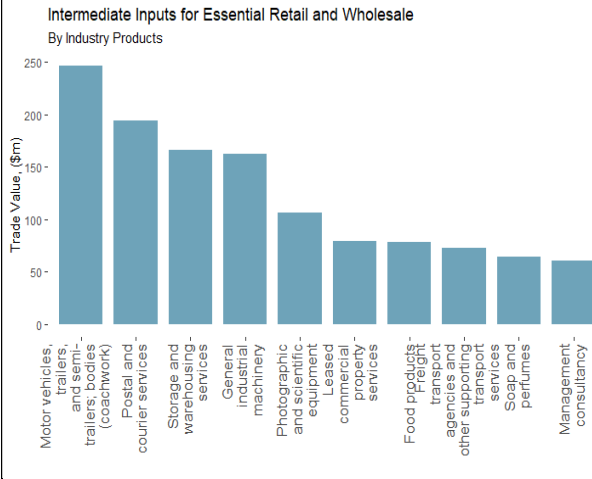
The key countries that these imports originate from are EU, Australia, China, and the USA. The top ten countries we import from overall make up over three quarters of total imported intermediate goods for this industry. The source of exports for essential and wholesale trade is mainly to Australia (\$358 million), China (\$264 million) and US (\$234 million).

The essential retail and wholesale industry employs about 200,000 people, which makes up some 10% of New Zealand's total filled jobs. About 44,000 (22%) of these jobs are linked to exports. In terms of regional employment, Auckland and Christchurch make up just over 50% of filled jobs within the sector. Similarly, Auckland, Christchurch and Wellington contribute the most to gross output for the essential and wholesale industry.

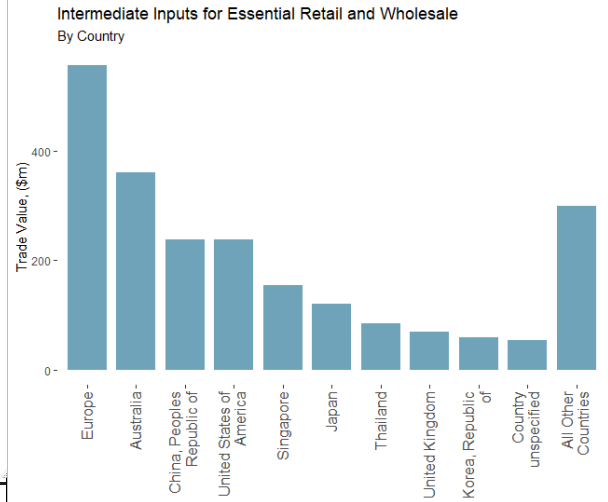
⁵ FF11. Wholesale trade, GH11. Motor-vehicle and motor-vehicle parts and fuel retailing, GH12. Supermarket, grocery, and specialised food retailing.

⁶ After removing the wholesale and retail margins, otherwise exports were overstated (at 45%).

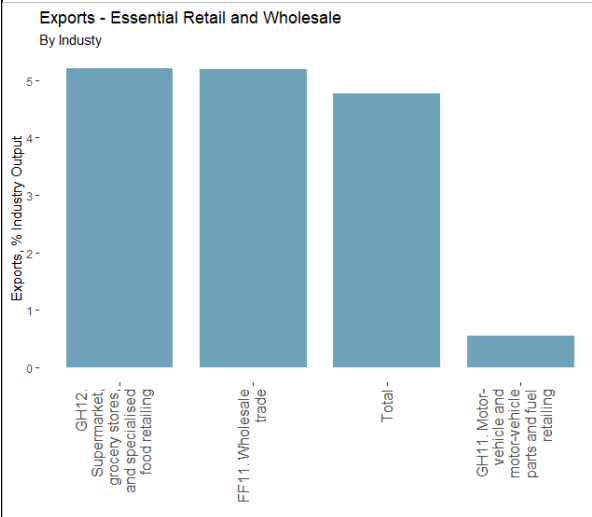
Key Intermediate Inputs



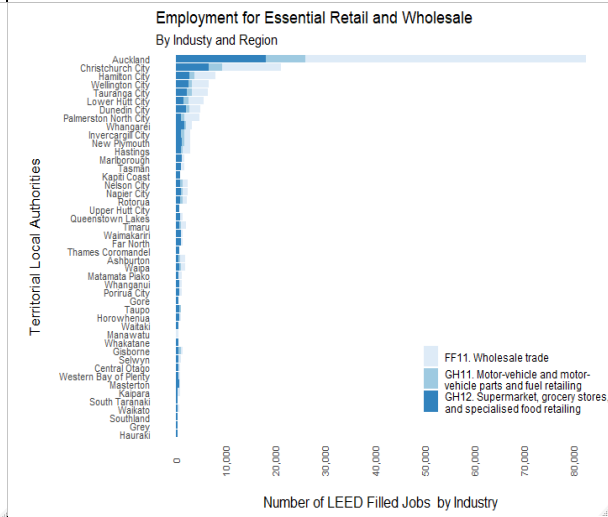
Key Import Sources



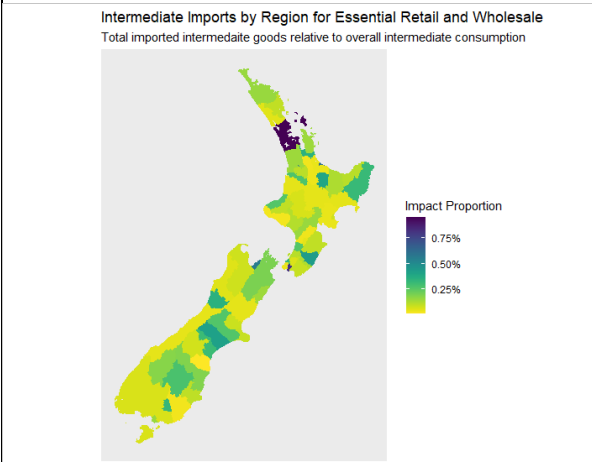
Share of Output Exported



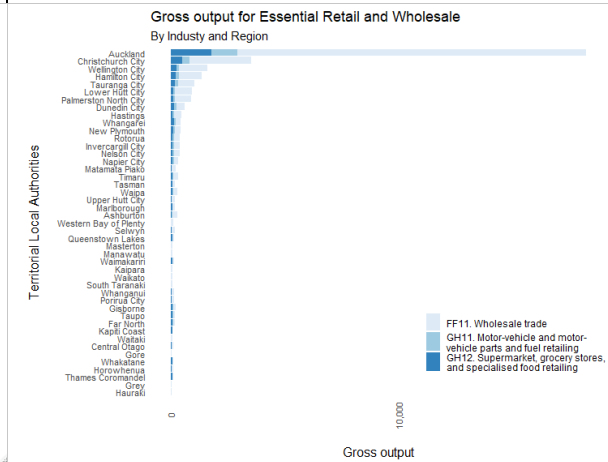
Employment



Regional Import Concentration



Regional Output



Source: Sense Partners, Stats NZ

Transport and Warehousing

Key Points

- Transport and warehousing account for around 5% of GDP and 4% of national employment
- Approximately 22% of intermediate inputs are imported while around 30% of outputs are exported
- Imports are dominated by services, which comprise roughly 60 percent of the total

Insights

Transport and warehousing⁷ account for around 5% of GDP and 4% of national employment. Approximately 30% of the sector's output is exported and 22% of total intermediate inputs are imported. This sector's employment and output are centralised in major city centres.

These industries are net exporters of services but net importers of goods. Over 50% of the *goods* imported for these industries are petroleum and petroleum based products. Rubber for tires is another significant input. Other key intermediate products include vehicles and plastic articles. The top 10 import sources account for over three quarters of imported intermediate goods and services. The top three sources (Europe, Singapore and Australia) account for over half of the sector's inputs, collectively accounting for \$1.9 billion worth of imports.

By and large, these industries were considered essential under the level four lockdown and mostly remained in operation. The three industries in this sector cover air and space transport, postal and courier services, rail transportation, road transportation, transport support services, and warehousing and storage services.

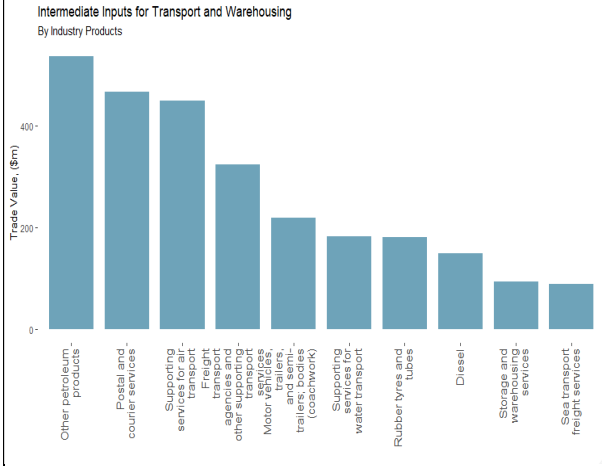
One key challenge for these industries in the recovery period will be variability in the price and availability of intermediate inputs that are imported. This will be dependent on oil prices and exchange rate fluctuations. As long as international travel is prohibited, it is likely export revenue from services will be negatively affected.

Key export markets for this sector are Australia, Europe, and the United States. The main goods products exported are waste products, aluminium, copper, paper and plastic, all of which are associated with the road transport sector.

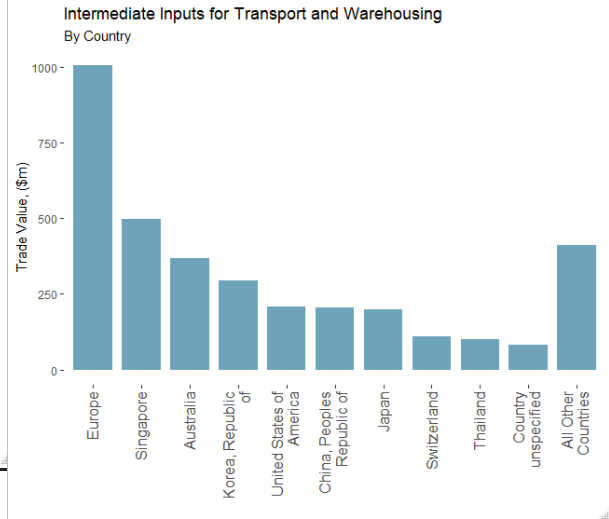
Employment for this industry is about 90,000, which is about 4% of total filled jobs. This sector has some export exposure, with about 37,000 jobs related to exports.

⁷ Industries covered – I11. Road transport, I12. Rail, water, air, and other transport, I13. Postal, courier, transport support, and warehousing services.

