



# **Freight futures**

## **Long term sea freight scenarios**

**Report to Ministry of Transport**

**September 2010**



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# Executive summary

## Introduction

We have explored the role of freight transport policy in the promotion of economic growth by conducting an initial examination of the specific aspects of sea freight movements in the New Zealand context both domestically and internationally. The question we wish to address is how can policymakers act to ensure an efficient sea freight market.

## Background

Our focus is on the important supply and demand factors that influence the efficiency of the sea freight sector. This includes:

- The role of world trade, further integration of the world economy, and the rise of China. We expect these trends to increase New Zealand's trade with Asia over the forecast period, increasing the frequency of shipping services from Asia;
- Illustrating the impact of the shipping cycle, particularly strategic behaviour in the phase of the cycle we are now in (i.e. what a slump in the industry means for ship operator behaviour) ;
- Further understanding the trends in the New Zealand sea freight industry detailing the export and import value by volume and indicating the likely patterns of trade in the base case;
- Detailing the patterns of strategic behaviour that are likely to occur in the New Zealand context. Here we examine the level of market power of ship operators, negotiating strategies of ship operators, bargaining power of ports, the impact on port companies, the role of local and regional politicians, and port efficiency.

These trends and behaviours are used in the next section to set out the base case and show how industry players are likely to react in the scenarios developed.

## Framework

Our organising framework has been set up to capture sea freight market interactions in the New Zealand economy and to show where the various qualitative and quantitative tools have been applied to address the sea freight issues. It concentrates on the constraints/opportunities (strategic behaviour) in each scenario, interactions between the freight markets and the economy, how market players react to the international trends and cycles of the world economy, the GDP outcomes, and the possible policy responses.

To operationalise the framework we have used scenario analysis and a model of the New Zealand economy (CGE model) to calculate GDP effects. The scenarios are deliberately provocative with the aim of demonstrating how the various market players will react to different circumstances.

## Scenarios

The status quo is a reflection of past political and economic influences which have shaped the sea freight industry e.g. production, infrastructure, geographical distribution of exports and imports, local authority ownership and control. The status quo represents the “direction of travel” that we think the sea freight sector will take over the next twenty years. .

Besides the status quo, three high level scenarios are developed:

- Hubbing of New Zealand export and import containers through Australian ports. Larger ship operators move New Zealand bound containers through Australian hubs;
- A “two port” strategy – one large port in the North Island and one in the South Island for container traffic; and
- A reduction in ship operators willing to service the New Zealand market.

The scenarios have been put together after discussion with the Ministry of Transport. The scenarios, description of the scenarios, and the key assumptions are set out in the table below.

<b>Scenarios</b>		
Scenario	Description	Key assumptions
(1) Base case	NZIER Quarterly predictions forecasts out to 2031. Uses current relationships between sea freight volumes and GDP.	Takes account of stage of the shipping cycle and likely behavioural relationships (as described in section 1)
(2) Hubbing in Australia	All ship operators move containers to New Zealand through Australia (exports and imports).	5% increase in sea freight costs for containerised trade (exports and imports) because of increased costs associated with trans shipments, delays, and other port costs.
(3) Two ports	New Zealand has two ports (one in the North Island and one in the South Island) where only very large container ships can call.	Exports and imports experience a positive productivity shock from the increase in scale of ports (5%) and a negative productivity shock for shippers because of reduced opportunities (less frequent service) and increased market power of ports (10%). This is likely to impact on shippers most of all.
(4) Fewer Ship Operators	The number of ship operators calling at New Zealand ports drops.	Increased freight rates across the board (5%) because of an increase in market power for ship operators

Source: NZIER

## Modelling of scenarios

The results show losses in all scenarios relative to the status quo. These losses are crucially dependent on the modelling assumptions and the explanations given for using those assumptions. The detailed behaviours of ship operators, shippers, ports, and coastal shippers are set out in Appendix B . The losses are due to inherent inefficiencies in the deviations from the status quo. These include extra port delays

(hubbing in Australia scenario), reduction in port competition (two ports scenario), and a reduction in shipping line services (fewer ship operators scenario).

However, the assumed level of inefficiencies in the two “supply side” scenarios (hubbing in Australia and two big ports) will not result in significant decreases in efficiency across the New Zealand economy. Also, it should be noted that the modelling for both these scenarios has been based on a total shift to the extreme version of the situation modelled and in practice this is unlikely to occur.

The demand side scenario – fewer ship operators – is likely to have a bigger negative impact relative to other scenarios, which suggests that policy makers should be concerned with encouraging a competitive ship operator market.

## Policy implications

The policy question is how policy makers can ensure that the market players act in a way that supports a competitive sea freight market.

Under the base case, the spotlight is firmly fixed on the lack of understanding by owners of major ports in New Zealand of ship operator strategic behaviour. Most port owners are focused on the supply side of the argument with little understanding of the competition dynamics (demand). The long term solution for bigger ports is to move towards a more commercial model. While there are many ways this could be done, it does not mean that ports should be sold to the private sector, however, it does mean that local politicians should have less say in the running of ports.

The hubbing in Australia scenario plays on fears of increased competition from Australian ports. It suggests that if we do not follow the Australian example and dredge channels for larger and larger vessels, New Zealand is likely to become a backwater and only serviced by Australian and New Zealand based ship operators. While we think this is unlikely to happen because of the costs and possible delays associated with trans shipment, there is a need to understand relative efficiency between Australian and New Zealand ports and how efficiency improves or declines over time.

The development of two large ports is the solution to a supply side issue in isolation from demand side factors. The argument suggests that we need to have two big ports so that New Zealand can accommodate bigger ships, increase the scale of operation to drive further efficiency, and deal on an equal footing with shipping operators.

The policy problem is not to increase the returns to investors in ports by creating two large ports but to ensure that sea freight arrives at markets (imports and exports) as efficiently as possible. Therefore, advocating a two ports strategy is a misdiagnosis of the policy problem since it is likely to benefit the ports who will exert monopoly power over shippers. Ship operators are likely to be able to resist attempts by ports to increase port charges by presenting a united negotiating position.

Lessening of competition between ship operators could potentially be a significant drag on efficiency in the sea freight sector (fewer ship operators scenario). The policy issue is to ensure that those who own the ports are sufficiently aware of the dynamics of ship operating to encourage new shipping operator entrants. If port reviews or other mechanisms are used by ship operators in an attempt to improve their returns then ports should be free to pursue a strategic response whose actions are purely based on commercial objectives (we advocate a similar response to the base case).

In summary, the analysis suggests that the alternative options discussed here are unlikely to improve efficiency. Also, policy makers need to consider both supply and demand side factors when thinking about policy interventions. Furthermore, consideration of demand side factors (e.g. exports growth, stage of shipping cycle, competitiveness of ship operators) may be more important than supply side factors (e.g. port size) when thinking about appropriate interventions.



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# 1. Introduction

This report seeks to explore the role of freight transport policy in the promotion of economic growth by conducting an initial examination of the specific importance of sea freight movements in the New Zealand context both domestically and internationally.

The aim of this project is to better understand the sea freight demand and supply issues that are faced by New Zealand so that policymakers can further understand the types of interventions that will and will not work to improve efficiency of the sector. We do this by developing scenarios for New Zealand's sea freight future over a 30 year timeframe. Scenario analysis has been employed so that we can explore a range of options to give the Ministry a better understanding of the interaction of demand and supply in the sea freight sector and how these issues impact on efficiency of the sector. With a better understanding of the impacts of various issues on sector efficiency this report becomes a useful input into planning the Ministry's long term thinking for sea freight.

The scenario based approach of this report is inevitably speculative and based on views about the future and the ways in which entities (private sector and government) in New Zealand will respond. Selected scenarios differing in how market players could be positioned by 2031 provide a framework to examine policy implications. We have also developed a base case scenario to incorporate current and recent past practice. The scenarios are then compared to the base case.

It is also important to note that the report deals only with the implications for the shippers, shipper owners, ports and coastal shipping behaviour, and does not deal with other changes to the economy.

The report sections are as follows:

- Setting out the elements of the base case and trends and behaviours that are likely to be important when considering the various demand and supply issues;
- Examining the components common to all scenarios and introducing the tools used (scenario analysis, and CGE modelling) to examine outcomes;
- Outlining a framework for the structure, behaviour and performance under each scenario;
- Setting out the high level quantitative results of each scenario;
- Considering the possible policy implications from changes to the sea freight industry under different scenarios;

To avoid undue complexity, we have tried to isolate the main freight issues when modelling the scenarios.<sup>1</sup>

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<sup>1</sup> Multiple shocks to a CGE model confuse the interpretation and communication of results, and dilute our understanding of the issues we most want to examine (e.g. freight impact on various market impacts).

## 2. Background

A number of demand and supply factors are likely to impact on the base case and all scenarios over the time period.<sup>2</sup> These factors are related to the continued emergence of Asia (particularly China and to a lesser extent India) as economic powerhouses, the prevailing super cycle of international shipping, investments by other jurisdictions such as channel dredging or new capital equipment), trends in the freight industry, and likely behavioural responses of industry stakeholders.

In examining these issues, our main aim is to increase our understanding of how New Zealand “fits” into the continual shaping and re-shaping of transport links to and from New Zealand. The next section sets up the conditions for the base case scenario and shows the types of behaviours that will be modelled.

### 2.1 This is the Asian century

This section examines the relationship between world trade and world GDP growth, the impact of closer integration, and the rise of Asia as an economic force. We show that a more interrelated world and the growing demand for food means that New Zealand is likely to be a reliable constant source of sea freight cargo (both exports and imports) for the foreseeable future.

#### 2.1.1 World trade

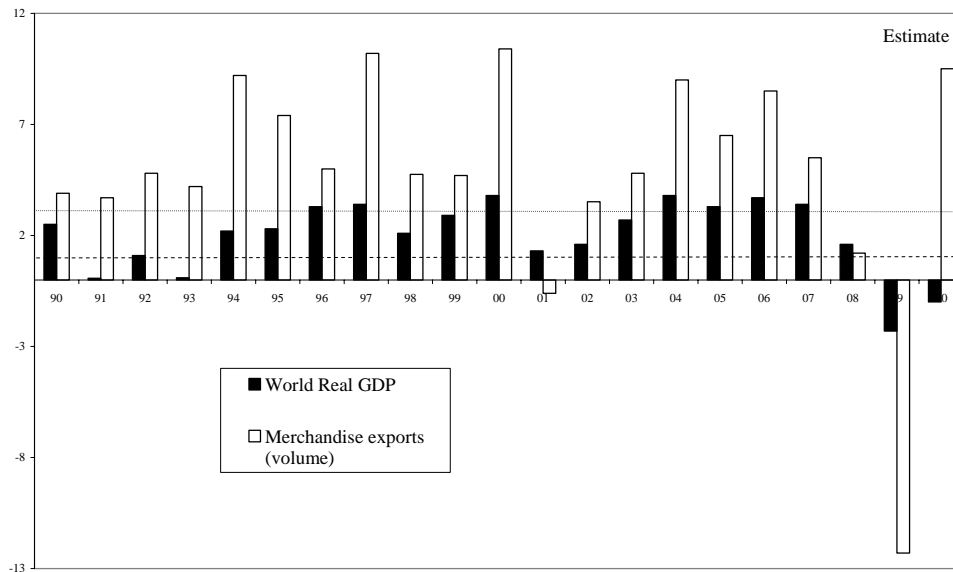
World trade is driving world GDP. In the period 1990-2010 we see a continuing transformation of the world economy as more countries participated significantly in world trade, despite the recent structural and cyclical downturn. This has been a period of further reduction in trade barriers, where traditional trade patterns became less important, and where a vigorous growth of new trade was pursued. Alarming for governments generally, there was reduced control over trade flows and a consequent reduction in their ability to regulate.

Since the 1990s, real world GDP has grown at an average of two per cent annually. Over the same period, world trade in goods and services has increased at more than double this rate. The volume of trade grew from one tenth of world GDP in 1950 to close to one third of world GDP in 2004 (Mussa, 2000 and WTO, 2009). Figure 1 illustrates this by comparing world exports with world GDP over the 1990-2010 period. Apart from 2001 and 2009, export growth consistently out-performed GDP growth.

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<sup>2</sup> Up until 2031.

**Figure 1: World export growth and world GDP growth 1990-2010**  
Annual percentage change at constant prices



Note: Average world GDP growth was 2.0%. Average export volume growth was 4.9%.

Source: [www.wto.org](http://www.wto.org) press release various years

Shipping – of course – is central to the process of closer world interconnection since it is this sector that carries 90% of world trade volumes. Since World War II, there has been a steady rise in total trade volume and this is reflected in the distance and tonnage carried by ships. Since the 1950s, total seaborne trade estimates have nearly quadrupled, from less than 6 thousand billion tonne-miles in 1965 to over 27 thousand billion tonne-miles in 2004.

### 2.1.2 Global integration

It is not generally realised that up until the mid 1970s increased integration represented a simple recovery to former levels pre World War I (see Table 1).

**Table 1: World merchandise trade**

Exports relative to world GDP

1850 <sup>1</sup>	1880 <sup>1</sup>	1913 <sup>1</sup>	1950	1973	1985	1993	2007
5.1	9.8	11.9	7.1	11.7	14.5	17.1	32.0

Notes: (1) OECD countries only.

Source: Krugman (1995) p331 & WTO (2009)

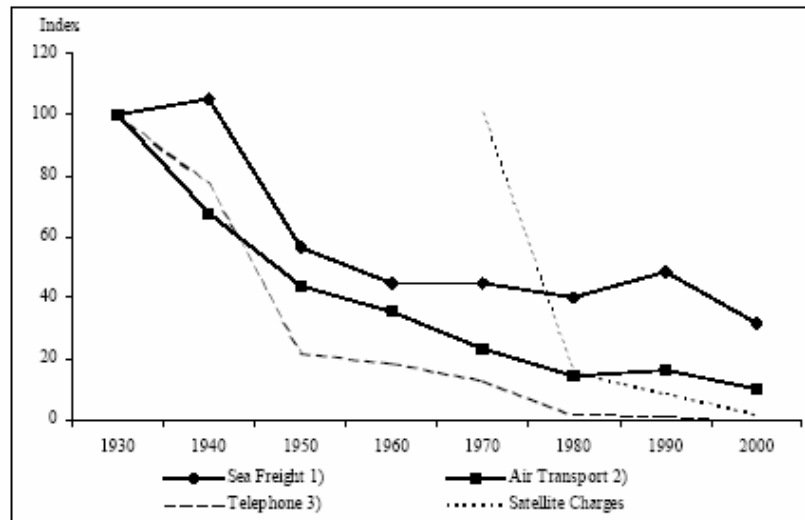
Furthermore, it is only since China's admission into the WTO that the world has reached proportions of trade that are significantly different from pre 1914 levels. Therefore, it is only very recently that the world has been in truly "new times" in terms of the intensity of global integration.

What has contributed to these “new times”? Over the past century the costs of global transport and telecommunications services have fallen dramatically. As a result of rapid advances in information and communications technology (ICT) and the digital revolution in communications technology, the speed with which sophisticated business transactions can be carried out has exponentially increased.

Figure 2 illustrates this point that there have been large decreases in transport and communication costs since 1930 where the real cost of a three minute phone call from New York to London has fallen by 99.9 percent, while shipping and airfreight costs have fallen by nearly half since 1950 (Busse, 2002). The greater availability of satellite communications combined with their rapid fall in cost has assisted New Zealand firms in conducting business globally in real time and facilitated the growth in world trade.

