



Ministry of **Transport**
TE MANATŪ WAKA

New Zealand International Air Freight



Final Report

submitted by

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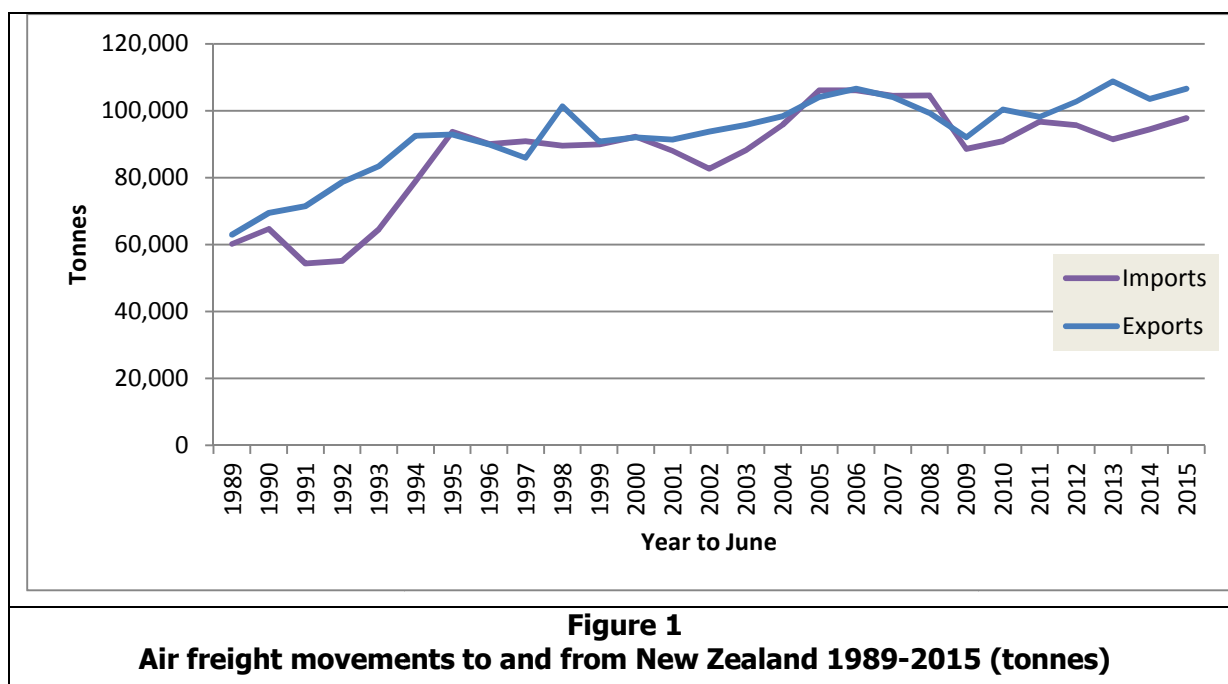
New Zealand International Air Freight

Executive Summary

Airfreight carries an important part of New Zealand's exports and imports, accounting for total trade of \$17bn and representing about 17 per cent of the total value of foreign trade in the year ended June 2015. By value, Auckland Airport which handles about 85 per cent airfreight traffic is the third largest port in New Zealand, behind Auckland seaport and Port of Tauranga, handling about 15 per cent of the value of New Zealand's international trade.

However airfreight typically attracts high value products, and although representing 17 per cent of the value of international commodity trade, it only represents a very small share of the weight of goods imported and exported, about 0.3 per cent of the total by air and sea.

Over recent years the share of airfreight in total trade by value has fluctuated from year to year but since the late 1990's the proportion carried has generally declined from a peak of 22 per cent of the total in 1999 to the 17 per cent recorded today. The volumes carried by air, while also fluctuating from year to year have been generally stable in recent years, with imports declining slightly and exports rising slightly. This is set out in Figure 1. This is contrast to the position for sea freight where growth in the volumes carried has been strong. As a result airfreight's share of total international trade by volume has declined from a peak of 0.55 per cent in 1998 to just under 0.3 per cent today.



Source: Statistics NZ

For exports, the flows are dominated by movements of primary products, with meat, fish and horticultural products accounting for almost half the weight carried. For imports, manufactured goods represent almost 90 per cent of the flows by air.

Airfreight is carried both in dedicated freighter aircraft and in the bellyhold of passenger aircraft. Two airlines and Tasman Cargo Airlines (whose main customer is DHL) operate regular freighter services to and from New Zealand and these are supplemented by charter operations, although they tend to carry specialised cargoes. For passenger aircraft, which account for the larger part of airfreight capacity, the bellyhold space available for freight depends on the needs of passengers who have a higher priority (in part because the effective rates per kg are much higher) and it may also be constrained at short notice if an aircraft has to take on extra fuel in response to adverse climatic conditions. While airlines may publish a nominal capacity based on the assumption of a full passenger load, they can also make use of the capacity not used when the passenger demand is lower. These factors make managing the volumes of freight to be carried challenging. To help address these difficulties' airlines have developed different levels of service to help match the priorities which have different prices.

Airfreight rates are typically 10-20 times higher than those charged for sea freight. However they are only about 30 per cent of the effective rate per kg for passenger services (on the assumption that the passenger and his or her luggage on average weighs 110kg). This explains the higher priority given to passengers on a particular flight and freight capacity on these services is after the needs of passengers and their baggage have been met.

To understand the balance between the demand for airfreight and the potential supply we have analysed the potential capacity based on both the nominal cargo capacity of the aircraft and a more detailed approach estimating the extent to which capacity over and above the nominal freight capacity would be available if passenger loads were below their maximum. Although airfreight is to some extent constrained by passenger needs and climatic events, our analysis of the capacity available by route based on either of the approaches set out above indicates that on a month to month basis this is typically substantially larger than the potential demand, both for imports and exports. However discussions with stakeholders have indicated that temporary shortages of capacity may exist, especially when production or market opportunities for primary products spike in an unpredictable fashion. This is a particular problem for flows through Christchurch Airport where capacity for exports from Christchurch could be under short term pressure in some months.

At these times cargo owners may be faced with having to use route options for transport involving more complex routes or higher charges. These would include transporting goods by road to Auckland or having goods taking fairly complex or more expensive routes to reach their destination. Given the nature of the product to be transported in some cases these may not be attractive, although the scale of this is understood to be relatively small. While in principle, chartering of freighters to meet these demands would be possible, the relatively high costs of this mean that this option would not be attractive.

While for some commodities (e.g. urgent documents) air freight has limited competition, for others it is in effect competing with sea freight. Changes in technology which allow perishable commodities to be better carried by sea or changes in supply chains can affect the levels of airfreight. As an example of the former, kiwifruit used to be transported by air, but the development of shipping services offering the appropriate temperature control as well as changes to the institutional environment mean that this traffic is no longer carried by air in significant quantities. As an example of the second, the introduction of slow steaming in response to high fuel prices has resulted in increases in the airfreight of chilled meat to more distant markets. It is however possible those changes to shipping companies' policies could reverse this position.

Forecasts of possible future flows of airfreight have been made, looking at the major commodities transported by air. These take into account the recent rather static nature of demand and the potential for competition from sea freight. In general the forecasts assume that flows over the period to 2030 will remain broadly unchanged from the present day reflecting a continuation of recent trends. Some allowance has however been made for continuing but limited growth in exports of milk and dairy products and meat.

In summary while air freight volumes are small in weight terms they represent a significant portion, 17 per cent, of New Zealand's international commodity trade by value. In value terms air freight's share of the total over recent years has remained broadly stable, but in terms of the weight carried its share has declined as the unit value of the goods transported has grown at a rate faster than sea freight. Analysis of demand and capacity available by month indicates that while temporary supply shortages to particular destinations at particular times may exist, in general there is sufficient capacity to handle the demand. Because of a number of uncertainties, particularly the interaction with sea freight and changing demands for key products, forecasts for the future up to 2030 are necessarily tentative in nature. This suggests that the current position is likely to remain over the future with some limited growth in export traffic.

1 Introduction

1.1 Purpose of research and scope of work

The Ministry of Transport has forecasts for passenger movement by air, and wishes to complement these with international air freight forecasts to aid in its modelling work. This report examines the current demand and supply for air freight and recent trends, and forecasts the future tonnages likely to be moved.

1.2 The nature of air freight

Air freight is carried on a mixture of dedicated freight aircraft and in the bellyholds of passenger aircraft. In the latter case, which accounts for the majority of air freight, passengers and their baggage typically have the highest priority and air freight therefore can potentially only use any additional capacity that is not required by passengers. While there is some space for freight which is over and above that required for passengers even when the aircraft is fully loaded and can therefore be considered to be dedicated for freight, there is also the potential to make use by freight of space which would be nominally allocated for passengers if the flight is fully loaded but which may not be required on a particular flight, if passenger flows are less.

However the requirements for passengers and their baggage may not be known exactly much in advance of the departure of the aircraft and there is therefore an element of uncertainty about the exact amount of space for freight which may be available on a particular flight. In addition weather conditions may require the aircraft to take on additional fuel which again given the priority for passengers would reduce the space available for air freight and may even impact on the "dedicated" freight space.

Managing air freight therefore requires these uncertainties to be taken into account, which may mean that it may not be possible to carry the maximum amount of freight on any particular flight. The airlines have addressed this problem by developing different pricing structures, with guaranteed freight on a particular flight having a higher price, and freight which can if necessary be delayed until a later flight having a lower one.

In addition our discussions with airlines have indicated that they endeavour to achieve a balance between perishable and non-perishable commodities. This is to ensure that in the event of some cargo having to be delayed at short notice because of shortages of capacity, especially in the case of adverse weather, there is sufficient non-perishable cargo to be deferred while allowing the perishable cargo, which may deteriorate if there is a delay, to be transported on time.

The tariff structure with higher rates for guaranteed delivery does however work against the needs of shippers, with perishable products typically having lower values and therefore not having the same ability to incorporate higher transport charges. There are therefore balancing acts to be undertaken both by airlines and shippers to ensure that perishable cargoes are transported in as timely a fashion as possible. This is a particular issue given that the requirements for perishable cargoes may be very specific in terms of movements at particular times and on particular days of the week to meet market requirements.

Issues with availability of capacity are most likely to affect irregular and fluctuating movements of cargo where shippers have difficulty in providing reasonably firm estimates of demand over the short term. This again particularly applies to perishable products where good or poor climatic conditions may affect harvests on a day to day basis and may result in spikes of demand. Many of these are in the peak passenger season when the capacity for air cargo may in any case be limited which may exacerbate the problem. Having said this, our discussions with the stakeholders in the industry indicated that problems are typically short-lived and transport needs can in general be met in some form, although possibly with a routing or charge that is considered to be sub-optimal to the cargo owner.

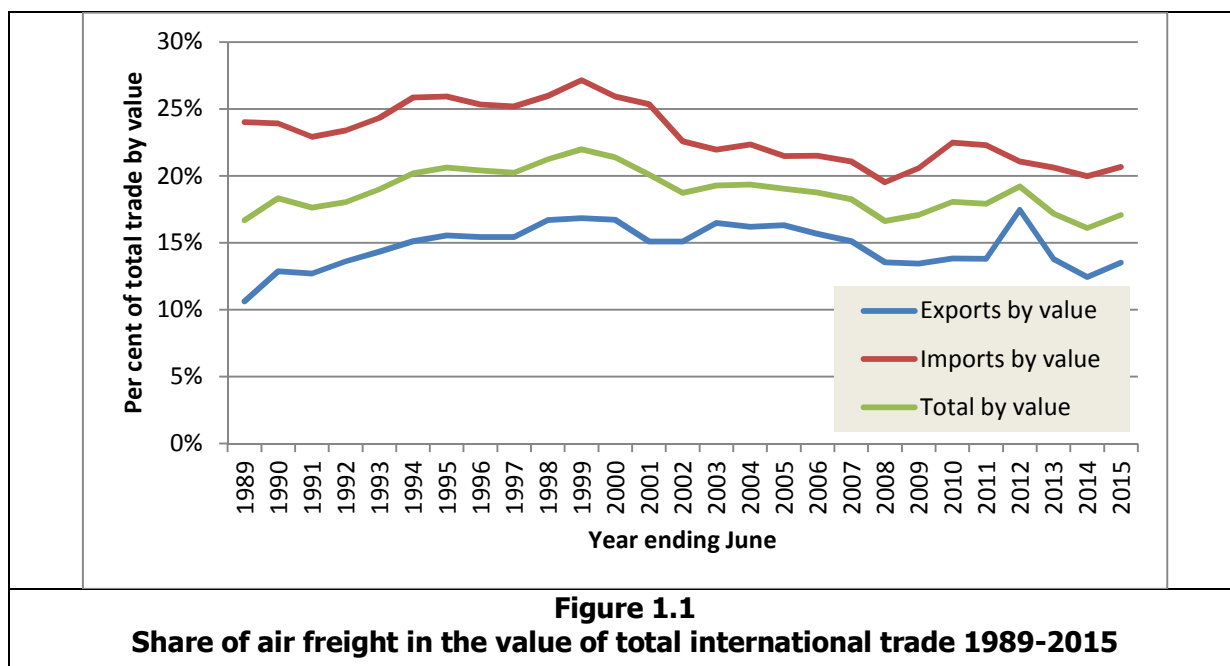
As we have indicated earlier, the majority of freight capacity is provided by bellyhold space after taking account of the passenger requirements. There are also regular dedicated freighter services from New Zealand, mainly serving Australia or routing through it which supplement the bellyhold capacity, but again the capacity offered by these is fixed and is not flexible to meet short-term fluctuations. The use of chartered freighters is considered to be too expensive for all but the most specialised cargoes, typically band or theatre equipment or cars for testing or racing.

1.3 Value of air freight for New Zealand

While relatively small in volume accounting for less than 1 per cent of NZ international trade, air freight represents a significant proportion of New Zealand foreign trade by value. The total value of air freight and its shares of international trade are set out in Table 1.1 and Figure 1.1.

Table 1.1 Air freight and total international trade by value (\$NZ bn) 1989-2015 (1)									
Year	Exports by value (FOB) (1)			Imports by value (CIF) (2)			Total by value		
	Air	Total	Air freight share	Air	Total	Air freight share	Air	Total	Air freight share
1989	1.58	14.91	11%	2.96	12.33	24%	4.54	27.24	17%
1990	1.95	15.18	13%	3.54	14.80	24%	5.49	29.99	18%
1991	2.00	15.76	13%	3.37	14.73	23%	5.38	30.49	18%
1992	2.44	17.92	14%	3.45	14.74	23%	5.89	32.67	18%
1993	2.75	19.18	14%	4.08	16.77	24%	6.83	35.95	19%
1994	3.04	20.14	15%	4.68	18.11	26%	7.73	38.25	20%
1995	3.27	21.06	16%	5.23	20.18	26%	8.50	41.23	21%
1996	3.23	20.94	15%	5.33	21.05	25%	8.56	41.99	20%
1997	3.32	21.50	15%	5.24	20.81	25%	8.56	42.31	20%
1998	3.76	22.52	17%	5.63	21.67	26%	9.39	44.19	21%
1999	3.93	23.35	17%	6.33	23.31	27%	10.26	46.66	22%
2000	4.42	26.45	17%	7.05	27.19	26%	11.47	53.64	21%
2001	4.97	32.92	15%	7.95	31.38	25%	12.92	64.30	20%
2002	4.99	33.07	15%	7.08	31.40	23%	12.08	64.47	19%
2003	5.01	30.42	16%	6.95	31.65	22%	11.96	62.07	19%
2004	4.95	30.58	16%	7.28	32.59	22%	12.23	63.17	19%
2005	5.10	31.26	16%	7.59	35.34	21%	12.69	66.60	19%
2006	5.16	32.94	16%	8.03	37.37	21%	13.19	70.31	19%
2007	5.40	35.71	15%	8.40	39.90	21%	13.80	75.61	18%
2008	5.52	40.82	14%	8.51	43.64	20%	14.04	84.46	17%
2009	5.85	43.51	13%	9.32	45.29	21%	15.17	88.80	17%
2010	5.72	41.43	14%	8.91	39.63	22%	14.63	81.07	18%
2011	6.52	47.21	14%	9.91	44.43	22%	16.42	91.63	18%
2012	8.77	50.23	17%	9.92	47.09	21%	18.68	97.32	19%
2013	6.48	47.05	14%	9.56	46.39	21%	16.04	93.44	17%
2014	6.57	52.77	12%	9.90	49.62	20%	16.47	102.39	16%
2015	6.75	49.96	14%	10.36	50.13	21%	17.10	100.09	17%

- Notes
- (1) Year ending June
 - (2) FOB; Free on board - includes the cost of transport to the vessel used for exporting the goods
 - (3) CIF: Value including Cost of the goods, Insurance and Freight. This is the measure used by Statistics NZ in its general statistics on international commodity imports.



Source: Statistics NZ and consultant analysis

The spike in 2012 reflects the export of aero engines.

In 2015, in value terms air freight represented about 14 per cent of total exports, and 17 per cent of total trade. As a share of the total value of international trade, in recent years, air freight has typically represented about 15 per cent of exports and about 20-25 per cent of imports. While there have been substantial fluctuations in the share from year to year, these shares have generally been declining both for imports and exports since the early 2000s.

The average value of air freight per tonne in the year ending June 2015 amounted to about \$63,000 for exports and \$106,000 for imports. These can be compared with average values of \$1,200 per tonne for goods exported by sea and \$1,800 per tonne for imports.

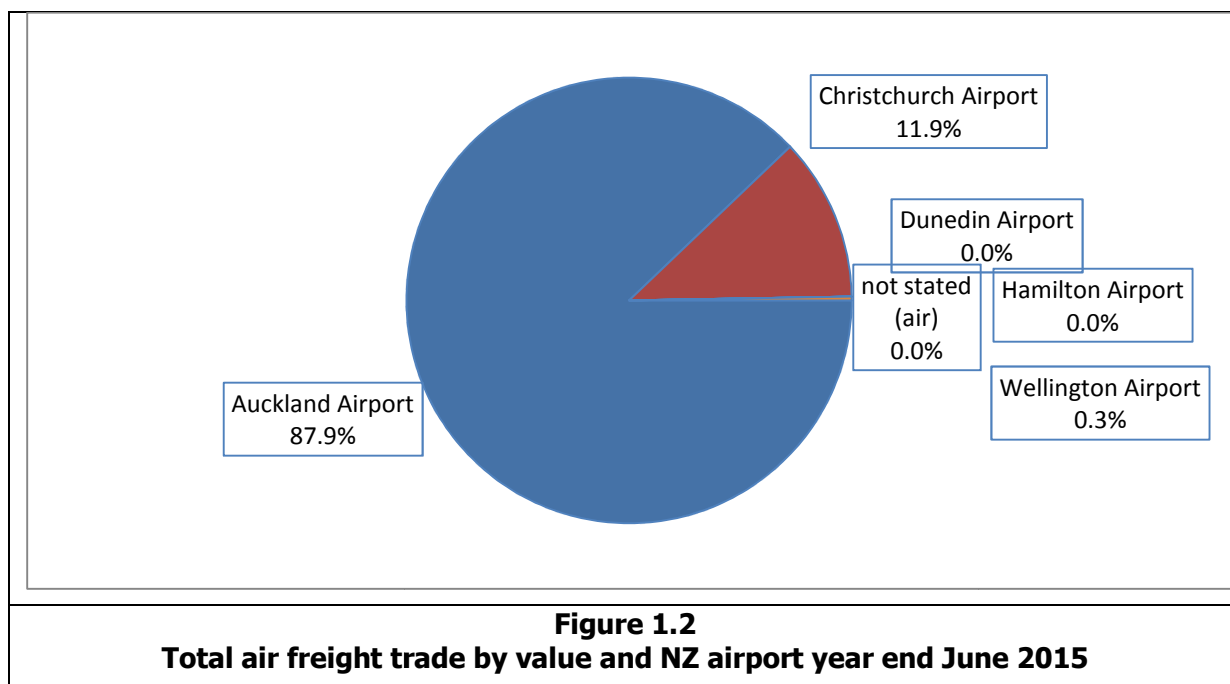
1.4 Distribution of air freight by airport in New Zealand

Air freight movements are very much concentrated at Auckland Airport as can be seen in Table 1.2 and Figure 1.2.

Table 1.2 Foreign trade in year ending June 2015 by value (\$NZ bn)				
	Imports CIF (cost, insurance and freight)	Exports FOB (free on board)	Total	Per cent of total
Auckland Airport	9.73	5.30	15.03	15%
Christchurch Airport	0.60	1.43	2.03	2%
Wellington Airport	0.03	0.02	0.05	0%
Dunedin Airport	0.00	0.00	0.00	0%
Hamilton Airport	0.00	0.00	0.00	0%
not stated (air)	0.00	0.00	0.00	0%
Total Airports	10.36	6.75	17.10	17%
Auckland (sea)	21.54	6.49	28.03	28%
Lyttelton (sea)	4.02	4.97	8.99	9%
Port Chalmers (sea)	0.36	3.61	3.97	4%
Gisborne (sea)	0.00	0.31	0.31	0%
Bluff (sea)	0.66	1.22	1.88	2%
Napier (sea)	0.58	3.95	4.52	5%
New Plymouth (sea)	0.25	2.14	2.39	2%
Nelson (sea)	0.28	0.71	0.99	1%
Picton (sea)	0.00	0.09	0.09	0%
Taharoa (sea)	0.00	0.00	0.00	0%
Timaru (sea)	0.33	1.46	1.78	2%
Tauranga (sea)	5.46	16.32	21.78	22%
not stated (sea)	0.00	0.00	0.00	0%
Wellington (sea)	2.01	1.30	3.31	3%
Whangarei (sea)	4.29	0.65	4.94	5%
Total Seaports	39.77	43.22	82.99	83%
Total All Cargo	50.16	49.98	100.13	100%

Source: Statistics NZ

The total includes parcel post amounting to about \$0.04bn for exports and imports combined.