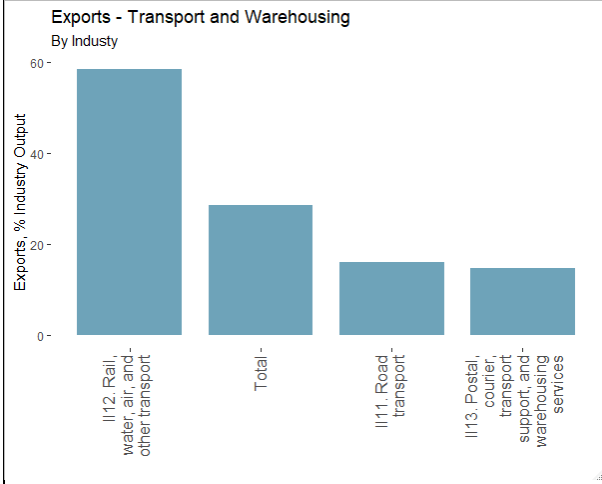
Key Intermediate Inputs



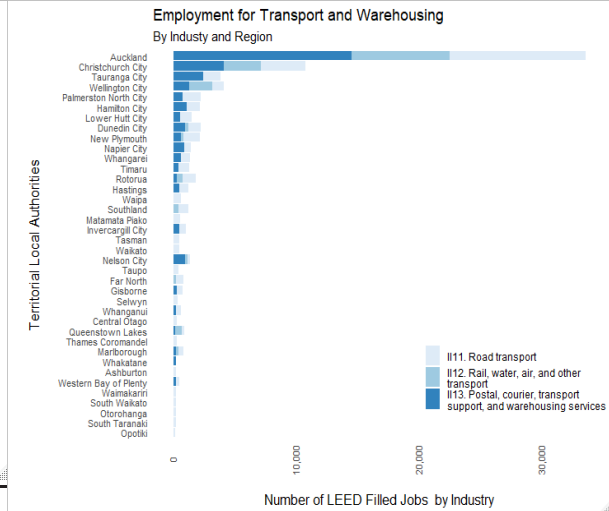
Key Import Sources



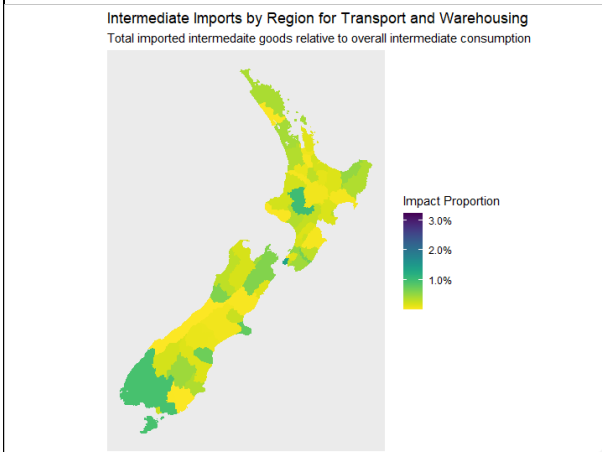
Share of Output Exported



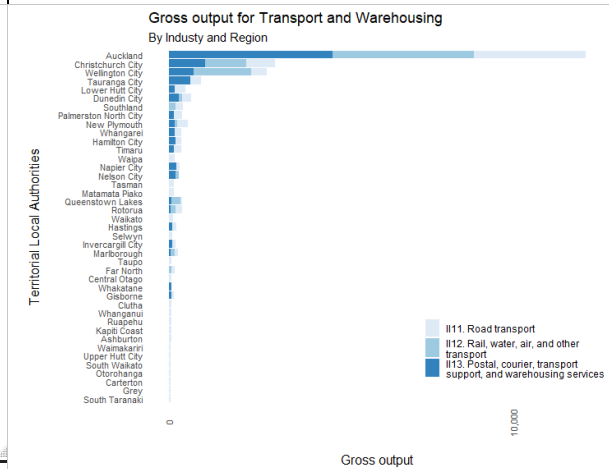
Employment



Regional Import Concentration



Regional Breakdown



Utilities

Key Points

- The utilities sector accounts for around 6% of GDP and 2.4% of all jobs
- 11% of the sector's intermediate inputs are imported, primarily from developed countries such as Australia, Europe and the USA, but also from China
- The sector has a low export dependency, sending only 4% of its output directly offshore, almost all of which is comprised of services (93%)

Insights

The utilities sector⁸ as a whole accounts for some 6% of New Zealand's GDP and imports approximately \$2 billion worth of intermediate goods and services. This accounts for around 10% of the sector's intermediate inputs overall.

These imports are primarily directed towards telecommunications, which account for nearly half of the sector's intermediate imports. TV and film production, broadcasting, and electricity generation are also key, but comparatively much smaller consumers of intermediate imports within the sector.

Intermediate imports are tilted towards services across the sector as a whole, which account for \$1.2 billion (approx. 60%) and include a significant amount of media content, IP licensing, and telecommunication services. Goods account for approximately \$0.8 billion and include electronic goods, chemicals and production materials.

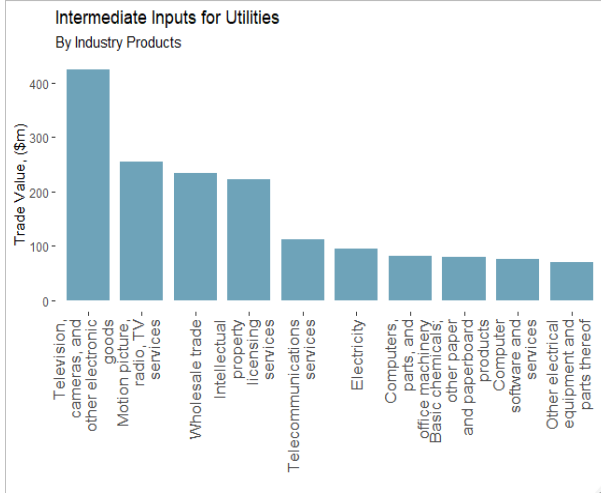
These imports are primarily sourced from Europe (\$571 m), China (\$392 m), Australia (\$322 m) and the United States (\$237 m). In the case of goods imports, Viet Nam (\$68 m) is also a major supplier, sitting well behind China (\$374 m) but ahead of Australia (\$63 m). Service imports on the other hand are dominated by EU (\$519 m), Australia (\$259 m), and the US (\$192 m).

With regard to exports, the sector sells approximately 4% of its output directly offshore. This is relatively low compared to other sectors and suggests the sector would be fairly resilient to fluctuations in overseas demand. A higher share of the sector's output is indirectly exported, embedded in other exported goods and services. (This effect is not picked up by STORM, but Stats NZ input-output tables suggest the figure is about 23%). This industry employs about 50,000 people, with 12,000 filled jobs related to its exports.

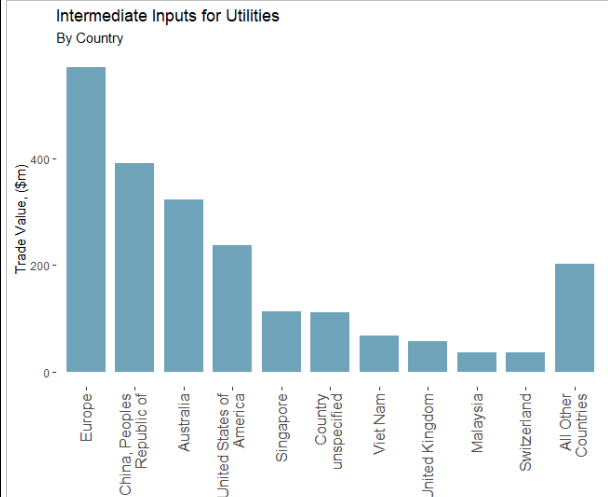
From a regional perspective, these industries are heavily focused around urban centres, Auckland and Wellington in particular. The level to which they are dependent on intermediate inputs, however, varies across cities. In Auckland, for instance, imported products account for a very high proportion of total inputs, whereas in Wellington this figure is much lower. Given this sector's heavy dependence on media, this likely reflects the divide between local content creation and the acquisition of foreign material, the latter of which is likely to be managed from Auckland-based HQs. As such products tend to be digital in nature, however, they are likely to be more resilient to any supply-chain effects attributable to Covid-19.

⁸ The utilities sector includes: DD11. Electricity and gas supply, DD12. Water, sewerage, drainage, and waste services, JJ11. Information media services, and JJ12. Telecommunications, internet, and library services.