**Figure 2: Transport and communication costs 1930-2000**

Base year 1990 (US dollars)



- Notes: (1) Average ocean freight and port charges per short tonne of import and export cargo  
 (2) Average air transport revenue per passenger mile  
 (3) Cost of a three minute telephone call from New York to London

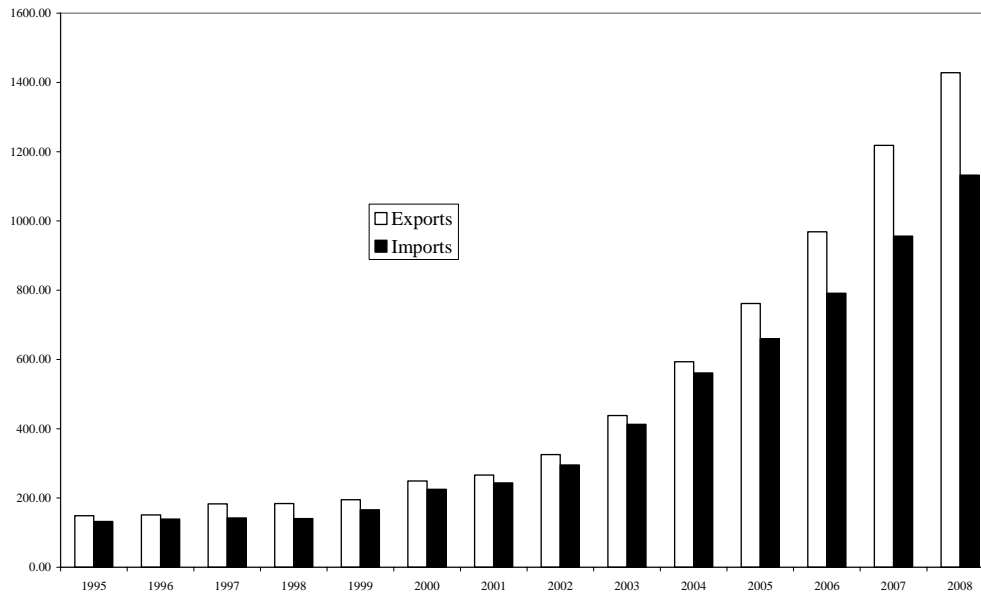
Source: Busse, M. (2002)

### 2.1.3 Intensified by the China factor

Since 2000, there has been a dramatic shift in the world price of commodities as China has entered the world trading system. In 2008, China surpassed Germany to become the leading exporter in the world with exports growing at approximately 20% per annum since 1995 (WTO 2009). As an example of how dramatic the increase in trade has been, Figure 3 shows total merchandise trade for China over the past fifteen years.



**Figure 3: Chinese merchandise imports and exports**  
Millions of US \$



Source: WTO (2009)

In particular, China's demand for minerals has been strong. Real prices for oil, aluminium, and other base metals are at levels not seen since the 1970s. Demand in China has also been strong for land intensive agricultural products such as cereals, dairy, and meat. Strong demand has halted, albeit temporarily, the decline in real agricultural prices. Forecasts by OECD – FAO (2009) suggest that the real price of land intensive agricultural goods will be slightly less in the 2015 – 2025 period, relative to current prices.

While this may sound pessimistic, in reality:

- This is a major change from the thirty years prior to 2000 when real agricultural prices fell between twenty and thirty percent; and
- Productivity gains in agriculture over the period will more than offset real price declines.

Further, if current growth rates continue then the Chinese economy will add an extra 150 - 300 million workers to the world economy by 2020 (IMF 2004). Feeding these workers underpins the demand for food in the region and while there is likely to be competitive response from other supplier regions, New Zealand is in a good position to capitalise on the growing demand.

#### 2.1.4 Summary

This is all highly significant for New Zealand. World trade growth, further integration, the rise of Asia, and the bright outlook for agricultural products mean that the long

term outlook for New Zealand's export commodities (at least in the next twenty years) is brighter than it has been for many years. The growth of Asia, and its relative importance to the world economy, it also means that distance to export markets is starting to reduce. The significance of this is shown sharply by recent gravity modelling undertaken by the NZIER (forthcoming). We know that for every 1% increase in the average distance between a country to the rest of the world, New Zealand's exports to that country decrease by 2.6% on average. However, remoteness has little impact on New Zealand's imports.

## 2.2 The shipping super cycle

The inelastic nature of demand (i.e. demand for shipping services is relatively insensitive to the price) means that like other commodity products shipping transport is are subject to cyclical price movements. Two observations can be made:

- The cycle which has just ended (perhaps in 2001-2003) lasted for some thirty years; and
- The cycle is not a series of "black box" events that lead to boom and bust but a series of interrelated periods where capacity (supply side) gradually adjusts to market forces (demand side).

To illustrate this point we have set out the interrelated periods of the last cycle (see Figure 4):

- The beginning of the cycle began with the boom between 1965 and 1973. Supply of ships was very tight with no ships laid up (very similar to the boom we have just had from 2003 -2008);
- Between 1973 and 1993 significant tonnage was laid up. While these volumes of laid up tonnage expanded and contracted, depending on the economic conditions of the time, there was always a significant volume hanging over the market. In the late 1970s and early 1980s the surplus grew very large e.g. the period between 1975-8 produced a peak of 55 million deadweight. This was followed by an even larger peak of over 100 million deadweight;
- From the mid 1980s onwards the surplus slowly reduced and it was not until 2003 that it fell back to the 1973 level.

In retrospect at least, the cycle is relatively clear, indicated by the laid up tonnage. However, for the companies involved, it was much less obvious from a day-to-day perspective. During the three decades all they saw was a series of unrelated and unpredictable markets with various levels of surplus ships, which tended to depress rates or keep returns low. In fact many ships were ordered and delivered during this period – we should not view this stages of the cycle as extremes of total feast or famine, but a mix of different market conditions.

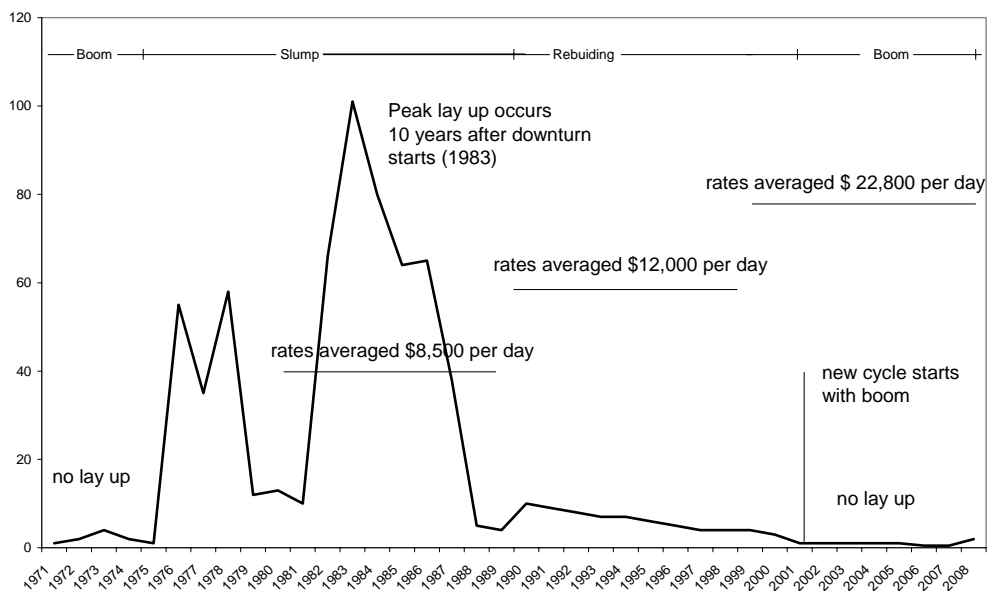
Figure 4 reinforces this point by also showing the average earnings for tankers, bulk carriers and containerships between 1980 and 2009:

- The 1980s was a difficult time for the industry, where for four years the earnings were less than \$US 5,000 per day. The average for the decade was only \$8,500 per day;
- In the 1990s earnings averaged \$US12,000 per day. At this price earnings only slightly covered the cost of borrowing;
- The 2000s saw a massive step up in earnings for ship owners with an average of \$US22,000 per day.

During this time shipping companies really only made money in the boom time (1965 to 1973 and latterly 2003 to 2008). In the second period (1973 to 1993) they lost money and in the third period (1993 to 2003) they only covered their costs.

**Figure 4: The shipping cycle**

Millions Dwt Laid up



Note: The laid tonnage volumes are break bulk and tankers while the rates are averages of containerised, break bulk and tankers (ClarkSea Index Levels).<sup>3</sup>

Source: Stopford (2009)

### 2.2.1 Summary

The lessons of the last shipping cycle are sobering. If we apply this to the current cycle, where we have just finished the boom part of the cycle, we are now entering a long period of unwinding the order books that have been built up during the boom time of the 2000s. Possibly, the growth in new merchant shipping will increase at something like 7-8 percent per annum when economic and trade growth is likely to be relatively flat as the world recovers from the economic crisis (Stopford 2009) .

<sup>3</sup> The ClarkSea Index is a weighted average of earnings from all the major vessel types.

Furthermore, the spotlight is now likely to focus on those who are financing the growth in merchant ship delivery, since the banks who have financed the order book growth are unlikely to make a return from their investment.

In the current period – perhaps lasting for the next twenty years – the competition between ship owners is likely to be fierce as shipping rates fall from the levels of 2000s. Ship owners are unlikely to turn down opportunities to pick up cargo from markets such as New Zealand particularly as trade remains stable (or grows) as the region becomes more integrated. In this respect, ship owners will continue to compete strongly for cargo moved domestically and exported irrespective of whether or not New Zealand ports invest large sums of money in dredging channels for port access.<sup>4</sup> Maintaining market share in profitable markets, particularly during downturns, is a high priority for ship operators.

### 2.3 Trends in the New Zealand Freight industry

There have been substantial changes in New Zealand's export and import scenes over the years.

The trends in export and import by value and by volume indicate the likely patterns of trade for the base case scenario. These trends may change with partner countries growing at different rates and also changes in their production and consumption trends. Given the large changes in world trade over the past ten years with the continued growth of Asian economies and the rise of China, this is more than a possibility.

In Appendix A we examine trends in total exports and imports by value and volume and compare these with the trend in GDP growth. Statistics New Zealand estimated values and volumes of exports and imports have been used in this analysis. Since our interest is on imports and exports by seaports, we have also analysed the trend of the share of seaports in total imports and exports.

### 2.4 Behaviour of industry participants<sup>5</sup>

In New Zealand the focus of stakeholders has been on ports, port ownership and the alleged power of ship operators. Below we focus on these issues and at the same time examine wider industry concerns that impact on the structure, behaviour and performance of the industry participants.

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<sup>4</sup> Of course this will not be their public stance, since they are very keen to see larger and larger ships stop in New Zealand so that they can minimise running costs (economies of scale effect). This is especially important in difficult economic times.

<sup>5</sup> This section - Behaviour of industry participants - has been adapted from another NZIER report: Port Performance and Ownership. A report prepared for the Local Government Forum 2010.

### 2.4.1 Bargaining strength of container shipping lines

Ship operators have significant bargaining strength in their dealings with many port companies and this bargaining strength has been increasing in recent years. There are several factors which contribute to this strength:

- New Zealand has a large number of container ports for the size of the country and economy. As a consequence, there is some overlap in their economic catchment areas which drives strong competition for container cargo;
- It is important to maintain market share to reap economies of scale. Most container ports have the average cost of handling a container significantly above the marginal cost. This means that the acquisition and retention of container volumes are important for the financial performances of ports. Linked to this, container ports are capital intensive and many of the capital assets have limited alternative use and value. Some assets, such as dredged channels and pier areas, are sunk in an economic sense. These assets are of limited value if the container trade should cease. Marginal cost pricing, as driven by competition, will not fully cover the capital costs of a port;
- Container shipping lines do not usually provide long-term commitments to port companies even when the port companies are required to install capital equipment to service their needs. This risk imbalance, in part, reflects the absence of long-term commitments to shipping lines from many of the shippers of cargo. So the consequence is that ports are vulnerable at almost any time to container shipping lines seeking to renegotiate charges down and/or the quality of service up by, for example, seeking preferential slots for berthing and access to equipment;
- Through mergers and differential rates of growth, container shipping lines have become very much larger and trade is becoming increasingly concentrated in the hands of fewer shipping lines. In 1995, the largest container shipping line, Sealand (Maersk), had capacity of only 188,000 TEUs.<sup>6</sup> By January 2009, the 15 largest container lines all had capacity of more than 250,000 TEUs each. Nine of these 15 container lines have scheduled services to New Zealand. Maersk is the largest with capacity of 2,000,000 TEUs, followed by MSC (Mediterranean Shipping Company) with 1,400,000 TEUs.<sup>7</sup> In the case of Maersk, much of its growth has come through mergers with other European shipping lines, like P&O. On the other hand, MSC's growth has been entirely organic and not at all due to mergers. In 2000, the top three container shipping lines had a combined market share of 22%. By 2009, this had climbed to 34%;<sup>8</sup>
- Shipping lines are effectively exempt from the provisions of Part 2 of the Commerce Act when it comes to arrangements relating to international shipping.<sup>9</sup> Thus, they are able to collude with one another and act as a cartel when setting rates and charges and can use their market power to reduce competition. Port

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<sup>6</sup> TEU = twenty foot equivalent, a method of measuring container capacity in terms of the number 20-foot containers to which the capacity is equivalent.

<sup>7</sup> <http://www.alphaliner.com/>

<sup>8</sup> Loc.cit.

<sup>9</sup> Commerce Act 1986, s. 44(2).

companies have no such exemption. They are required to compete with one another and are precluded from colluding or using their market power to countervail against large shipping companies;

- The proportion of New Zealand's trade carried in containers has increased markedly over the last 15 years or so, which has strengthened the negotiating position of the container shipping lines relative to the port companies as they now handle more of the trade. In 1995, New Zealand's total container volume amounted to approximately 650,000 TEUs and this represented only 15% of the total volume of trade by weight. By 2009, the number of containers had increased to approximately 2,350,000 TEUs and this represented 38% of trade by weight. In value terms, the share of containers would be even higher as it is mainly the low value to weight cargoes such as timber, coal and fertiliser that are not containerised;
- The size of the container ships operating in New Zealand has recently increased from around 3,000 TEUs to around 4,100 TEUs with suggestions that the next generation of ships will be in the 5,000 to 7,000 TEU range.<sup>10</sup> In 1988, the average container ship in the global fleet had a capacity of 1,303 TEUs. By 2009, this had increased to 2,654 TEUs and, on the basis of ships under construction and likely retirements, is projected to increase to 3,127 TEUs by 2012.<sup>11</sup> The larger the vessels, the fewer visits required for a given volume of cargo, the greater the pressure to provide larger infrastructure to service arriving vessels and the greater the negotiating strength of the container shipping lines.

#### 2.4.2 Negotiation strategies of shipping lines

Maersk provides a good example of how ship operators have attempted to use this bargaining power and how other players react to its moves. Maersk, the world's largest container shipping line, which in January 2008 had 16.1% of world capacity<sup>12</sup> and has a reputed 40% market share of New Zealand's container trade,<sup>13</sup> has on two recent occasions conducted what it terms port reviews in New Zealand. These are effectively tenders among New Zealand port companies to secure inclusion of their port in the scheduled services operated by Maersk.

The most highly publicised aspects of these Maersk port reviews have involved Auckland and Tauranga and the three east coast South Island ports – Lyttelton Port of Christchurch, PrimePort Timaru and Port Otago.<sup>14</sup> In the South Island in 2002/03, Maersk concentrated significant services away from Lyttelton to Otago. It also added Timaru as a port of call for another of its services and shifted exports from Fonterra's factory at Clondeboye in South Canterbury to PrimePort Timaru from Lyttelton. In

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<sup>10</sup> Auckland Regional Holdings, op. cit., p.10.

<sup>11</sup> <http://www.alphaliner.com/>

<sup>12</sup> Loc.cit.