Source: Statistics NZ and consultant analysis

In 2015 Auckland Airport accounted for 94 per cent of the value of imports by air and 79 per cent of exports, with Christchurch accounting for most of the balance. Because of this concentration, in value terms Auckland Airport was the second largest import port and third largest export port in New Zealand. In terms of total trade value, it was the third largest behind Auckland seaport and Tauranga.

1.5 Methodology

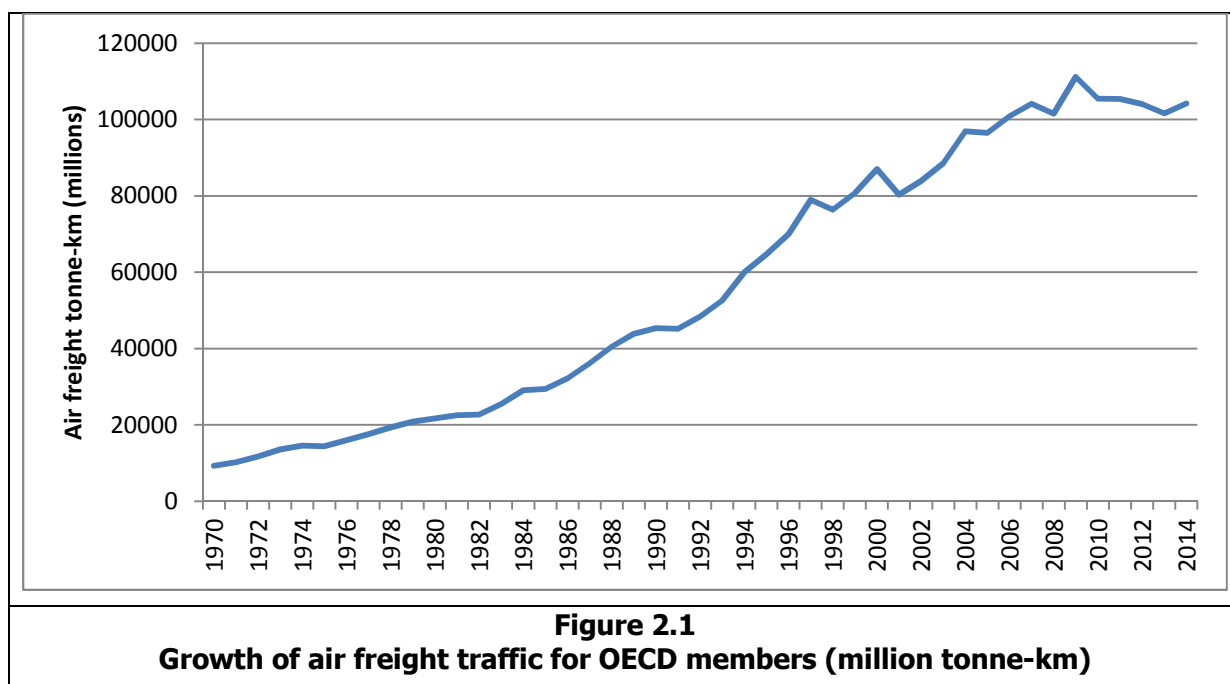
The report has analysed two main data sources, the Statistics NZ data for weight and value to establish the demand; and data on aircraft movements and schedules to establish supply, at least for bellyhold capacity. These sources have been supplemented by interviews with airlines and forwarders. In general our analysis has focussed on the position for 2014 for which the most detailed information has been made available and which has been used as the basis for the forecasts for subsequent years. It should be noted that the data available covers a combination of financial years, calendar years and other periods. In some instances therefore the numbers may vary from those published in FIGS and the Transport and Trade report. In addition it should be noted that the Statistics NZ figures do not include low value goods or mail although the volumes of these are considered to be small.

The forecasts have been derived by analysing the major commodity groups, looking at the trends, and the forecasts developed for these groups in the National Freight Demand Study and then extrapolating these into the future to 2020 and 2030 in line with the Ministry's recent air passenger forecasts.

2 The Growth of Air Freight

2.1 International growth

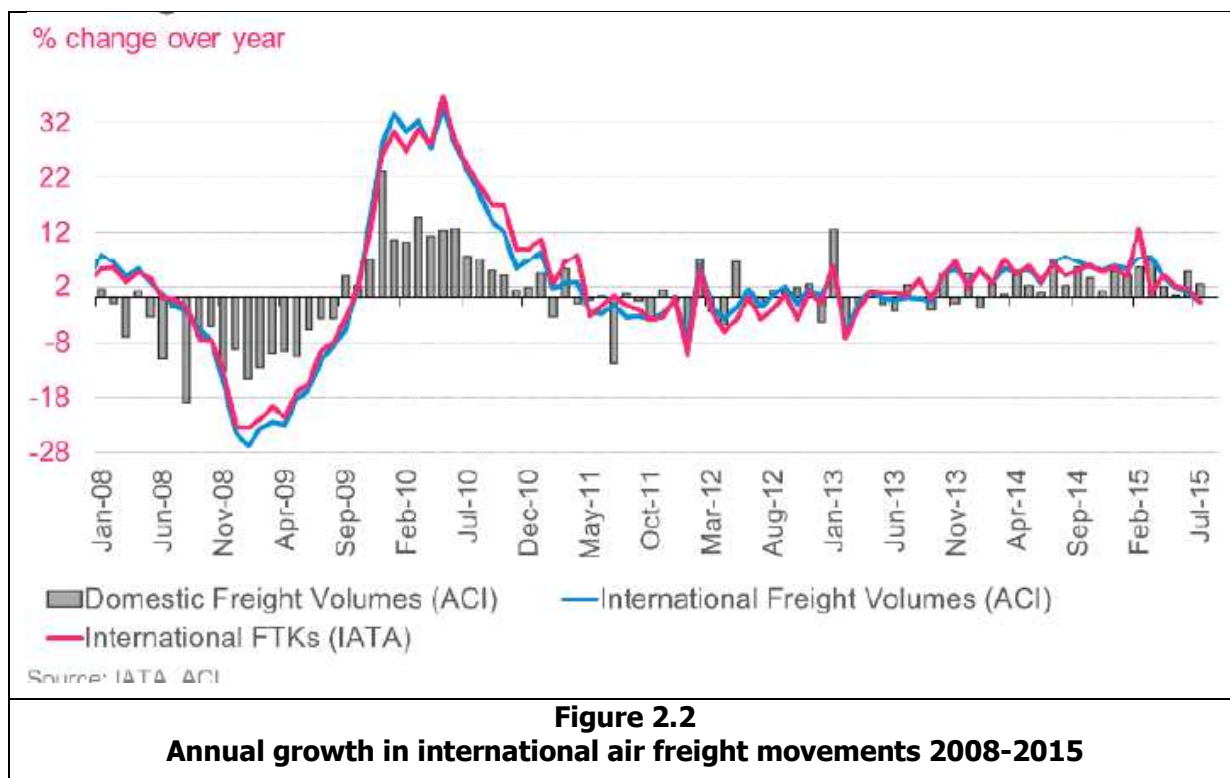
Long term trends in air freight for OECD countries (for which the statistics appear to be reasonably reliable) are set out in Figure 2.1.



Source: World Bank Indicators Database <http://data.worldbank.org/indicator/all>

This shows substantial growth over the period up to the mid 2000's after which increases in flows have been much more limited and have fluctuated substantially from year to year. Over more recent years the figures illustrate the decline in volumes carried by air with the Global Financial Crisis in 2008, substantial growth to 2009, and then lower flows subsequently.

More detailed information although covering all air freight for the period from 2008 is set out in Figure 2.2.



Source: IATA Cargo Chartbook 2015 Q2

<https://www.iata.org/publications/economics/Pages/caarchives.aspx>

This highlights the fluctuations over more recent years and the rather limited growth that has been achieved internationally since the end of 2010.

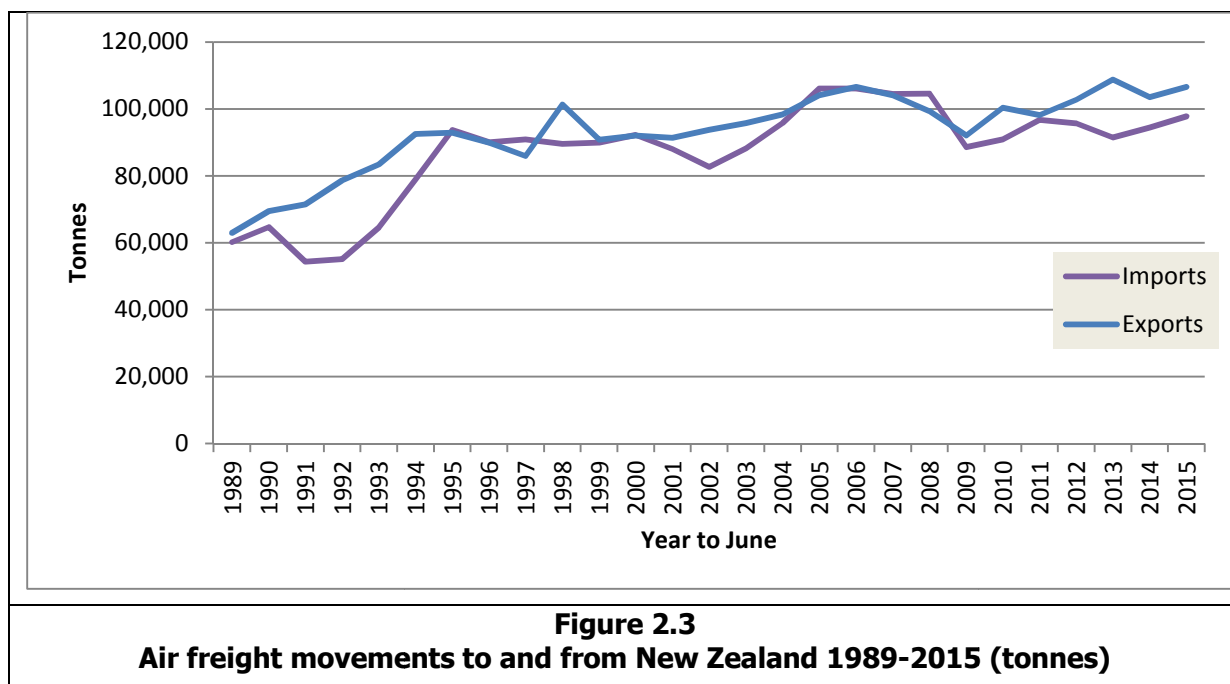
2.2 Air freight growth in New Zealand

The volumes of air freight to or from New Zealand over the period from 1989 are set out in Table 2.1 and Figure 2.3.

Table 2.1 Total air freight volumes to and from New Zealand 1989-2015 (1)			
Year ending June	Total air freight volumes (tonnes)		
	Exports	Imports	Total
1989	62,931	60,147	123,078
1990	69,420	64,683	134,103
1991	71,423	54,384	125,807
1992	78,625	55,149	133,774
1993	83,444	64,540	147,984
1994	92,522	78,801	171,323
1995	92,898	93,639	186,537
1996	89,916	90,011	179,927
1997	85,946	90,927	176,873
1998	101,302	89,494	190,796
1999	90,830	89,959	180,789
2000	91,980	92,230	184,210
2001	91,352	88,046	179,398
2002	93,738	82,654	176,392
2003	95,757	88,204	183,961
2004	98,376	95,734	194,110
2005	104,043	106,089	210,132
2006	106,528	106,104	212,632
2007	104,116	104,446	208,562
2008	99,249	104,583	203,832
2009	92,036	88,540	180,576
2010	100,372	90,891	191,263
2011	98,113	96,676	194,789
2012	102,760	95,707	198,467
2013	108,803	91,406	200,209
2014	103,510	94,420	197,930
2015	106,608	90,080	196,688

Source: Statistics NZ

Notes (1) Year ending June



Source: Statistics NZ and consultant analysis

At an aggregate level, the data indicates that after growing strongly up to the mid 1990's, the volumes carried by air have broadly stabilised, with the volumes of exports matching fairly closely the volume of imports. The GFC resulted in a reduction in movements of both imports and exports in 2008, mirroring the broader world-wide trends. While there has been a subsequent recovery, this has left flows broadly at their pre GFC levels or less, with imports in particular being 15 per cent below their pre- GFC highs and exports in 2015 being similar to the pre GFC high in 2006.

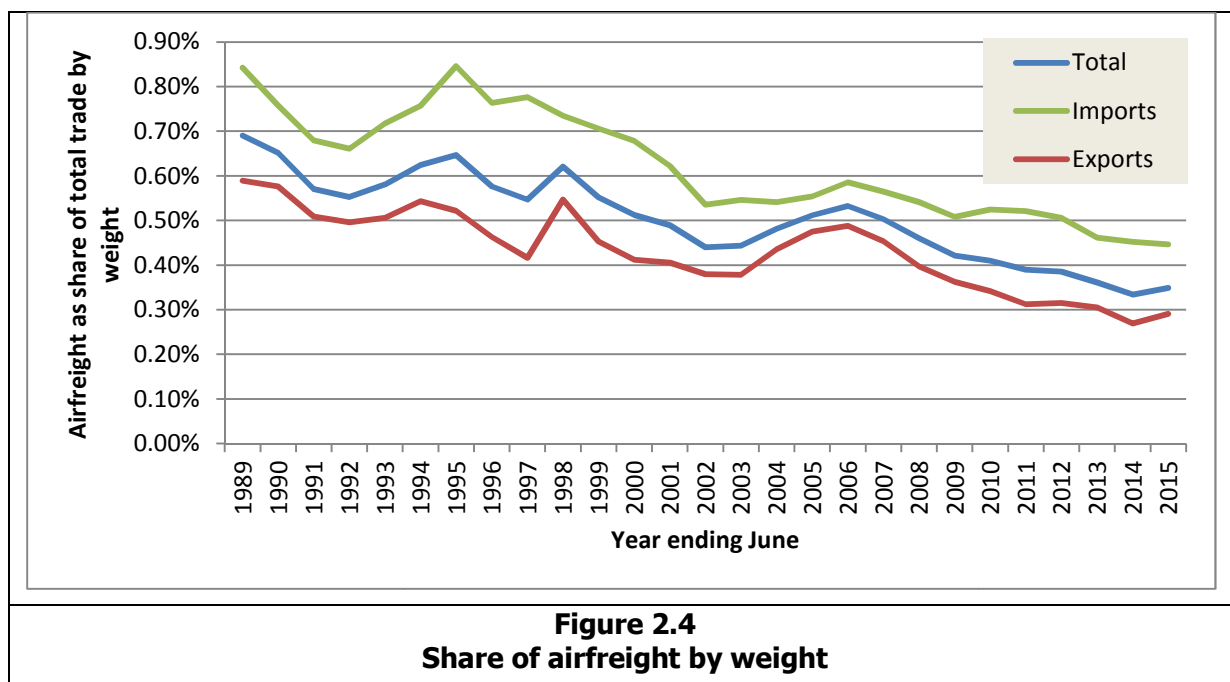
The general stability of the volumes of air freight traffic is in contrast to the substantial growth in sea freight volumes over recent years, as set out in Table 2.2.

Table 2.2 Total New Zealand International Trade by air and sea 1989-2015 (1) (Million tonnes gross weight)				
Year ending June	Total Airports	Total Seaports	Total	Per cent by air
1989	0.123	17.70	17.82	0.69%
1990	0.134	20.46	20.59	0.65%
1991	0.126	21.92	22.04	0.57%
1992	0.134	24.07	24.20	0.55%
1993	0.148	25.35	25.50	0.58%
1994	0.171	27.27	27.44	0.62%
1995	0.187	28.68	28.87	0.65%
1996	0.180	31.04	31.22	0.58%
1997	0.177	32.18	32.35	0.55%
1998	0.191	30.53	30.72	0.62%
1999	0.181	32.60	32.78	0.55%
2000	0.184	35.76	35.94	0.51%
2001	0.179	36.50	36.68	0.49%
2002	0.176	39.94	40.12	0.44%
2003	0.184	41.31	41.49	0.44%
2004	0.194	40.10	40.29	0.48%
2005	0.210	40.85	41.06	0.51%
2006	0.213	39.75	39.96	0.53%
2007	0.209	41.26	41.46	0.50%
2008	0.204	44.14	44.35	0.46%
2009	0.181	42.68	42.86	0.42%
2010	0.191	46.51	46.70	0.41%
2011	0.195	49.81	50.01	0.39%
2012	0.198	51.30	51.50	0.39%
2013	0.200	55.26	55.46	0.36%
2014	0.198	59.12	59.32	0.33%
2015	0.204	58.42	58.62	0.35%

Source: Statistics NZ and consultant analysis

Notes (1) Year ending June

The decline in the airfreight share is set out in Figure 2.4.



Source: Statistics NZ and consultant analysis

In general the share of airfreight in total trade has declined with both imports and exports displaying similar trends. In part this will reflect the buoyancy of general economic conditions with the years before the GFC showing an increasing share for airfreight, but the relative decline has resumed in recent years.

3 Current Patterns of Air Freight Movements

3.1 Total air freight movements by commodity

Detailed information has been obtained on the patterns of air freight movement for 2014. For that year, the total volumes of air freight movements by the major HS2 commodities have been identified and these are set out in Table 3.1 and Figure 3.1 and Figure 3.2. It should be noted that slightly different commodity groups have been used for forecasting. In this chapter the 2014 data is for the calendar year.

Table 3.1		
Air freight into and out of New Zealand by major commodities 2014		
Commodity and HS2 number	Total tonnes	Per cent of exports or imports
Exports		
02 Meat	9,906	9
03 Fish	19,522	19
04 Dairy	6,595	6
07 Vegetables	10,503	10
08 Fruit	9,234	9
84 Machinery	5,776	6
All others	43,217	41
Total Exports	104,753	100
Imports		
07 Vegetables	5,256	5
08 Fruit	3,149	3
30 Pharmaceuticals	2,859	3
39 Plastics	4,219	4
42 Leather	1,588	2
48 Paper	1,904	2
49 Printed matter	5,723	6
61+62 Clothing	6,948	7
73 Iron/steel articles	2,501	3
84 Machinery	17,025	18
85 Electrical	11,471	12
87 Vehicles	2,643	3
90 Optical etc	3,088	3
All others	27,570	29
Total Imports	95,944	100

Source: Statistics NZ. HS2 is the 2-digit (highest) level of the Harmonised System for commodity classification internationally. The codes and commodities are listed in Appendix A.