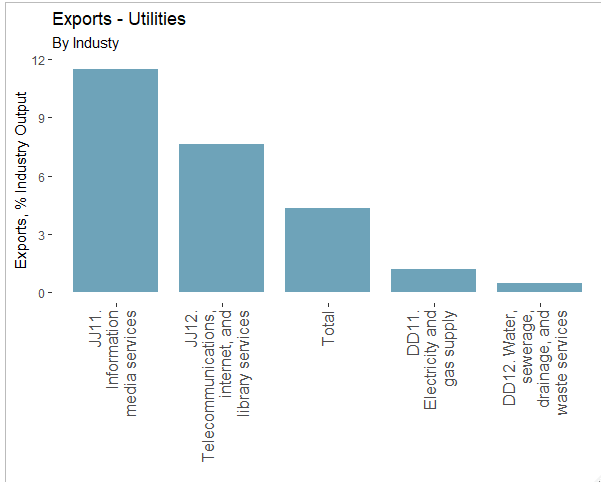
Key Intermediate Inputs



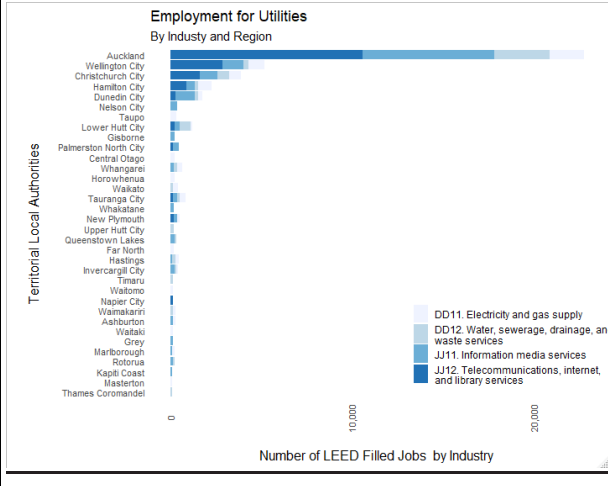
Key Import Sources



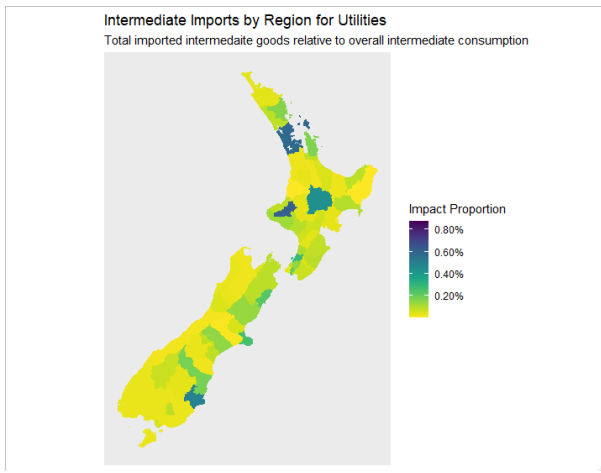
Share of Output Exported



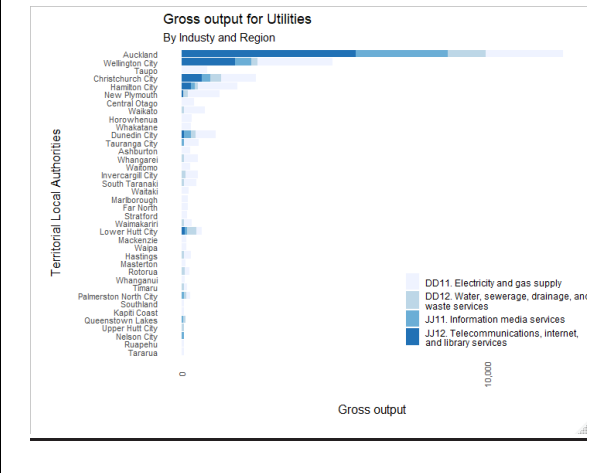
Employment



Regional Import Concentration



Regional Breakdown



Source: Sense Partners, Stats NZ

Non-Primary Manufacturing

Key Points

- About 40% of intermediate inputs in the non-primary manufacturing sector are imported
- Key intermediate inputs across this quite diverse group of manufacturing industries include crude oil; aircraft engines; plastics; electrical machinery; chemicals; iron and steel; and paper.
- Excluding oil, Australia, China and the US are the sources for about half of these imports.

Insights

Collectively, these industries⁹ make up about 7% of GDP and about 13% of their output is exported. (For reference, primary manufacturing makes up about 5% of GDP, with 39% of output exported). By and large, non-primary manufacturing industries weren't considered "essential" under the level four lockdown and were mostly closed down. Given their significance as employers and exporters it will be important for firms in these industries to recover as quickly as possible.

One key challenge for these industries in the recovery period will be a high share of intermediate inputs that are imported. About \$13.7 billion of imported goods and services are intermediate inputs into non-primary manufacturing industries, just under 40% of total intermediate inputs. The import exposure ranges considerably, from about 14% (non-metallic mineral product manufacturing) to 73% for petrol manufacturing (almost all of which is imported crude oil) and 67% for transport equipment manufacturing.

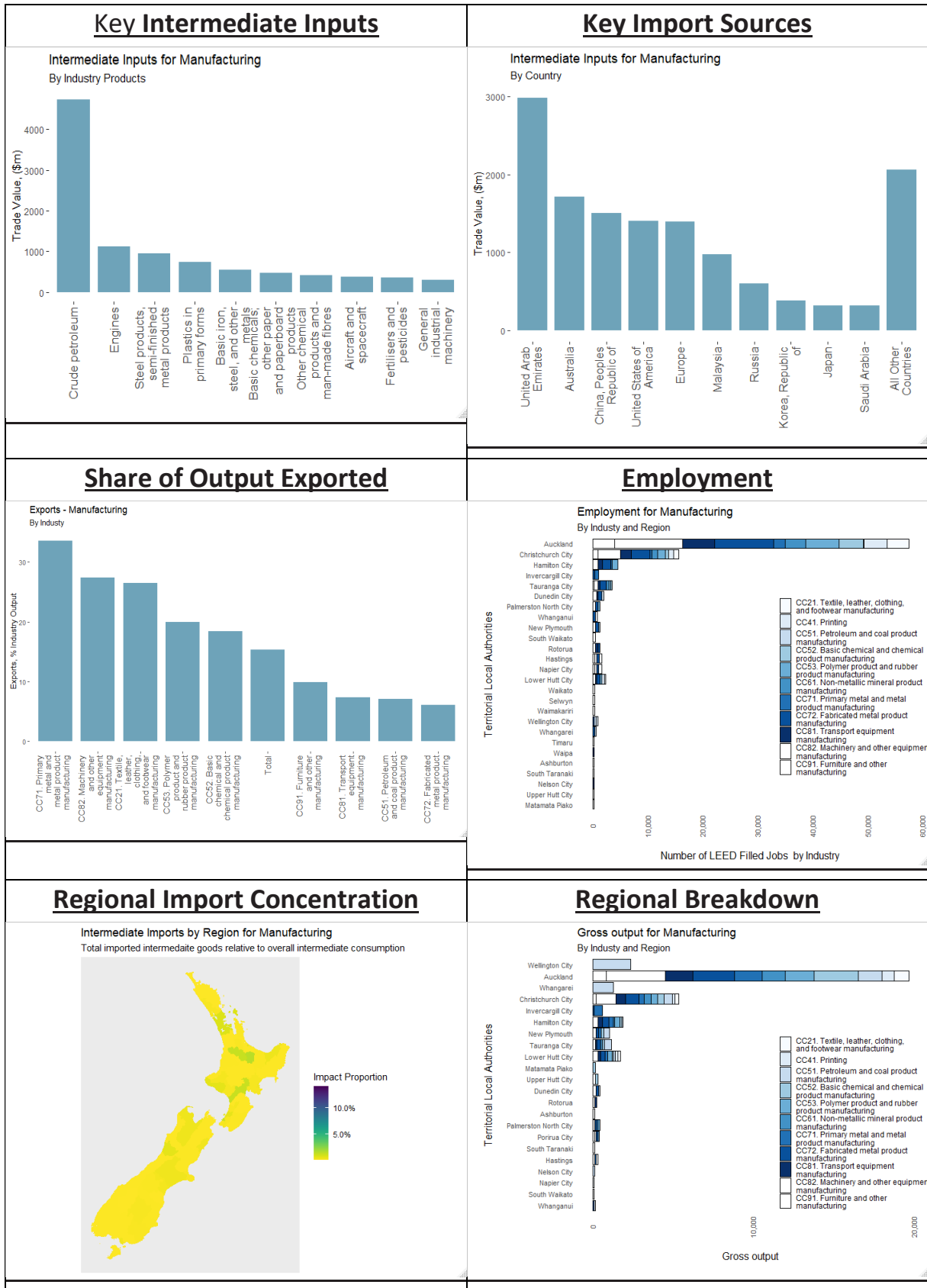
Crude oil is by far the largest imported intermediate input into this grouping of industries at \$4.7 billion. Aircraft engines are another significant input at \$0.8 billion (related to the Air New Zealand engineering facility) as are aircraft (\$0.4 billion). Other key intermediate products include: plastics and plastic articles; electrical machinery; chemicals; iron and steel and related articles; and paper (likely a high share of this is packaging).

The top 10 import sources account for over 80% of imported intermediate goods and services. Excluding oil producers, the top four sources (Australia, China, EU and US) account for about half of manufacturing inputs, with about \$1.5 billion imports from each of these.

The export exposure for these manufacturing industries is also quite diverse, from almost nothing (printing) to around one third (primary metal and metal product manufacturing and machinery and other equipment manufacturing). On average, about 13% of output of these industries is exported.

Non-primary manufacturing employed around 120,000 people in 2018, about 6% of total filled jobs, with about 50,000 of those jobs related to the export-oriented part of the industry. This employment is heavily concentrated in Auckland (57,000) and, to a lesser extent, other major cities Christchurch (16,000), Hamilton (5,000) and Tauranga (4,000). Manufacturing output is similarly concentrated in Auckland (43% of total), followed by Christchurch (12%), Wellington (6%) and Hamilton (4%).

⁹ Industries covered: Non-primary sector manufacturing (textiles; printing; petrol, chemicals and rubber; metal; equipment; and furniture). A total of 11 ANZSIC industry classes are included.



Source: Sense Partners, Stats NZ

Construction

Key Points

- About 10% of the intermediate inputs into construction are imported.
- The most important intermediate inputs range from general machinery, construction materials, and petroleum products, to financial and insurance services.
- These inputs are primarily sourced from China, Australia and the USA, with China being the largest source of intermediate goods for the construction sector overall.

Insights

The construction industry¹⁰ makes up 8% of GDP and imports about \$4.7 billion of intermediate goods and services, of which 90% of imported inputs are in goods. The bulk of imported intermediates go to the construction services subindustry (\$2.5 billion) and building construction (\$1.5 billion).

Intermediate inputs are concentrated around construction materials, machinery and equipment. These intermediate inputs are made up of machinery, construction materials, equipment, and petroleum products.

The top ten import source countries make up 76% of all intermediate imported inputs. As a share of total gross output, the construction industry exports relatively little – just \$0.2 billion, most of this in the form of construction services.

Looking at the prospects of the industry, early signs suggest construction is more likely to face a demand shock than a supply shock as a result of Covid-19. However, this industry may prove more resilient through the recovery stage due to fiscal stimulus packages aimed at investment in infrastructure.

The construction industry employs about 162,000 people across New Zealand making up 7.6% of total filled jobs for the 2018 year. Auckland, Christchurch and Hamilton account for the greatest shares of construction jobs, together covering half of all construction jobs in New Zealand. Of the 162,000 employed, only 11,000 (7%) are linked to the export sector.

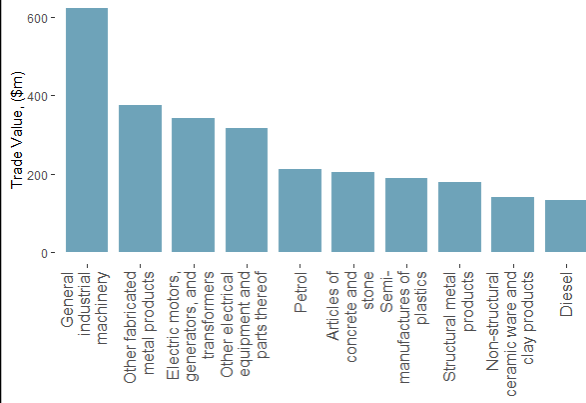
“Building Construction” and “Construction Services”, make up almost 80% of total gross construction output. In terms of overall regional output, Auckland, Christchurch and Hamilton contribute the most to gross output for construction activities.

Across the regions, intermediate consumption follows the size of the industry, with Auckland, Christchurch and Hamilton again making up over half of all intermediate consumption. Imported intermediate consumption of construction activities is distributed equally across overall regional intermediate consumption for construction.

¹⁰ Industries covered: EE11. Building construction, EE12. Heavy and civil engineering construction, and EE13. Construction services.