<sup>13</sup> [http://www.nzherald.co.nz/business/news/article.cfm?c\\_id=3&objectid=10398270](http://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=10398270)

<sup>14</sup> [http://findarticles.com/p/news-articles/timaru-herald/mi\\_8192/is\\_20060823/ports-await-maersk-review-outcome/ai\\_n51693769/](http://findarticles.com/p/news-articles/timaru-herald/mi_8192/is_20060823/ports-await-maersk-review-outcome/ai_n51693769/) and [http://www.nzherald.co.nz/business/news/article.cfm?c\\_id=3&objectid=10398270](http://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=10398270)

2008, Maersk reduced its services to PrimePort Timaru<sup>15</sup> and in 2009 Fonterra decided to return to exporting Clandeboye's output through Lyttelton Port of Christchurch.<sup>16</sup> In late 2006, following another review, Maersk decided to shift the focus of its northern North Island port of call from Tauranga to Auckland.

Some other shipping lines have also changed the ports at which they call. In some instances this has been in response to the opportunities presented by Maersk shifting its scheduled services following its reviews. Two container shipping lines that seem to specialise in building their business in this way are MSC and CMA CGM Group, both of which have been growing faster than Maersk on a global basis and gaining market share.<sup>17</sup>

When Maersk shifted port calls in the South Island as a result of its 2002 port review, MSC, the world's second largest line, very quickly responded to fill the vacuum. Indeed, although MSC is a family owned and controlled businesses and, as a result, is able to make decisions quickly, the response from MSC on this occasion was so quick the only plausible explanation is that the management of Lyttelton had already arranged with MSC that it would "replace" Maersk should the latter depart. When Maersk shifted the focus of its northern port calls from Tauranga to Auckland in 2006, Hamburg Sud very quickly announced it would reschedule its services from Auckland to Tauranga to fill the gap. Subsequently, CMA CGM, the world's third largest container shipping line and another family owned and controlled business, followed suit and reorganised its schedules to make Tauranga rather than Auckland its main port of call.<sup>18</sup>

### 2.4.3 Bargaining strength of port companies

The port companies have their own bargaining strength for many trades, including for some container services. The choice for shippers is either to use the local port or to bear the costs of moving the goods to or from another more distant port. Their decision depends on the costs of local transportation by road, rail or coastal shipping compared with the costs of an international container ship visiting a number of ports in New Zealand, dropping off and collecting cargo from each.

The country comprises two main islands, each with a difficult topography for efficient road and rail transport. Coastal shipping is not well developed, perhaps suffering from a lack of scale, although companies like Pacifica do compete head-to-head with international ship operators.

There has long been discussion that trade in container and other cargoes will become more concentrated in a few key ports in New Zealand – that hubbing will

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<sup>15</sup> <http://www.stuff.co.nz/timaru-herald/news/546115>

<sup>16</sup> [www.stuff.co.nz/timaru-herald/news/2769722/Jobs-to-go-at-Timaru-port-after-Fonterra-export-call](http://www.stuff.co.nz/timaru-herald/news/2769722/Jobs-to-go-at-Timaru-port-after-Fonterra-export-call)

<sup>17</sup> <http://www.alphaliner.com/>

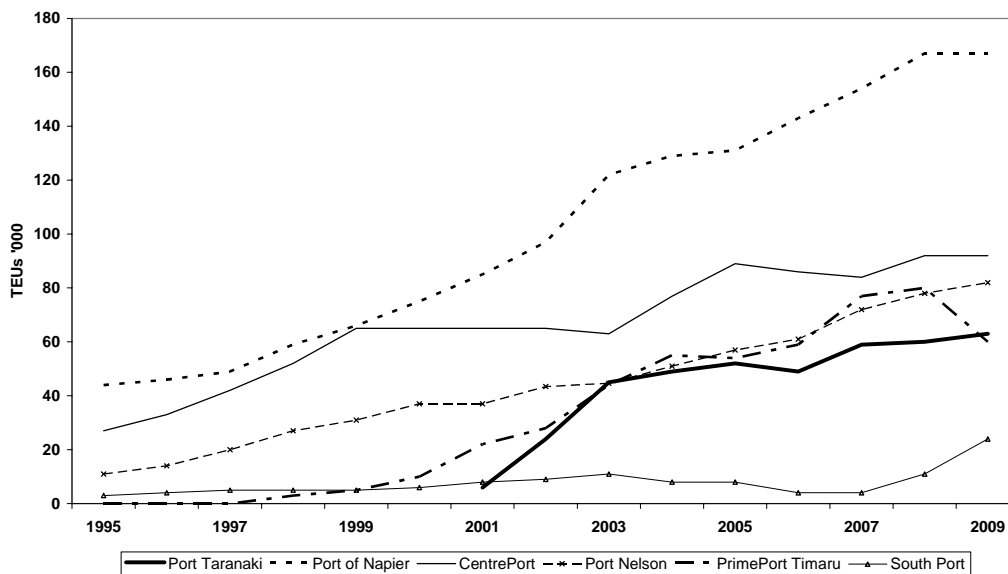
<sup>18</sup> [www.nzherald.co.nz/ports-of-auckland-imited/news/article.cfm?o\\_id=158&objectid=10491326](http://www.nzherald.co.nz/ports-of-auckland-imited/news/article.cfm?o_id=158&objectid=10491326)

develop. The reality is that the reverse has actually occurred for the container trade and volumes in total.

The Herfindal-Hirschman Index (HHI) is a standard measure of market concentration used by economists.<sup>19</sup> In 1995, the HHI for the New Zealand container trade was 39.1%. By 2009, the HHI had nearly halved to 21.2% (see Figure 5). The lower the score, the less concentrated the market and a score of 21.2% suggests a wide dispersion of activities among different participants. Over the same period, the HHI for non-container cargoes increased marginally from 13.6% to 15.9%., but remained a low level of market concentration.

**Figure 5: Container volumes at minor ports 1995 to 2009**

TEUs, thousands



Source: Calculated by NZIER from annual reports.

#### 2.4.4 Impact on port companies

When a container shipping line relocates its port calls, it takes some cargo with it, at least for a period. Usually, the cargo that shifts is that of the key export clients of the shipping line, such as Fonterra or meat exporters. The exports of these clients often underwrite the viability of the service for the line that moves, so they usually have or make arrangements to retain these cargoes, prior to any port agreement.

The loss of cargo may only have a small impact on the port, particularly if it is a bigger port. When the port that loses a service is a significant one for the container trade, like Ports of Auckland, Port of Tauranga, Lyttelton Port Company and Port Otago, there are usually alternative container shipping lines willing and able to move in to provide services when another company decides to relocate.

<sup>19</sup> The HHI is the sum of the squares of market shares expressed as a fraction. Using the squares gives extra weight to entities with a large share.



It is also possible that the port company itself is financially better off than it would have been had it met the requirements of the departing container shipping line on price and service delivery. However, local businesses using and servicing the port and the port company's employees are worse off financially through the reduction in throughput of the port and diversion of cargo elsewhere.

Those ports that increase cargo throughput through changes in shipping schedules may be worse off financially if the price concessions and the cost of facilities and services commitments it has made to secure the trade mean it will not earn an adequate return to fully cover its economic costs, including its costs of capital on these services. Of course, the local business community and employees of the port company will financially benefit from any diversion of trade towards the port.

Changes in shipping schedules or port use by major exporters can have much more dramatic impacts on smaller ports and leave them with little or no return on significant investments they had previously undertaken to secure the trade. The loss of Fonterra's trade and some scheduled services in 2009 has had a major negative impact on PrimePort Timaru.<sup>20</sup> Port Taranaki was also very significantly impacted by the loss of Fonterra's trade in 2009.<sup>21</sup> The impact on the forecast revenue of Taranaki Regional Council has been estimated at a 45% reduction, of \$1.5 million, in 2010/11 alone and could be higher in future years.

#### 2.4.5 Reactions of local politicians

These behavioural strategies are not widely understood. Local politicians can be mistaken about the potential significance for the financial performance of the larger container ports of the decisions of an individual shipping line to shift port calls. For example, in August 2006, the then Mayor of Christchurch City is reported to have said about Maersk's port review "... if Maersk stopped using Lyttelton and other smaller ports they could have to shut".<sup>22</sup> Similar views have been expressed by the Chair of the Auckland Regional Council, in comments over Maersk favouring Auckland ahead of Tauranga. It is as though local politicians translate the current share of a port company's container business in the hands of the shipping line threatening to leave directly into the financial impact on the port's profit should they do so. As not all trade will shift with a line and alternative lines are likely to fill a void at a major port, such an assumption significantly overplays the potential impact on a port. It may in fact be that a port is financially better off losing some services than it would be if it made the concessions necessary to retain the trade.

It is not necessary for local body politicians to share the extreme views of the Mayor of Christchurch to be very concerned if a reduction in trade is likely at a port their council controls. As we have already noted, any diversion of cargo from one port to another will adversely impact on the local business community and the local

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<sup>20</sup> [www.stuff.co.nz/timaru-herald/news/2769722/Jobs-to-go-at-Timaru-port-after-Fonterra-export-call](http://www.stuff.co.nz/timaru-herald/news/2769722/Jobs-to-go-at-Timaru-port-after-Fonterra-export-call)

<sup>21</sup> [www.stuff.co.nz/taranaki-dail-news/news/3547079/Ports-wobbles-to-cost-ratepayers](http://www.stuff.co.nz/taranaki-dail-news/news/3547079/Ports-wobbles-to-cost-ratepayers)

<sup>22</sup> [www.nzherald.co.nz/business/news/article.cfm?c\\_id=3&objectid=10398270](http://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=10398270)

employees of the port company losing trade and positively impact on the business community and port employees of the locality gaining trade. This is irrespective of how the transfer affects the financial performance of the two port companies involved.

Local body politicians are elected by local residents and ratepayers, and a port company usually has only one vote and is unlikely to exercise even that. There is an incentive for councillors to want the port company their council controls to retain all existing trades and to gain new trades, even if the terms it has to offer to shipping lines to do so means the port company will not achieve a full return on any of its capital investments. The legislative objective of port companies to “operate as a successful business” can be in direct conflict with the incentives on the councillors who effectively and ultimately control the port companies. Councillors need to respond to the interests of the electorate, and for significant components of the electorate the retention and gaining of trade is far more important, because of its impact on them, than the success of the port company as a business.

Through holding companies, Christchurch City Council and the Auckland Regional Council own majority or full control of Lyttelton and Auckland ports, respectively. Views such as those expressed by civic leaders place very high pressure on directors and managers to be successful in retaining port calls and shipping services. It would be no surprise if, in attempting to retain or gain services, port companies offer discounts to prices and add services of such a magnitude that the retention of the service is financially the poorer option for the shareholders than losing the port calls.

#### 2.4.6 Port efficiency

Significant improvements in the efficiencies of port operations occurred in the 10 years or so after port companies were established e.g. ship turnaround times dropped, loading rates rose, truck waiting times fell and labour productivity increased. Provisions of the Employment Contracts Act 1991 (ECA) helped this process along with more efficient use of plant and equipment and a greater focus on commercial performance.

However, improvement in efficiency of port operations has slowed according to some critics and may have even reversed in some ports. The focus of criticism has been the Employment Relations Act 2000 and its amendments. The new legislation encourages union membership and makes it more difficult to change conditions, especially for entities with local government shareholders who have non-commercial objectives. What is the relevant evidence? It includes:

- The Australian Productivity Commission produced a report in 2002 that benchmarked various trans Tasman ports.<sup>23</sup> It found that Tauranga rated reasonably highly in terms of container lifts per hour compared with Australian and other overseas ports, however, Auckland was below average on this measure. In

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<sup>23</sup> Productivity Commission, *International Benchmarking of Container Stevedoring*, 2003.

relation to other measures of productivity, the picture for New Zealand's key container ports is mixed. Tauranga had exceptionally high labour productivity, but Lyttelton had the worst of all the ports on which data is reported. Moreover, the three New Zealand ports covered had low straddle carrier productivity but moderate container crane productivity.

- The World Economic Forum's Global Competitiveness Index (GCI)<sup>24</sup> is compiled annually. One of the index components relates to the adequacy and efficiency of infrastructure and one of the elements of this component is the quality of port infrastructure. In 2005, New Zealand was ranked 18<sup>th</sup> but by 2008 had slipped to 22<sup>nd</sup> in terms of this criterion. Of course, port infrastructure is not the same thing as port efficiency, but it seems very likely that when responding to this question in the survey, executives would be strongly influenced by not just the physical assets that are available, but also the quality and efficiency of the services their organisations receive from local ports;
- In 2007 and 2010 the World Bank undertook major surveys of people engaged in the logistics industry to compile a Logistics Performance Index (LPI) of countries, including New Zealand.<sup>25</sup> New Zealand's rank dropped two places on the LPI, from 19<sup>th</sup> to 21<sup>st</sup>, between 2007 and 2010. Most of the more affluent OECD countries, plus Singapore, ranked above New Zealand in both surveys. Between the two surveys, Australia's ranking declined one place from 17<sup>th</sup> to 18<sup>th</sup>;

These points may surprise some commentators who believe port reform brought significant improvements in the performance of New Zealand ports. But the focus does not contradict that reform brought improvement. Other countries also undertook port reforms in the 1980s and 1990s and in many cases made more radical changes to port ownership and governance. It is the relative improvement in performance of New Zealand ports that we are questioning, not their absolute performance. The evidence is also consistent with some deterioration in the relative performance of New Zealand ports in recent years, including compared with Australian ports.

#### 2.4.7 Summary

Our review of the available evidence indicates that we need to consider a wide range of factors when examining the overall efficiency of the ship transport sector:

- Ship operators do have significant market power, however the business is fiercely competitive and the removal of business from one port to another opens opportunities for other ship operators, although small ports are in a weaker position;
- Local politicians can adversely affect port operations by limiting the ability of the ports to negotiate with ship operators, thus possibly severely affecting the performance of ports;<sup>26</sup> and

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<sup>24</sup> <http://www.weforum.org/en/initiatives/gcp/Global%20Competitiveness%20Report/index.htm>

<sup>25</sup> World Bank, *Connecting to Compete*, 2007 and 2010, [http://siteresources.worldbank.org/INTTLF/Resources/LPI2010\\_for\\_web.pdf](http://siteresources.worldbank.org/INTTLF/Resources/LPI2010_for_web.pdf)

<sup>26</sup> We have not intended in this report to examine port profitability or lack it. However, we note with some concern that port companies are revaluing their assets on a yearly basis instead of using

- Most New Zealand ports have scope to improve the quality of their services and efficiency and there is some evidence that their relative performance has declined in recent years.

If you combine the behavioural aspects of the interplay between ports and ship operators, the steady flow of freight shipped to and from New Zealand, and the stage of the cycle we are now in, we are likely to see even fiercer competition for cargo in the period after the boom. The number of ships that have been laid up will mean that ship operators have a wide range of ships to choose from to service any particular market and while they would prefer to use the largest ship possible, they will not leave cargo on the wharf for their competitors to pick up. They will tailor the ship size to port specifications.

### 3. Framework

An organising framework was set up to capture the essence of the sea freight market interactions in the New Zealand economy within which various qualitative and quantitative tools (described below) have been applied to address the salient sea freight issues. This framework is a model that allows us to capture and illustrate the advantageous and disadvantageous outcomes from each scenario and gain insights into sea freight industry behaviour.