Figure

3.1

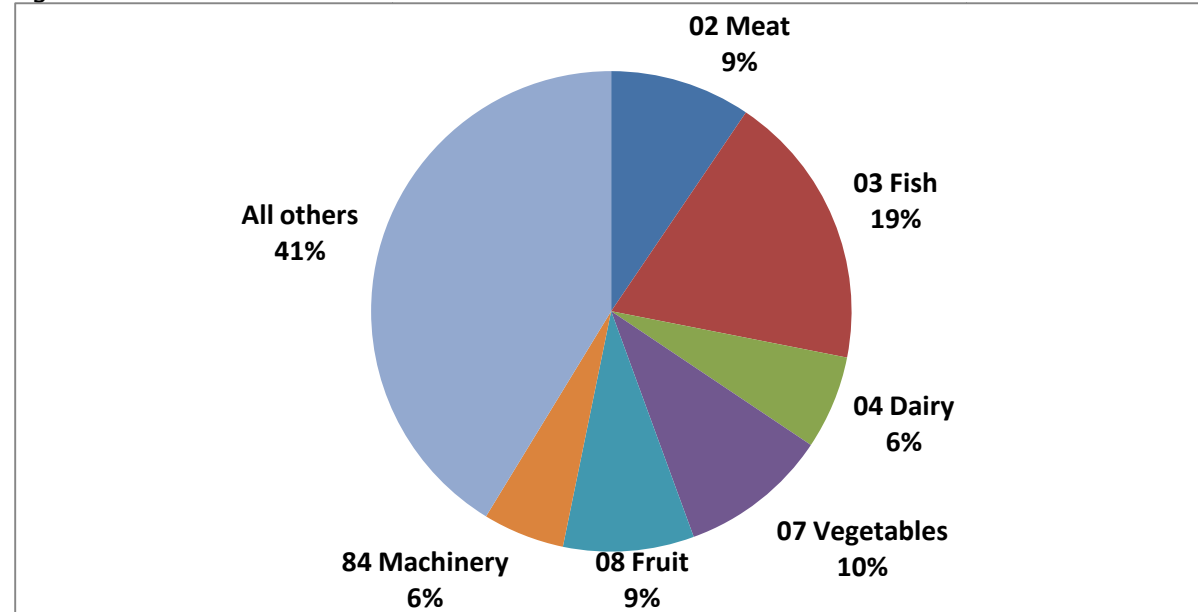


Figure 3.1
Air freight exports by major HS2 commodity 2014 (tonnes)

Source: Statistics NZ and consultant analysis

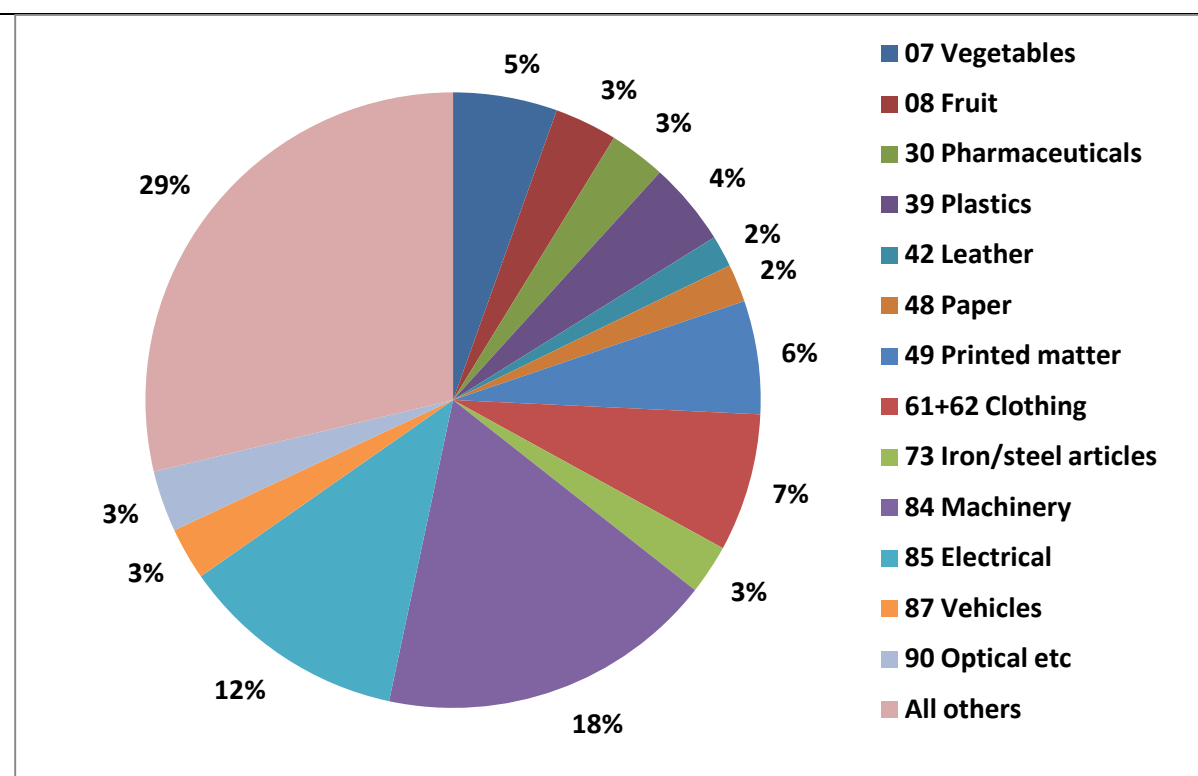


Figure 3.2
Air freight imports by major HS2 commodity 2014 (tonnes)

Source: Statistics NZ and consultant analysis

Exports are dominated by the movement of primary products, especially fish, fruit and vegetables and meat which account for almost half the total. Imports have a wider distribution of mainly manufactured goods of different categories with machinery, electrical goods and vehicles and parts accounting for about a third of the total.

3.2 Air freight by airport 2014

Having identified the total flows, the breakdown of air freight by New Zealand airport is set out in Table 3.2.

Table 3.2										
Distribution of air freight by airport 2014										
Airport	Exports					Imports				
	tonnes	%	\$m	%	\$/t	tonnes	%	\$m CIF	%	\$/t
Auckland	84,737	81	5,140	77	60,661	88,292	92	9,186	94	104,039
Christchurch	18,953	18	1,541	23	81,293	7,113	7	595	6	83,680
Wellington	1,022	1	12	-	12,132	534	1	29	-	53,481
All others	40	-	0.5	-	12,325	5	-	2	-	356,994
Total	104,753	100	6,694	100	63,902	95,944	100	9,811	100	102,261

Source: Statistics NZ and consultant analysis

Given the dominance of Auckland and Christchurch, which handle 99 per cent of the traffic by weight, and almost 100 per cent by value, these form the focus of this report. Within these two, Auckland has a much larger share with over 80 per cent of the export tonnage and almost 95 per cent of the import tonnage. This reflects the size of the Auckland market and also the wide range of international air services which serve this market and thus provide opportunities for bellyhold air freight.

The values of exports and imports per tonne vary widely by the type of commodity. The high import value per tonne for other airports reflects the importation of aircraft into Dunedin. This table also shows that while exports were 9 per cent higher in weight than imports, imports were 47 per cent more valuable. This reflects the higher proportions of manufactured goods of different types in imports as set out in Figure 3.2, compared to the large shares of more basic products in exports as illustrated in Figure 3.1.

Because of its dominance in both markets, Auckland's figures for imports and exports are similar to the national figures. In Christchurch however, exports were 2.7 times imports by weight, and 2.6 times in value. Christchurch's exports were more valuable per tonne than the average, but imports were less than the average.

By way of comparison, in the year ending March 2002 the volumes were lower (as Figure 2.3 also shows).¹

Table 3.3										
Distribution of air freight by airport year ending March 2002										
Airport	Exports					Imports				
	tonnes	%	\$m	%	\$/t	tonnes	%	\$m CIF	%	\$/t
Auckland	72,432	78	2,944	72	40,640	72,526	87	6,457	87	89,029
Christchurch	18,364	20	1,050	26	57,168	8,938	11	713	10	79,728
Wellington	1,969	2	114	3	58,029	2,053	2	192	3	93,557
All others	-	-	2	-	-	-	-	86	1	-
Total	92,765	100	4,109	100	44,297	83,517	100	7,444	100	89,131

Source: Statistics NZ and consultant analysis

¹ This year was taken as a comparator because of ready availability of data.

While Auckland was even then the dominant airport, the shares of both Christchurch and Wellington were a little higher than in 2014.

3.3 Exports

3.3.1 Auckland

Trading patterns

In 2014 Auckland exported 84,737 tonnes of air freight, 81 per cent of the total and so significantly higher than all other airports combined. The exports from Auckland were worth \$5,140m, 77 per cent of the total, also much higher than other airports. We consider that weight is the most important parameter to forecast, as weight reflects the capacity of the aircraft fleet serving NZ, and so there will be little focus on value in this report. As an example, the most valuable commodity exported from Auckland at HS2 level was Commodity 84, machinery, valued at \$1,079m. This represented 20 per cent of the total value out of Auckland but commodity 84 was only 5 per cent of the weight moved. Moreover 61 per cent of the value of that commodity was HS4²: 8411, jet engines, a very valuable commodity, but which weighed less than half a percent of the total exports through Auckland. Overall, value per tonne ex Auckland was \$60,661.

In 2002, Auckland exported 72,432 tonnes, 78 per cent of the total, worth \$2,944m, in dollars of the day, in both cases well above other airports. Commodity 84 was also the most valuable commodity then, worth \$409m, with commodity 85, electrical machinery, relatively more important than in 2014, at \$394m. Within commodity 84, the largest HS4 level commodity was 8473, parts for computers and other office machinery (27 per cent of commodity 84). Jet engines were relatively unimportant then.

Australia was the most common destination for exports in 2014, with 41 per cent (34,626 tonnes) of Auckland's exports, the same proportion that Australia represents as a destination for the whole country. Other destinations are individually much less important, as Table 3.4 and Figure 3.3 show:

Table 3.4				
Exports from Auckland 2014, major destinations				
Destination	Tonnes	Per cent	National tonnes	Per cent of national total
Australia	34,626	41	42,660	41
China	11,747	14	13,592	13
Japan	8,466	10	9,385	9
North America	7,719	9	9,679	9
SE Asia	6,427	8	8,085	8
Western Europe	3,707	4	5,799	6
Pacific	4,010	5	4,026	4
United Kingdom	2,851	3	4,747	5
All others	5,169	6	6,780	6
Total	84,722	100	104,753	100

Note: in this report China includes Hong Kong. Source: Statistics NZ and consultant analysis

² HS4 is the 4-digit level of the Harmonised System, the next level down from HS2. The full HS4 classification list is part of the 10-digit list, which is very large. It can be found on <http://www.stats.govt.nz/methods/classifications-and-standards/classification-related-stats-standards/harmonised-system-2012.aspx>.

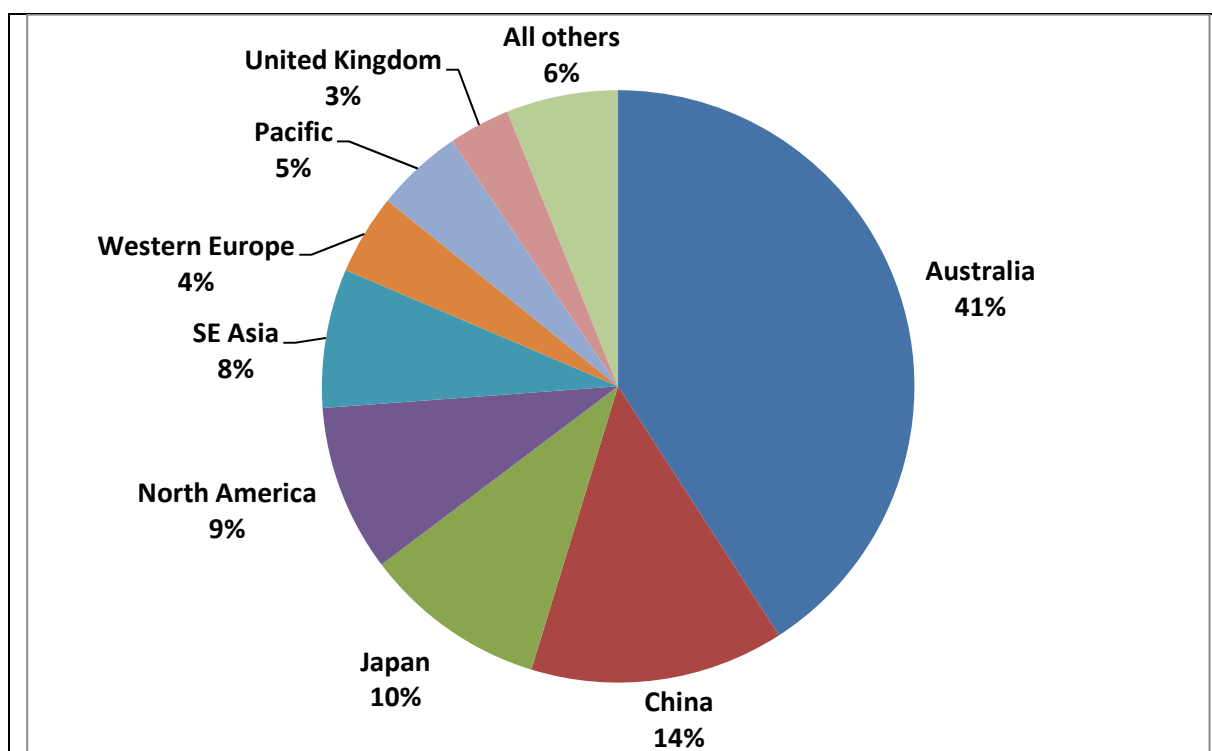


Figure 3.3
Auckland air freight exports by destination 2014

Source: Statistics NZ and consultant analysis

The dominance of Australia, followed by China and Japan, which together account for almost two-thirds of the total, is shown in Figure 3.3.

Major commodities

The major commodity exported from Auckland is fish, which accounts for 16 per cent of the total outbound from Auckland. Other important commodities are vegetables (12 per cent) and fruit (9 per cent).

Commodity and HS2 number	Tonnes	Per cent	National tonnes	Per cent
02 Meat	6,023	7	9,906	9
03 Fish	13,264	16	19,522	19
04 Dairy	5,495	7	6,595	6
07 Vegetables	10,438	12	10,503	10
08 Fruit	7,333	9	9,234	9
84 Machinery	4,626	5	5,776	6
All others	37,543	44	43,217	41
Total	84,722	100	104,753	100

Source: Statistics NZ and consultant analysis

Significant "other" commodities include HS2: 61 and 62 clothing (3,903 tonnes, 5 per cent), 21 other food preparations (3,721 tonnes, 4 per cent), 19 cereal preparations (3,227 tonnes, 4 per cent), and 39 plastics (2,514 tonnes, 3 per cent).

In 2002, the most significant commodities from Auckland by weight were fish (11,623 tonnes, 16 per cent - the same proportion as 2014), vegetables (6,914 tonnes, 10 per cent) meat (5,708 tonnes, 8 per cent) fruit (5,390 tonnes, 7 per cent), and plastics (4,057 tonnes, 6 per cent).

In terms of the important commodities to specific destinations, fish is the most important export to **Australia**, 6,433 tonnes, making up 19 percent of all exports to Australia (and this destination/commodity combination accounts for 7.6 per cent of all exports from Auckland). Clothing is next at 11 per cent (3,742 tonnes), reflecting the role of NZ distribution hubs directly serving Australian markets, with vegetables 9 per cent (3,191 tonnes) and fruit 9 per cent (3,155 tonnes) the next most important commodities exported from Auckland to Australia.

Fish also dominates exports to **China**, making up 26 per cent of the total (3,059 tonnes), followed by dairy (2,300 tonnes, 20 per cent), other food preparations (1,453 tonnes, 12 percent) and cereal preparations etc (1,390 tonnes, 12 percent). The latter includes infant formula.

Vegetables are the single most important export to **Japan**, with 5,966 tonnes, accounting for 70 per cent of the total exports to Japan. This is mostly capsicums (pimentos). Only 743 tonnes of fish goes to Japan.

Fish is again the main commodity to **North America** (2,159 tonnes, 26 per cent of exports to North America). Machinery (HS2: 84) accounts for 14 percent, 1,048 tonnes.

Fruit is 28 per cent of exports to **SE Asia** (1,804 tonnes), most likely avocados.

Meat is 43 percent (1,585 tonnes) of exports to **Western Europe**, mainly chilled beef, lamb, and venison.

In summary

- 48 per cent of the **fish** went to Australia, 23 per cent to China, 17 per cent to North America
- 57 per cent of the **vegetables** went to Japan, 31 per cent to Australia
- 43 per cent of the **fruit** went to Australia, 25 per cent to SE Asia
- 27 per cent of the **meat** went to the UK, and 26 per cent to Western Europe
- 42 per cent of the **dairy** went to China, and 23 per cent to SE Asia
- 40 per cent of the **machinery** (HS2:84) went to Australia, 23 per cent to North America. This includes aero engines, jet and piston, pumps and refrigeration equipment.³

Seasonality

Traffic out of Auckland is focused on the summer months, especially meat, dairy, fruit and vegetables. Overall, though the peak month is only 1.5 times the lowest month. For individual commodities, however, the peak can be much more pronounced: for vegetables the ratio between trough and peak months is 1:17, for fruit 1:10, for meat 1:4, and for dairy 1:2. Fish is much more even at 1:1.3.

In terms of destinations, because of its dominance, Australia is similar to the average, and has a trough: peak ratio of 1:1.7, with other major destinations peaking in different months, and more sharply peaked. Again, important commodities to Australia are sharply peaked: for meat the ratio between trough and peak months is 1:106; for fruit 1:75, for vegetables 1:69, and for dairy 1:16. Japan particularly has substantial differences between monthly flows reflecting high flows of capsicums across the summer months.

The pattern of flows by destination through the year is illustrated in Figure 3.4.

³ Note that 2002 comparisons at the destination and month level are not available in the data set we have available.

Table 3.6
Seasonality of export traffic from Auckland to major destinations 2014

Month	Total		Australia		China		Japan		US		SE Asia		W Europe	
	t	%	t	%	t	%	t	%	t	%	t	%	t	%
Jan	8106	9.6	3492	10.1	1075	9.1	1024	12.1	707	9.2	559	8.7	183	4.9
Feb	7785	9.2	3782	10.9	687	5.8	1073	12.7	630	8.2	414	6.4	263	7.1
Mar	8352	9.9	3417	9.9	1046	8.9	973	11.5	954	12.4	482	7.5	447	12.1
Apr	6668	7.9	2509	7.2	640	5.4	778	9.2	746	9.7	504	7.8	441	11.9
May	6235	7.4	2414	7.0	864	7.4	359	4.2	631	8.2	727	11.3	320	8.6
Jun	5890	7.0	2540	7.3	795	6.8	397	4.7	539	7.0	438	6.8	318	8.5
Jul	6235	7.4	2910	8.4	807	6.9	370	4.4	494	6.4	478	7.4	320	8.6
Aug	5680	6.7	2454	7.1	842	7.2	329	3.9	560	7.3	338	5.3	285	7.7
Sep	5737	6.8	2248	6.5	1115	9.5	352	4.2	528	6.8	424	6.6	212	5.7
Oct	6935	8.2	2881	8.3	1041	8.9	728	8.6	509	6.6	624	9.7	244	6.6
Nov	8618	10.2	3122	9.0	1476	12.6	957	11.3	698	9.0	819	12.8	300	8.1
Dec	8480	10.0	2857	8.3	1361	11.6	1123	13.3	724	9.4	619	9.6	376	10.2
Total	84722	100	34626	100	11747	100	8466	100	7719	100.0	6427	100	3707	100
Ratio	1:1.5		1:1.7		1:2.1		1:3.3		1:1.9		1:2.0		1:2.1	

Source: Statistics NZ and consultant analysis

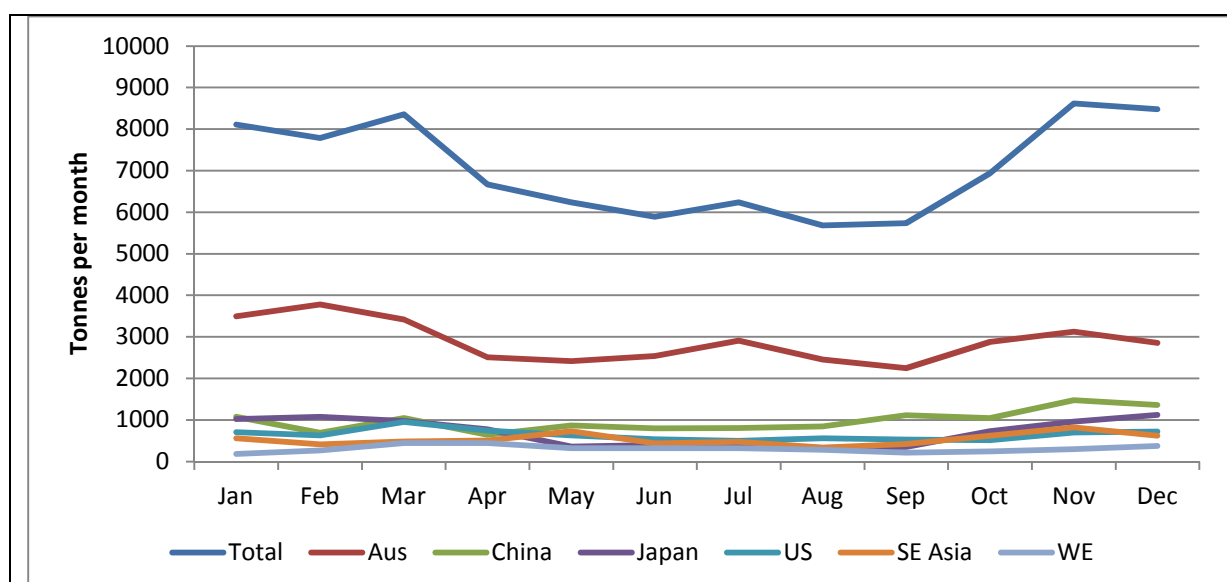


Figure 3.4
Seasonality in export flows from Auckland airport to major trading partners 2014

Source: Statistics NZ and consultant analysis

Note that the total pattern is very similar to the seasonality for the whole country for 1992 in Figure 6 in *New Zealand Airfreight Exports: Constraints and Opportunities*, published by the Ministry of Foreign Affairs in the early 1990s.

3.3.2 Christchurch

Trading patterns

Compared to Auckland air freight flows through Christchurch Airport are relatively small. In 2014 Christchurch exported 18,954 tonnes, that is, 22 per cent of the volume through Auckland. The value of Christchurch exports was \$1,541m, 30 per cent that of Auckland. However average value per tonne was \$81,293, 34 per cent higher than in Auckland. This reflects the commodity mix, probably because of the value of jet engines. In Christchurch the value of jet engines is as high as 80 per cent of the same commodity in Auckland, yet overall the total value out of Christchurch is only 30 percent that of Auckland. Jet engines represent therefore a much greater share of the total export value from Christchurch (34 per cent) compared with Auckland (13 per cent), increasing Christchurch's average value relative to Auckland's.

In the year ending March 2002 there were 18,634 tonnes exported from Christchurch, 25 per cent of Auckland's volume. The value was \$1,050m, 36 per cent of Auckland. Average value per tonne at \$57,168 was above Auckland's. Jet engines were less important then.