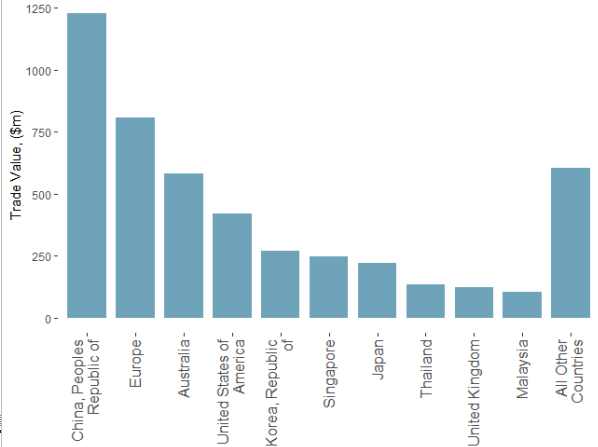
Key Intermediate Inputs

Intermediate Inputs for Construction
By Industry Products



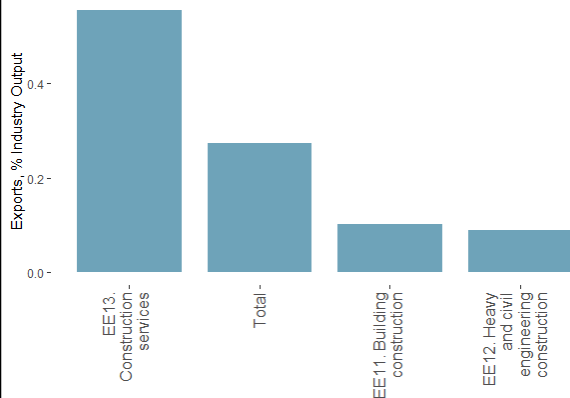
Key Import Sources

Intermediate Inputs for Construction
By Country



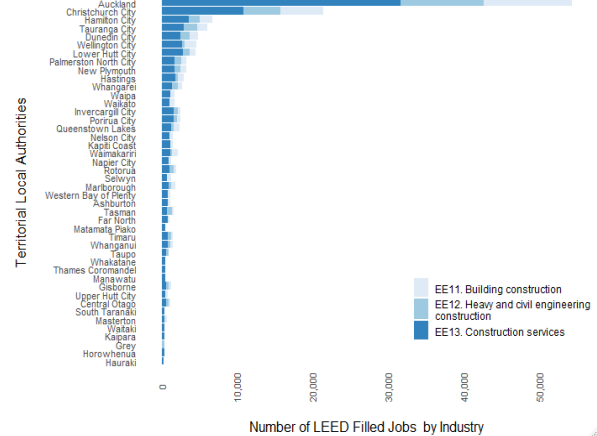
Share of Output Exported

Exports - Construction
By Industry



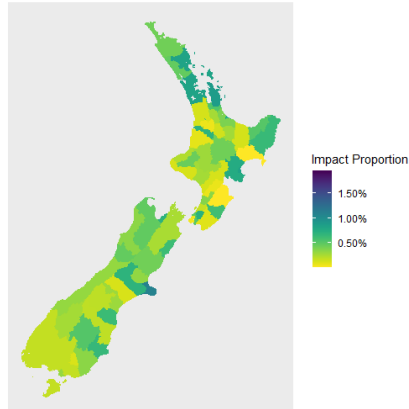
Employment

Employment for Construction
By Industry and Region



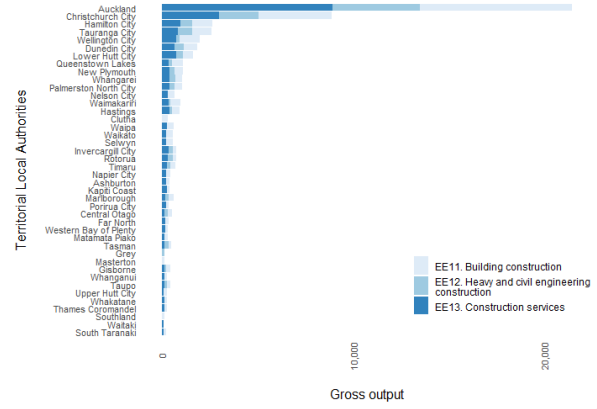
Regional Import Concentration

Intermediate Imports by Region for Construction
Total imported intermediate goods relative to overall intermediate consumption



Regional Output

Gross output for Construction
By Industry and Region



Source: Sense Partners, Stats NZ

Education

Key Points

- The education sector accounts for 5% of GDP and 7% of national employment
- Key exports are education services provided to international students, mainly from China and India
- Key import products are services from China, Australia and the United States. Around 13% of intermediate inputs in the education and training sector are imported

Insights

Education and training in New Zealand account for 5% of GDP and 206,000 jobs, or 7.4% of national employment. This is predominately located in city centres due to larger populations and the location of universities. Of the 206,000 jobs filled by the Education sector, about 25,000 (13%) are export related jobs.

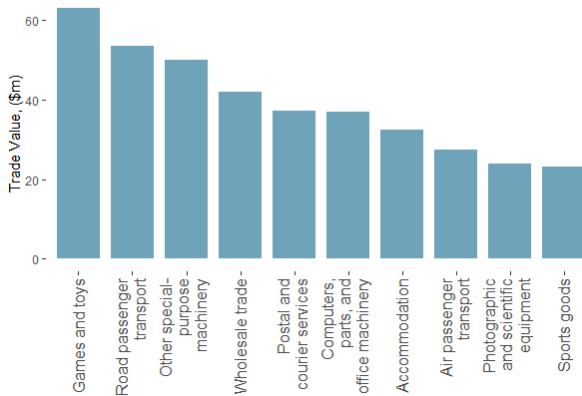
About \$0.6 billion of imported goods and services are used as intermediate inputs in the education and training sector, which can be broken down into school education, tertiary education, adult and community education, and preschool education. These sub-industries each use a range of imported intermediates with school education and tertiary education accounting for 41% and 39% of total imports respectively. Imports only account for 13% of total intermediate inputs.

New Zealand's tertiary sector and broader education system has a particular dependence on international students, with 110,000 being enrolled across all levels. Of these students, China and India account for a large share.¹¹ Given the current boarder closures, many international students are not able to access New Zealand's educational system. The total value of tuition fees collected from international students in 2018 was \$1.2 billion, with the majority of fees coming from tertiary education institutions. Although shifts to online learning might offer some protection, the sector is likely to be heavily disrupted.

¹¹ <https://www.educationcounts.govt.nz/statistics/international-education/international-students-in-new-zealand>

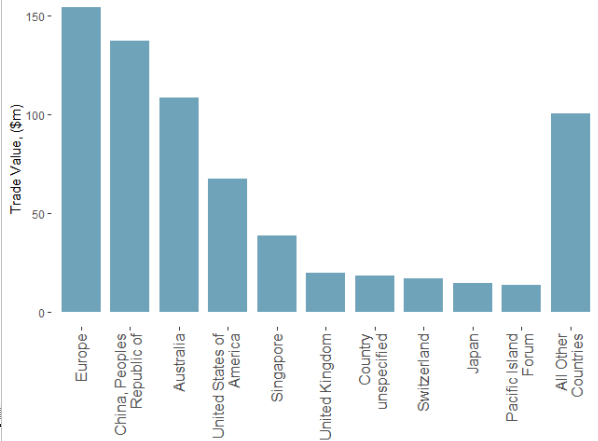
Key Intermediate Inputs

Intermediate Inputs for Education
By Industry Products



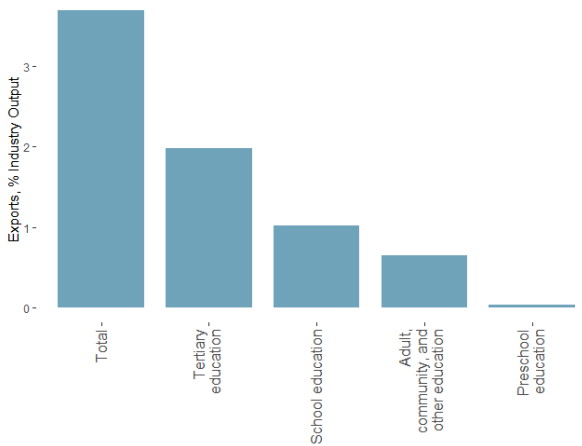
Key Import Sources

Intermediate Inputs for Education
By Country



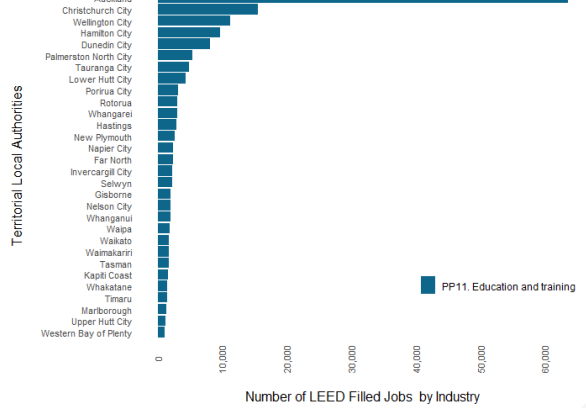
Share of Output Exported

Exports - Education
By Industry



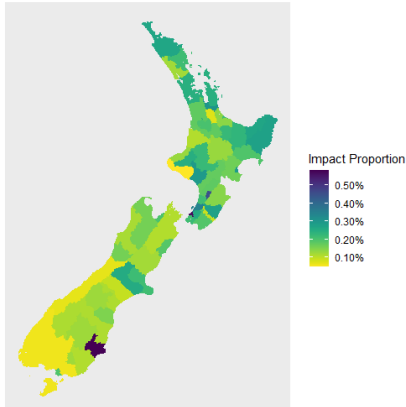
Employment

Employment for Education
By Industry and Region



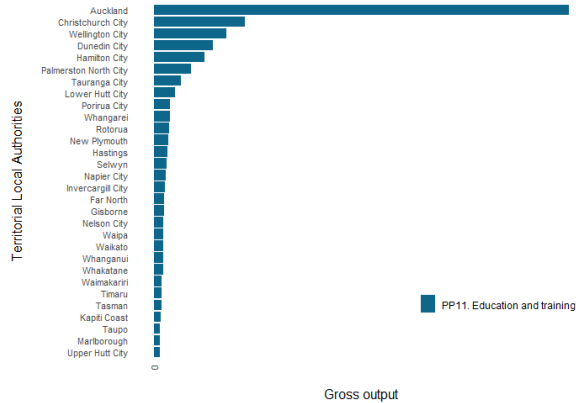
Intermediate Imports By Region

Intermediate Imports by Region for Education
Total imported intermediate goods relative to overall intermediate consumption



Regional Breakdown

Gross output for Education
By Industry and Region



Source: Sense Partners, Stats NZ

Other Retail

Key Points

- Approximately 8% of the retail sector's intermediate inputs are imported, which are predominantly in the form of goods (approx. 62%) – likely reflecting the importance of wholesale stock to the sector's business model
- Services inputs are dominated by Australia, while product inputs are sourced primarily from China, Australia and the USA

Insights

The "other retail" sector accounts for all retail activity excluding the sale of groceries, fuel and vehicles (i.e. GH13. "Other store based retailing and non-store retailing"), which is captured elsewhere. These industries account for approximately 3% of GDP.