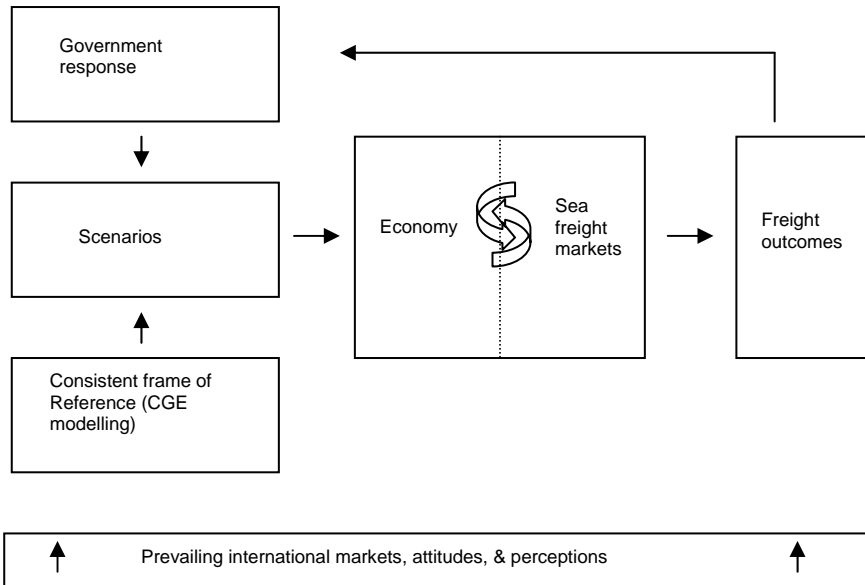
Figure 6 shows the framework used. It concentrates on the:

- The constraints/opportunities (international behaviour – in terms of rules, perceptions, and attitudes) in each scenario. Most of these factors are beyond the control of New Zealand policy makers e.g. economic growth in Asia and the shipping cycle;
- Interaction between the freight markets and the economy. How New Zealand reacts to the international trends and cycles of the world economy;
- The outcomes in terms of GDP and other economic impacts; and
- Possible policy responses.

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historical cost of capital equipment in their annual report. Since return on capital is a major driver of profitability this behaviour may have a major negative impact on reported profits.

**Figure 6: Stylised framework**



Source: NZIER

The following sections look at the development of the scenarios, the modelling of the impacts and looking at the possible policy impacts and responses.

## 4. Shaping the scenarios

We used a mixture of qualitative and quantitative techniques to draw out sea freight transport policy implications from the scenarios. These techniques are not ends in themselves but standard tools used to cast light on particular issues.

### 4.1 Qualitative analysis - creating the scenarios

Under the Ministry's direction, four scenarios were developed; a base case and three variations to illustrate the possible situations that shippers, ship operators, coastal shipping and ports might face over the next 30 years (see Table 2). The base case takes into account the behaviour described in the first section of the report while each scenario contemplates other possible futures – whether we think they are likely or not.

These scenarios were deliberately designed to examine a range of possible futures that New Zealand might face. Each scenario charted out a chosen future, as distinct from projecting past trends (incorporated into the base case). The approach is designed to provide, possibly provocative thinking that helps take people away from their comfort zone; a comfort zone that can constrain understanding of the future behaviours by focusing on the same patterns we see today or preferred views of the world.

While we realise that these scenarios do not cover the full range of possible future scenarios the aim is develop a methodology which can be easily applied to other scenarios if required. The scenario characteristics we want to flesh out include:

- The status quo: hubbing as now, similar size ships, similar frequency, similar number of ports and other characteristics that reflect current conditions (Scenario 1: the status quo). Specifically this means:
  - Ship operators are strongly focused on market share although they will weigh up returns from New Zealand services relative to demand elsewhere in the world. They will also take advantage of regional and local body politics to gain concessions out of ports;
  - Shippers try to ensure their product receives the best service at the lowest rates possible. Also important is certainty of transit times and space availability;
  - Ports experience more tension over market share, some making decisions for non-economic reasons i.e. relying on the council as a fall-back if investment plans do not fulfil expectations – along the lines of “we will build it and they will come”. Also efficiency ebbs and flows depending on labour laws;
  - Coastal shipping attempts to carve out markets but faces fierce competition from international shipping and land transport (except between the islands).<sup>27</sup>
- Hubbing in Australia with impact on size of ships, frequency of service, ability to access markets in a timely fashion, number of ports and other relevant characteristics (Scenario 2: Hubbing in Australia). Specifically this assumes:
  - That containerised goods exported and imported travel via Australia;
  - General cargo is as in the status quo;
  - Smaller ships are likely used in the trans Tasman trade.
- Two ports in New Zealand to accommodate larger and larger vessels (Scenario 3: Two big ports). Specifically:
  - All ship operators move to bigger ships at once;
  - The focus is on shipping economies of scale with much larger ships calling at only two ports – one in the North Island and one in the South Island.

Decreasing number of shippers have representation (Scenario 4: Reduced number of shippers). Specifically this assumes:

- that no other ship operators see the opportunity in increase market share by entering the trade;
- No regulatory change – particularly, competition law remains the same.

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<sup>27</sup> We are also assuming that the regulatory environment remains broadly the same (specifically no incentives to shift modes of transport).

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**Table 2: Scenarios**

Scenario	Description
(1) Base case	Uses current relationships between volumes and GDP, the stage of the cycle, and behavioural relationships (as described in section 1)
(2) Hubbing in Australia	All ship operators move containers to New Zealand through Australia (exports and imports)
(3) Two ports (for containers)	New Zealand has two ports (one in the North Island and one in the South Island) where very large ships call at only
(4) Fewer Ship Operator Representatives	The number of ship operators calling at New Zealand ports drops

Source: NZIER

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We have also overlaid these 4 scenarios detailed above with 2 further variations (to give 8 options)<sup>28</sup>:

- Export tonnage grows 25% faster than GDP growth (variation 1); and
- Export tonnage shrinks (by 50%) as GDP grows (variation 2).

In each scenario we will consider structure, behaviour, and performance. This includes:

- Describing the conditions; includes looking at the structure of the industry and the background conditions against which each scenario is played out: number of shippers, scale, types of service etc.
- Describing the dynamics of each scenario and their likely outcomes. How will shippers price their product, types of competitive behaviour, business attitudes and strategic behaviour.
- Understanding and explaining the key performance parameters: impact on efficiency, type of service variety, indications of profitability (if possible).

## 4.2 Quantitative scenarios - fleshing out the scenarios

We have used a set of assumptions in each scenario (Table 3). Inevitably, this was speculative and based on beliefs about the future and the ways in which each of the stakeholders will respond. This required identifying underlying influences and assumptions, and then for each scenario assembling or 'colouring-in' a picture of New Zealand in its global context. This was useful in developing a picture of

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<sup>28</sup> To illustrate this point, if we assume that GDP growth roughly approximates growth in trade volumes (see Figure 14) then between period 0 and 1 in the base case (where we assume 2% per annum GDP growth) volumes might move from an index number of 1000 to 1020. Where we expect a 25% faster growth (variation 1) then volumes will grow from 1000 to 1025 between period 0 and 1. If we assume that growth shrinks by 50% (variation 2) as GDP grows at 2% per annum then growth in volumes will increase from 1000 to 1010.

domestic economic activity under each scenario and identifying interactions between various sectors. This process also pointed to possible policy responses.

We have looked only at containerised cargo. For the analysis, we assume that transportation of bulk cargo would not be affected by these developments. While this may over simplify what happens in practice, it has been done to draw out the differences between the various scenarios.

The development of scenarios allows us to discuss how the choices now impact on the future. Our objective is to allow those dealing with transport policy to understand what each scenario means and how they may be able to react to improve efficiency of the sector.

**Table 3: Key modelling assumptions**

	Base case: use historical ratio between GDP growth and export volumes	(1) Increased tonnage relative to GDP growths (+25%)	(2) Decreased tonnage relative to GDP growth (-50%)
(1) Base case		Based on NZIER Quarterly Predictions long term forecasts	
(2) Hubbing in Australia	5% increase in sea freight costs for containerised trade (exports and imports) because of increased costs associated with trans shipments, delays, and other port costs.	5% increase in freight costs for of NZ trade (exports and imports).  Increases in freight costs with volume increases	5% increase in freight costs for of NZ trade (exports and imports).  Decreases in freight costs with volume decreases
(3) Two ports (for containers)	Exports and imports experience a positive productivity shock from the increase in scale at ports (5%) and a negative productivity shock for shippers because of reduced opportunities (less frequent service) and increased market power of ports (10%).	Exports and imports experience a positive productivity shock from the increase in scale of ports (5%) and a negative productivity for shippers shock because of reduced opportunities (less frequent service) and increased market power of ports (10%).  Conservatively an extra \$1 billion in infrastructure required at ports and also the land transport connections	Exports and imports experience a positive productivity shock from the increase in scale of ports (5%) and a negative productivity shock for shippers because of reduced opportunities (less frequent service) and increased market power of ports (10%).  \$1 billion infrastructure costs
(4) Fewer Ship Operator Representatives	Increased freight rates across the board (5%) because of an increase in market power for ship operators	Increased freight rates (5%)	Increased freight rates (5%)

Notes: (1) Assume 2% per annum growth over 30 years. (2) Assume unchanging policy environment.

Source: NZIER

### 4.3 Quantitative analysis - CGE modelling

The qualitative information around each scenario has been translated into a set of assumptions that could be modelled in a Computable General Equilibrium (CGE)



model. A CGE model uses input-output tables and a range of datasets to estimate how an economy might react to changes in policy, technology or other external factors. In this case the model was used to estimate how the New Zealand economy would look under each scenario given a 2% per annum GDP growth.

The CGE model provided a consistent framework to mimic the workings of the New Zealand economy. It is a mathematical tool that relates economic and social values together in a logical manner. This model can help us see how changes can ripple through the economy by changing key parameters such as GDP effects of different scenarios.

Using a CGE model helped us to ensure that all scenarios were consistent across all sectors and that the assumptions made reflected the economic conditions in each scenario. The model incorporates a wide range of flows and markets in the economy, capturing for example the interdependency between industries and households, capital and labour, and balance of trade and the exchange rate.

The CGE modelling is useful in informing economy-wide policy analysis as it can identify flows between sectors and impacts across industries, occupations and regions from a variety of different modelling assumptions. One of the strengths of this approach is that not only does it interpret some of the more obvious impacts of each scenario but also some of the less obvious impacts – affects that might not have been described in other sorts of approaches.

As with the qualitative aspects of this work, the information from the CGE is also speculative because it is based on the assumptions put together by the project team. Nevertheless, this study is squarely focused on helping reveal future transport outcomes and how they are affected by each scenario.

## 5. Interactions between freight markets and the economy

The interaction between the sea freight markets and supply and demand factors are crucial to understanding behaviour in the industry in the four scenarios. In Appendix B we flesh out those interactions.

We have compared the advantages and disadvantages of three possible options relative to the status quo situation. These are summarised in Table 4. In general, the main impacts are felt by ship operators, shippers, ports and coastal shipping. In each case we have set out the structure under each scenario, likely behavioural responses, and performance mainly in terms of efficiency. These assumptions are used to inform the modelling.

**Table 4 Comparison of scenarios relative to the status quo**

Scenario	Characteristics	Advantages	Disadvantages
Australian Hub	Trans-Tasman trade	Possible increase in trade due to development of new trade  Dynamic efficiency gains	Uncertainty on trans-Tasman shipping costs
	Trade beyond Australia	Likely cheaper shipping costs beyond Australia due to fierce competition	Likely to discourage new trade development  Overall costs may increase due to higher trans-Tasman shipping costs  Extra warehousing for some shippers such as Fonterra, leading to bottlenecks
	Coastal shipping	Increased competition may result in lower costs to shippers  Some coastal shipping companies may expand services to trans-Tasman	Coastal shipping may face more competition due to increase in trans-Tasman shipping
Two ports	Shipping costs	Increase ship size provides economies of scale and hence lower unit costs  Larger shippers would be able get benefit of large ships	Lower frequency of service – small shippers are likely to suffer more  Increase costs of domestic transportation of cargo
	Ports	Two container ports will develop to accommodate large ships	Other ports suffer from lower ship visits  The two ports will have lower competition and hence may increase the port charges
	Coastal shipping	Increased market for coastal shipping  Dynamic efficiency gain	No apparent disadvantage to coastal shipping operators  Likely increase in costs to shippers
Fewer ship operators for international shipping	Shipping costs	Scope for better use of advanced technology	Lower competition is likely to result in higher shipping costs  Shippers and ports being price takers will suffer – shippers facing higher costs and ports experiencing lower profits
	Coastal shipping	Likely increase in market size	No apparent disadvantage to coastal shipping operators

Source: NZIER

If all international ship operators moved to hubbing New Zealand bound containers at the same time we would expect some disruption in the supply chain for New Zealand shippers. The objective of ship operators would be to improve the efficiency of their

own fleet operations.<sup>29</sup> However, this would be unhelpful for New Zealand shippers because:

- Of the potential delay costs with export goods going beyond Australia;
- It sets up potential bottlenecks for major exporters in the Australian hubbing port; and
- It may limit the ability of smaller exporters to develop new export markets.

The “two (big) port” scenario could occur if ports either through tacit agreement or through some other arrangement moved to two large ports only receiving/sending containers from overseas and the government then ensured that the land (road and rail) infrastructure was put in place. This scenario would improve port efficiency, however, the monopoly power of the two ports would restrict competition and reduce the quality of service.

The fewer ship operators scenario would occur if ship operators decided either as a group or individually to partially withdraw from the New Zealand market. This scenario would be of major concern for New Zealand shippers since prices are likely to increase because of a lack of competition and service quality would also be reduced.

## 6. Modelling results

Our aim is to provide some quantitative numbers to possible future freight scenarios. We do not attempt to model specifics (e.g. construction or redevelopment of ports and associated costs) but focus on the interaction of freight reforms with the rest of the economy.

To do this we use NZIER’s static Computational General Equilibrium (CGE) model of the New Zealand economy. CGE modelling is a highly-respected and well-developed technique that has a rich history for assessing policy, regional and industry questions. Our model was developed in close collaboration with Monash University, a global leader in building and applying CGE models.

We employ a static CGE model with a long-term focus. The benefit of a CGE model is that it considers both the first round effects of the project – changes to freight costs and productivity – as well as the impact that this first round effect has on other prices, and demand and production, in the rest of the New Zealand economy.

The levers in the model we use to ‘shock’ (i.e. make changes) the model include:

- Changes to freight prices
- Industry productivity in using freight
- Freight industry productivity

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<sup>29</sup> This ignores the demand issues such as the intense competition for containers, the stage of shipping cycle, and whether or not hubbing is economic.

- Import and export prices or quantities.<sup>30</sup>

For more information on the CGE modelling approach and more detailed results see Appendix B .

## 6.1 Base case

The base case is modelled on the NZ Institute of Economic Research's *Quarterly Predictions* forecasts until 2031. It is from these forecasts that the base case has been developed (particularly the average GDP growth rate assumption of 2%). These results are characterised as differences from the base case.

Apart from the issues specified in each scenario, “environmental” trends and shocks i.e. the impact of the shipping cycle, oil prices, climate change, behaviour of Australian ports etc. are the same in each scenario and therefore do not have an impact on the modelling.

## 6.2 Hubbing in Australia

The modelling assumptions are set out in section B.1.5, Table 3, and Table 8. The most important assumption which drives model results in this scenario is the 5% increase in average cost of freight. Non-Australian containerised trade accounts for approximately 32% of total trade. This suggests an overall increase in total shipping cost by 1.6%, if there is a 5% increase in the average cost of this traffic. We apply a 1.6% freight price rise as a shock to the system, instead of separate applications for only the affected traffic, because the model cannot differentiate destinations and containerisation.

We find that the impacts on freight have negative results for wider New Zealand. Costlier freight will make New Zealand fundamentally poorer. Freight is a service that facilitates trade; increases to freight costs reduce returns for producers and/or increase prices for consumers.<sup>31</sup> The 5% increase in freight rates has a negative impact on GDP of 0.021%, relative to the base case. This is about \$38 million for the period.

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<sup>30</sup> We do not use the import and export prices lever to proxy for freight price changes within the model. The impact of a change in freight costs on export or import commodity prices is dependent on a number of factors, particularly the proportion of freight required to facilitate the trade. This will be commodity-specific (e.g. logging and timber has relatively high freight costs, whereas export services do not). The model database captures this explicitly, thus shocks to freight prices will have disparate impacts across industries – this is endogenously calculated by the model. Shocking import or export prices would exclude this key relationship.

<sup>31</sup> Given that New Zealand on most products is a price taker the burden is likely to fall on producers.