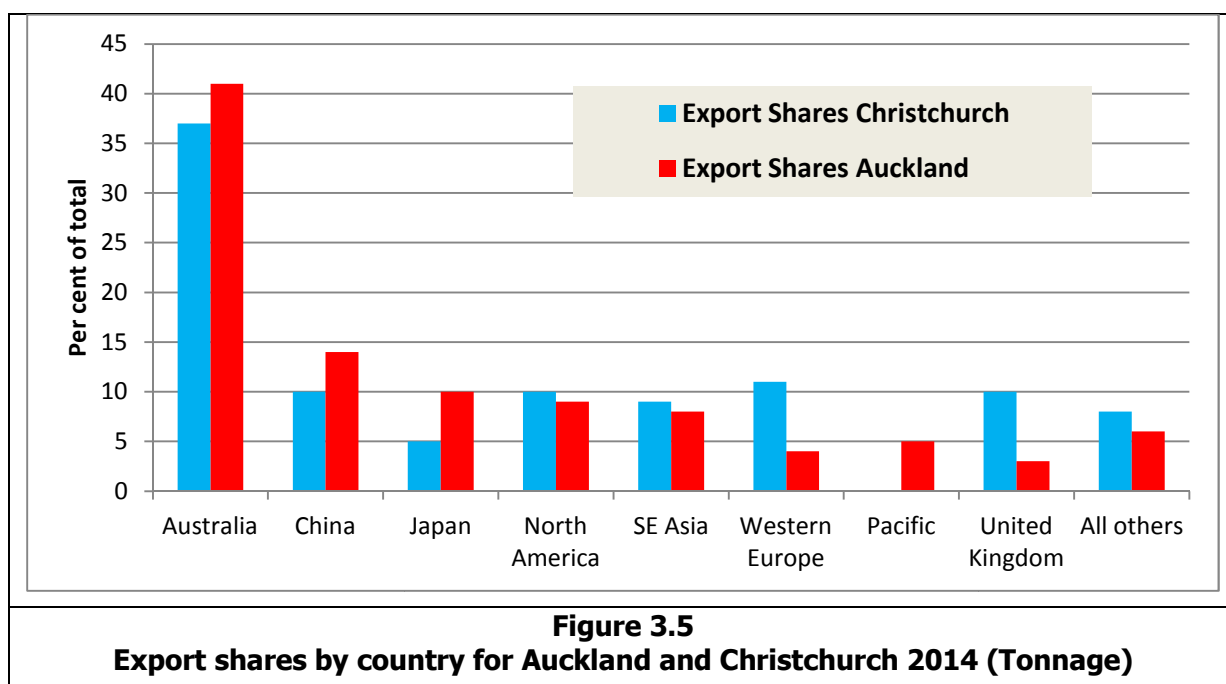
As in the case of Auckland, the major 2014 destination for Christchurch's freight is Australia, although a slightly lower proportion to the total went to that country – 37 per cent, 7,010 tonnes. The next most significant destinations are much lower – Western Europe 11 per cent (2,091 tonnes); China 10 per cent (1,842 tonnes) and North America (1,960 tonnes) and UK (1,895 tonnes), each with 10 per cent of the total.

Table 3.7				
Exports from Christchurch to major destinations 2014				
Destination	Tonnes	Per cent	National tonnes	Per cent of national total
Australia	7,010	37	42,660	41
China	1,842	10	13,592	13
Japan	919	5	9,385	9
North America	1,960	10	9,679	9
SE Asia	1,657	9	8,085	8
Western Europe	2,091	11	5,799	6
Pacific	12	-	4,026	4
United Kingdom	1,895	10	4,747	5
All others	1,568	8	6,780	6
Total	18,954	100	104,753	100

Source: Statistics NZ and consultant analysis

The list of destinations is the same as for Auckland. In comparison with Auckland, Christchurch has much lower proportion of its trade with Japan and the Pacific, reflecting Auckland's different air connections, and a much higher proportion with Western Europe and the United Kingdom, reflecting the commodity mix.

The different shares for Auckland and Christchurch exports are illustrated in Table 3.5.



Source: Statistics NZ and consultant analysis

As Figure 3.5 indicates, Australia still dominates exports from Christchurch, although its share is somewhat less than for Auckland.

Major commodities

Again, like Auckland, the most important commodity for Christchurch was fish, accounting for 32 per cent of the exports (6,081 tonnes), with meat accounting for 20 per cent (3,883 tonnes). In 2002 the same two major commodities dominated– Fish 28 per cent, (5,066 tonnes); and meat 19 per cent (3,511 tonnes). The other main commodities in 2014 are listed in Table 3.8.

Commodity and HS2 number	Tonnes	Per cent	National tonnes	Per cent
02 Meat	3,883	20	9,906	9
03 Fish	6,081	32	19,522	19
04 Dairy	1,100	6	6,595	6
07 Vegetables	65	-	10,503	10
08 Fruit	1,901	10	9,234	9
84 Machinery	1,141	6	5,776	6
All others	4,783	25	43,217	41
Total	18,954	100	104,753	100

Source: Statistics NZ and consultant analysis

The commodity list is the same as Table 3.4 to enable comparison with Auckland. It is clear that exports through Christchurch are more heavily weighted to meat and fish than Auckland, with these accounting for over half all exports compared to less than 30 per cent for Auckland.

Overall the commodity mix is more concentrated in Christchurch, with the residual "All others" row accounting for only 25 per cent, compared with 44 per cent in Auckland. Important "other" commodities at Christchurch include HS2 85 electrical (5 per cent, 991 tonnes), and livestock (horses) 3 per cent, 479 tonnes.

In terms of important commodities to specific destinations: fish (3,644 tonnes) was 52 per cent of exports to **Australia** (this route and commodity accounted for 19 per cent of all Christchurch exports). HS2 84 machinery and 85 electrical accounted for 466 tonnes and 483 tonnes respectively (both 7 per cent).

Meat accounted for 77 per cent of traffic to **Western Europe** (610 tonnes) and 78 per cent to the **UK** (1,487 tonnes)

Fish was the main commodity to **China** – 44 per cent, 815 tonnes. Livestock was 16 per cent, 295 tonnes. Meat (176 tonnes) was 10 per cent and dairy (164 tonnes) 9 per cent.

Fish was also the main export to **North America**, 52 per cent, 1,027 tonnes, followed by machinery 16 per cent (311 tonnes) and meat 8 per cent (155 tonnes)

Dairy was the main export to **South East Asia** 42 per cent (689 tonnes) followed by fruit 27 per cent (439 tonnes)

In summary:

- 61 per cent of **Livestock** (horses) went to China and 38 per cent to Australia.
- 41 per cent of **meat** went to Western Europe and 38 per cent to the UK.
- 60 per cent of **fish** went to Australia, 17 per cent to North America, and 13 per cent to China.
- 63 per cent of **dairy** went to South East Asia, and 15 per cent to China.
- 33 per cent of **fruit** went to Taiwan and 23 per cent to SE Asia.
- 41 per cent of **machinery** went to Australia, and 27 per cent to the US. 49 per cent of electrical machinery also went to Australia, and 11 per cent to North America.

While most flights from Christchurch were to Australia, it does have direct services to Singapore, and Emirates flights to Australia continue to Dubai. Clearly there is some onward transshipping at these places to reach the ultimate destination. Seasonal services operate to Taiwan via Sydney and Melbourne, although this latter was added in October 2015 and so would not be included in our statistics.

Seasonality

Overall, the traffic out of Christchurch is only mildly seasonal, with the peak month of January only 1.9 times the trough. Traffic to the main market of Australia is even less seasonal, with a trough: peak ratio of 1:1.3. The other destinations are more seasonal, reflecting the commodity mix, especially the UK, which receives 25 per cent of its exports from Christchurch in one month, December. 96 per cent of the exports to the UK that month were meat. In the next busiest month for exports to the UK, April, 92 per cent was meat. China received 20 per cent of its Christchurch exports in July – 78 per cent was livestock.

Month	Total		Australia		W Europe		China		US		UK		SE Asia	
	t	%	t	%	t	%	t	%	t	%	t	%	t	%
Jan	2249	11.9	599	8.5	82	3.9	282	15.3	136	7.0	65	3.5	374	22.6
Feb	1640	8.7	649	9.3	175	8.4	122	6.6	159	8.1	105	5.6	244	14.7
Mar	1662	8.8	661	9.4	292	14.0	85	4.6	156	8.0	230	12.1	84	5.1
Apr	1648	8.7	556	7.9	254	12.1	74	4.0	145	7.4	388	20.5	73	4.4
May	1569	8.3	572	8.2	256	12.3	181	9.9	172	8.8	148	7.8	77	4.7
Jun	1273	6.7	558	8.0	188	9.0	101	5.5	122	6.2	90	4.7	62	3.7
Jul	1582	8.3	605	8.6	91	4.3	376	20.4	157	8.0	53	2.8	103	6.2
Aug	1302	6.9	564	8.0	129	6.2	66	3.6	281	14.4	33	1.7	69	4.2
Sep	1207	6.4	512	7.3	116	5.6	229	12.4	158	8.1	13	0.7	78	4.7
Oct	1282	6.8	615	8.8	112	5.3	149	8.1	152	7.8	20	1.0	118	7.1
Nov	1670	8.8	581	8.3	225	10.8	87	4.7	179	9.1	274	14.5	193	11.6
Dec	1868	9.9	539	7.7	172	8.2	89	4.8	142	7.2	475	25.0	182	11.0
Tot	18952	100	7010	100	2091	100	1842	100	1960	100	1895	100	1657	100
Ratio	1:1.9		1:1.3		1:3.2		1:4.3		1:2.3		1:36.5		1:6	

Source: Statistics NZ and consultant analysis

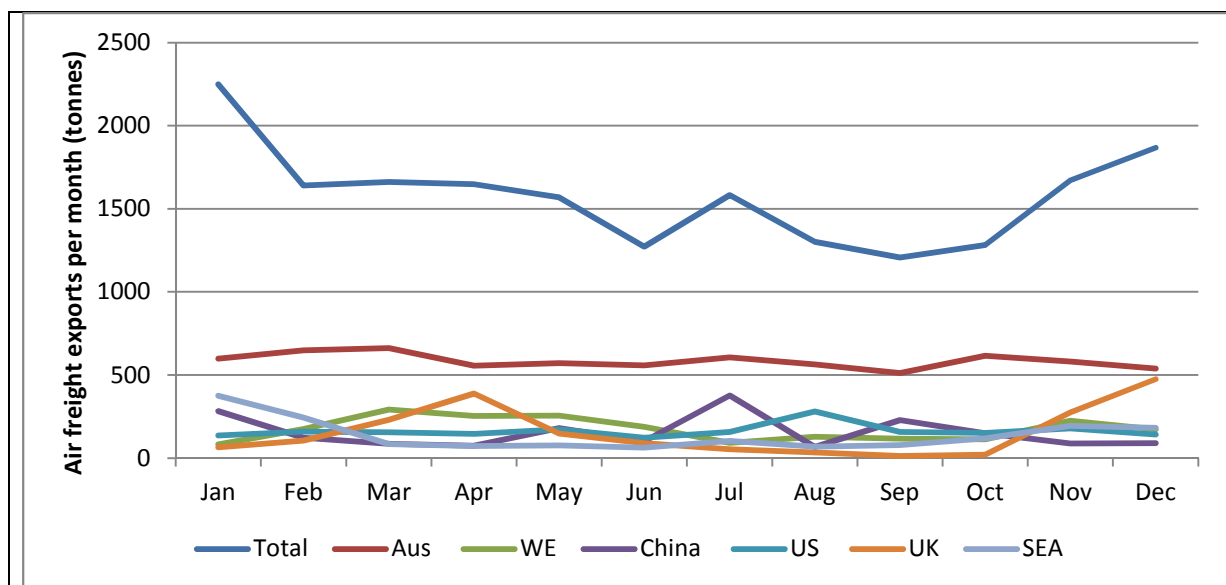


Figure 3.6
Seasonality of air freight exports from Christchurch by destination 2014

Source: Statistics NZ and consultant analysis

3.4 Imports

3.4.1 Auckland

Patterns of trade

Auckland handled 88,292 tonnes of imports in 2014, slightly higher than the export total. These were worth \$9,185.8m CIF, and were worth \$104,039 per tonne, both figures substantially higher than for exports. The most valuable commodities were machinery and electrical machinery, which accounted for 49 per cent of the value. Included in this were computers (HS4: 8471 – 11 per cent of total value). Jet engines were also imported as well as exported, amounting to 6 per cent of the total value.

In 2002, Auckland imported 72,526 tonnes, almost the same as the export total. They were worth \$6457m CIF, and \$89,029/tonne, both more than the export figures for 2002 – the same patterns as in 2014. The most valuable commodities were as for 2014 – machinery and electrical machinery were 49 per cent of the total value, and within that computers were 10 per cent of the total.

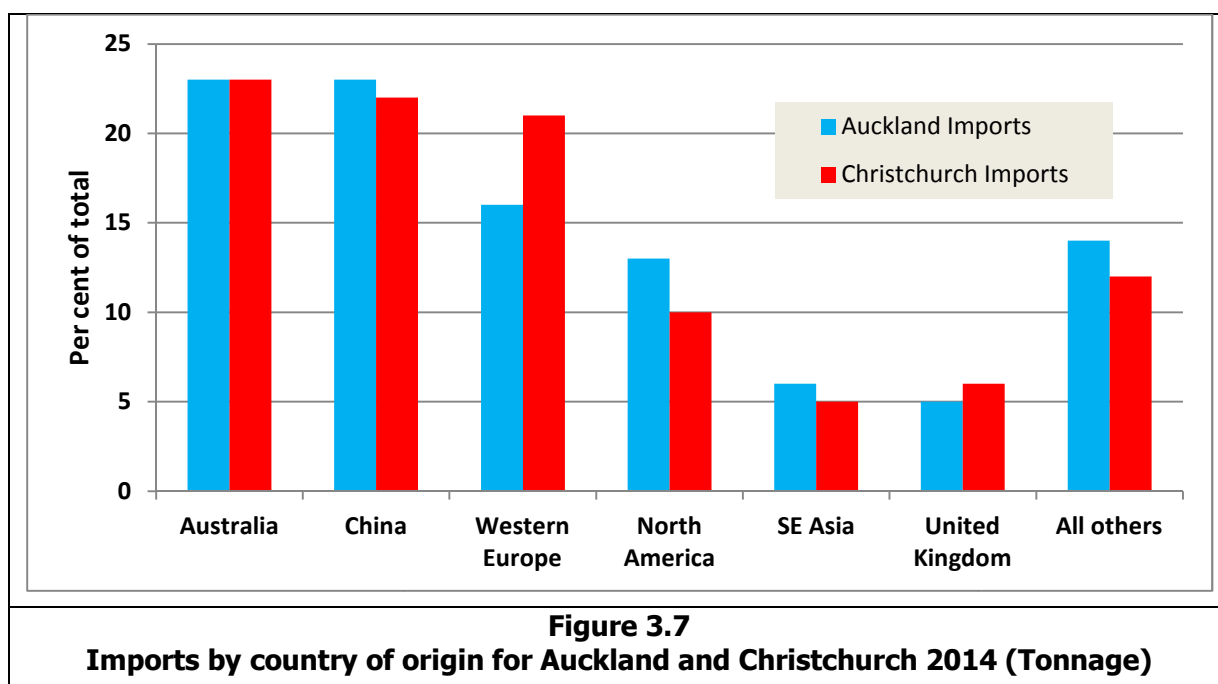
Most imports in 2014 came from Australia and China, which together accounted for nearly half of all imports. Australia is not as dominant for imports as it is for exports. The position is set out in Table 3.10.

Table 3.10				
Air freight imports into Auckland by major origins 2014				
Origin	tonnes	Per cent	National tonnes	Per cent of national total
Australia	20,641	23	22,635	24
China	20,583	23	22,253	23
Western Europe	14,234	16	15,790	16
North America	11,841	13	12,589	13
SE Asia	4,880	6	5,276	6
United Kingdom	4,021	5	4,429	5
All others	12,092	14	12,972	14
Total	88,292	100	95,944	100

Source: Statistics NZ and consultant analysis

The main “other” origins were the Pacific, South Asia and Japan.

The comparison with the position for Christchurch is set out in Figure 3.7.



Source: Statistics NZ and consultant analysis

Major commodities

Machinery and electrical machinery (HS2: 84 and 85) were the most important commodities imported into Auckland, accounting for 18 per cent and 12 per cent respectively of the total imports (15,533 tonnes and 10,665 tonnes respectively). Commodity HS2 07, vegetables, was the next most common, with 6 per cent (5,084 tonnes). The same commodities were the most important in 2002 – machinery 12,482 tonnes (17 per cent), electrical machinery 8,684 tonnes (12 per cent) and vegetables 4,217 tonnes, (6 per cent).

Commodity and HS2 number	Tonnes	Per cent	National tonnes	Per cent of national total
07 Vegetables	5,084	6	5,256	5
08 Fruit	3,060	3	3,149	3
30 Pharmaceuticals	2,814	3	2,859	3
39 Plastics	3,869	4	4,219	4
49 Printed matter	5,160	6	5,723	6
61 and 62 clothing	6,346	7	6,948	7
73 Iron/steel articles	2,265	3	2,501	3
84 Machinery	15,533	18	17,025	18
85 Electrical	10,665	12	11,471	12
87 Vehicles	2,460	3	2,643	3
90 Optical etc	2,960	3	3,088	3
All others	28,076	32	31,062	32
Total	88,292	100	95,944	100

Source: Statistics NZ and consultant analysis

The table shows that imports are nowhere near as concentrated on a few commodities as was the position for exports. It lists all those with over 3 per cent of the total, and there are still 32 per cent of the total commodities left, each with a very small share of the total. There is some concentration on machinery, especially HS2:84. The biggest single HS4 level code in HS2:84 was 8471: computers (4,774 tonnes).

In terms of important commodities from specific origins, vegetables were 15 per cent (3,021 tonnes) of the imports from **Australia**, followed by printed matter at 13 per cent (2,619 tonnes) electrical machinery 11 per cent (2,241 tonnes) other machinery 10 per cent (2,092 tonnes), and fruit at 10 per cent (2,084 tonnes).

Auckland's largest imports from **China** are clothing at 22 per cent (4,524 tonnes), and machinery 22 per cent (4,474 tonnes); and electrical machinery 18 per cent (3,704 tonnes).

Machinery and electrical machinery made up 22 per cent (3,142 tonnes) and 11 per cent (1,581 tonnes) respectively of imports from **Western Europe**.

The same commodities made up 21 per cent (2,514 tonnes) and 7 per cent (815 tonnes) of imports from **North America**, and 22 per cent (1,095 tonnes) and 19 per cent (911 tonnes) of those from **SE Asia**.

The major imports from the **UK** were different: 31 per cent (1,231 tonnes) was books, newspapers, and other printed matter, although machinery and electrical machinery were also important, with 12 per cent and 7 per cent respectively (485 and 282 tonnes).

In summary:

- 29 per cent of the **machinery** (HS2:84) came from China, and 35 per cent of the electrical machinery (HS2: 95). 20 per cent of HS2:84 came from Western Europe and 15 per cent of commodity 85.
- 51 per cent of **printed matter** came from Australia and 24 per cent from the UK.
- 71 per cent of the **clothing** came from China, and 10 per cent from South Asia.
- 59 per cent of the **vegetables** came from Australia and 30 per cent from the Pacific.
- 25 per cent of the **plastics** came from Australia, 22 per cent from China, and 17 per cent from Western Europe.
- 68 per cent of the **fruit** came from Australia and 11 per cent from the Pacific.

Seasonality

Seasonality is less pronounced than for exports, from most origins. February is a consistently low month. This is set out in Table 3.12 and Figure 3.8.