About \$450 million of intermediate goods and services are imported by this section of the retail sector. This is mostly accounted for by department stores and houseware and fashion retailers. Non-store and commission based retailing (e.g. infomercials and door to door sales) also make up a significant share. Overall around 8% of the sector's intermediate inputs are imported.

These intermediate inputs are dominated by commercial leasing, transport, and wholesale stock. Retail pharmaceutical products also account for a large proportion of the sector's intermediate product imports. Where final stock is concerned (not captured in this analysis), shortages in availability could have a significant impact on local businesses.

The origin of these imports mirrors New Zealand's trading profile overall, with Australia, China, the United States, and Europe being the largest sources and together accounting for over 50% of the total. Looking specifically at goods, China dominates as the source of origin followed by EU, Australia, and the US. With regard to services, EU is the largest source, with Australia, the US, and Singapore also accounting for large shares.

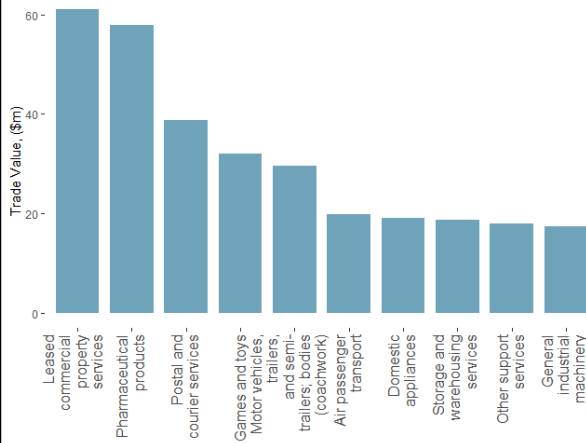
The sector has low reliance on exports with 1% of output¹². This is dominated by takeaways (i.e. tourism), beverage services, and IP on the services side, and pharmaceutical products and electronics with respect to goods.

The retail sector accounts for approximately 110,000 jobs or around 5% of the country's total, of this 10,000 are export related jobs. These jobs are concentrated in urban areas and closely match the distribution of population overall; the three regions with the highest employment in this sector are Auckland, Christchurch and Wellington. This is unsurprising giving the sector's reliance on foot traffic and, in the case of online sales, cost efficient distribution hubs.

¹² After removing the wholesale and retail margins, otherwise the exports were overstated (at 53%).

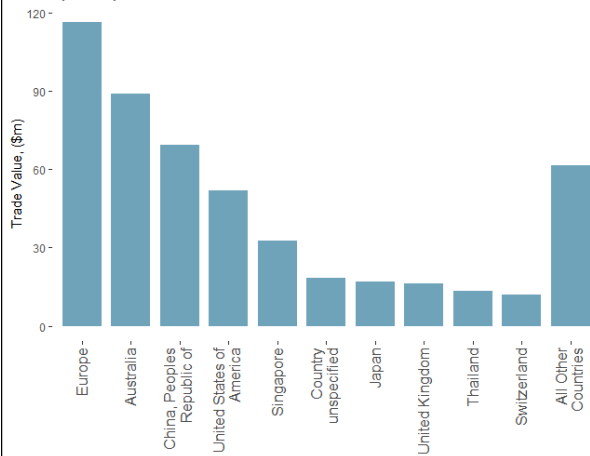
Key Intermediate Inputs

Intermediate Inputs for Other Retail
By Industry Products



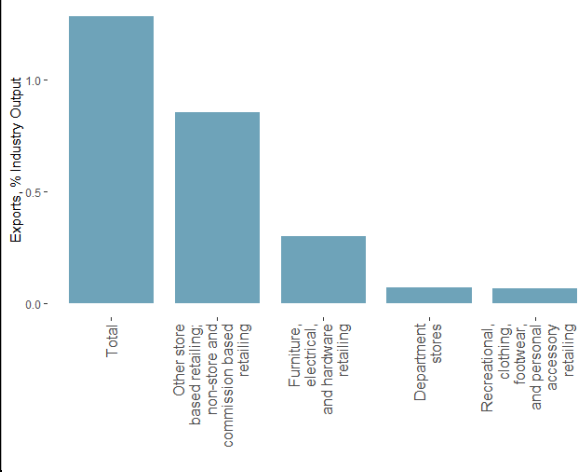
Key Import Sources

Intermediate Inputs for Other Retail
By Country



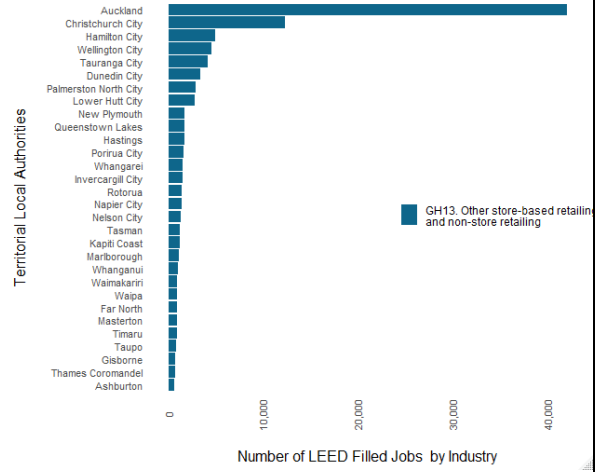
Share of Output Exported

Exports - Other Retail
By Industry



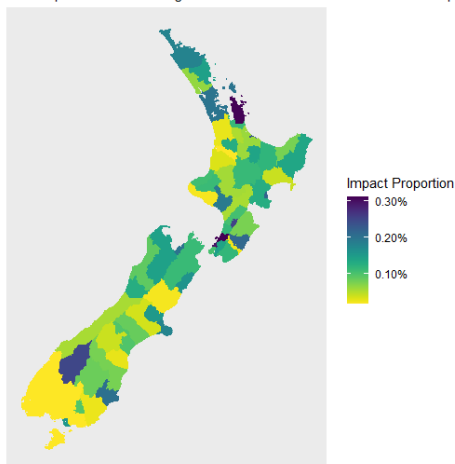
Employment

Employment for Other Retail
By Industry and Region



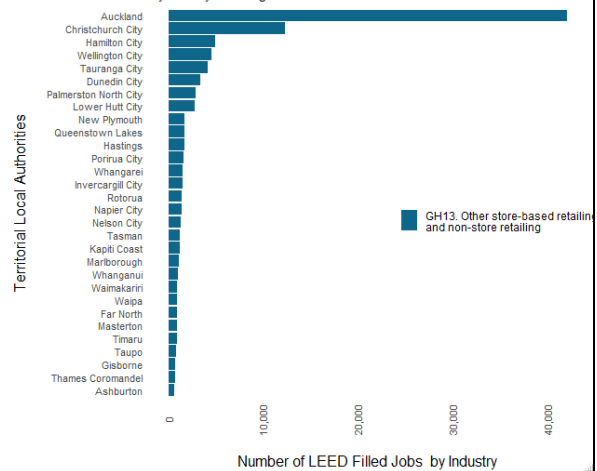
Intermediate Imports By Region

Intermediate Imports by Region for Other Retail
Total imported intermediate goods relative to overall intermediate consumption



Regional Breakdown

Employment for Other Retail
By Industry and Region



Source: Sense Partners, Stats NZ

Services – Private

Key Points

- About 10% of the intermediate inputs into private services are imported and 8% of output is exported.
- Food and accommodation services export about half of their products (i.e. the share attributable to international tourism).
- The range of intermediate inputs is diverse, with transportation, insurance, commercial property, and consultancy services being some of the more important intermediate inputs.
- These inputs are primarily sourced from our largest trading partners.

INSIGHTS

Private services¹³ make up 34% of GDP and approximately \$13.2 billion of exports. Of the services exported by this sector, accommodation accounts for over half of the \$5.8 billion dollar intermediate imports of which 48% are goods. Professional and scientific, “property and real estate”, and “accommodation and food services” make up the majority of imported intermediate consumption.

The key countries exported to by the sector, largely through food and accommodation within the tourism industry, are Europe (\$3.0 billion), Australia (\$2.4 billion), USA (\$1.5 billion) and China (\$1.0 billion), with the top 10 export destinations making up over 80% of the total.

The range of intermediate inputs for this industry is diverse, reflecting the broad nature of sectors it includes. These imported products range from food and beverage and accommodation products, to imports of business services, such as financial and computer software services.

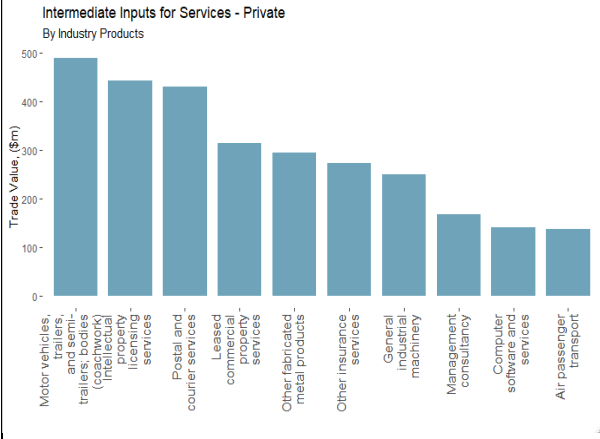
The key source countries for imported inputs are EU (\$1.4 billion), Australia (\$ 1.1 billion), USA (\$0.7 billion) and China (\$0.7 billion). The top ten countries in this regard account for over three quarters of all imported intermediate goods for private services.

The private services industry employs about 635,000 people, which makes up about 30% of total filled jobs in New Zealand, with about 164,000 (26%) being export related jobs . Auckland has the highest employment for jobs in private services, followed by Christchurch, then Wellington, which combined account for 50% of total filled jobs in private services.

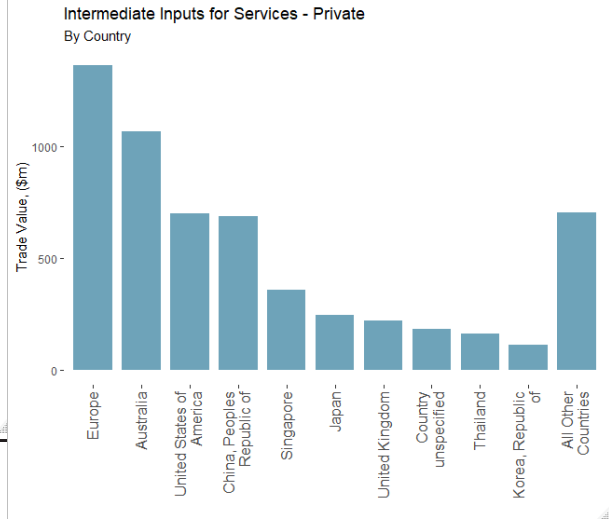
Professional, scientific and technical services account for the largest portion of gross output (26%) within private services, followed by property and real estate, finance, then food and accommodation. Unsurprisingly, Auckland, Wellington and Christchurch contribute the most to gross output.