Trade volumes may increase or decrease over time.<sup>32</sup> Testing the sensitivity of the results to different levels of international trade, we find that increased levels of trade lead to bigger losses; conversely, at reduced levels of international trade, the impact of costlier freight is smaller. We have highlighted two scenarios:

- Trade volumes increase by 25%; and
- Trade volumes decrease by 50%.

The results are set out in Table 5. Given that hubbing is expected to have a negative impact of 0.021%, the large increase and decrease have only slight difference in the impact. A 50% reduction in trade volumes would reduce the GDP by about 0.016% and an increase of 25% would reduce the impact to about 0.025%<sup>33</sup>.

If we compare the changes with respect to trade volume, the impact on GDP is small but the variation with respect to the initial estimate is not so small in percentage terms.<sup>34</sup>

**Table 5: Hubbing in Australia GDP results**

	Forecast volume	-50% lower volumes relative to GDP	25% less relative to GDP
GDP % (\$ million)	- 0.021 (-38.0)	- 0.016 (-30.5)	- 0.025 (-45.0)

All results are relative to the base case

Source: NZIER

The CGE model results are based on the assumed increase in containerised shipping costs. What these results indicate is that if there is an increase in shipping costs, there will be some negative effect on GDP. If hubbing results in a reduction in overall shipping costs, then there would be a positive impact. The size of the impact would depend on the size of the reduction in shipping costs. The analysis shows that if containerised shipping costs increase by 5% then the level of GDP would be lower by 0.021% compared to what would happen if there was no such increase.

More detailed results are set out in Appendix B

<sup>32</sup> We tried a number of different freight levels. These included -50%, -25%, +25% and +50% but chose to put forward the -50% and +25% variations to clearly demonstrate the impact reduced/increased sea freight volumes.

<sup>33</sup> This difference is with respect to the base situation. If the base situation had 50% lower trade, then the reduction in GDP would be lower by only 0.016%. It should only be compared with 0.021% under the normal circumstances. Similarly, if trade volume was higher, the reduction would also be higher.

<sup>34</sup> For example, a reduction of 0.016% is about 24% lower than the reduction of 0.021%. Similarly, 0.025% reduction is about 19% higher than the 0.021% reduction.

## 6.3 Two ports

The modelling assumptions are set out in section B.2 and Table 3. The key modelling assumption is the reduction of trade from fewer ships and less frequent ships coming to New Zealand relative to the base case. We have assumed this to be a dynamic efficiency loss of the two-ports rationalisation which will lead to:

- A 5% increase in port productivity. The 5% productivity gain is relatively small because the two big ports have monopoly power which reduces their efficiency (over and above a situation where they are faced with competitors). They are also likely to use that power to improve their profitability (mainly from shippers); and
- A 10% decrease in the productivity of those industries using sea freight to transport their product reflecting the missed opportunities with less frequent services and higher port charges. We scale the 10% to reflect the export proportion of total output for each industry.

A secondary assumption is the spending of \$1 billion on infrastructure to be able to cope with peak volumes when these larger ships load and unload cargo. This spending includes port infrastructure and inland connections in both islands. While this spending does not impact on GDP it may take resources away from other spending in the economy.

If government is funding the project then they have two options:

- Taking funding away from other parts of the economy (social spending, other infrastructure spending, or even paying back debt); or
- Borrowing the money overseas. This could be reflected in even higher port charges or road/rail user charges for those using the port or a higher debt burden which will be funded by the taxpayer.

If the private sector funds the infrastructure development similar impacts could be felt. It could take investment away from other projects within New Zealand (that may or may not be more important) or it could borrow money to fund specific infrastructure projects. It would have to recoup that funding through tolling and other charges.

We find that the impacts on freight have negative results for wider New Zealand because reduced productivity of shippers outweighs the increased productivity of larger ports. The negative GDP impact is roughly GDP of 0.023%, relative to the base case. This is about \$43 million for the period.

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**Table 6: Two ports GDP results**

	Forecast volume	-50% lower volumes relative to GDP	25% less relative to GDP
GDP % (\$ million)	-0.023 (-43.0)	-0.011 (-20.4)	-0.025 (-45.9)

All results are relative to the base case

Source: NZIER

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## 6.4 Fewer ship operators

The modelling assumptions are set out in section B.3 and Table 3. The key modelling assumption involves fewer ship operators plying New Zealand waters. As a result of this lessening of competition we assume this leads to an increase in freight prices of approximately 5%. This price effect is applied to all shipping not just the containerised trade since the reduction in ship operators has a much bigger impact (relative to the base case and other scenarios).

Unsurprisingly, the impact of fewer competitors has the biggest negative impact of all scenarios because of its wide range impact on competition. The negative GDP impact is roughly GDP of 0.064%, relative to the base case. This is about \$120 million for the period.

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**Table 7: Fewer ship operators**

	Forecast volume	-50% lower volumes relative to GDP	25% less relative to GDP
GDP % (\$ million)	- 0.064 (-120.0)	-0.051 (-95.4)	-0.077 (-143.5)

All results are relative to the base case

Source: NZIER

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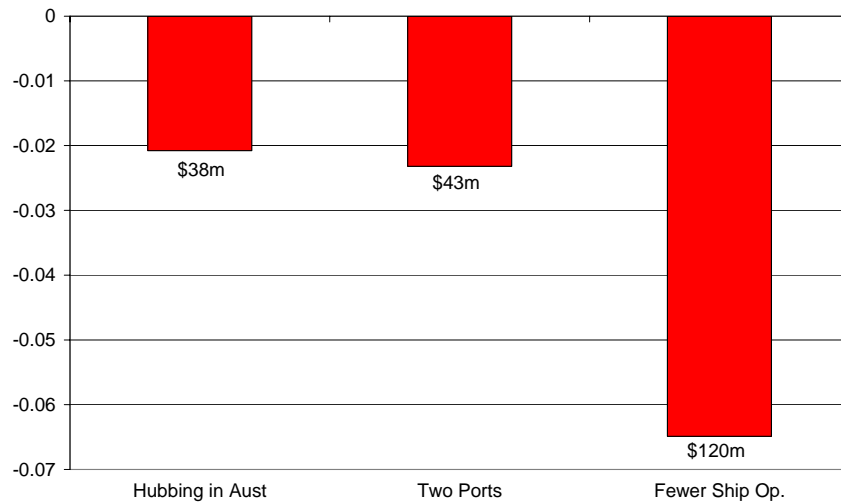
This is roughly three times the impact of other scenarios and highlights the importance of ship operator competition in the New Zealand context.

## 6.5 Comparison between scenarios

The comparison of the results is set out in Figure 7 and Figure 8. We find that the impacts on freight have negative results for wider New Zealand. Costlier freight will make New Zealand fundamentally poorer. Freight is a margin service that facilitates trade; increases to freight costs reduce returns for producers and/or increase prices for consumers.

**Figure 7: Summary of results**

% GDP



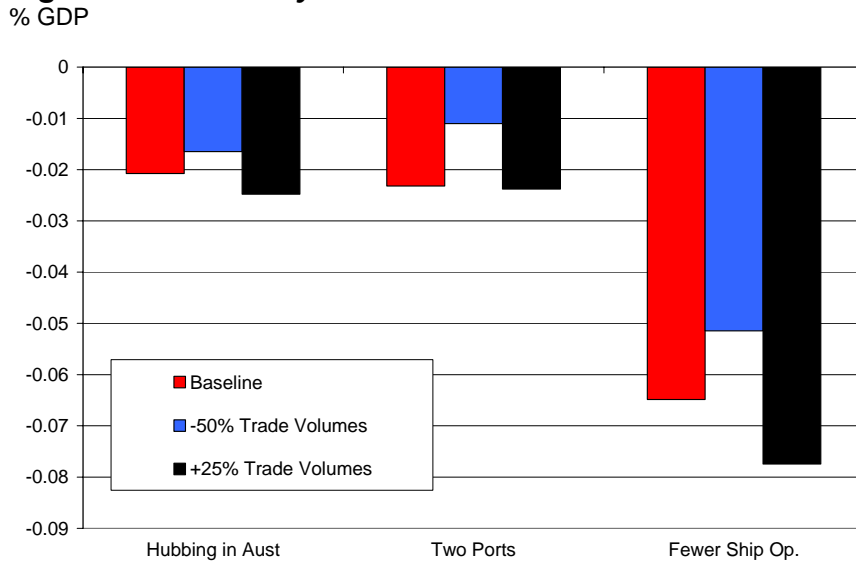
Source: NZIER

Testing the sensitivity of the results to different levels of international trade, we find that increased levels of trade lead to bigger losses; conversely, at reduced levels of international trade, the impact of costlier freight is smaller.

For Hubbing in Australia and Fewer Shipping Operators, the impact of trade volumes on the results are reasonably proportional; however the Two Ports scenario has two opposing forces that vary in relation to trade volumes: benefits from port productivity are increased with increased trade volumes, however costs of domestic freighting to the ports rises slightly faster.



**Figure 8: Sensitivity of results**



Source: NZIER

## 7. General policy implications

The real issue faced by policymakers is to understand how they can act to make sea freight of New Zealand exports and imports as efficient as possible and ensure that the market players are acting in a way that supports a competitive market. This is important since any move away from a competitive market – as the scenarios show – is likely to act as a drag on the New Zealand economy and reduce GDP.

What do the scenarios tell us about policy responses?

### 7.1 Base case

Under the base case, the spotlight is firmly fixed on the lack of understanding by owners of major ports in New Zealand of strategic behaviour by ship operators. Most port owners are firmly focused on the supply side of the argument with little understanding of the demand side and how it interacts with the supply side. In major New Zealand ports operational behaviour manifests itself in an approach that defends market share at all costs. Ship operators are all too well aware of this and have used these fears to good effect in negotiating new schedules with ports (see section 2.4).

For smaller ports however, losing ship operators does have a major impact on their activities and this is part of the risk they take for owning a port. Port ownership in this instance is risky and they are liable to lose out every now and again as other ports compete away their trade.

The long term solution for bigger ports is involve more commercial operations. While there are many ways this could be done, it does not mean that local government

should divest itself of the port and its facilities, however, it does mean that local politicians should have less say in the running of ports. For example, a possible option is to adopt the Australian model in relation to local government involvement in port company ownership and operations. This would be to require port companies to become landlord ports and allow competition between stevedores for both the break bulk and containerised trades.

For smaller ports the options are narrower. While government should not pick “winning” or “losing” ports they should at least be able to assist ports that want to exit the business to be able to do so i.e. reduce exit costs associated with RMA and perhaps even assist in redundancies. However, once shut, guarantees should be sought to ensure that the ports should stay shut.

## 7.2 Hubbing in Australia

The hubbing in Australia scenario plays on fears of increased competition from Australian ports. It suggests that if we do not follow the Australian example and dredge ports so that bigger and bigger ships can dock, New Zealand is likely to become a backwater only serviced by Australian and New Zealand based ship operators. This is unlikely to happen because of both supply and demand side impacts. On the supply side the cost of trans shipping in Australia, possible delays, and other shipping costs are likely to add cost to containerised trade relative to the base case.

Also on the demand side, Asia is increasingly a major export destination and import source of New Zealand’s exports and imports. Not only is trade growing with Asia, Asian hubbing ports are much larger and more cost competitive than Australian ports. If existing ship operators divert New Zealand containerised trade via Australia it will create opportunities for other ship operators who are likely to capture a major chunk of the containerised trade by directly servicing the New Zealand market.

Despite this, we do need to understand the relative efficiency between Australian and New Zealand ports and how it moves over time. As suggested in section 2.4.6 the relative efficiency of New Zealand ports could well be slipping relative to Australian ports. To date, this has been attributed to the Employment Relations Act 2000 and its amendments but there could also be other factors driving this process.

## 7.3 Two ports

The development of two large ports is the solution to a supply side issue in isolation from demand side factors. The argument suggests that we need to have two big ports so that they can deal on an equal footing with shipping operators and at the same time increase the scale operation so that they can capture scale benefits.

We need port rationalisation because the scale of ships coming to New Zealand is growing. This is indeed true and particularly in the boom phase of the shipping cycle. However, in the slump phase of the cycle, where new shipping tonnage is coming on

to the market at a much greater rate than the growth of world trade, this argument is unlikely to stand up, since there will be a huge range of ships that ship operators can call in to service for the New Zealand trade. Another feature of this phase of the cycle is that ship operators are likely to fiercely protect their market share. If the sea freight demand is increasing between Asian and New Zealand then ship operators will carry it irrespective of whether New Zealand ports are able to accommodate bigger ships or not.

Another argument that can be mounted is that we need bigger ports so that they can deal effectively with ship operators. The strategy ship operators adopt when faced with a port monopoly is to form a united front (their own monopoly) and extract concessions that way. In fact, the likely losers are shippers who are faced with monopoly port operations. We do expect some advantages from scale but we also expect higher port charges and a reduced service arrangement as the port monopolies maximise profits.

The policy problem is not to increase the returns to investors in ports by creating two large ports but to ensure that sea freight arrives at markets (imports and exports) as efficiently as possible. Therefore, advocating a two ports strategy is a misdiagnosis of the policy problem since it is likely to benefit the ports at the expense of shippers.

## 7.4 Fewer ship operators

This scenario shows the importance of competition for the efficient movement of sea freight around New Zealand and to and from its markets.

Lessening of competition between ship operators could potentially be a significant drag on efficiency in the sea freight sector. However, in the short to medium term this is unlikely to occur since demand for services between New Zealand and its markets is likely to grow steadily. Ship operators view this type of trade as important and are willing to defend market share. Hence the large number of ship operators represented in the New Zealand market.

The policy issue is to ensure that shippers and those who own the ports understand the dynamics of ship operating. If port reviews or other mechanisms are used by ship operators to improve their returns then ports should be allowed to deal with these strategic players purely on a commercial basis and without interference from local politicians i.e. by encouraging new ship operator entrants. In this respect, the policy implications are similar to the base case.

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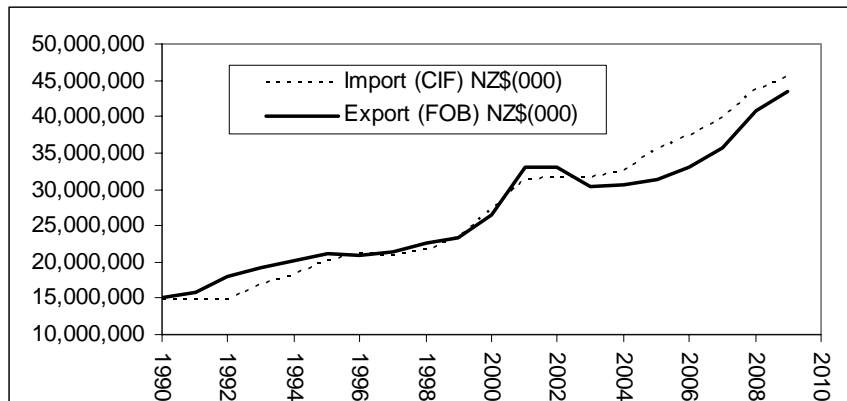
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## Appendix A : Trends in export and import values

Both imports and exports are growing over time (Figure 9). The value of all imports in 2009 was \$45.316 billion and the value of exports was \$43.520 billion. Total import value has been greater than total export values since 2003.