Table 3.12
Seasonality for Auckland imports 2014

Month	Total		Australia		China		W Europe		N America		SE Asia		UK	
	t	%	t	%	t	%	t	%	t	%	t	%	t	%
Jan	6089	6.9	1441	7.0	1471	7.1	924	6.5	852	7.2	298	6.1	302	7.5
Feb	5773	6.5	1205	5.8	1291	6.3	1010	7.1	816	6.9	361	7.4	284	7.1
Mar	7110	8.1	1420	6.9	1804	8.8	1237	8.7	1009	8.5	333	6.8	390	9.7
Apr	6734	7.6	1402	6.8	1706	8.3	1041	7.3	961	8.1	375	7.7	305	7.6
May	7396	8.4	1621	7.9	1720	8.4	1178	8.3	1081	9.1	469	9.6	347	8.6
Jun	7467	8.5	1799	8.7	1673	8.1	1278	9.0	1002	8.5	406	8.3	298	7.4
Jul	7850	8.9	1928	9.3	1732	8.4	1373	9.6	1018	8.6	427	8.8	330	8.2
Aug	7679	8.7	1988	9.6	1697	8.2	1129	7.9	1002	8.5	403	8.3	351	8.2
Sep	8022	9.1	2108	10.2	1792	8.7	1241	8.7	983	8.3	415	8.5	350	8.7
Oct	8385	9.5	1903	9.2	1867	9.1	1422	10.0	1097	9.3	479	9.8	379	9.4
Nov	8137	9.2	1999	9.7	1951	9.5	1272	8.9	1063	9.0	440	9.0	343	8.5
Dec	7651	8.7	1826	8.8	1879	9.1	1130	7.9	958	8.1	474	9.7	341	8.5
Tot	88292	100	20641	100	20583	100	14234	100	11841	100	4880	100	4021	100
Ratio	1:1.4		1:1.7		1:1.5		1:1.5		1:1.3		1:1.6		1:1.3	

Source: Statistics NZ and consultant analysis

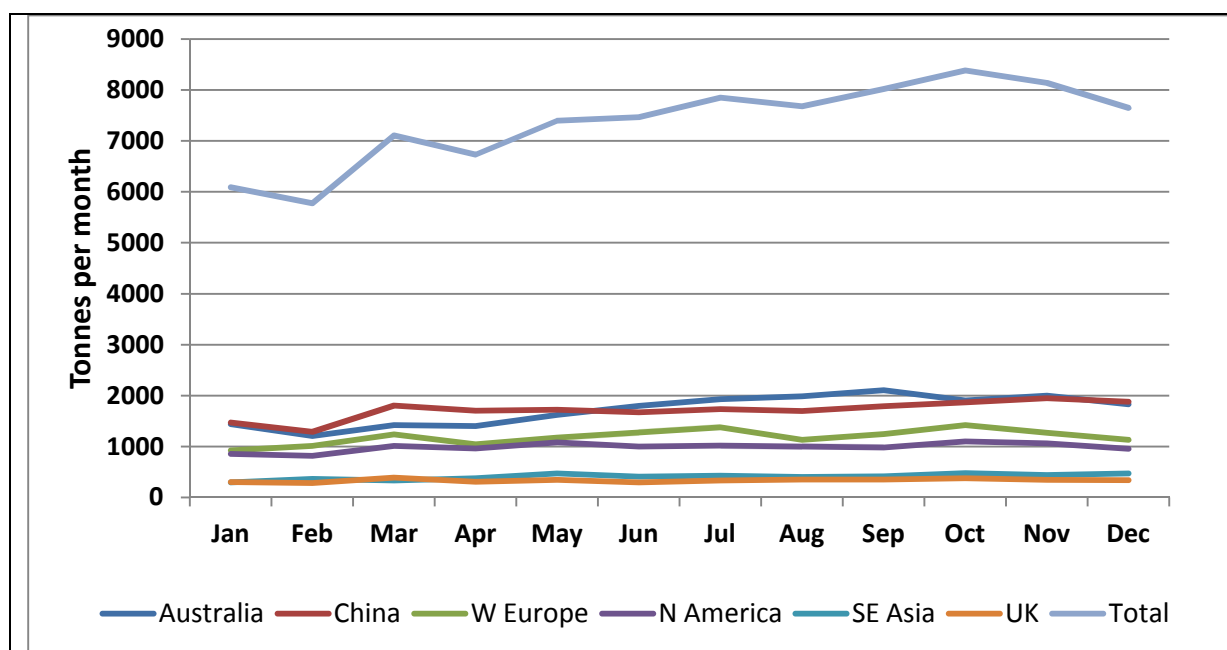


Figure 3.8
Seasonality for Auckland imports 2014

Source: Statistics NZ and consultant analysis

3.4.2 Christchurch

Patterns of trade

Christchurch handled 7,113 tonnes of imports, worth \$595m on a CIF basis, on both measures less than 40 per cent of the exports. As well, the weight and value were very much less than Auckland, less than 10 per cent in both cases. The average value per tonne was \$83,680, only 80 per cent of that of Auckland.

In the March 2002 year, 8,938 tonnes were imported into Christchurch, more than in 2014. Imports were worth \$713m, again both less than exports. Although both imports and exports were still much lower than Auckland, Christchurch was slightly more important in 2002 – tonnes were 12 per cent and value \$11 per cent of Auckland's. The average value per tonne was \$79,728, 90 per cent of that of Auckland.

Table 3.13				
Major origins for Christchurch imports 2014				
Origin	Tonnes	Per cent	National tonnes	Per cent
Australia	1,662	23	22,635	24
China	1,584	22	22,253	23
Western Europe	1,511	21	15,790	16
North America	716	10	12,589	13
UK	398	6	4,429	5
SE Asia	386	5	5,276	6
All others	856	12	12,972	14
Total	7,113	100	95,944	100

Source: Statistics NZ and consultant analysis

The main "other" origins for Christchurch were South Asia, Taiwan, and Japan.

Major commodities

The major commodities imported into Christchurch are machinery 1,447 tonnes (20 per cent), and electrical machinery 780 tonnes (11 per cent).

Table 3.14				
Major import commodities handled at Christchurch 2014				
Commodity and HS2 Numbers	Tonnes	Per cent	National Tonnes	Per cent
39 Plastics	329	5	4,219	4
42 Leather	202	3	1,588	2
48 Paper	218	3	1,904	2
49 Printed matter	534	8	5,723	6
61+62 Clothing	557	8	6,948	7
84 Machinery	1,447	20	17,025	18
85 Electrical	780	11	11,471	12
87 Vehicles	181	3	2,643	3
All others	2,865	40	44,423	46
Total	7,113	100	95,944	100

Source: Statistics NZ and consultant analysis

The most important 2002 commodities were as for 2014, machinery (1,366 tonnes, 15 per cent), and electrical machinery (790 tonnes, 9 per cent)

In terms of major commodities from specific origins, printed matter was 18 per cent (293 tonnes) of the imports from Australia, followed by machinery (13 per cent, 216 tonnes) and electrical machinery (14 per cent, 235 tonnes).

Christchurch's largest imports from **China** are clothing at 22 per cent (4,524 tonnes), machinery 12 per cent (185 tonnes); and electrical machinery 10 per cent (163 tonnes).

Machinery and electrical machinery made up 28 per cent (417 tonnes) and 13 per cent (193 tonnes) respectively of imports from **Western Europe**. Machinery (HS84) was also the largest import from North America (35 per cent, 248 tonnes).

Machinery (20 per cent, 771 tonnes) and clothing at 19 per cent (728 tonnes) were the main commodities from **SE Asia**, followed by electrical machinery (14 per cent, 527 tonnes).

The major imports from the **UK** were different: 36 per cent (143 tonnes) was printed matter, although machinery was also important, with 13 per cent (537 tonnes).

In summary:

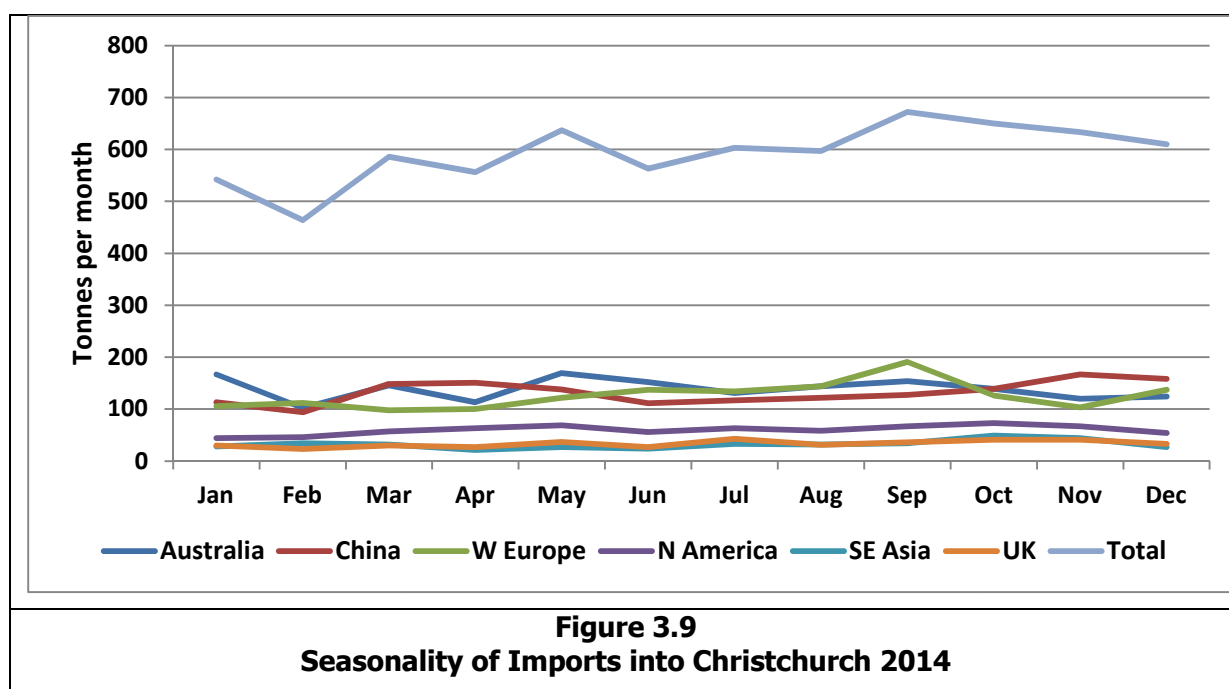
- 29 per cent of the **machinery** came from Western Europe and 25 per cent of the electrical machinery; 15 per cent of the machinery came from Australia and 30 per cent of the electrical machinery.
- 55 per cent of **printed matter** came from Australia and 27 per cent from the UK.
- 63 per cent of the **clothing** came from China, and 13 per cent from South Asia.
- 34 per cent of the **plastics** came from Australia, 20 per cent from China, and 18 per cent from Western Europe.
- 71 per cent of the **leather** came from China and 20 per cent from South Asia.
- 58 per cent of the **paper** came from China, and 16 per cent from Australia.
- 31 per cent of the **vehicles** came from Western Europe, and 23 per cent from North America.

Seasonality

Seasonality for imports is more pronounced than for imports to Auckland, but still much less so than for exports from Christchurch. Imports are much less in tonnage terms than exports, and not sharply peaked, so are not likely to have a great influence on the supply of capacity.

Table 3.15 Imports to Christchurch – seasonality 2014														
Month	Total		Australia		China		W Europe		N America		SE Asia		UK	
	t	%	t	%	t	%	t	%	t	%	t	%	t	%
Jan	542	7.63	167	10.06	113	7.15	106	7.03	44	6.09	28	7.37	30	7.50
Feb	464	6.53	102	6.15	94	5.91	112	7.38	46	6.41	34	8.91	23	5.85
Mar	586	8.24	146	8.76	148	9.31	98	6.46	57	7.91	32	8.33	30	7.43
Apr	556	7.82	113	6.82	151	9.52	100	6.64	63	8.81	21	5.47	27	6.68
May	637	8.95	169	10.19	138	8.73	122	8.10	69	9.65	27	7.05	37	9.22
Jun	563	7.92	152	9.12	111	6.98	137	9.08	56	7.81	24	6.23	27	6.78
Jul	603	8.47	131	7.91	117	7.38	134	8.89	63	8.78	33	8.47	43	10.80
Aug	597	8.39	144	8.65	122	7.70	144	9.54	58	8.12	32	8.34	31	7.81
Sep	672	9.45	154	9.26	127	8.03	191	12.62	67	9.40	34	8.82	36	9.15
Oct	650	9.13	139	8.37	139	8.77	126	8.36	73	10.14	49	12.72	41	10.26
Nov	633	8.91	120	7.23	167	10.56	103	6.84	67	9.39	44	11.34	41	10.28
Dec	610	8.57	124	7.47	158	9.96	137	9.06	54	7.48	27	6.95	33	8.25
Tot	7113	100	1662	100	1584	100	1511	100	716	100	386	100	398	100
Ratio	1:1.4		1:1.6		1:1.8		1:1.9		1:1.7		1:2.3		1:1.8	

Source: Statistics NZ and consultant analysis



Source: Statistics NZ and consultant analysis

4 Air freight charges

A major factor affecting the demand for air freight is the charge to shippers, which varies by the priority given to the cargo and in some instances the nature of this, especially if it requires special handling. While rates are typically subject to negotiation a published example of such differential pricing provided by LAN Chile for flights between Auckland and Santiago is set out in Figure 4.1.

Table 4.1 LAN Chile tariffs for air freight cargo from New Zealand to Santiago							
ORIGEN : NUEVA ZELANDA							
Aeropuerto			Producto	Commodity	Moneda	Mínimo	Normal
AKL	Tarifas hasta Almacén Aduana	FAST AIR ALMACENES DE CARGA S.A.	STD	CARGA GENERAL	NZD	118.75	6.50
		DEPOCARGO S.A.	STD	CARGA GENERAL	NZD	118.75	6.50
		AEROSAN S.A.	STD	CARGA GENERAL	NZD	118.75	6.50
		FAST AIR ALMACENES DE CARGA S.A.	PFS	CARGA GENERAL	NZD	130	8.56
		DEPOCARGO S.A.	PFS	CARGA GENERAL	NZD	130	8.56
		AEROSAN S.A.	PFS	CARGA GENERAL	NZD	130	8.56
CHC	Tarifas hasta Almacén Aduana	FAST AIR ALMACENES DE CARGA S.A.	STD	CARGA GENERAL	NZD	125	6.50
		DEPOCARGO S.A.	STD	CARGA GENERAL	NZD	125	6.50
		AEROSAN S.A.	STD	CARGA GENERAL	NZD	125	6.50
WLG	Tarifas hasta Almacén Aduana	FAST AIR ALMACENES DE CARGA S.A.	STD	CARGA GENERAL	NZD	125	6.50
		DEPOCARGO S.A.	STD	CARGA GENERAL	NZD	125	6.50
		AEROSAN S.A.	STD	CARGA GENERAL	NZD	125	6.50

The conditions attached to the alternative forms of transit are set out in 4.2.

Table 4.2 Different categories of air freight carried by LAN Chile			
	POSITIVE FS	PRIORITY 1	STANDARD PRODUCT
Our promise	The highest priority and commitment to guarantee boarding on the specific flight booked.	The highest priority and commitment to ensure boarding on the first freighter flight available to the requested destination.	Regular and reliable service that allows access to all flights.
Routes	Direct passenger flights only.	Direct cargo flights only.	All flights.
Guarantee	100% refund(See terms and conditions).	50% refund(See terms and conditions).	Not applicable.

Also as an example Qantas have a more nuanced structure as set out in Figure 4.1.

 <u>Q-GO Priority</u> Guaranteed uplift of your goods on the flight you need them to be on.	 <u>Q-GO Express</u> When you need to move freight fast; lodge close to aircraft departure and pick up early after aircraft arrival.	 <u>Q-GO Classic</u> Reliable, timely movement of freight at an economical price.
 <u>Q-GO Pets</u> Specialty pet handling services in the air and on the ground.	 <u>Q-GO Animals</u> Moving animals for commercial purposes; including and not limited to, zoo animals or thoroughbred race horses.	 <u>Q-GO Fresh</u> Your fresh produce moved, quality preserved.
 <u>Q-GO Pharma</u> When preserving product integrity matters.	 <u>Q-GO Secure</u> Highly monitored freight when a safe delivery is important.	 <u>Q-GO Custom</u> When you need things to run on your own schedule, Qantas Freight freighter aircraft are available for charter.

Figure 4.1
Options for air freight for QANTAS

The average charges for air freight to different destinations from New Zealand as published by IATA are set out in Table 4.3.

Table 4.3
International air freight flows and charges by destination
(Year end August 2015)

City name	Volume (000 tonnes)	Average Revenue per kg USD
Sydney	16.07	0.69
Melbourne	14.01	0.72
Tokyo	8.04	1.23
Hong Kong	7.85	1.03
Los Angeles	5.87	1.88
London	5.21	2.35
Brisbane	5.08	0.55
Shanghai	4.73	2.06
Singapore	3.75	1.47
Tianjin	2.76	1.00
Perth	2.65	1.02
Guangzhou	2.48	1.37
Nadi	2.37	0.59
Bangkok	2.31	0.98
Taipei	2.05	1.70
Zurich	1.87	2.74
Osaka	1.82	1.11
Chicago	1.40	2.75
Seoul	1.36	1.35
Rarotonga Island	1.29	1.29
Vancouver	0.98	2.22
Kuala Lumpur	0.95	1.01
New York	0.94	2.52
Paris	0.75	2.77
Amsterdam	0.70	2.88
Others	18.05	2.50
Total	115.34	1.44

Source: derived from IATA data.

To give an indication of the relative revenues generated by freight and passengers for selected routes, the revenues per kilogram derived from freight have been compared to the equivalent revenues derived from passengers based on an average weight for passengers and baggage of 110 kg⁴. This is based on the published charges for Air New Zealand flights mid-week in February 2016 and assumes an exchange rate of \$US 1 = \$NZ 1.56.

The results are set out in Table 4.4.

⁴ Adapted from Survey on standard weights of passengers and baggage Final report Reference EASA 2008.C.06/30800/R20090095/30800000/FBR/RLO [http://easa.europa.eu/document-library/research-projects?search=&date_filter\[min\]=&date_filter\[max\]=&&project_status=All&page=2](http://easa.europa.eu/document-library/research-projects?search=&date_filter[min]=&date_filter[max]=&&project_status=All&page=2)

Table 4.4 Comparison of unit air freight and passenger revenues (\$NZ)						
Route	Representative Passenger Fare (Seat+Bag)	Taxes etc	Total fare exc tax	Rev/ kg	Freight charge (\$NZ)	Ratio of pass revenues/kg to freight revenues/kg
Auckland-Sydney	339	63.5	275.5	2.50	1.08	2.33
Auckland/Singapore	882	31.7	850.3	7.73	2.29	3.37
Auckland/Hong Kong	639	31.7	607.3	5.52	1.61	3.44
Auckland/London	1364	38.3	1325.7	12.05	3.67	3.29
Auckland/Tokyo	639	31.7	607.3	5.52	1.92	2.88
Auckland/Los Angeles	887	86.3	800.7	7.28	2.93	2.48
Auckland/Shanghai	882	31.7	850.3	7.73	3.21	2.41

Source: Air New Zealand website, IATA data, consultant analysis

This indicates that passenger revenues per kg are about 2.5-3.5 times higher than the revenues derived from freight, and explains the relative importance of passengers in filling the space on the aircraft (and the relatively little use of pure freighters).

The costs of air freight have also been compared to the costs of movement by sea. Although shipping rates are currently very volatile, we have used information from the Productivity Commission report on international freight movements to give an indication of costs. On this basis sea freight and air freight costs for three selected routes have been compared and the results are set out in Table 4.5.

Table 4.5 Comparison of sea freight and air freight costs to selected overseas destinations						
Overseas Destination	Cost per TEU (\$NZ)	Weight per container (tonnes)	Shipping cost/ tonne (\$NZ)	Sea freight costs (\$NZ/kg)	Air freight costs (\$NZ/kg)	Ratio of air freight: sea freight costs
Singapore	1600	16.5	97	0.10	2.29	23.7
Los Angeles/ Long Beach	2800	16.5	169	0.17	2.93	17.3
Shanghai	1650	16.5	100	0.10	2.06	20.6

Sources: Productivity Commission *International Freight Transport Services Inquiry* 2012 Appendix G, FIGS, IATA data and Consultant analysis

This demonstrates the very substantial differences between the charges for sea and air freight, with sea freight charges typically being about 5 per cent of those for air freight.

5 New Zealand International Air Freight Capacity

5.1 Historical trends

There are a number of factors which affect the general availability of space for air freight cargo, including the numbers of aircraft, the type of aircraft, the configuration of these aircraft and the passenger load factors. On a more short-term basis this may also be affected by weather factors with pilots having to take on additional fuel (and so provide less space for air cargo) when adverse conditions threaten.

A major part of the air freight capacity into and out of New Zealand is provided in the bellyholds of passenger aircraft. The changes in the numbers of these flights into New Zealand over recent years are set out in Figure 5.1.



Source: Statistics NZ

While the numbers of international flights into New Zealand grew sharply over the period to 2005, growth subsequently has been much slower.

To some extent this will have been accompanied by an increase in aircraft size, although this may not necessarily lead to increases in the nominal cargo carrying capacity.⁵ This varies significantly with aircraft type and is for example typically lower for the A380 than for the smaller Boeing 777 (8,000 – 12,000 kg for an A380-800 compared to 17,000 - 23,000 kg for a 777-300ER). In addition different passenger seating configurations will potentially result in different nominal cargo carrying capacities. As an example the 737-800 operated by Virgin Australia with a passenger capacity of 176 has a nominal cargo capacity of 2,000 kg. The same aircraft operated by Qantas with a 160 seat passenger capacity has a nominal cargo capacity of about 3,600 kg.

The numbers of passengers per aircraft has also increased as can be seen in Figure 5.2.⁶

⁵ This is the advertised cargo capacity. Actual capacity may vary depending on passenger numbers, weather and other factors.

⁶ This considers arriving passengers but the numbers of passengers and flights are very similar in the inbound and outbound directions.



Source: Statistics NZ and consultant analysis

The increase in average loads reflects both increased load factors and also the introduction of larger aircraft. The effects of this on the cargo carrying capacity available are uncertain but it is probable that these would have resulted in an increase in the capacity available for air cargo.

We have also analysed in more detail the current balance between supply and demand and also discussed this with airlines and freight forwarders to determine whether capacity constraints exist and are likely to have limited the growth in air freight. In general the position that emerges is that overall there appears to be sufficient capacity to support flows significantly in excess of the current level of demand, but there could be temporary and short-lived shortages of capacity when potential demands are higher than expected or when aircraft capacity is constrained by adverse weather conditions or particularly high passenger flows. On longer distance routes, capacity may also be constrained by the need to accommodate cargo to be loaded on a later leg.