¹³ Industries include accommodation and food services, finance insurance services, rental and hiring services, property and real estate services, professional, scientific, and technical services, arts and recreation services, and others.

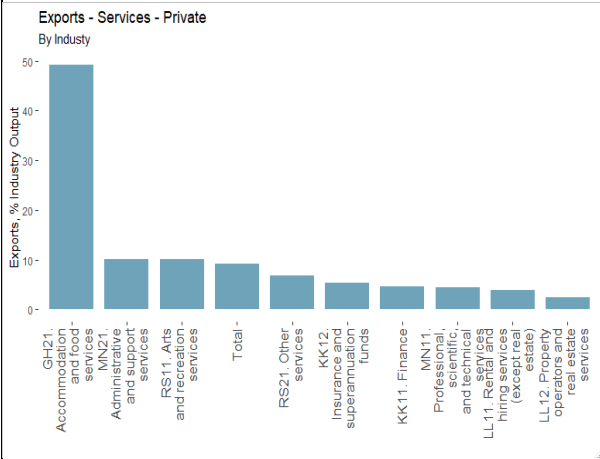
Key Intermediate Inputs



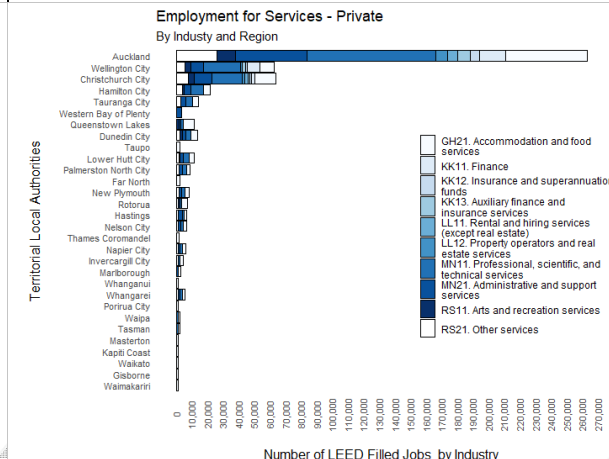
Key Import Sources



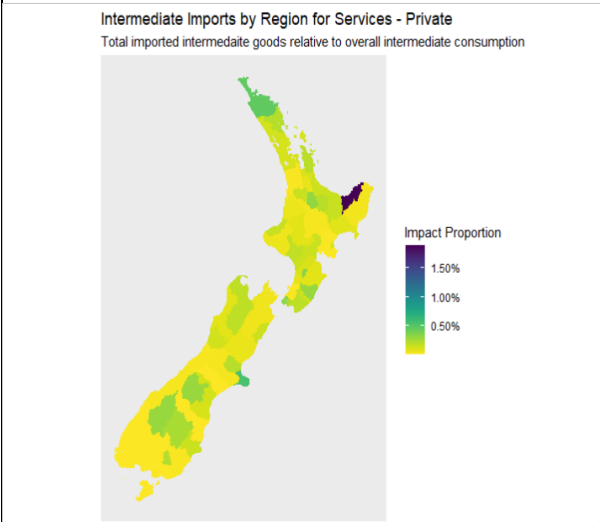
Share of Output Exported



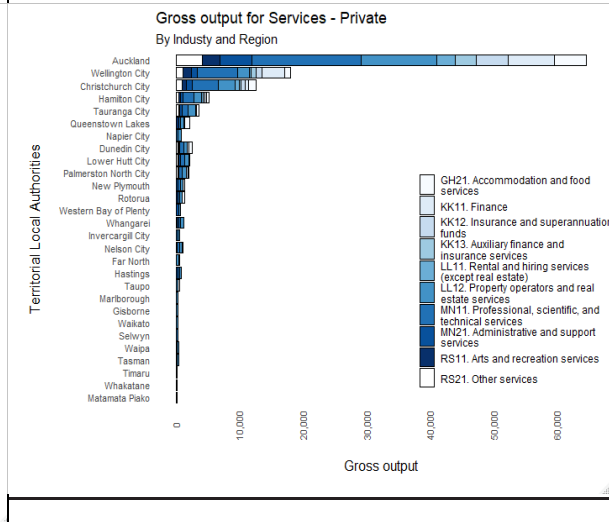
Employment



Regional Import Concentration



Regional Breakdown



Source: Sense Partners, Stats NZ

Services – Public

Key Points

- Central and local government administration, including defence and public safety, have a relatively low exposure to imported intermediates (13%)
- In contrast to most other industries, imported services are as important as imported goods, particularly for central administration
- Defence is the main user of imported intermediate goods, mostly vehicles and equipment

Insights

The Public Services industries¹⁴ make up about 5% of GDP. About \$1.1 billion (13%) of intermediate goods are imported for central and local government administration, mostly the former. Around half (\$0.5 billion) of imported intermediates are services, with most of this going into central government. Most imported intermediate goods are for defence sub-industry (\$0.3 billion), including vehicles and parts (\$152 million); electrical equipment (\$87 million); and weapons and ammunition (\$43 million).

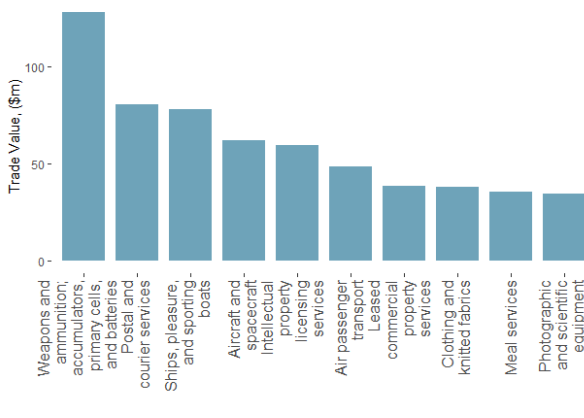
The EU, Australia, the United States and China account for around two thirds of imported intermediates. China mostly provides goods, while the others are more evenly split between goods and services.

There were about 133,000 filled jobs in the public service industries in 2018 (about 6% of total filled jobs). Unsurprisingly, Wellington has a high share of regional employment (31,000 or 24%) and output (29%), as does Auckland (36,000 jobs and 27% of both output and employment). Christchurch (11,000), Palmerston North and Hamilton (6,000 each) round out the top five.

¹⁴ Industries covered – OO11. Local government administration and OO21. Central government administration, defence, and public safety.

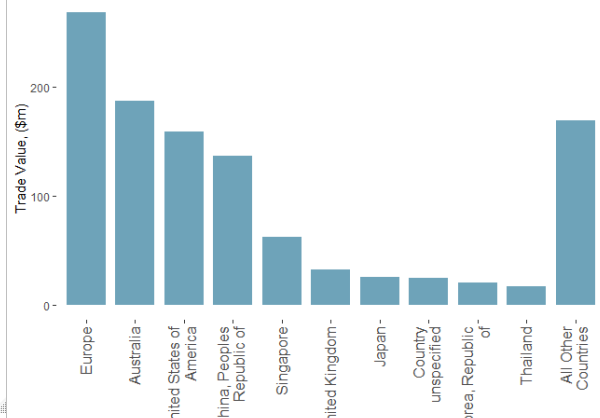
Key Intermediate Inputs

Intermediate Inputs for Services - Public
By Industry Products



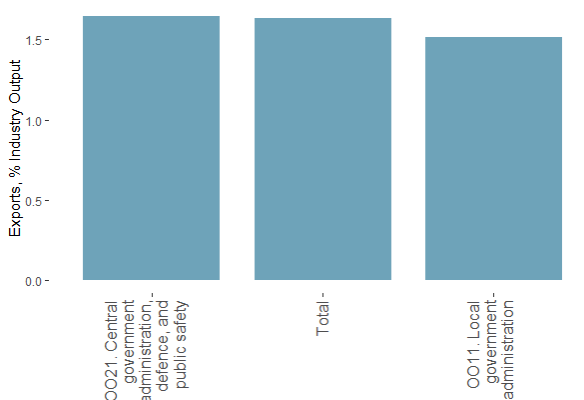
Key Import Sources

Intermediate Inputs for Services - Public
By Country



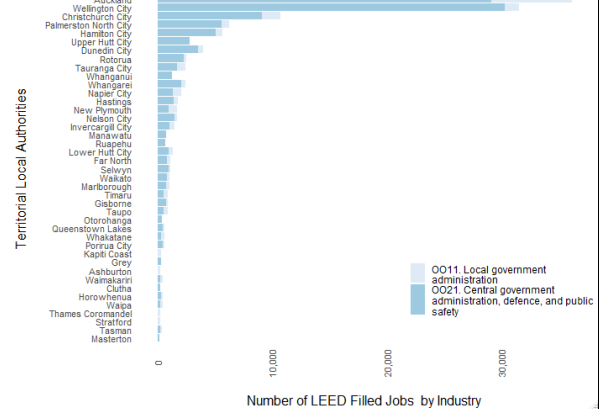
Share of Output Exported

Exports - Services - Public
By Industry



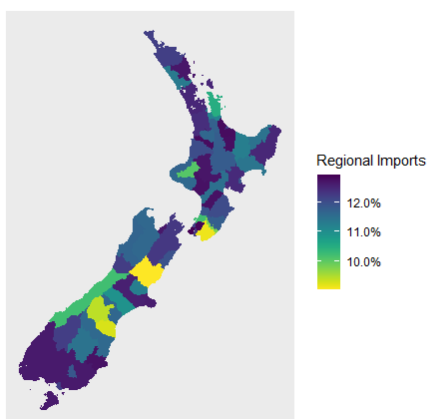
Employment

Employment for Services - Public
By Industry and Region



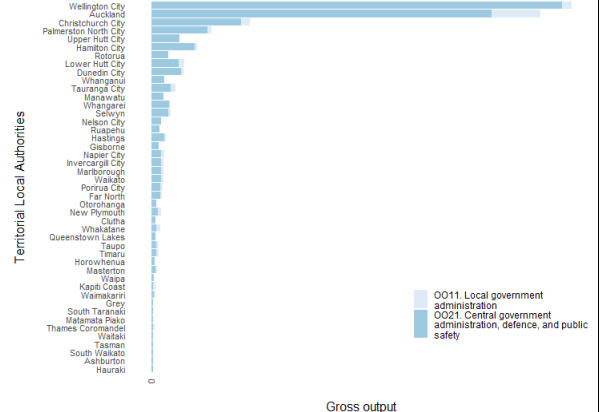
Regional Import Concentration

Intermediate Imports by Region for Services - Public



Regional Breakdown

Gross output for Services - Public
By Industry and Region



Source: Sense Partners, Stats NZ

Country Summaries

Australia

Key Points

- New Zealand depends on Australia for around \$11.9 billion of intermediate products
- These inputs are disproportionately consumed by the metal production, food manufacturing, construction and dairy sectors
- Australia is also a major export market for New Zealand, accounting for around 17% of New Zealand's goods and services exports to foreign markets and dominated by goods exports (63%)

Insights

New Zealand imports around \$11.9 billion of intermediate products from Australia, some 7.3 billion (61%) of which are physical goods requiring transportation. These imports include a diverse mix of high and low value products, illustrating the breadth of the two countries' economic relationship. Key intermediate imports include air travel, metal, food products, chemicals, and vehicles. With regard to sectors, the metal production, food product manufacturing, construction, and dairy sectors are among the most dependent on Australian inputs for their production.