**Figure 9: Export and import values**



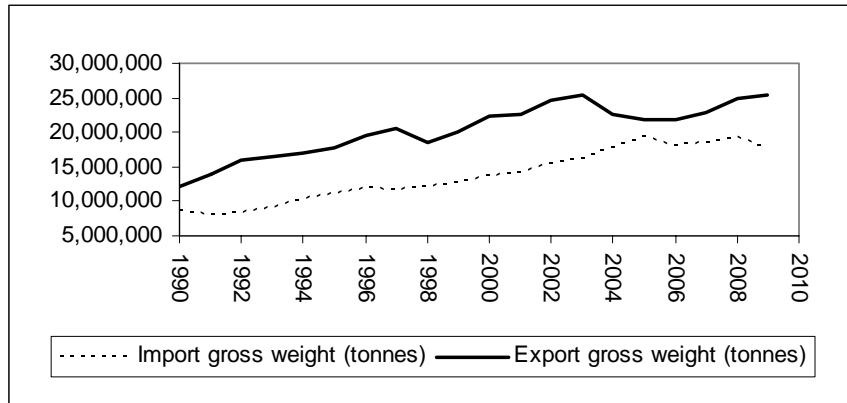
Source: Statistics New Zealand, NZIER

The gap in the two trends has narrowed in recent years.

### A.1 Trends in export and import volumes

The total volume of goods imported and exported show a different picture. The gross volume of all imports was 17.438 million tonnes in 2009 and that of all exports was 25.415 million tonnes. The total gross volume of exports has always been greater than imports during the last 20 years (Figure 10). The difference between import and export volumes was the lowest in 2005 and is steadily increasing since then.

**Figure 10: Export and import volumes**



Source: Statistics New Zealand, NZIER

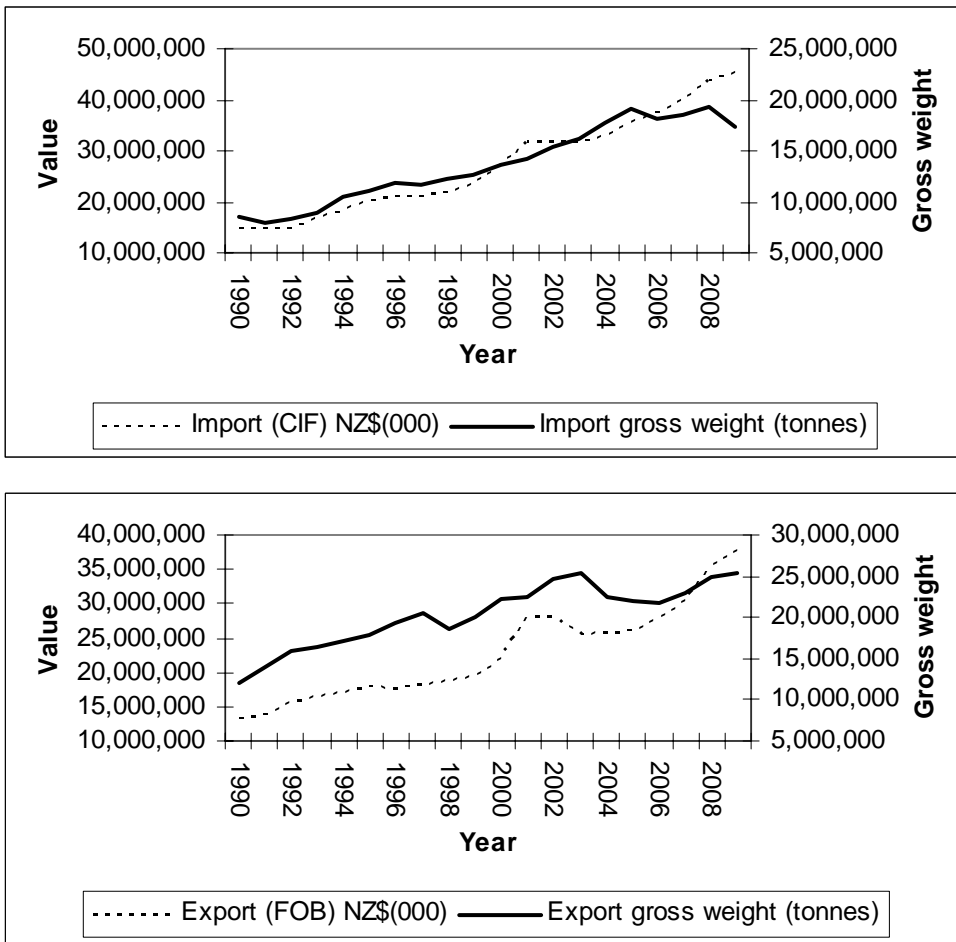
Even though in value terms total imports is greater than total exports in recent years, the opposite is observed in terms of volume. This suggests that relatively more high value items are being imported in comparison with exports.

## A.2 Comparison of value and volume

If we compare the trends in value and volume together for both imports and exports we find another interesting picture. Both imports and exports have been growing steadily in recent years in value terms. However, gross volume shows different trends. Import volume was lower in 2006 and then it increased to 2008 but reduced again in 2009.

Export volumes declined after 2003 and started increasing since 2006 (Figure 11).

**Figure 11: Total imports and exports**

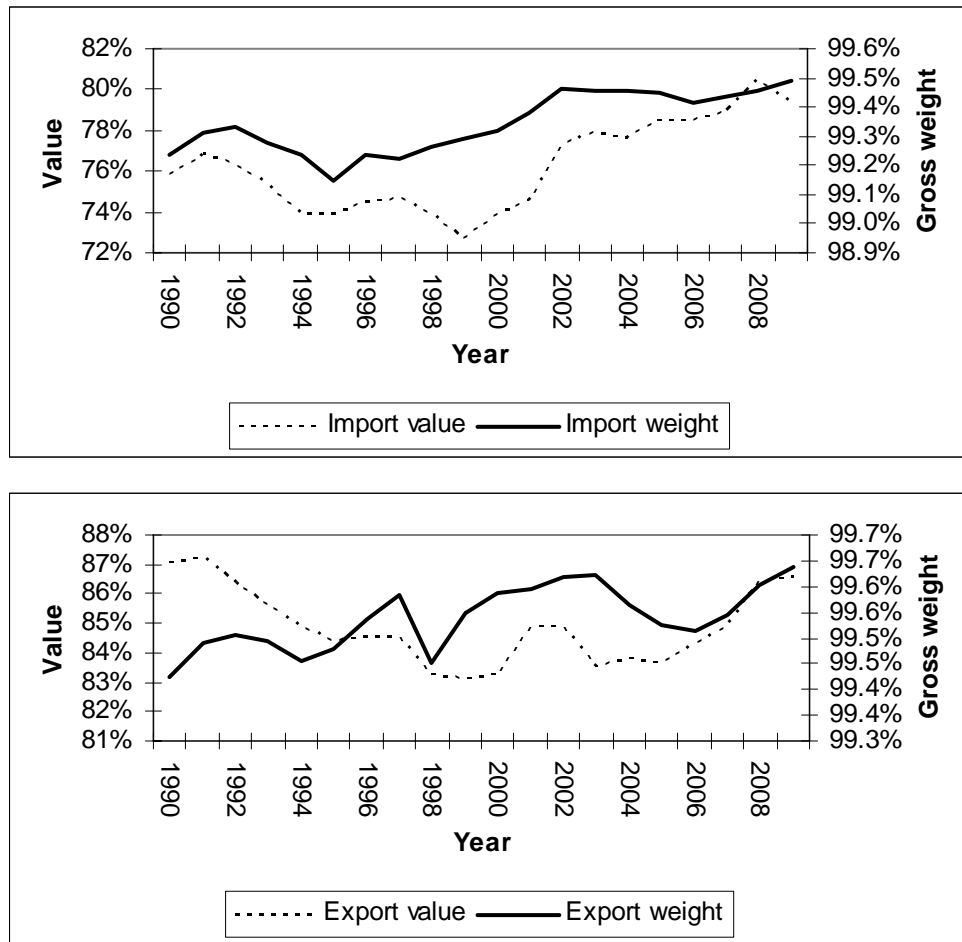


Source: Statistics New Zealand, NZIER

### A.3 Share of seaports

As expected most exports and imports are through seaports both in value terms and in volumes. Seaports account for over 99% of cargo in quantity imported or exported. Their share in value of cargo imported has varied between 73% and 80%, whereas for exports the share has varied between 83% and 87% during the last twenty years (Figure 12).

**Figure 12: Share of seaports**



Source: Statistics New Zealand, NZIER

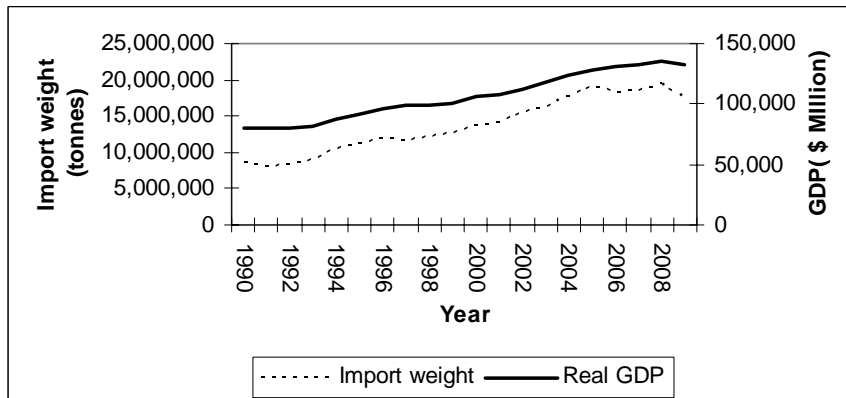
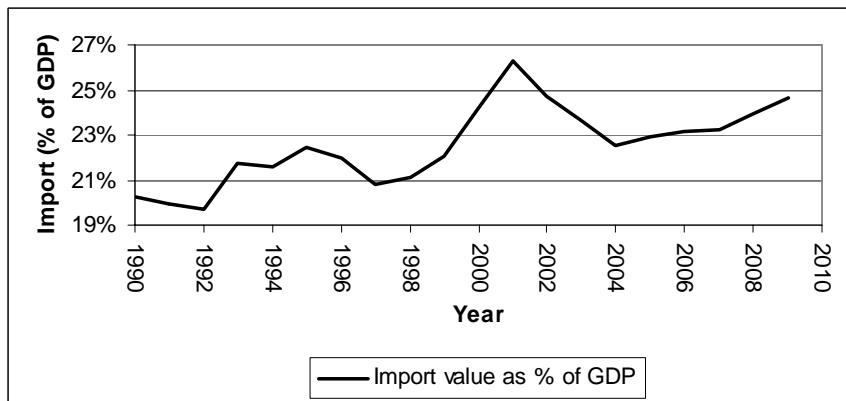
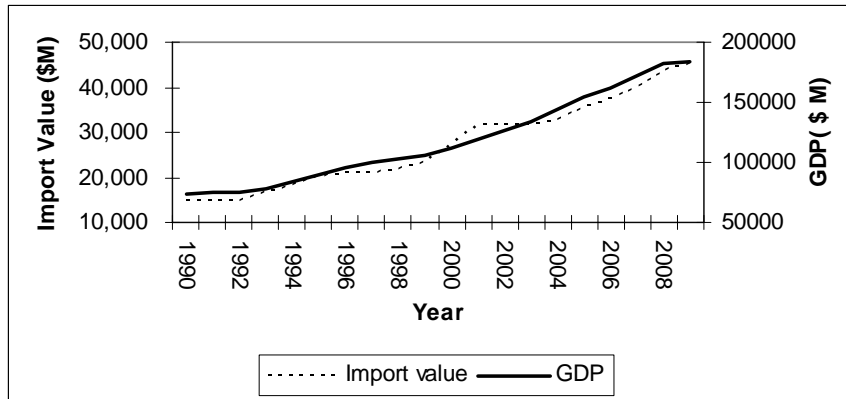
## A.4 Imports and GDP

A comparison of imports and GDP shows that imports have grown with GDP (Figure 13). However, as a percent of GDP, import has varied over the years, between 20% and 26%. In percentage terms, import was the highest in 2001 and then it declined until 2004, when it started rising again.

The gross volume of imports increased steadily up to 2005. It has slightly fluctuated and the trend has changed since then. Even though GDP at constant prices continued to increase up to 2008, gross volume of imports was lower in 2006 and 2007 than the level in 2005.



**Figure 13: Imports and GDP**



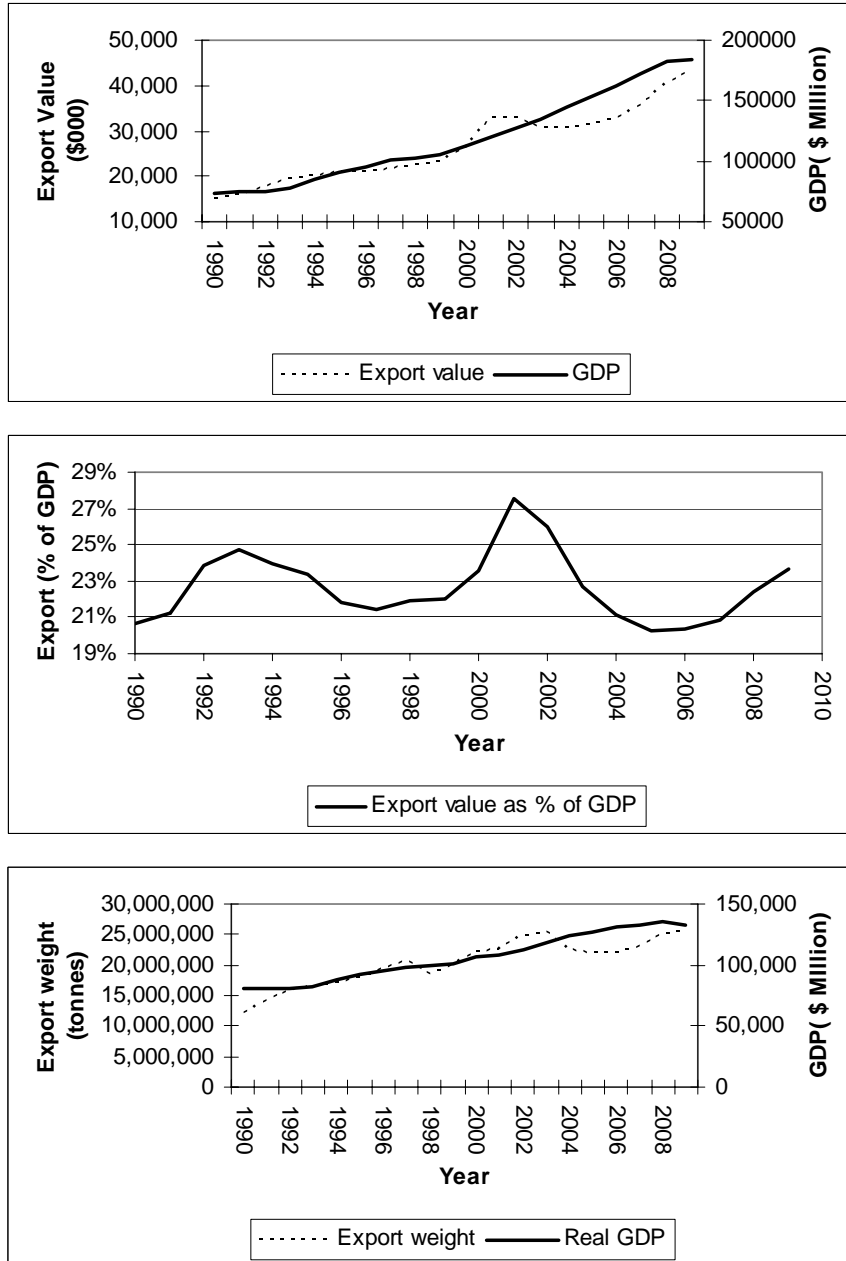
Source: Statistics New Zealand, NZIER

## A.5 Exports and GDP

The increasing trend of exports stopped in 2003 and it started rising again from 2006. However, as a percentage of GDP, exports have fluctuated similar to imports, between 20% and 28% over these years (Figure 14). The volume of exports has

recently changed the trend. It started declining from 2004 and had a slightly increasing trend since 2007.