Because of the nature of air freight and the supply chains it supports particularly for perishable goods, the availability of capacity at particular times is important, minimising the time between the despatch of the goods and their arrival in overseas markets. This is particularly the case for the shorter movements to Australia and at peak times there may be limited capacity available for spot despatches, especially for lower value cargoes which are unable to support a premium rate. Our understanding is however that there is sufficient capacity available for the regular movements, and for movements for which some flexibility in timing is possible. There is possibly an analogy with passenger traffic where travel is possible at almost all periods, although it may involve a routing, timing or a class of travel that would not be the first choice of the traveller, requiring a more complex, longer or more expensive route.

The conclusion from this analysis is therefore that the relatively stable levels of demand for air freight reflect the underlying level of demand and are not generally supply constrained in the sense that capacity is not available.

5.2 Current levels of capacity

5.2.1 Introduction and approach

A large proportion of air freight is conveyed in bellyholds of aircraft. There are only a limited number of regular freighter flights and some ad hoc ones as well. Thus understanding the freight capacity requires an understanding of the passenger demand.

The total payload of an aircraft includes passengers, baggage, and freight (Crew are normally regarded as part of the tare weight). These factors can be traded off, so that if there are fewer passengers, then more freight can be flown. Not all airlines publish their freight capacity, but those that do express it in two different ways. Some airlines (such as Qantas, Emirates and Virgin Australia) publish a nominal capacity, with the important caveat that it is the cargo weight assuming a full passenger load. These can differ from operator to operator for the same aircraft type depending on the passenger configuration. Other airlines (e.g. United, ANA) publish a figure that is or is close to total payload. They clearly envision a situation where the freight load might dominate. Air New Zealand does not publish the loads it assumes.

In order to assess whether there are capacity constraints on the air freight market, it is necessary to consider the available capacity and relate it to the actual exports and imports. This can be done at a monthly level. To measure the available capacity we have taken both a total payload approach and a nominal capacity approach. Nominal capacity varies between airlines for the same aircraft type, and we have taken either the figure specific to the airline, or a representative figure.

For gross payloads, we used manufacturers' figures, except for the A380, which was not available from the manufacturer.⁷ For nominal payload figures we have used figures from airline websites, for those airlines serving New Zealand where available. In 2014, there were about 18 different types and variants of aircraft serving New Zealand, and Table 5.1 lists the most important types.

Table 5.1 Freight capacity of aircraft serving New Zealand		
Aircraft type	Payload (t)	Typical nominal freight capacity (t)
Boeing:		
B737 -700	17.0	1.5
B737-800	21.3	2
B747-400	63.9	14.1
B767-300	41.6	13
B777 -200	54.92	14
B777-300	64.0	23
B787 -800	43.3	14.3
Airbus:		
A320	16.6	2
A330-300	45.9	17
A340-300	30.8	9.2
A380-800	66.4	8

Sources: Payload: Boeing "Airplane Characteristics for Airport Planning", www.boeing.com; Airbus www.airbus.com, except A380, see footnote 7. Nominal: airline websites.

⁷ The A 380 payload was taken from www.civilaviation.eu.

Payload based assessments need information on the passenger load. We had access to a commercial airline data system, Sabre, through the Ministry of Transport. This provided very detailed data on the flights from Auckland and Christchurch by aircraft type, by airline, destination, and month, as well as passengers in and out by origin and destination. We assumed that flight numbers (and nominal capacity) from Auckland and Christchurch were matched by flights to those airports. We do not believe this has introduced any significant error.

The data enabled a calculation of passenger weight from passenger numbers, using an assumed 110kg weight for passengers and baggage.⁸ This is shown in the columns labelled "Actual pax load" in the tables below. We established the payload for each aircraft type (see table 5.1), and so could establish the total payload for each type for each origin-destination pair for each month ("Payload capacity"). We then subtracted the passenger load from the payload to give capacity available for freight, and then reduced that to an assumed 75 per cent of the total available to be conservative and allow for other factors such as float for uncertain passenger numbers, weather, and range ("Capacity available for freight"). Because load factors are different in each direction, influencing available capacity, this information is given for both directions.

We then sum each origin to Auckland and Christchurch and each destination from them, by month. For certain origin and destination relationships (and for all traffic to and from each of the airports) we then compare that data with imports and exports by weight⁹. The general picture that emerges is that there is normally no shortage of capacity on a monthly basis.

We did the same analysis of each aircraft type by destination and month for nominal payloads. These overall work out to be two-thirds the payload figures, but clearly the payload figures are sensitive to load factor so the relationship between the two approaches also varies. The nominal capacities are also compared to import and export weights. We understand that many airlines run with the nominal capacities as a general rule, but where there is pressure on capacity, more may be carried depending on the passenger load. In terms of nominal capacity, the picture that emerges is that for Auckland imports and exports, and imports to Christchurch, capacity exceeds supply. For some months in Christchurch the situation for exports can be sensitive to capacity, and occasionally more is carried than the nominal payload, especially where the passenger load factor is low.

5.2.2 Auckland

Auckland has 35 destinations for passenger flights (and we assume the same number of origins). These can be grouped into the following. Note that not all airports are served every month. Hiroshima, Osaka and Nagano were served by occasional charter services during the peak summer season.

⁸ See note 4 above.

⁹ It should be noted that this may exclude low- and nil-value goods for example mail and courier packages. However based on a comparison of Statistics NZ and IATA data the volumes of these are believed to be small in relation to the overall totals and would not affect the overall conclusions.

Table 5.2 Airports served and passenger flight numbers – Auckland 2014			
Region	Number of airports served	Number of departures p.a.	Airports served
Australia	9	12,942	Adelaide, Brisbane, Cairns, Melbourne, Perth, Sydney, Gold Coast, Sunshine coast, Norfolk Island
South East Asia	4	1,361	Singapore, Kuala Lumpur, Bangkok, Denpasar
China	3	1,748	Guangzhou, Hong Kong, Shanghai
Japan	4	392	Hiroshima, Osaka, Nagoya, Tokyo
Pacific	9	3,612	Apia, Niue, Nadi, Suva, Noumea, Papeete, Rarotonga, Nuku'alofa, Port Vila
North America	4	1,701	Honolulu, Los Angeles, San Francisco, Vancouver
Other	2	630	Santiago, Seoul
Total	35	22,386	

Source: Sabre. Note that the flights are counted to the first port of call, as that is how the data is organised. The two direct flights to Europe are included as flights to Los Angeles and Papeete respectively.

While it is possible to relate cargo origins and destinations to these regions, it has a degree of uncertainty in that clearly some cargo goes beyond the destination of the actual airport and this may be particularly an issue in relation to Asian destinations which are largely served through gateways in Hong Kong and Singapore. Nevertheless, we believe some indications can be given. Australia is one; even though airlines like Emirates fly beyond the Australian destinations, Australia is such a major source of imports and destination for exports that the error should not be large. Similarly the Pacific Islands are a largely self-contained unit in terms of flights ex Auckland. Japan also has direct flights with no obvious onward movement, although it is also served by routes through Singapore and Hong Kong.

As well, the total exports and imports have been compared with the total flight capacity. This eliminates the issues with onward destinations/origins, although it does not identify the issues with particular markets.

Auckland to/from Australia

Table 5.3 includes all Australian airports served.

Table 5.3 Passenger load and freight capacity between Auckland and Australia 2014									
Month	From Auckland				Nominal Capacity (t)	To Auckland			
	Actual pax load (t)	Payload capacity (t)	Capacity available for freight(t)	Exports to AU (t)		Actual pax load (t)	Payload capacity (t)	Capacity available for freight(t)	Imports from AU (t)
Jan	22,779	36,172	10,045	3,492	7,249	21,217	36,172	17,598	1,441
Feb	18,111	31,229	9,838	3,782	6,180	18,387	31,229	15,410	1,205
Mar	19,802	34,358	10,917	3,417	6,933	18,228	34,358	17,682	1,420
Apr	20,126	33,169	9,782	2,509	6,507	18,072	33,169	17,180	1,402
May	16,726	30,839	10,585	2,414	5,964	16,006	30,839	16,475	1,621
Jun	15,179	30,728	11,662	2,540	5,848	15,782	30,728	16,430	1,799
Jul	18,435	33,784	11,511	2,910	6,712	17,659	33,784	17,552	1,928
Aug	17,187	32,816	11,722	2,454	6,538	17,107	32,816	16,937	1,988
Sep	17,332	32,334	11,251	2,248	6,507	17,462	32,334	16,523	2,108
Oct	20,023	34,343	10,740	2,881	7,141	20,879	34,343	16,752	1,903
Nov	18,632	30,871	9,179	3,122	6,563	19,901	30,871	14,789	1,999
Dec	19,844	36,145	12,226	2,857	7,603	22,753	36,145	17,163	1,826
Total	224,176	396,787	129,458	34,626	79,742	223,454	396,787	200,491	20,641

Source: Sabre and consultant analysis

This table shows that the available capacity appears to be many times that needed for the relatively small volumes of exports and imports. Available capacity is reasonably consistent month to month and in no month does the demand exceed supply.

Flights to and from Australia include typical tourist destinations like Cairns, Sunshine Coast, Gold Coast, and Norfolk Island. These are unlikely to be significant freight generators. If they are excluded the total available capacity reduces only by 2-3 per cent, so there remains no impact on the relationship with actual freight demand.

Auckland to/from Pacific Islands

The Islands are primarily a tourist destination, but air freight does play an important part in their trade. There is substantial capacity available for the freight demand on both the nominal and payload bases.

Table 5.4									
Passenger load and freight capacity between Auckland and Pacific Islands 2014									
Month	From Auckland				Nominal capacity (t)	To Auckland			
	Actual pax load (t)	Payload capacity (t)	Capacity available for freight.(t)	Exports to Pacific (t)		Actual pax load (t)	Payload capacity (t)	Capacity available for freight.(t)	Imports from Pacific (t)
Jan	4,606	8,025	2,565	273	1,701	5,065	8,025	2,369	200
Feb	3,921	5,944	1,517	320	1,266	3,865	5,944	1,662	165
Mar	4,408	6,901	1,870	345	1,433	4,226	6,901	2,152	181
Apr	4,708	7,584	2,157	293	1,514	4,392	7,584	2,581	177
May	4,847	8,017	2,377	379	1,665	4,801	8,017	2,537	184
Jun	5,244	8,368	2,344	344	1,759	5,102	8,368	2,581	192
Jul	6,141	10,111	2,977	310	2,142	6,239	10,111	3,044	220
Aug	5,704	9,359	2,741	349	1,949	5,502	9,359	3,010	253
Sep	5,534	8,465	2,199	299	1,788	5,316	8,465	2,530	242
Oct	5,388	8,416	2,271	337	1,804	5,553	8,416	2,256	264
Nov	4,436	7,162	2,045	374	1,538	4,507	7,162	2,124	234
Dec	5,483	8,327	2,133	389	1,859	5,290	8,327	2,455	224
Total	60,420	96,680	27,195	4,010	20,416	59,858	96,680	29,301	2,535

Source: Sabre and consultant analysis

In the case of Japan, there are many fewer flights available and the demand is much closer to the supply for exports. In the early months of the year demand would appear to exceed supply, which suggests that that there is transshipping taking place e.g. through Singapore or Hong Kong.

Table 5.5 Passenger load and freight capacity between Auckland and Japan 2014									
Month	From Auckland				Nominal Capacity (t)	To Auckland			
	Actual pax load (t)	Payload capacity (t)	Capacity available for freight.(t)	Exports to Japan (t)		Actual pax load (t)	Payload capacity (t)	Capacity available for freight.(t)	Imports from Japan (t)
Jan	500	1,683	887	1,024	417	409	1,558	862	135
Feb	597	1,462	649	1,073	377	425	1,337	684	151
Mar	777	1,556	584	973	423	462	1,556	820	178
Apr	694	1,407	535	778	402	622	1,407	589	180
May	690	1,489	599	359	418	711	1,489	583	164
Jun	718	1,514	597	397	410	693	1,514	615	198
Jul	558	1,556	748	370	423	716	1,556	629	193
Aug	621	1,609	741	329	427	733	1,609	657	182
Sep	724	1,514	593	352	410	772	1,514	557	199
Oct	612	1,542	698	728	422	698	1,542	633	218
Nov	820	1,939	839	957	469	788	1,939	863	182
Dec	1,001	2,141	855	1,123	694	704	2,141	1,077	206
Total	8,311	19,411	8,325	8,466	5,292	7,735	19,161	8,569	2,185

Source: Sabre and consultant analysis

The most reliable view is to compare total flights with total exports. This is set out in Table 5.6. This also shows that in aggregate total capacity just from bellyhold capacity appears to be well in excess of demand, although short-term shortages may occur in response to particular seasonal peaks. As well, the substantial freighter offering can add some 2,800 tonnes per month to the passenger capacity (see section 5.3 and Table 5.10). Available capacity is thus unlikely to be a significant factor that influences forecasting of overall demand although the pattern of this demand may change with the introduction of new services.

Table 5.6 Passenger load and freight capacity between Auckland and all airports served 2014									
Month	From Auckland				Nominal capacity	To Auckland			
	Actual pax load (t)	Payload capacity (t)	Capacity available for freight.(t)	Exports to all destinations (t)		Actual pax load (t)	Payload capacity (t)	Capacity available for freight.(t)	Imports from all origins (t)
Jan	41,295	74,439	24,858	8,106	17,641	42,268	74,314	30,565	6,089
Feb	34,936	62,602	20,750	7,785	14,782	35,737	62,441	25,910	5,773
Mar	36,765	66,309	22,158	8,352	15,493	33,997	66,309	29,964	7,110
Apr	36,655	64,925	21,203	6,668	14,816	33,070	64,925	29,935	6,734
May	33,388	62,922	22,151	6,235	14,753	31,818	62,922	28,803	7,396
Jun	32,451	63,250	23,099	5,890	14,734	31,834	63,250	28,914	7,467
Jul	36,244	69,734	25,118	6,235	16,530	36,871	69,734	30,246	7,850
Aug	34,801	67,134	24,250	5,680	15,869	34,550	67,134	29,711	7,679
Sep	34,885	64,885	22,500	5,737	15,415	35,328	64,885	27,706	8,022
Oct	36,272	67,919	23,735	6,935	16,350	39,547	67,919	28,041	8,385
Nov	35,995	63,654	20,744	8,618	15,529	37,296	63,654	26,463	8,137
Dec	41,339	75,274	25,452	8,480	18,252	43,283	75,274	31,290	7,651
Total	435,025	803,048	276,017	84,722	190,162	435,598	802,763	347,549	88,292

Source: Sabre and consultant analysis

5.2.3 Christchurch

A similar exercise has been undertaken for Christchurch, although this has a much lower number of flights and destinations. These are set out in Table 5.7.

Table 5.7 Airports served and passenger flight numbers – Christchurch 2014			
Region	Number of airports served	Number of departures p.a.	Airports served
Australia	5	3,691	Brisbane, Sydney, Melbourne, Perth, Gold Coast
South East Asia	1	381	Singapore,
Pacific	1	82	Nadi
Total	7	4,154	

Source: Sabre

For Australian airports, capacity again exceeds demand on a monthly basis.¹⁰

Table 5.8 Passenger load and freight capacity between Christchurch and Australia 2014									
Month	From Christchurch				Nominal Capacity	To Christchurch			
	Actual pax load (t)	Payload capacity (t)	Capacity available for freight.(t)	Exports to AU (t)		Actual pax load (t)	Payload capacity (t)	Capacity available for freight.(t)	Imports from AU (t)
Jan	5,684	8,588	2,178	599	1,625	5,525	8,588	2,297	167
Feb	4,198	6,818	1,965	649	1,351	4,156	6,818	1,997	102
Mar	4,794	7,659	2,149	661	1,509	4,619	7,659	2,279	146
Apr	4,917	7,468	1,913	556	1,462	4,725	7,468	2,057	113
May	4,087	6,612	1,894	572	1,247	4,028	6,612	1,938	169
Jun	3,843	6,343	1,875	558	1,202	3,923	6,343	1,815	152
Jul	4,458	7,013	1,916	605	1,297	4,396	7,013	1,963	131
Aug	4,244	6,856	1,959	564	1,277	4,301	6,856	1,917	144
Sep	4,295	6,851	1,917	512	1,262	4,503	6,851	1,760	154
Oct	5,031	7,326	1,721	615	1,337	4,872	7,326	1,841	139
Nov	5,060	7,417	1,768	581	1,316	5,077	7,417	1,755	120
Dec	6,408	9,473	2,298	539	1,839	6,486	9,473	2,240	124
Total	57,020	88,424	23,553	7,010	16,721	56,611	88,424	23,860	1,662

Source: Sabre and consultant analysis

Table 5.9 adds in the two non-Australian airports served from Christchurch to give the total capacity from Christchurch to all destinations. The pattern is the same, capacity exceeds demand per month on a payload basis, but in January export demand exceeds capacity on a nominal capacity basis. However there is also a six day per week B767 freighter operating on a Sydney-Auckland-Christchurch –Sydney route. This will carry both Auckland and Christchurch freight, and we assess that Christchurch's share of its capacity is 60 per cent (see section 5.3). This amounts to 700 tonnes additional capacity a month, eliminating the deficit, at least on a whole-month basis. Nevertheless we understand that there are occasions when there can be a short-term capacity issues in Christchurch.

¹⁰ The export and import figures are Statistics Department data and do not include very low value consignments, nil-value items and mail. However we consider that it is only for exports through Christchurch where this potentially could have any significant impact on the balance between the demand for airfreight and the capacity available, but it is understood that the larger part of this traffic travels through Auckland.. For imports and for all Auckland traffic the capacity is much greater than demand.. There may also be some confidential consignments that may not be in the data at all and errors in the data provided which have not been corrected at source, but again the effects of these are understood to be small. Accordingly we do not believe this to alter our conclusions.

Table 5.9
Passenger load and freight capacity between Christchurch and all airports served 2014

Month	From Christchurch				Nominal Capacity	To Christchurch			
	Actual pax load (t)	Payload capacity (t)	Capacity available for freight.(t)	Exports to all destinations (t)		Actual pax load (t)	Payload capacity (t)	Capacity available for freight.(t)	Imports from all origins (t)
Jan	6,580	10,651	3,053	2,249	2,137	6,480	10,651	3,128	542
Feb	4,904	8,424	2,640	1,640	1,749	4,924	8,424	2,625	464
Mar	5,579	9,446	2,900	1,662	1,950	5,242	9,446	3,153	586
Apr	5,613	9,184	2,678	1,648	1,888	5,237	9,184	2,960	556
May	4,821	8,421	2,700	1,569	1,691	4,604	8,421	2,863	637
Jun	4,530	8,076	2,660	1,273	1,630	4,477	8,076	2,699	563
Jul	5,370	9,035	2,749	1,582	1,765	5,462	9,035	2,680	603
Aug	5,081	8,815	2,801	1,302	1,739	5,172	8,815	2,732	597
Sep	4,913	8,617	2,778	1,207	1,694	5,165	8,617	2,589	672
Oct	5,575	9,164	2,692	1,282	1,785	5,681	9,164	2,612	650
Nov	5,752	9,171	2,565	1,670	1,746	5,731	9,171	2,580	633
Dec	7,459	11,929	3,353	1,868	2,441	7,432	11,929	3,373	610
Total	66,175	110,932	33,568	18,952	22,213	65,606	110,932	33,995	7,113

Source: Sabre and consultant analysis

If the tourist destinations of Gold Coast and Nadi are not included, the available capacity reduces by up to 5 per cent per month. January remains with demand exceeding nominal bellyhold capacity and November is tight.

5.3 Dedicated Freight Services

As well as bellyhold capacity additional freight capacity is provided by a range of dedicated freighter services using a combination of 757, 767 and 747 aircraft. The capacity offered by these on the basis of current service levels is estimated to amount to about 1000 tonnes per week. While some of these fly directly from Auckland to overseas destinations, the Singapore services fly circular routes via Melbourne in one direction, and most of the services operated by Qantas operate a loop Sydney-Auckland-Christchurch-Sydney. Thus not all of the capacity on these flights is available into or out of Auckland. The total capacity provided by these services, and the estimated share available to Auckland, is summarised in Table 5.10. In the case of the Qantas route via Christchurch we have estimated that 60 per cent of the space is for Christchurch exports, on the basis that there is other Auckland-Sydney capacity available, but no other freighter from Christchurch. For the Singapore flights shared with Australia, we have estimated Auckland's share to be 50 per cent.

Table 5.10
Air freighter service capacity from New Zealand

Route	Tonnes/ week	Annual Capacity (t)	Auckland share	Auckland annual capacity (t)	Proportion of total
Auckland-Sydney	215	11,000	100%	11,000	33%
Auckland-Christchurch-Sydney	280	14,000	40%	5,600	17%
Auckland-Cairns-Hong Kong	56	3,000	100%	3,000	9%
Auckland-Singapore	330	17,000	50%	8,500	25%
Auckland-Melbourne-Singapore	220	11,000	50%	5,500	16%
Total	1100	55,000		33,600	

Source: Based on schedules derived from airline websites and discussions

Of the total freighter capacity estimated at about 34,000 tonnes, about 33 per cent is on services direct from Auckland to Sydney, about 17 per cent is on services from Auckland just to Australia via Christchurch, about 16 per cent is on services landing in Australia but continuing to a further destination and about 25 per cent is on direct services to Singapore (which comes to Auckland via Melbourne and sometimes Sydney and will carry freight from these as well).