New Zealand also exports some \$14.1 billion worth of goods and services to Australia, accounting for around 17% of New Zealand's total exports. Top exports to Australia are food products (including dairy) and travel related services (air travel, meal services, accommodation etc.). As with imports, exports are dominated by goods trade, which account for around \$8.9 billion of the total (63%).

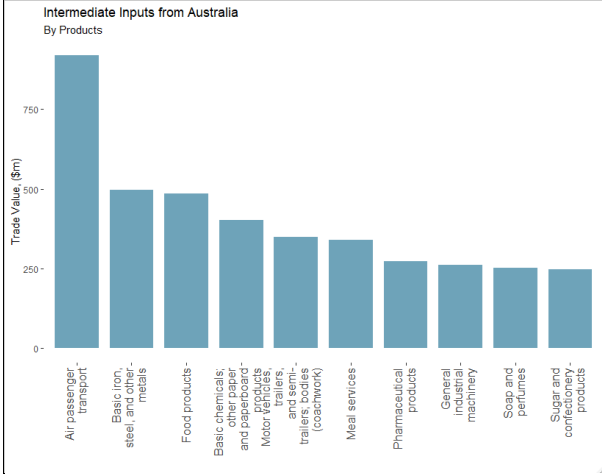
Looking across the top 5 export sectors¹⁵ (roughly 40% of the total), employment is primarily concentrated in urban centres, with Auckland, Wellington, Christchurch and Hamilton together accounting for approximately 58% of all jobs. When assessing which areas are most disproportionately reliant on Australia (i.e. in relation to their overall share of jobs), Mackenzie, Kaikoura, Westland, and Queenstown come out on top.

The story is similar for imports, with the 5 sectors most dependent on intermediate inputs from Australia¹⁶ (accounting for approx. 30% of the total), having 58% of their jobs located in Auckland, Christchurch, Wellington, and Hamilton. As this is slightly more than these areas account for in total jobs (56%) these urban areas would be disproportionately affected by a reduction in trade with Australia. Kapiti Coast, Lower Hutt, Porirua, and Invercargill also have a high number of jobs in these sectors relative to their overall share.

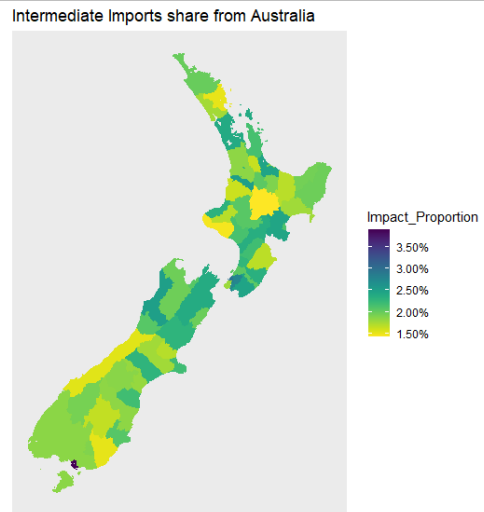
¹⁵ Wholesale trade, dairy product manufacturing, mining, transport, and accommodation and food services.

¹⁶ Primary metal and metal product manufacturing Fruit, oil, cereal, and other food product manufacturing; Wholesale trade; Construction services; Health care and social assistance.

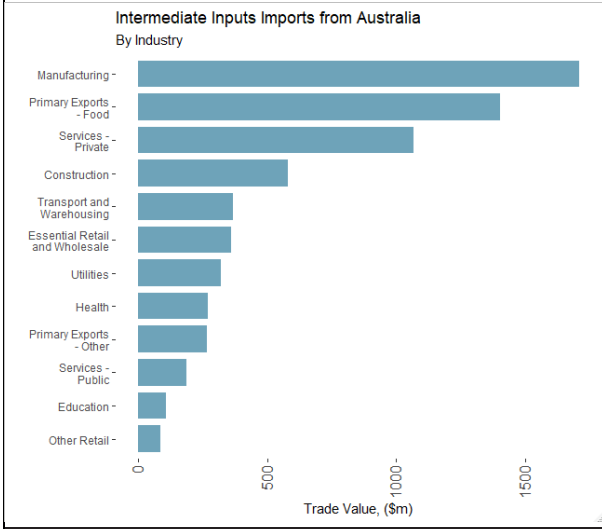
Key Intermediate inputs



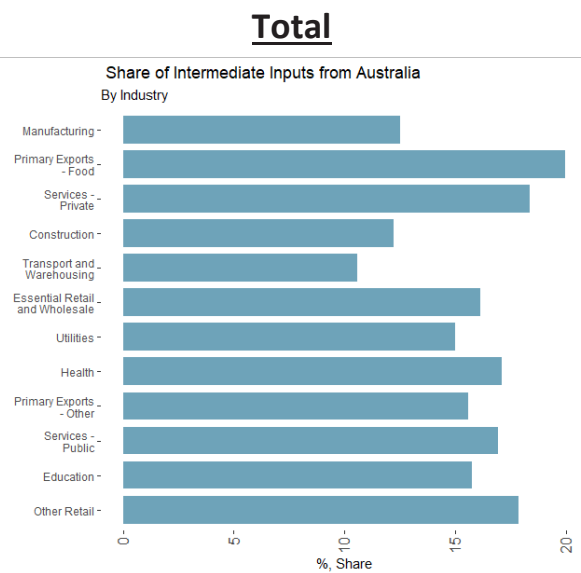
Intermediate Imports by Region



Intermediate Imports by Industry



Intermediate Imports, % of Industry



Source: Sense Partners, Stats NZ

India

Key Points

- New Zealand depends on India for some \$956 million of intermediate products
- These inputs are primarily utilised in the metal manufacturing, construction and healthcare sectors
- India is a small but fast growing export market for New Zealand, accounting for around 2% of New Zealand's total exports in 2019

Insights

New Zealand imports approximately \$956 million worth of intermediate goods and services from India.

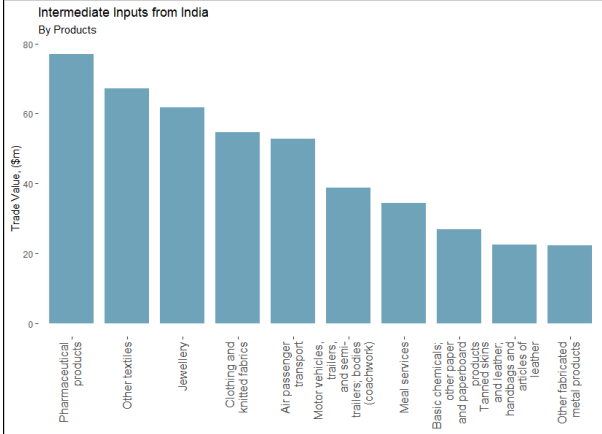
Imports are a mixture of high and low value products, including large amounts of travel and hospitality (air travel, accommodation, meal services etc.), pharmaceuticals, textiles, jewellery, chemicals, and machinery (including vehicles).

Among the industries most dependent on these inputs from India are the metal manufacturing (\$60 million), construction (\$50 million), healthcare (\$30 million), and food product manufacturing sectors.

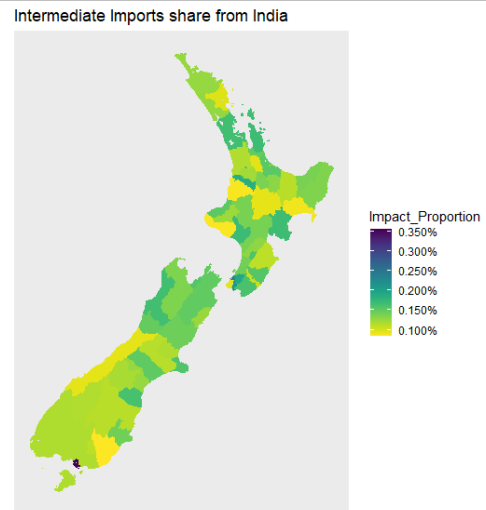
India also accounts for some \$1.6 billion of New Zealand's exports (2% of total exports) and based on recent growth, particularly for services trade, has been identified as a priority market by MFAT and NZTE (see [here](#) for further details). Services exports include a significant component of tourism (air travel, food services, accommodation etc.) and education, with India being New Zealand's second largest source of international students.

Looking at the distribution of jobs related to exports to India in these industries, they are disproportionately (i.e. in relation to population) located in Mackenzie, Kaikoura, Westland, and Queenstown. In terms of absolute shares, however, they are predominantly centred in urban areas, with 60% of jobs being located in Auckland, Christchurch, Wellington and Hamilton, which is roughly in line with the overall job share of these regions.

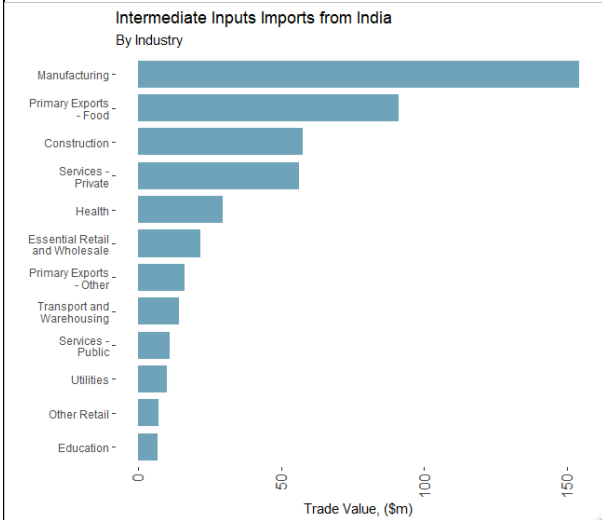
Key Intermediate inputs



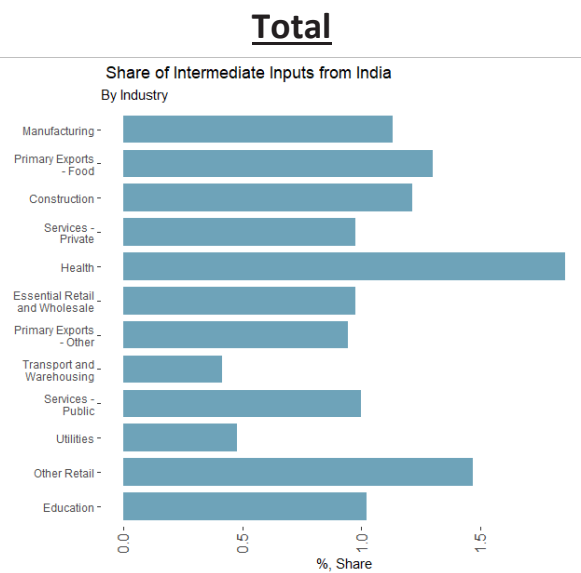
Intermediate Imports by Region



Intermediate Imports by Industry



Intermediate Imports, % of Industry



Region Summaries

Auckland

Key Points

- Auckland contributes 38% of New Zealand's total GDP, employing about 36% of all New Zealand filled jobs.
- Private services, retail and wholesale trade, manufacturing and construction contribute the most to the region's GDP.
- Auckland also has the highest number of export-oriented jobs, but as a proportion of its entire labour composition, Auckland's jobs are within the lower quartile for export jobs as a proportion of its labour force.
- Auckland exports \$32.2 billion (17%) of its total gross output and imports \$15 billion (15%) worth of intermediate inputs; the manufacturing sector is the highest consumer of overseas intermediate goods.
- The countries that are key import sources for intermediate inputs, given Auckland's industry composition, are Europe, Australia, China, USA, and Singapore.