**Figure 14: Exports and GDP**



Source: Statistics New Zealand, NZIER

## A.6 Seaport trends

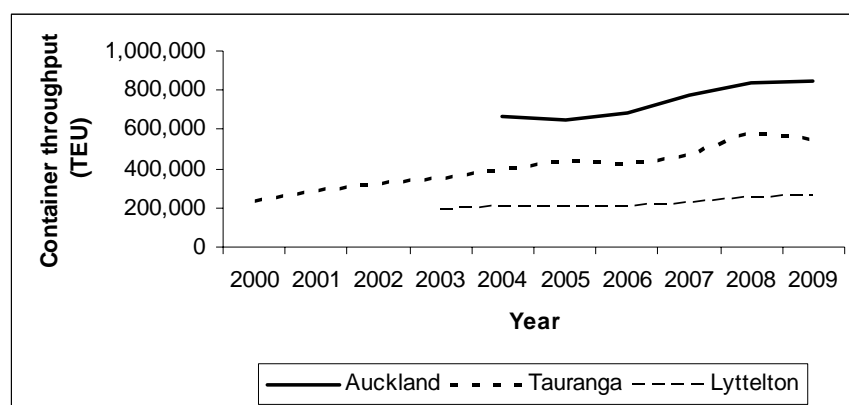
Most imports and exports are through Auckland, Tauranga, Lyttelton, New Plymouth and Whangarei. These five seaports accounted for 77% of sea cargo by value and 73% by volume in 2009. Their shares in 1990 were 68% and 69% respectively.

While Auckland and Tauranga are the two major seaports for both exports and imports, Auckland cargo is more valuable per tonne than Tauranga cargo – for both imports and exports. In 2009, Auckland had 48% of total value of import by sea and 21% by volume, whereas these two percentages for Tauranga were 14% and 20% respectively. For exports the figures were 23% and 11% for Auckland whereas these were 21% and 26% for Tauranga. Lyttelton and Whangarei also handle relatively low value cargo.

### A.6.1 Container movement

There are 16 ports in New Zealand. Eleven of them (Auckland, Tauranga, Northport, Napier, Taranaki, Wellington, Nelson, Lyttelton, Timaru, Otago and Southport) have at least some container trade. The container volume handled by Northport and Southport are negligible (ARH 2009). We could find only some limited data on growth in container movement through seaports. Information available on this has been mainly from Tauranga, Auckland and Lyttelton. In all cases there has been an increasing trend (Figure 15).

**Figure 15: Container throughput (TEU)**



Source: Statistics New Zealand, NZIER

Container throughput in Tauranga is growing by about 10% in recent years, whereas in the other two seaports the rate of growth has been between 5% and 6%. Thus container throughput has been relatively high in Tauranga.

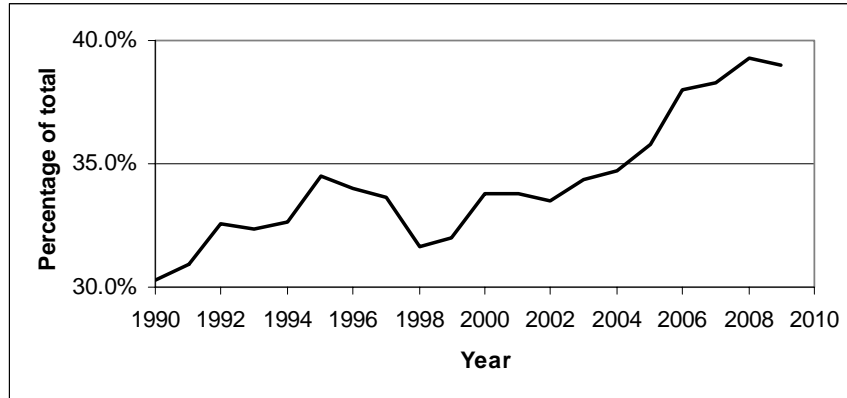
### A.6.2 Trade to and from Asia

New Zealand's trade with Asia has increased in recent years and there is scope for further improvement with countries having low trade at present but have growing trends.

The percentage of total exports to and imports from Asia has grown (in value) from about 30% in 1990 to about 39% in 2009 (Figure 16). The share has been growing at about 2% rate per year since 2003. This is mainly from imports. Exports have been fairly steady in recent years (Figure 17). While the share of imports from Asia has

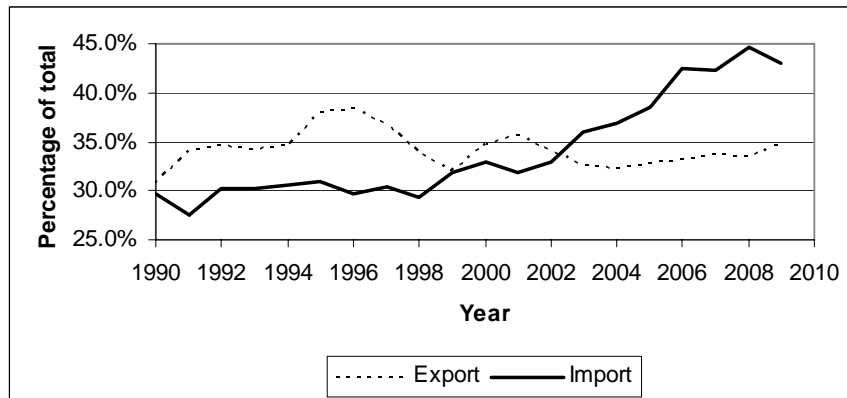
been growing at about 4% since 2002; the share of exports has started growing only since 2005 (at about 1.5% rate)

**Figure 16: Asia's share of New Zealand's international trade**



Source: Statistics New Zealand, NZIER

**Figure 17: Asia's share of New Zealand's exports and imports**

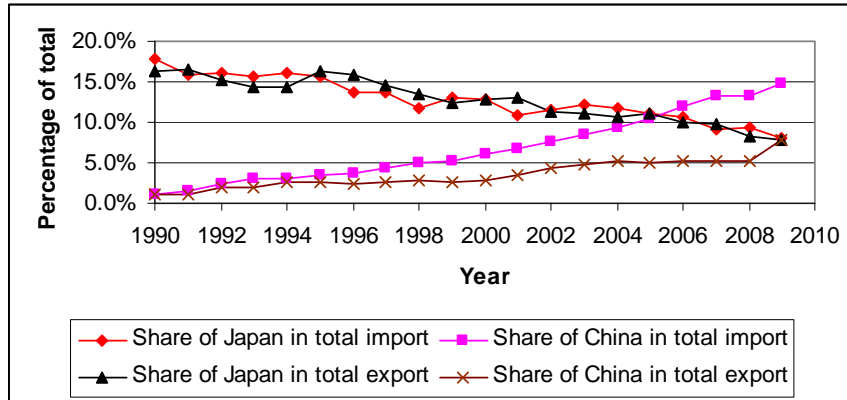


Source: Statistics New Zealand, NZIER

As can be seen from Figure 17, the gap between Asia's shares of New Zealand's exports and imports has increased substantially in recent years.

Both imports from and exports to China have been growing over time, in values and also as percentage of total imports and total exports. Japan's share on the other hand has been gradually declining (Figure 18).

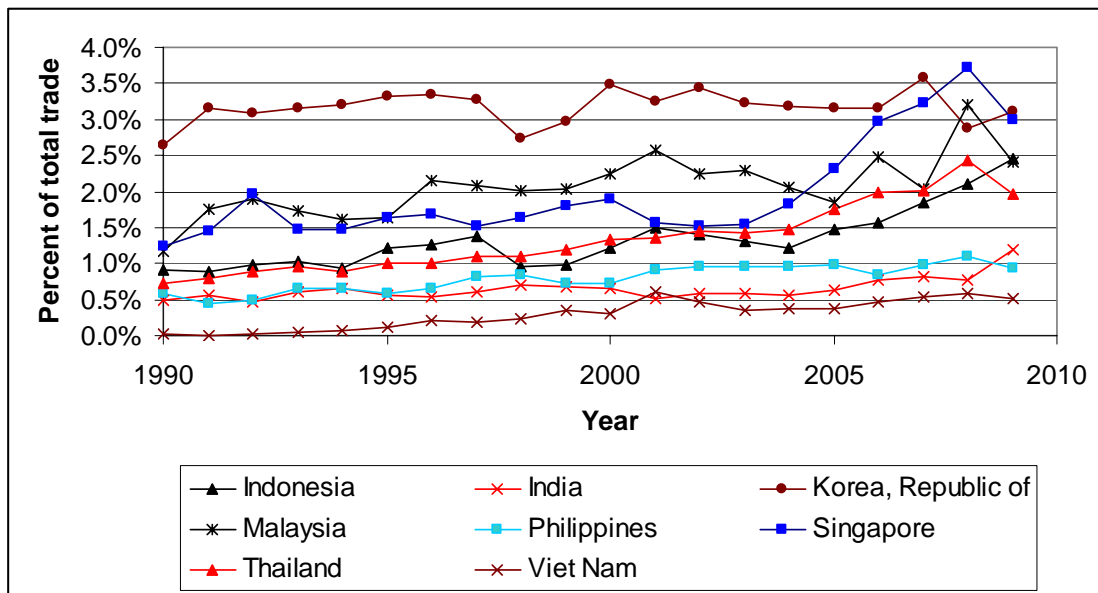
**Figure 18: Share of exports and imports (China and Japan)**



Source: Statistics New Zealand, NZIER

While the current share in New Zealand's total trade is relatively low in some countries, there is an increasing trend and that should be taken into account for developing future scenarios.

**Figure 19: Share of exports and imports (a few other countries)**



Source: Statistics New Zealand, NZIER

Trends in a few other countries (Indonesia, India, Korea, Malaysia, Philippines, Singapore, Thailand and Vietnam) are shown in Figure 19. While Korea has the highest share of total trade amongst these countries, it has been more or less static over this period. Trade with Singapore has increased from 1.5% in 2003 to 3.7% in 2008. Strong increasing trend in recent years is also noticed for Thailand, Indonesia and India.

## Appendix B : Sea freight market interactions

In this section we examine each scenario in turn to flesh out the interactions between participants and their likely economic behaviour. This includes examining the assumptions behind each scenario which drive the modelling.

In general, the main impacts are felt by international ship operators, shippers, ports and coastal shipping. In each case we have set out the structure, behaviour and performance issues that these participants grapple with.

### B.1 The status quo

#### B.1.1 International Ship operators

The ship operators are those who transport the cargo to and from and around New Zealand. While typically they are large multinationals who have built formidable shipping networks their ownership structures vary widely. Some are family businesses, others are stand alone businesses, while others are closely connected with governments.

#### Structure

The high capital costs and pre-commitment (in the form of a contractual obligation) to most voyage costs, irrespective of load, dominate the economics of ship operating. This means that economies of scale are very important to ship operators – the larger the ship they can use the lower the unit cost.

Furthermore, ship operators are driven by simple economics to maximise load factors. Structurally, that means having a shipping capacity larger than the present (working) coverage to deal with inevitable fluctuations and changes in the market. However, the size of the ship bought to New Zealand depends on a number of different factors other than ship size.

Competition occurs when contractual obligations are up for renewal. Deliberately, this happens relatively frequently to increase ship operators' flexibility, therefore there is fierce competition at the margin for loads. Over the long run this slowly shifts/drives market share.

Entry to business (new competitors) occurs when average revenue is above average total costs. Mergers occur when average revenue falls below marginal variable costs. This is complicated by overseas governments subsidising ship building and ship operating. In the new phase of the shipping cycle (see Figure 4), the threat of entry, possibly from low cost competitors, will become an important factor since there are likely to be more ships laid up relative to the previous boom phase of the cycle.

Also, at this stage of the cycle, the ability to minimise costs by engaging in joint behaviour with other players is likely to become even more common. This includes consolidating loads, tacit agreements on pricing, vessel sharing agreements

(quantity), ship operators cooperating in “discussion agreements” to negotiate with ports, and service levels (i.e. frequency of visits).

Large numbers of ship operators are represented in New Zealand even if they do not ship here.<sup>35</sup> New Zealand represents roughly 0.2% of world trade yet those who move roughly 50% of the world’s containers are represented in New Zealand. Ship operators are always looking for opportunities to diversify trade, therefore if an opportunity in New Zealand arises they will seriously consider it.

## Behaviour

As already explained in section 2.2 the short run stable demand conditions (i.e. inelasticity or unresponsiveness of the demand curve to price movements) mean that ship operating exhibits the typical commodity cycle characteristics: the highs and lows in a shipping super cycle. We have just finished the “boom” part of the cycle where ship operators have made “super normal profits”. We are now entering the down side of the cycle which is likely to be with us for at least two thirds of the forecast period. In this period the emphasis will be on unwinding the debt built up with ordering new ships, coping with a continual overhang of excess capacity, minimising costs, and competing fiercely for cargo. Some of the other behaviours will include:

- On the demand side, maintaining their grip on market share by competing on quality of service (key is frequency). To defend market share operators have to provide a reliable service (so ports are visited on a regular basis – fixed day schedules). Despite the relatively high cost to ship operators, profits can be made with multiple port visits because of the high cost of domestic transport. Some vessels call at up to seven ports in one voyage.
- On the supply side, continually re-examine cost structures and repeated attempts to put pressure on ports and their owners to extract preferential service (if possible also play ports off against each other). If this strategy is successful then they will also attempt to squeeze shippers by increasing freight rates.

## Performance

Like any business, ship operators have the goal of profit maximisation, however for ship operators this means maximising over the long term (e.g. over the shipping cycle, with volume ebb and growth, plus investment lags). Returns move with the cycle. So once demand drives returns up, they stay high until new vessels (or more tonnage) can be built/leased to provide competition. In the rest of the cycle operators are trying to, minimise losses, price up as close as possible to average cost, maintain market share in order to guarantee reasonable loads, and be as flexible as possible to take advantage of new sources of demand and maximise returns from opportunistic behaviour.

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<sup>35</sup> Note that ships don’t disappear when ship operators merge, there is little impact on volumes but the new merged entity possibly acquires ships at a relatively lower costs therefore their breakeven operating costs are lower.

Investments or disinvestments will be driven by ship choice (ship numbers and scale). The type of ship used by any particular ship operator will represent a careful balance of the advantages of size (impact on cost) with quality (service frequency), given that total volumes offering on any route are likely to be relatively steady (inelastic demand for ship operator services).

Ship operators will also take into consideration:

- The level of product variety required. To maintain market share in New Zealand requires a high level of product variety (frequent service and servicing many ports);
- The role of technology - both steady incremental technology improvements and occasional bursts of real innovation - are important drivers of productivity gains;
- Offshore pressures also have a bearing on performance (mergers and acquisitions), and overseas governments subsidising ship building and ship operating. These pressure are likely to be intense in the part of the shipping cycle we are now in, since ship operators are likely to have to cope with mounting debt, large volumes of laid up ships and the threat of low cost competitors (utilising a portion of the laid up shipping tonnage).

Smaller ship operators rely on doing it better than the big players – squeezing every last (cost) cent out of the marketing chain and matching service frequency, price, and quality of service – working smarter.

### B.1.2 Shippers

Moving product to market is a vital part of an exporting process. This is particularly so for those involved in the commodity trades which are characterised by large bulky items that need to be moved relatively cheaply to market.

#### Structure

The logistical problems of moving product is a continual issue for big exporters, ensuring that:

- They have the right number of container boxes; and
- Bottlenecks don't develop; and
- Delivering product to meet demand in competitive markets.

For some, the markets they service are determined by relative transport costs (e.g. logs), therefore there is a strong focus on minimising these costs. Even commodity products with relatively low transport costs fall into this category since New Zealand commodity producers are price takers on international markets. If world prices are set then whether they can service a market depends on the transport costs of their competitor relative to their own transport costs.



Smaller shippers have much less bargaining power than bigger players and rely on the competitive rates and frequency of service. Transport costs are a major barrier to exporting.

## Behaviour

Larger shippers have market power (based on need for ship operators to keep up load factors) and will keep pushing for better terms and conditions, and better service and returns from ports and ship operators e.g. Fonterra has a large facility half way between the Auckland and Tauranga ports. In this way they can seek to extract the best deal possible out of both ports.