5.4 Summary of freight capacity and demand

From the analysis set out earlier, the total freight capacity into Auckland and Christchurch provided by bellyhold space and dedicated freighters is summarised in Table 5.11

Table 5.11						
Estimated total annual capacity available for exports by air 2014 (tonnes)						
NZ Airport	Total Bellyhold Freight Capacity Outbound		Total Freighter Capacity Outbound	Total Freight Capacity Outbound		Total Air Freight Exports
	Payload basis	Nominal basis		Payload basis	Nominal basis	
Auckland	276,000	190,000	34,000	310,000	224,000	85,000
Christchurch	34,000	22,000	8,000	42,000	30,000	19,000
Total	310,000	212,000	42,000	352,000	254,000	104,000

Source: Consultant calculations

While there are some uncertainties about the exact capacity available, at an overall level there would appear to be sufficient capacity to meet the demands for air freight movements from the two airports. It is however recognised that this may conceal temporary shortages on particular flights but the substantial capacity available would suggest that alternative albeit less desirable options should be available.

6 Forecasting the demand for air freight

6.1 Longer term trends in air freight movements

The longer term trends in the tonnages of air freight movements to and from New Zealand are set out in Figure 6.1.

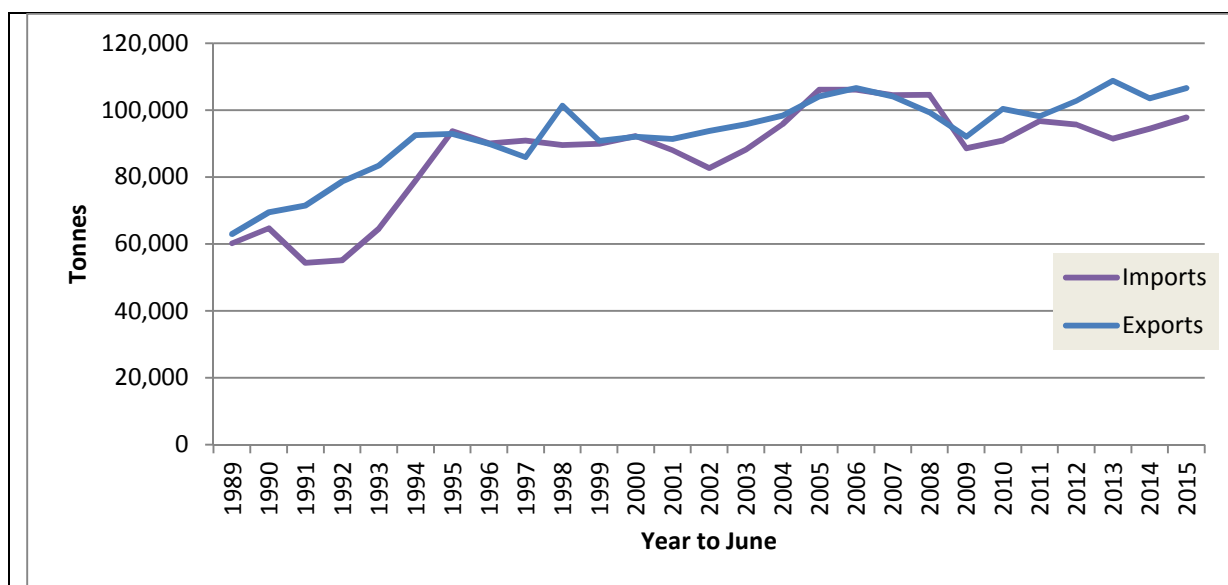


Figure 6.1
Growth in air freight tonnages to and from New Zealand 1989-2015 (tonnes)

Source: Statistics NZ and consultant analysis

As indicated earlier these grew strongly in the 1990s. Since that date volumes of both imports and exports have in general been more stable, although there have been some fluctuations through and after the GFC up to the present day.

6.2 Air freight by commodity

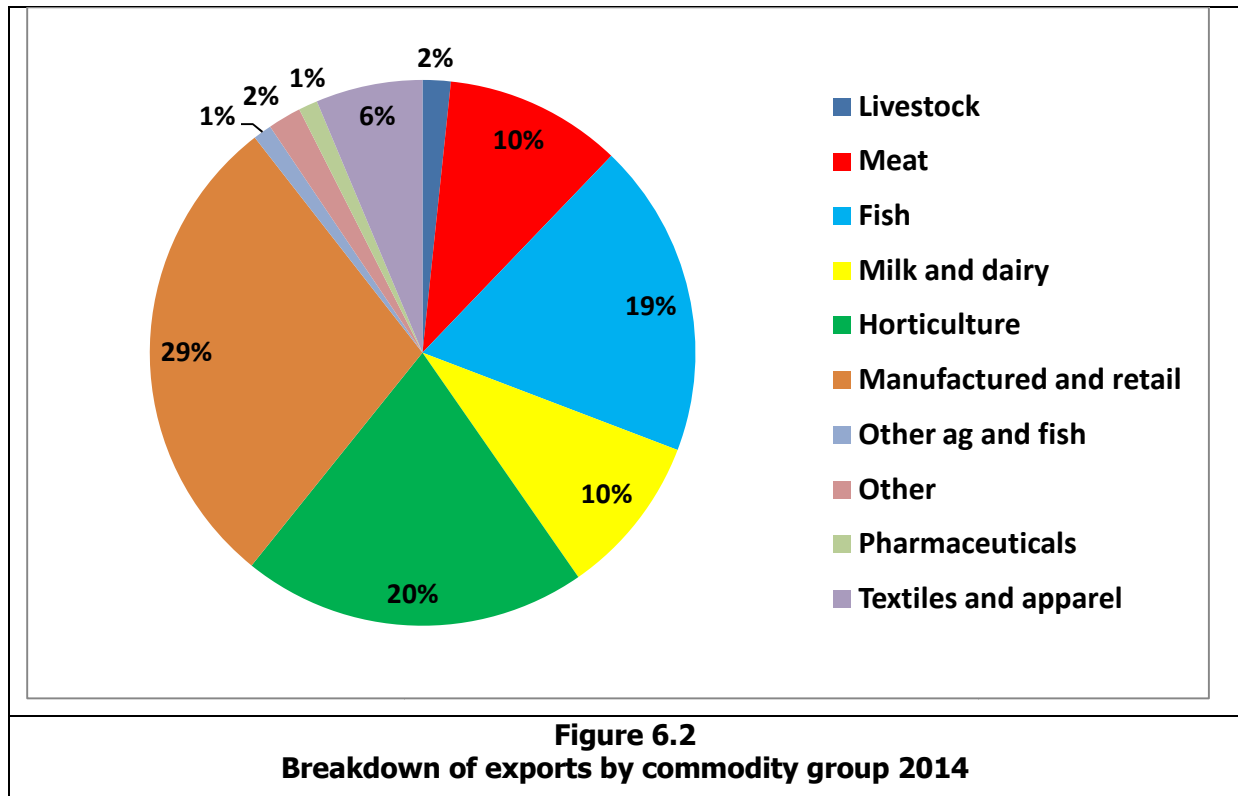
While information on the movements of freight by air are available in detail down to an HS4 level, in order to simplify these to provide a basis for future forecasting the detailed commodities carried by air have been grouped into the following broad categories:-

- Livestock
- Meat
- Fish
- Milk and dairy
- Horticulture
- Manufactured and retail
- Other agricultural products
- Other
- Pharmaceuticals
- Textiles and apparel

The detailed definitions of these by HS2 code are set out in Appendix A.

To a large extent these are in line with the commodity groupings developed for the National Freight Demands Study, but with the addition of pharmaceuticals and textiles and the grouping of a number of other categories where the flows are small.

The breakdown of the total flows in tonnage terms by broad commodity in 2014 is set out in Figure 6.2 and Figure 6.3.



Source: Statistics NZ and consultant analysis

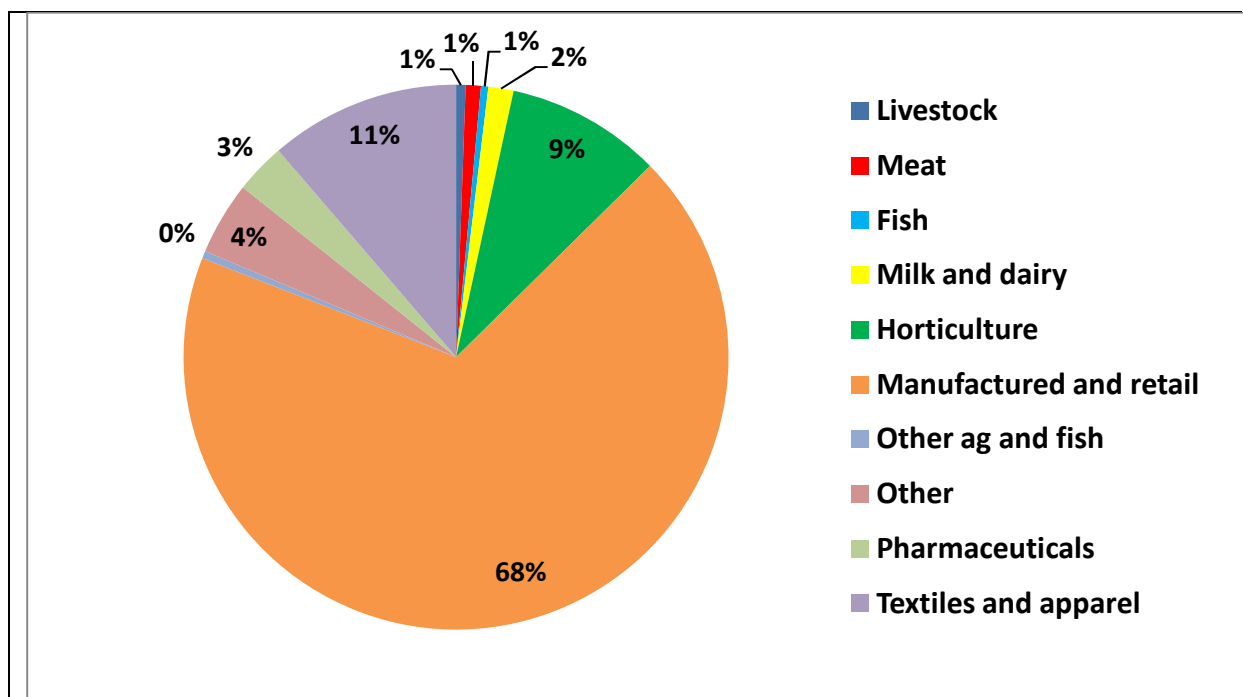


Figure 6.3
Breakdown of imports by commodity group 2014

Source: Statistics NZ and consultant analysis

6.3 Recent trends in air freight movements to New Zealand by Commodity

The changes in the volumes transported over recent years are set out in Figure 6.4 and Figure 6.5.

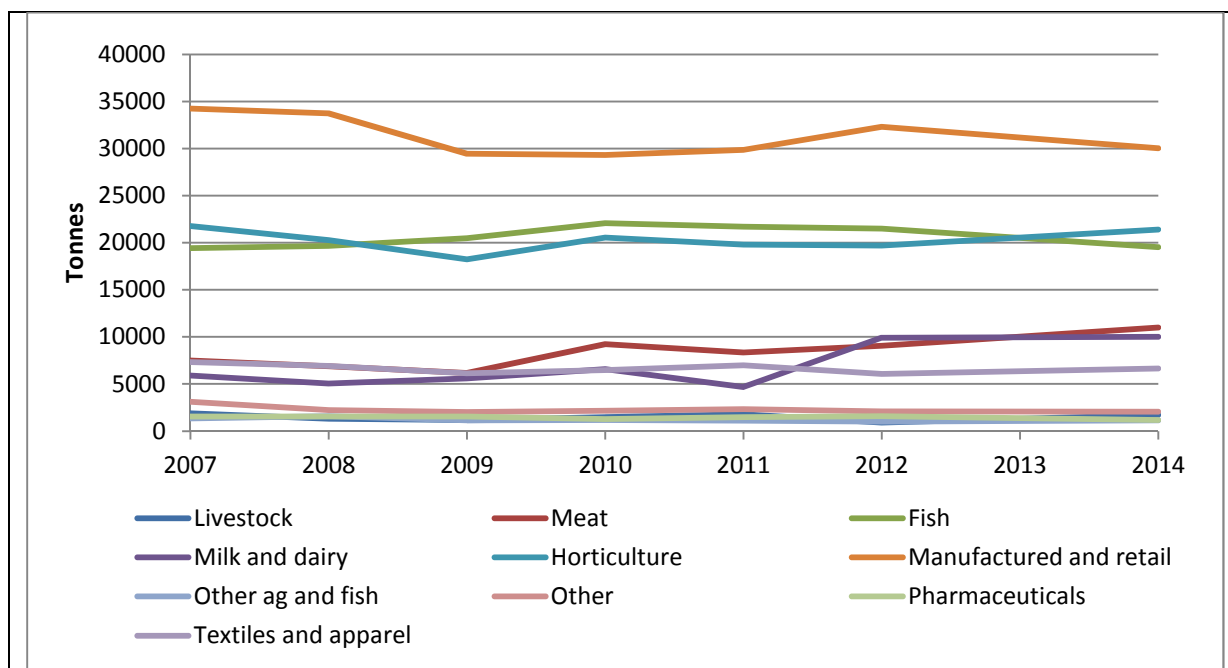


Figure 6.4
Air freight exports from New Zealand by commodity group

Notes : Year to June for 2007-2011, calendar year for 2012 and 2014, no data for 2013

Source: Statistics NZ and consultant analysis

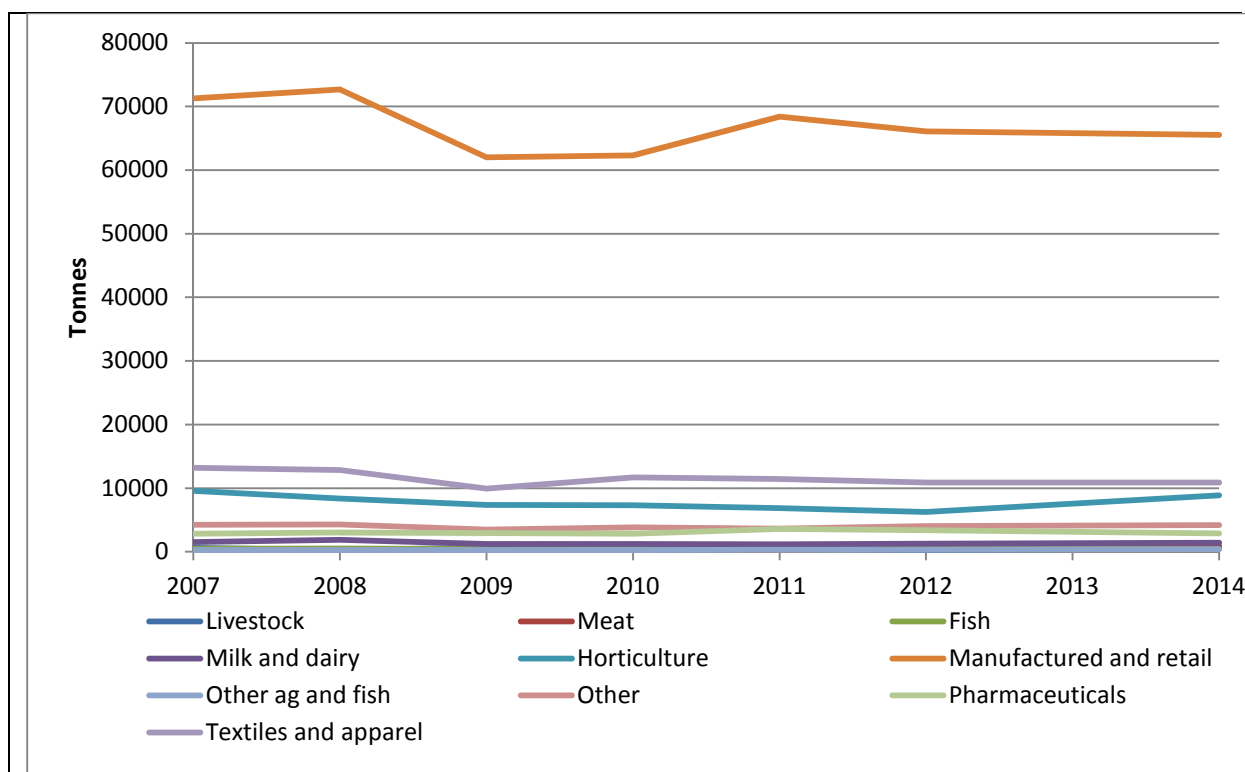


Figure 6.5

Air freight imports into New Zealand by commodity group

Notes : Year to June for 2007-2011, calendar year for 2012 and 2014, no data for 2013

Source: Statistics NZ and consultant analysis

Both imports and exports are dominated by the movements of manufactured goods, the flows of which have been generally stable or even declining slightly over the period considered. For exports the next most important commodity groups are fish and horticulture, which again have remained broadly constant in total. The next most important commodities with about 10,000 tonnes each in 2014 are meat and milk and dairy, both of which have grown fairly substantially over the period as a whole with annual average growth rates of 6 per cent and 8 per cent respectively. These high growth rates have however been balanced by declines for almost all the other commodity groups and the total export flow by air has remained broadly unchanged.

For imports, manufactured and retail goods account for almost 70 per cent of the total tonnage transported by air into New Zealand and this share and the total volume has remained broadly constant over the period. Textiles and apparel is the next largest commodity group to some extent reflecting the import to New Zealand from distribution centres in Australia. This flow works in both directions with relatively high exports by air to Australia of textiles and apparel which are imported into New Zealand by sea.

The broadly unchanging level of air freight transported into and out of New Zealand could in theory reflect capacity constraints on the aircraft serving the market. We have therefore analysed recent growth patterns in the likely availability of bellyhold capacity and then considered the position in 2014 in more detail.

6.4 Introduction to forecasting

Given the relatively stable flows of air freight over recent years, making forecasts of anything but a continuation of the current conditions is somewhat challenging. The nature of the manufactured goods distributed by air is changing, with the increasing miniaturisation of many of the key commodities transported in this way. An example of this is the mobile phone where miniaturisation of the product and a reduction in packaging have resulted in a product which occupies much less space than its forbears. In addition for the main Australian market there is a degree of competition with sea freight. Here the time disadvantages of travelling by sea are smaller and there may be substantial cost savings in its use. Improvements in container technology are also resulting in better temperature control for the goods transported and this may make urgent delivery less of a priority for markets or sources further away from New Zealand.

In addition our analysis of the detailed patterns of air freight to and from New Zealand have indicated that particularly for exports there are significant flows of very specialised products, serving particular markets. Current examples of these are the movements of pimentos (capsicums) to Japan and cherries to a number of South East Asian countries. Both of these arise over relatively short seasons and in these periods may represent significant shares of total air freight movements through the particular airports. Because of the importance of the movement of specific products to particular markets, future flows may be affected by changes in tastes or market opportunities or by the availability of alternative modes for transporting these goods more cheaply made possible by improved sea freight handling technology (which as Table 4.5 indicates may be available at a much lower cost). They may also be affected by changes in tariffs and in bio-security or other institutional arrangements. Examples of products affected in the past include kiwifruit and persimmons, both of which were extensively exported by air but which now use sea-freight. In addition it has been reported that the recent free trade agreement with China means that the import of fish to China via Hong Kong is no longer viable.

As a result of these issues, any forecasts for future air freight demand should be regarded as tentative only. In line with the forecasts of air passenger demand provided recently by the Ministry of Transport, these cover the period to 2030.

6.5 Potential for market growth

The potential for market growth has been considered for each of the commodities identified and this is discussed in the sections below:-

6.5.1 Exports

- **Manufacturing and retail goods.** These have displayed little overall growth both for imports and exports and there is no reason to expect this factor to change significantly over the future. Our forecasts therefore assume a continuation of the existing levels of movement into the future.
- **Fish.** There has been little growth in the exports of fish over the period from 2007 and we expect this position to continue into the future with air freight volumes remaining broadly constant.
- **Horticulture.** The position for horticulture is similar to that for fish and again air freight volumes are expected to remain broadly stable up to 2030. As however we have indicated earlier, much of the movement of horticultural items is for very specific products to very specific markets for example pimentos to Japan. While there is no obvious reason why this trade might not continue into the future, it is possible that a relatively small change in circumstances might lead to the movement by air ceasing or being significantly curtailed. Alternatively new product and market opportunities may emerge.

- **Meat.** There has been some increase in the volumes of meat exported by air, with the total growing fairly strongly over recent years by almost 20 per cent over the period from 2010. This contrasts with a rather slower growth for all exports of meat demonstrating the growing market for the premium products primarily chilled meat exported by air, and the current difficulties of supplying more distant markets in the UK and Western Europe by sea as a result of shipping lines' slow steaming policies, which have sharply diminished the available shelf life of the product at the destination. However should shipping lines review this policy then the air market is likely to be negatively affected.

The general trend in exports of beef and lamb with Western Europe and the UK is for the total value exported to decline for each of these products. In addition for lamb, the dominant part of the market for meat exports to Western Europe (including the UK), the share for chilled products has remained broadly unchanged. There has been some growth for beef, but this represents a small part of the market. Given these trends considerable uncertainty exists over the future trends of this trade, particularly given the possible responses from sea freight which could have a major impact on the volumes carried by air.