Insights

Auckland is New Zealand's largest source for economic activity, contributing \$93.6 billion in GDP and making up 38% of total GDP. Within the region, private services contribute the most to regional GDP (about 40%), followed by retail and wholesale (10%), manufacturing (8%), and then construction (7%).

As New Zealand's major hub both as a source of international connectivity and domestic activity, Auckland has the highest number of employed, around 750,000 – making up 36% of New Zealand's jobs. Unsurprisingly, employment by industry is almost identical to industry GDP contribution. Private services makes up 40% of jobs, followed by retail and wholesale, manufacturing, and construction.

We estimate that \$32.2 billion (17%) of regional gross output is exported. When compared against other regions in New Zealand, Auckland falls in the lower half of the group, New Plymouth is slightly above Auckland and South Wairarapa slightly below. This is largely due to Auckland's largest industry, private services, which is less export-oriented than most other industries.

In terms of intermediate inputs into Auckland's industries, about \$15.0 billion (15%) is imported, the remaining coming from domestic sources. In comparison to other regions, Auckland is within the upper quartile of regions with high imported intermediate consumption. Just above Auckland for imported intermediate inputs is Christchurch, and slightly below is Napier.

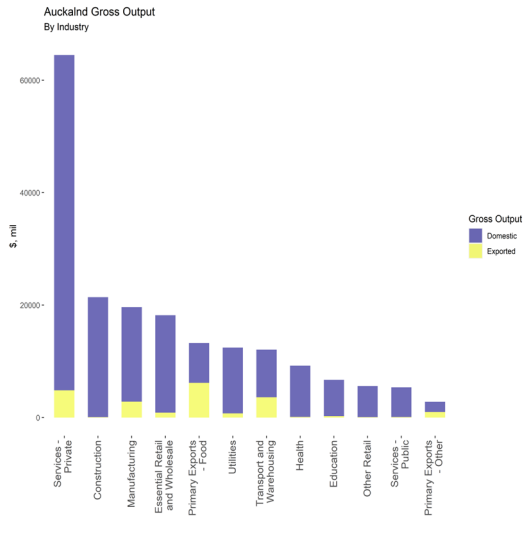
Within Auckland, the manufacturing industry has the highest proportion of imported intermediate consumption of \$4.5 billion (36%). This is predominantly comprised of petroleum products, steel products, other metals, plastics and basic chemicals. After the manufacturing industry, transport and warehousing imports 22% of its intermediate consumption, followed by utilities, 'other' primary exports, and health which each import about 15% of their intermediate consumption.

The countries that are an important source for intermediate inputs into Auckland are Europe, Australia, China, USA, and Singapore, which together account for some 60% of Auckland's imported intermediate consumption. The main export destinations that are important to Auckland are: Europe, Australia and China, which take over half of its exports.

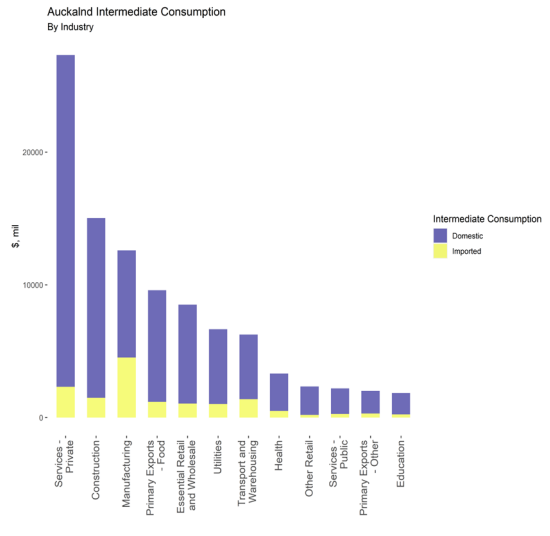
Despite accounting for the greatest share of employment among the regions, export related jobs in Auckland are only about 22% of the total (168,000). As a proportion, Auckland sits within the lower quartile of all regions for total jobs that are export-related.

The industries that have the highest proportion of export-related jobs are primary exports (60%), manufacturing (40%) and transport and warehousing (40%). However, the industries that employ the most in export jobs are private services, manufacturing, retail and wholesale.

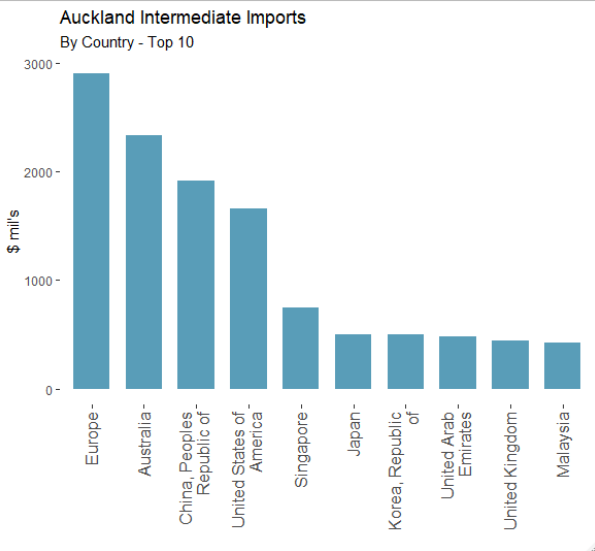
Gross Output by Industry



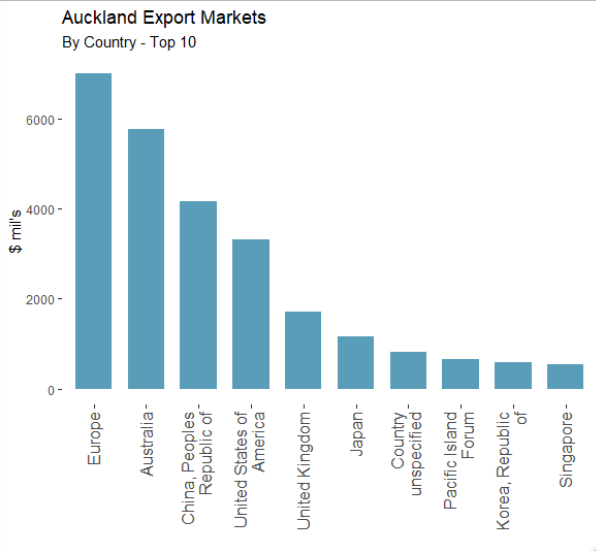
Intermediate Consumption by Industry



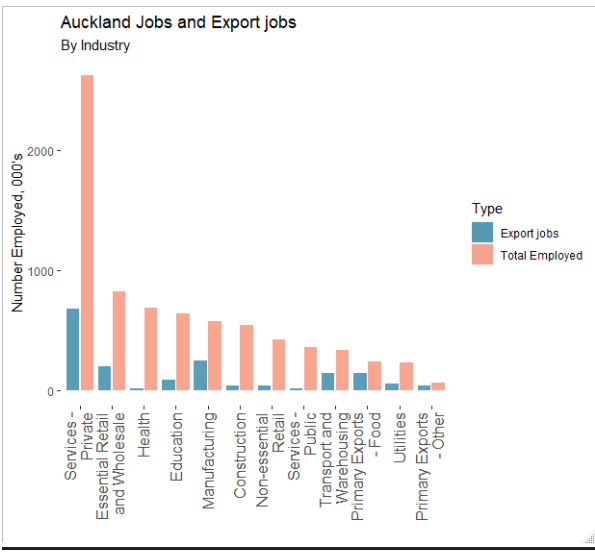
Intermediate Import by Country



Auckland Export Markets



Filled Jobs and Export Jobs by Industry



Source: Sense Partners, Stats NZ

Annex: Non-Technical Methodology Summary

The Sense Partners Trade Opportunities and Risks Model (STORM) is a data-based analytical system developed by independent economic consultancy Sense Partners to link New Zealand's international trade flows with its national and regional economic activity.

STORM is a combination of a trade module connected to a domestic economic production module. Geographic and economic product linkages between the modules allow researchers to explore how regional economic activity impacts on external trade opportunities. Similarly, the linkages allow researchers to explore how overseas trade issues constrain or accelerate New Zealand domestic business activity.

Previously, it has not been possible to identify at a detailed level of product disaggregation¹⁷ which goods and services each industry imports and exports, and with which countries. This has made global or regional supply chain analysis difficult.

For example, it has not previously been possible to determine:

- Which types of intermediate inputs into the construction industry are from China; or
- How reliant New Zealand hospitals are on equipment and machinery imported from the EU.

STORM links domestic production and overseas trade aspects through publicly available data metrics and well-established inter-industry economic activity structures. All trade and economic activity measures are reconciled with aggregate official data from Stats NZ.

STORM also presents regional labour market metrics and measures of regional business demographics to create a full picture of how overseas trade flows impact regional production, and vice versa. This allows researchers to consider (for example):

- How many jobs are potentially at risk, by industry and region, from changes in external trading conditions.
- How many jobs are supplied by regional industries who, in aggregate, are exporting to overseas markets.
- How might volume or price changes for imported inputs affect domestic production, employment and regional economic activity.

Filled job estimates have been estimated outside of STORM, using Linked Employer-Employee Data (LEED) filled jobs and Stats NZ 2013 Input-Output tables ultimate disposition export ratios. This makes the export share of jobs consistent with other MFAT export jobs estimates (see [Bailey and Ford 2018](#)), albeit using the LEED filled job measure rather than the HLFS total employment measure as the base.

¹⁷ The 6-digit Harmonised System of Classification for goods, and Balance of Payments Manual version 6 Service Types for services.

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