However for our forecasts we have assumed that the share carried by air will increase slightly reflecting recent trends and a nominal growth rate of 1 per cent has been assumed. This contrasts with the forecasts made in the NFDS which gave a total growth to 2032 of just 2.7 per cent. Our forecasts do assume therefore that the airfreight share of the market will grow but as cautioned above, this could be significantly affected by changes in the overall supply chain for chilled meat products and the effects of shortening times using sea freight could affect these forecasts significantly.

- **Milk and dairy products.** Again the export by air of milk and dairy products has grown rapidly in recent years although this may be in response to specific events in the main market of China which have resulted in shortages of product and given a premium to milk products from New Zealand. It is likely that with the slowdown of the Chinese economy these high rates of growth will be reduced and evidence over the period from 2013 when growth of milk exports by air was just 1 per cent suggests that this may already have started to happen. Because milk products are typically not particularly perishable, improved sea based supply chains could remove the need for movement by air responding to short-term shortages.

The forecasts from the NFDS based on expected increases in productivity and increases in the land used for dairying suggested that overall milk production would increase by an average of about 2.7 per cent per year for the 15 year period from 2012 to 2027. We have therefore used this rate in developing our future forecasts. This is higher than the most recent growth rate but is consistent with the likely longer term growth rates expected for the dairy sector.

- **Other commodities.** For other commodities the volumes exported by air have generally been broadly stable and this has been assumed to continue in the future forecasts.
- **Overall assessment of export forecasts.** The forecasts of exports for 2020 and 2030 are included in Table 6.1 and Figure 6.6, together with the observed data for the period from 2007.

Table 6.1									
Actual and forecast growth of air freight exports 2007-2030 (tonnes pa)									
	2007	2008	2009	2010	2011	2012	2014	2020	2030
Livestock	1889	1294	1183	1485	1786	918	1725	1750	1750
Meat	7491	6894	6164	9217	8342	9055	11005	11700	12900
Fish	19424	19679	20470	22091	21712	21492	19522	19500	19500
Milk and dairy	5917	5038	5608	6579	4677	9910	10009	11750	15350
Horticulture	21761	20289	18254	20556	19796	19704	21414	21400	21400
Manufactured & retail	34260	33746	29460	29333	29872	32327	30041	30050	30050
Other agriculture	1344	1588	1156	1187	1110	993	1140	1150	1150
Other	3121	2241	2041	2152	2329	2103	2065	2050	2050
Pharmaceuticals	1557	1546	1547	1265	1492	1583	1189	1200	1200
Textiles and apparel	7316	6933	6154	6495	6996	6056	6644	6650	6650
Total	104080	99249	92036	100360	98113	104142	104753	107150	111950

Source: Statistics NZ and consultant analysis

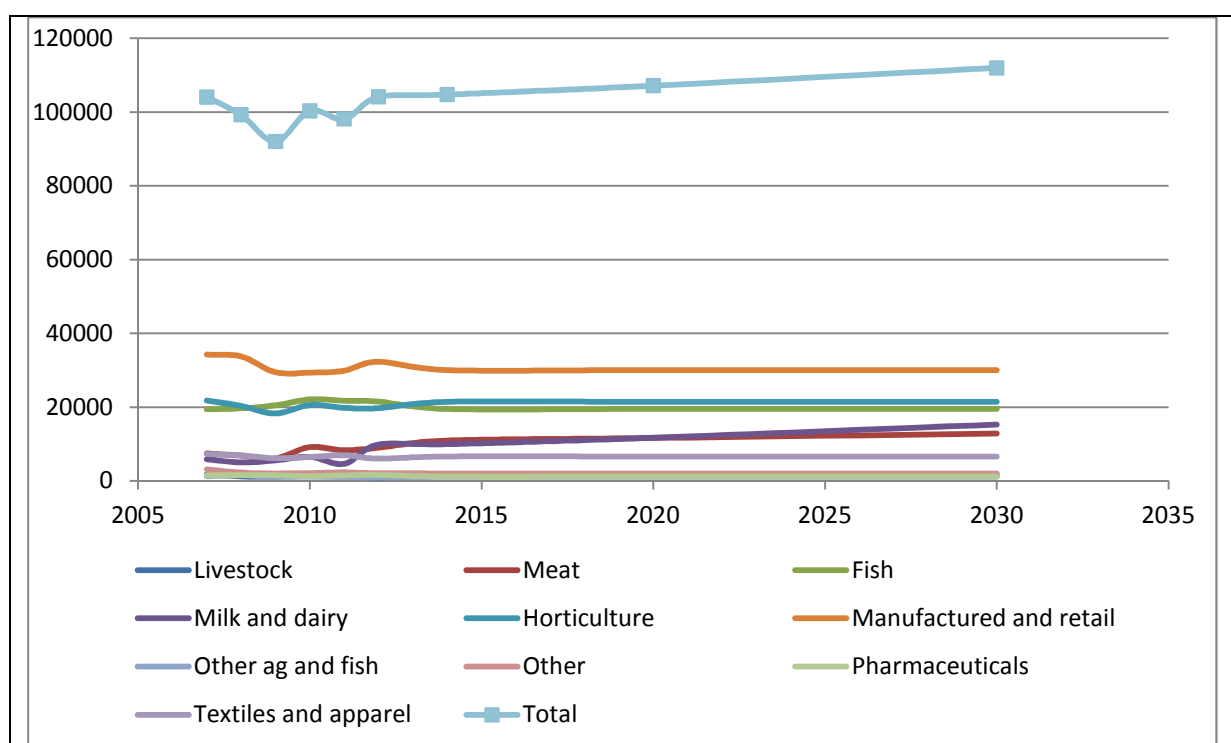
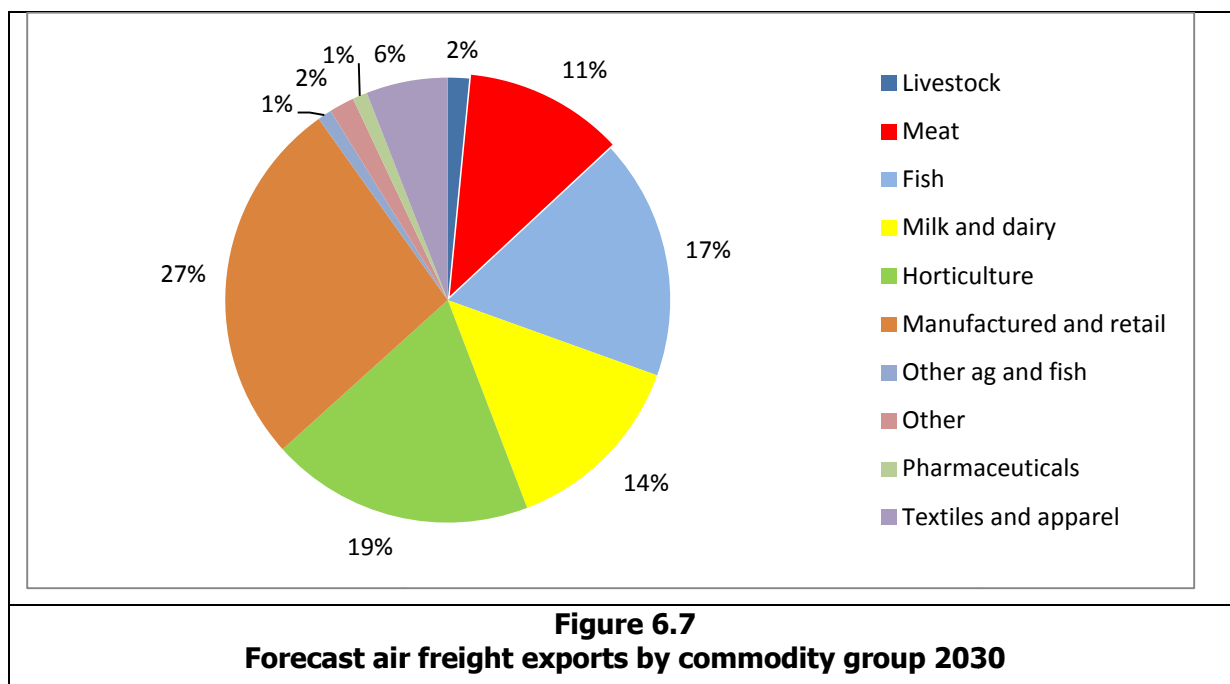


Figure 6.6
Actual and forecast growth of air freight exports 2007-2030

Source: Statistics NZ and consultant analysis

This highlights the growth of dairy and meat exports and the gradual increase in the export totals over this period. The growth of the overall totals is in line with the figures observed over the years up to and including 2014.

The forecast breakdown of air freight by commodity in 2030 is set out in Figure 6.7.



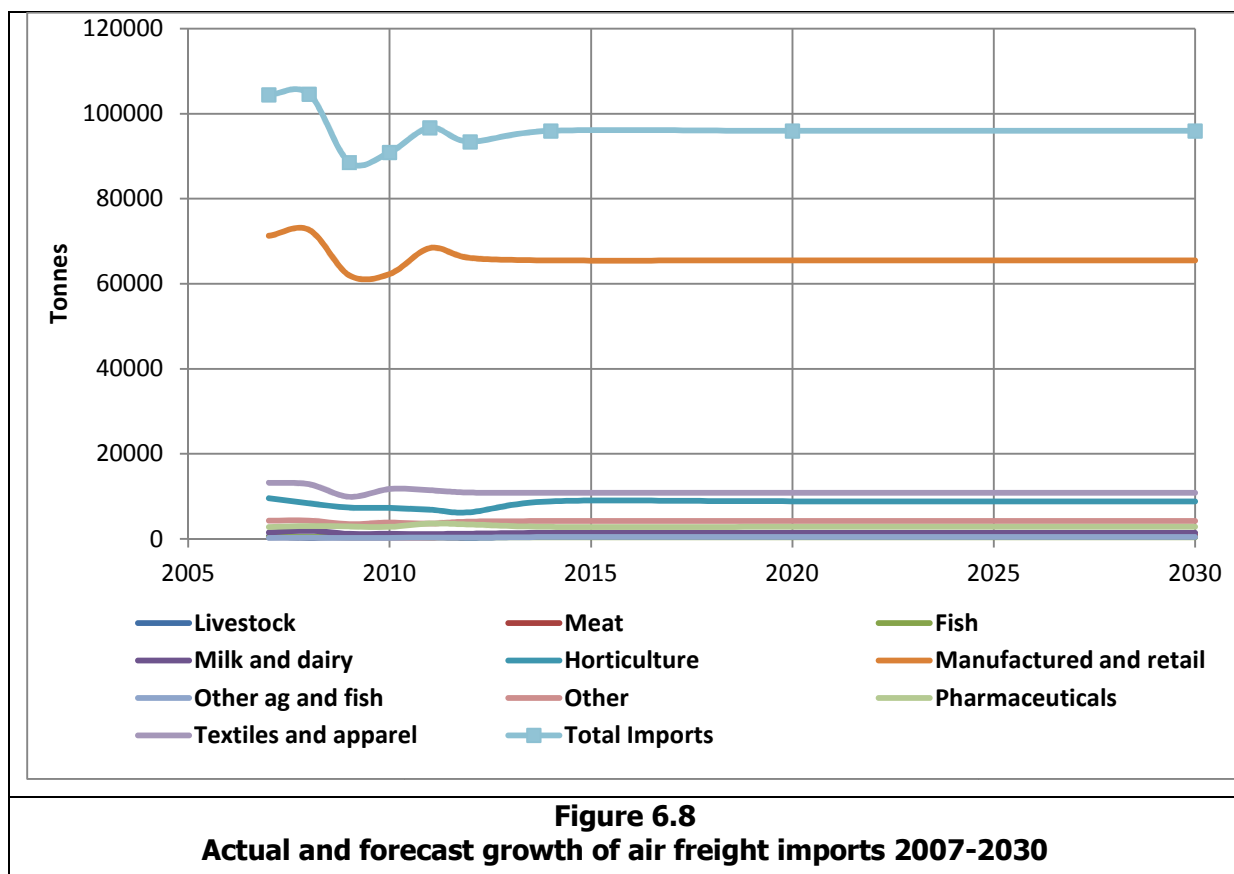
Source: Consultant analysis

Primary products are forecast to account for about two thirds of total air freight exports, up from the observed figure of about 60 per cent in 2014.

6.5.2 Imports

All commodities. For imports there has been little growth in either the total volumes of air freight or in the commodities making up this total. The observed volumes in 2014 are therefore assumed to remain broadly stable over the future.

The pattern that results is set out in Figure 6.8.



7 Summary and Conclusions

Air freight is a relatively small proportion of New Zealand's total trade by weight, and while the share of the value is higher, this is influenced by a few very valuable commodities. The majority of the demand in terms of weight (which is what is relevant to forecast) is primary exports, and machinery. In each of these cases too the proportion of the commodity exported or imported by air is also small. The volumes transported by air, while growing strongly in the early 1990s have been fairly stable in recent years, although with year to year fluctuations.

An analysis of the capacity available in the bellyholds of passenger aircraft, in terms of weight, suggests that in aggregate it is well in excess of the demand. (The dominance of dense primary commodities suggests that weight is a more important factor than cubic capacity). Even then, it is supplemented by a number of regular dedicated freighters and ad hoc freighters. Even on a nominal capacity basis there is generally adequate capacity.

As a result we have undertaken the forecasting essentially on the basis of demand, and on the basis of recent trends and forecasts for commodities. Because the air freight is concentrated on a few particular products which make up small shares of broader commodity groups, the actual amounts can fluctuate, especially if markets for these products or sea freight (which is much less costly) can compete on quality factors.

Our overall assessment is that the current trend of relatively flat growth will continue, with only modest increases through to 2030.

Appendix A

HS2 Commodity Codes and Groupings for Forecasting

01 Animals; live	Livestock
02 Meat and edible meat offal	Meat
03 Fish and crustaceans, molluscs and other aquatic invertebrates	Fish
04 Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included	Milk and dairy
05 Animal originated products; not elsewhere specified or included	Meat
06 Trees and other plants, live; bulbs, roots and the like; cut flowers and ornamental foliage	Horticulture
07 Vegetables and certain roots and tubers; edible	Horticulture
08 Fruit and nuts, edible; peel of citrus fruit or melons	Horticulture
09 Coffee, tea, mate and spices	Manufactured and retail
10 Cereals	Horticulture
11 Products of the milling industry; malt, starches, inulin, wheat gluten	Other ag and fish
12 Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit, industrial or medicinal plants; straw and fodder	Other ag and fish
13 Lac; gums, resins and other vegetable saps and extracts	Manufactured and retail
14 Vegetable plaiting materials; vegetable products not elsewhere specified or included	Manufactured and retail
15 Animal or vegetable fats and oils and their cleavage products; prepared animal fats; animal or vegetable waxes	Meat
16 Meat, fish or crustaceans, molluscs or other aquatic invertebrates; preparations thereof	Meat
17 Sugars and sugar confectionery	Manufactured and retail
18 Cocoa and cocoa preparations	Manufactured and retail
19 Preparations of cereals, flour, starch or milk; pastrycooks' products	Milk and dairy
20 Preparations of vegetables, fruit, nuts or other parts of plants	Manufactured and retail
21 Miscellaneous edible preparations	Manufactured and retail
22 Beverages, spirits and vinegar	Manufactured and retail
23 Food industries, residues and wastes thereof; prepared animal fodder	Manufactured and retail
24 Tobacco and manufactured tobacco substitutes	Manufactured and retail
25 Salt; sulphur; earths, stone; plastering materials, lime and cement	Other
26 Ores, slag and ash	Other
27 Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes	Other
28 Inorganic chemicals; organic and inorganic compounds of precious metals; of rare earth metals, of radio-active elements and of isotopes	Manufactured and retail
29 Organic chemicals	Manufactured and retail
30 Pharmaceutical products	Pharmaceuticals
31 Fertilizers	Other
32 Tanning or dyeing extracts; tannins and their derivatives; dyes, pigments and other colouring matter; paints, varnishes; putty, other mastics; inks	Manufactured and retail
33 Essential oils and resinoids; perfumery, cosmetic or toilet preparations	Manufactured and retail
34 Soap, organic surface-active agents; washing, lubricating, polishing or scouring preparations; artificial or prepared waxes, candles and similar articles, modelling pastes, dental waxes and dental preparations with a basis of plaster	Manufactured and retail
35 Albuminoidal substances; modified starches; glues; enzymes	Manufactured and retail
36 Explosives; pyrotechnic products; matches; pyrophoric alloys; certain combustible preparations	Manufactured and retail

37 Photographic or cinematographic goods	Manufactured and retail
38 Chemical products n.e.c.	Manufactured and retail
39 Plastics and articles thereof	Manufactured and retail
40 Rubber and articles thereof	Manufactured and retail
41 Raw hides and skins (other than furskins) and leather	Other ag and fish
42 Articles of leather; saddlery and harness; travel goods, handbags and similar containers; articles of animal gut (other than silk-worm gut)	Manufactured and retail
43 Furskins and artificial fur; manufactures thereof	Manufactured and retail
44 Wood and articles of wood; wood charcoal	Other
45 Cork and articles of cork	Other
46 Manufactures of straw, esparto or other plaiting materials; basketware and wickerwork	Manufactured and retail
47 Pulp of wood or other fibrous cellulosic material; recovered (waste and scrap) paper or paperboard	Other
48 Paper and paperboard; articles of paper pulp, of paper or paperboard	Other
49 Printed books, newspapers, pictures and other products of the printing industry; manuscripts, typescripts and plans	Manufactured and retail
50 Silk	Manufactured and retail
51 Wool, fine or coarse animal hair; horsehair yarn and woven fabric	Textiles and apparel
52 Cotton	Textiles and apparel
53 Vegetable textile fibres; paper yarn and woven fabrics of paper yarn	Textiles and apparel
54 Man-made filaments; strip and the like of man-made textile materials	Textiles and apparel
55 Man-made staple fibres	Textiles and apparel
56 Wadding, felt and nonwovens, special yarns; twine, cordage, ropes and cables and articles thereof	Textiles and apparel
57 Carpets and other textile floor coverings	Textiles and apparel
58 Fabrics; special woven fabrics, tufted textile fabrics, lace, tapestries, trimmings, embroidery	Textiles and apparel
59 Textile fabrics; impregnated, coated, covered or laminated; textile articles of a kind suitable for industrial use	Textiles and apparel
60 Fabrics; knitted or crocheted	Textiles and apparel
61 Apparel and clothing accessories; knitted or crocheted	Textiles and apparel
62 Apparel and clothing accessories; not knitted or crocheted	Textiles and apparel
63 Textiles, made up articles; sets; worn clothing and worn textile articles; rags	Textiles and apparel
64 Footwear; gaiters and the like; parts of such articles	Textiles and apparel
65 Headgear and parts thereof	Textiles and apparel
66 Umbrellas, sun umbrellas, walking-sticks, seat sticks, whips, riding crops; and parts thereof	Manufactured and retail
67 Feathers and down, prepared; and articles made of feather or of down; artificial flowers; articles of human hair	Manufactured and retail
68 Stone, plaster, cement, asbestos, mica or similar materials; articles thereof	Other
69 Ceramic products	Other
70 Glass and glassware	Manufactured and retail
71 Natural, cultured pearls; precious, semi-precious stones; precious metals, metals clad with precious metal, and articles thereof; imitation jewellery; coin	Manufactured and retail
72 Iron and steel	Other
73 Iron or steel articles	Manufactured and retail
74 Copper and articles thereof	Manufactured and retail
75 Nickel and articles thereof	Manufactured and retail
76 Aluminium and articles thereof	Other
78 Lead and articles thereof	Manufactured and retail

79 Zinc and articles thereof	Manufactured and retail
80 Tin; articles thereof	Manufactured and retail
81 Metals; n.e.c., cermets and articles thereof	Manufactured and retail
82 Tools, implements, cutlery, spoons and forks, of base metal; parts thereof, of base metal	Manufactured and retail
83 Metal; miscellaneous products of base metal	Manufactured and retail
84 Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	Manufactured and retail
85 Electrical machinery and equipment and parts thereof; sound recorders and reproducers; television image and sound recorders and reproducers, parts and accessories of such articles	Manufactured and retail
86 Railway, tramway locomotives, rolling-stock and parts thereof; railway or tramway track fixtures and fittings and parts thereof; mechanical (including electro-mechanical) traffic signalling equipment of all kinds	Manufactured and retail
87 Vehicles; other than railway or tramway rolling stock, and parts and accessories thereof	Manufactured and retail
88 Aircraft, spacecraft and parts thereof	Manufactured and retail
89 Ships, boats and floating structures	Manufactured and retail
90 Optical, photographic, cinematographic, measuring, checking, medical or surgical instruments and apparatus; parts and accessories	Manufactured and retail
91 Clocks and watches and parts thereof	Manufactured and retail
92 Musical instruments; parts and accessories of such articles	Manufactured and retail
93 Arms and ammunition; parts and accessories thereof	Manufactured and retail
94 Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings, n.e.c.; illuminated signs, illuminated name-plates and the like; prefabricated buildings	Manufactured and retail
95 Toys, games and sports requisites; parts and accessories thereof	Manufactured and retail
96 Miscellaneous manufactured articles	Manufactured and retail
97 Works of art; collectors' pieces and antiques	Manufactured and retail
98 New Zealand miscellaneous provisions	Manufactured and retail

Appendix B

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