For big shippers avoiding transport bottlenecks is an important priority. Major shippers will make government aware of their infrastructure needs and put pressure on to increase spending on infrastructure. This in turn puts pressure on government revenue raising activities and how it orders its spending priorities.

Smaller shippers have less market power and are less demanding – they tend to be more like price takers.

## Performance

The main performance goal for both big and small shippers is to minimise transport costs. Not only are they wanting to reduce the absolute value of transport costs but also they are also aiming to minimise transport costs relative to their competition.

Other important objectives include maintaining the quality of service (reliable service and relatively high frequency) and also to avoid bottlenecks.

### B.1.3 Ports

New Zealand has a large number of seaports for its population size – 14 commercial seaport operations (8 in the North Island and 6 in the South Island).

## Structure

The number of ports and high set up costs means that we do not expect any new port entrants over the forecast period.<sup>36</sup> We also expect no ports to exit the business because of support from regional government (also high exit costs – redundancies, RMA etc.).

While the current ownership structure remains, ports remain fully or partly in local government ownership. Government may change other aspects of the general regulatory environment that have an impact on port efficiency (e.g. labour laws).

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<sup>36</sup> Note that we have only one relatively new entrant into the port business – North Port. While there is speculation that Clifford Bay will be established, it makes no overall difference to the scenarios we are considering.

Scale matters, since port operations are highly capital intensive and have high sunk costs, so managers seek to maintain market share and look for opportunities to increase throughput.

Port differentiation does occur but is largely fixed with the location of each port. The notable exceptions are Auckland, Tauranga, and Port Chalmers who have developed inland ports or are engaged in vertical integration operations. Further attempts at differentiation will only be at the margin.

## Behaviour

Port strategic behaviour will be shaped by:

- Battles over market share which have the potential to have a detrimental impact on returns;
- Continued bursts of spending on capital equipment to outdo other ports;
- Fierce competition, particularly at the margin for new cargo. Competition for new customers will be intense and maintaining the customers a port already has will be a priority;
- Strategic behaviour continues – the aim is to deny competitors cargo;
- Parochial interests have a strong bearing on economic behaviour of ports – possibly acting in their own interests rather than considering national concerns.

## Performance

Performance under the base case consists of:

- Good dynamic efficiency (i.e. innovation at the margin but less gains from productive efficiency (scale). Dynamic efficiency gains are driven by the intense competition, however the intense competition coupled with the number of ports limits the ability of ports to take advantage of scale;
- Idle capacity remains, although ports are relatively efficient;
- Profitability that is variable given ports' place in the marketing chain. Their continual search for throughput makes them vulnerable to squeezes from both sides (shippers and ship operators);
- Local and regional government also make life more difficult for the major ports because of their lack of understanding of the business (see section 2.4).

### B.1.4 Coastal shipping

#### Structure

The coastal shipping industry is the classic small industry with small numbers of vessels moving cargo in direct competition to the international carriers and also moving cargo that international carriers can not or are unprepared to carry. Structural characteristics include:

- Lower barriers to entry (relative to international ship operators) through leasing and some product differentiation occurs in only some segments of the business;
- Players survive by doing things better than the big players (under current regulations – which we assume will continue). This involves focusing on the costs of the business; and
- Limited scope for vertical integration and diversification depending on the individual characteristics of their customers.

## Behaviour

On the surface, it is somewhat surprising that smaller competitors can survive in head to head competition with international ship operators, since it is well known that international ship operators do have a cost advantage. The types of behaviours exhibited by coastal ship operators include:

- Surviving and profiting by doing it more efficiently. This means a focus on all aspects of the marketing chain and squeezing out each dollar of efficiency e.g. utilising low cost port facilities, providing a high quality service, and ensuring systems allow for maximum flexibility; and
- Providing stiff competition for land transport operators, who price above shipping rates. The high cost of inland transport is an important factor in coastal shipping success.

Despite this, coastal shipping always faces:

- The threat of competitors entering the market; and
- High fixed costs (vessels, even if leased, and wages for skilled specialists).

## Performance

The degree of competition will always limit profitability of coastal shipping. We expect strong dynamic performance (to squeeze every last cent out of the marketing chain), but limited ability to exploit economies of scale.

In the current shipping cycle, where there is a lot of excess shipping capacity the threat of a new entry will only increase. This could constrain profitability further.

### B.1.5 Hubbing in Australia

The key assumption in this scenario is that all containerised goods exported and imported to New Zealand travel via Australia. General cargo and other specialised carriers are assumed to develop patterns of trade similar to the base case. Therefore, the focus of this scenario is on containerised trade only.

One of the main motivations of this scenario is that Australian ports have invested heavily in dredging and other capital equipment to increase their competitiveness. Some New Zealand commentators have raised the fear that New Zealand cargo will be re-routed through Australia (Auckland Regional Holdings, 2009).

It should also be noted that capacity to encourage bigger ships to Australian ports will occur whether hubbing of New Zealand goods in Australia happens or not.

## B.1.6 International ship operators

### Structure

The structure of the ship operating business is the same as the base case but different activities occur. Ship owners will re-configure their shipping arrangements to suit the most efficient and cost effective approach. In containerised trade, two types of vessels will emerge:

- Those involved with bigger ships only going to Australian ports; and
- Those plying the trans Tasman routes.

### Behaviour

This scenario relies on two very strong assumptions. All ship operators (containers only) move at the same time to hubbing in Australia – but may go to different ports to distinguish operations. It also relies on the assumption that it must be cheaper to hub in Australia rather than the bigger ports in Asia.

Other important behavioural responses in this scenario include:

- Fierce competition across the Tasman in terms of service (frequency) and price. While competition is already intense we expect that competition to increase as trade increases (given that all New Zealand containerised trade is rerouted across the Tasman);
- While competition is more intense (which adds pressure to bring freight rates down) ports will be served with possibly smaller vessels (pressure to increase rates). It is difficult to determine whether there will be a slight increase or decrease in freight rates relative to the base case.<sup>37</sup>;
- Costs higher relative to the base case for goods going further than Australia and these will be passed on to ports and shippers. There is unlikely to be an impact on ship operators;
- More scope for product differentiation on trans Tasman routes because of the large volume of containerised product.

### Performance

The performance of ship operators is likely to be least affected by the change to hubbing in Australia. Performance related issues include:

- Less ability to squeeze shippers and ports because of the increased frequency of visits from ships plying the trans Tasman trade;

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<sup>37</sup> An argument could be constructed along the lines that coastal traders already compete head to head with international ship operators on the New Zealand coastal trade so why couldn't they compete head to head across the Tasman? One of the key competitive reasons why coastal traders can compete on the New Zealand coast is because of the high cost of inland transport (road and rail). This may not occur on trans Tasman routes.

- Increased dynamic efficiency gains as ship operators offer increases on trans Tasman service variety although less ability to exploit scale;
- Increased product variety on trans Tasman service;
- Ability to exploit scale for goods going further than Australia since cargo can be consolidated into bigger ships.

### B.1.7 Shippers

#### Structure

Structurally there will be little or no change to the base case for most shippers. For the dairy industry the hubbing via Australia will cause a major bottleneck problem since they have to move product on smaller ships (relative to the base case). This is likely to add cost to their operation in terms of warehousing in New Zealand.<sup>38</sup>

A further level of uncertainty for all shippers will be trans shipment of product in Australia. Besides the added complication of trans shipment there are possibilities of delays, and other port costs. Delays are potentially the most damaging problem that shippers face since they may lose future export orders if reliability is uncertain.

#### Behaviour

The behaviour revolves around two distinct groups:

- Those that benefit from trans Tasman trade. This is roughly 25% of New Zealand exporters and 20% of New Zealand imports. A competitive trans Tasman shipping advantage for those exporting in Australia by:
  - Possibly slightly higher trans Tasman transport costs although this is uncertain since it depends on whether the increase in dynamic efficiency (more trade induces more frequent service and higher quality service) outweighs productive efficiency (smaller ships plying trans Tasman routes);
  - An increase in service and frequency could potentially increase sales for existing exporters to Australia. This allows for more scope to differentiate product offerings going to Australia (because of the frequency and types of services offered).
- Those that are likely to be disadvantaged by Australian trade. This is roughly 75% of New Zealand's exports by value and 80% of imports. The disadvantages for this group are:
  - An increase in trans shipment costs for both exporters and importers as freight is trans shipped in an Australian port (cost increase because of the extra handling in Australia);
  - The hubbing will increase the chances of an unreliable service and delays;
  - A more unreliable service will discourage new exporters, who rely on shipping, from seeking markets beyond Australia;

<sup>38</sup> This is likely to be substantial since dairy represents 23% of New Zealand exports, most of which will be sent further than Australia.

- It is likely to increase the chance of bottlenecks for seasonal supply of dairy products because the ship plying the trans Tasman trade are likely to be smaller (even with the additional peak loaders). The potential bottlenecks will occur not only in New Zealand but also possibly in Australia.

However, there will be a decrease in shipping costs beyond Australia as the ships leaving Australia are likely to be much bigger.

## Performance

The performance assessment for hubbing is set out in Table 8. The most important assumption is that trans shipment costs, the costs of delays and other shipping costs will increase freight rates in this scenario by 5%. This is despite the advantages of those exporting and importing from Australia who will benefit under this scenario.

**Table 8: Hubbing in Australia: Summary of key impacts**

Issue	Impact
<u>Trans Tasman trade</u>	
Increase in smaller vessels plying the trans Tasman routes.	Uncertain whether there will be an increase or decrease in freight costs across the Tasman - possibly higher, although mitigated by dynamic efficiency. Any freight reductions will be passed on to shippers.
Trade with Australia	Possible increase in trade to Australia from existing exporters.
New trade with Australia	Increase in service and frequency at all container ports will possibly encourage new trade with Australia (dynamic efficiency improvement).
<u>Trade beyond Australia</u>	
Trans-shipment costs, possible time delays, and other shipping costs <sup>1</sup>	5% increase.
New trade with the rest of the world	Likely to discourage new trade with the rest of the world for goods relying on sea freight. Act as a major barrier for new exporters .
Possible bottlenecks for Fonterra	This will manifest itself in terms of extra warehousing costs in New Zealand.
Cheaper shipping costs beyond Australia	Unsure if these cost savings will be passed on.
<b>Net impact</b>	<b>5% increase in freight rates</b>
Notes: (1) This is based on scenario where total port costs are estimated to be 10% of the total freight costs on average (Auckland Regional Holdings (2009) p 50. We have estimated that half this cost will be incurred for trans shipment, possible time delays, and other shipping costs.	
Source: NZIER	

## B.1.8 Ports

### Structure

The number of ports will be identical to the base case. The main impact of hubbing in Australia will be the mixed scale effects. Some of the smaller ports will be able to increase the scale of activities while the larger ports will suffer a decline in throughput. This is because smaller ships (relative to the base case) will be used to transport cargo across the Tasman, therefore there is increased potential for the container trade to be “spread through all ports” depending on the final destination of freight and other economic factors.

### Behaviour

Competition will be just as intense relative to the base case. The business strategy will revolve around:

- A business strategy that focuses on increased differentiation that gives customers unique service features that are able to be sustained over time; or
- A generic strategy which seeks to provide a competitively priced service to intended to encourage throughput (economies of scale strategy).

### Performance

The most important factor for ports is whether they will increase throughput under this scenario. With changing trade patterns, where all containers are being hubbed in Australia we would expect:

- Smaller and medium sized ports to increase throughput and service variety, therefore they will be more profitable under this scenario; and
- Larger ports to be worse off since they are likely to suffer a decreased throughput and reduced service variety.

The efficiency impact will be different for each port depending on import and export customer demands. Increased innovation from all ports might occur because of the pressure associated with lack of scale in bigger ports and in smaller ports because of the intensification of competition between all ports however only smaller ports will gain from productive efficiencies because they are the only ones to benefit from increased throughput.

The relatively poor performance of bigger ports increases the risks that they may see increased interference locally as profitability diminishes.

## B.1.9 Coastal shipping

### Structure

The structure is similar to the base case.

## Behaviour

Coastal shipping comes under more intensive competitive pressure since smaller ships plying the trans Tasman trade will be able to access all container ports and are likely to compete head to head with coastal shipping since they are likely to stop at more than one port after they have crossed the Tasman. Behaviour of coastal shipping companies might include:

- Further reduction in coastal services; although
- Some may try to fight back by developing trans-Tasman services, although the economics of these services would have to be carefully considered.<sup>39</sup>

## Performance

Performance is likely to decline as competition from the trans Tasman feeder services erodes the coastal traders business.

## B.2 Two ports

The two port scenario consists of two big ports, one in each Island, to accommodate larger and larger container ships. A key assumption is that all containerised goods exported and imported to New Zealand travel via these two ports.<sup>40</sup> General cargo and other specialised carriers are assumed to develop patterns of trade similar to the status quo. Therefore, the focus of this scenario is on containerised trade only. We have not designated specific ports in the scenario but just assumed that two ports were “picked” and government would go ahead and provide the land transport infrastructure for those ports to accommodate big ships.

### B.2.1 International ship operators

#### Structure

The key structural assumption is that all ship operators would move to bigger ships at once for the New Zealand trade. These ships would only stop at two ports in New Zealand. The focus for the international operators is on:

- Shipping economies of scale with much larger ships calling at only two ports. The scale effect is likely to have the impact of improving productivity by approximately 5%;
- How they might deal with ports that have an increase in size and develop a monopoly position (relative to the base case); and
- Considering whether or not they enter the coastal trade to extend their reach down the marketing chain. However, they would have to enter the coastal trade under the same terms and conditions as New Zealand shipping operators.

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<sup>39</sup> At present, treating domestic New Zealand and Australian ships as one market is outside CER rules. Bringing shipping within trans Tasman rules could have major ramifications for trans Tasman freight. Ramifications which we have not considered in this report.

<sup>40</sup> Although we would expect that the two ports would attempt to capture as much of the general cargo trade from overseas as possible as it looks to increase throughput.



## Behaviour

The increase in size of the two designated ports presents a major challenge for ship operators since they will have less room to manoeuvre on port costs and may not be able to command the same services and price discounts as in the base case. The approach they will take will be to attempt to combine all ship operators and negotiate as a block in order to extract concessions out of ports – this is akin to an arm wrestle between two powerful groups. How successful they will be will depend on how united ship operators are over time.

Bigger ships will mean less frequent service which reduces the quality of services for New Zealand exporters and importers. Less frequent service means that opportunities for imports and exports are missed at the margin particularly by smaller exporters who see less frequency of service as an increased barrier to trade. We estimate this loss of trading opportunities as a 10% productivity shock for imports and exports.

We expect service by ship operators to be less frequent and relatively inflexible. A business attitude of take it or leave it would develop.

## Performance

Performance of ship operators is mixed because:

- They will benefit from lower unit costs since the ship size will increase (increased productive efficiency) but some opportunities will be missed particularly from smaller prospective exporters and importers because of the infrequent service, relative to the base case (decrease on dynamic efficiency);
- Port charges could increase as the two ports exert market power, although this could be mitigated by ship operators combining together as one negotiating group to deal with both ports; and
- The service would provide less variety, relative to the base case, since port calls will be limited to the two main ports.

### B.2.2 Shippers

#### Structure

The same structure exists relative to the base case.

#### Behaviour

Larger shippers are likely to benefit as they will be able to capitalise on the availability of large ships entering the market. Bigger ships being able to call at New Zealand ports will benefit large seasonal producers who require containerised shipping.

To fully benefit from the economies of scale will require infrastructure that can cope with large volumes being moved to ports in short time frames. The focus will therefore be on seasonal bottlenecks which could potentially put huge strain on the infrastructure (ports and inland connections). Big players are likely to put pressure on

government to “fix” the problem, which means that the public is likely to pay for these improvements (at the expense of other public projects).

For smaller players shipping connections will be more inflexible and they are likely to miss out on opportunities. This is particularly so for the marginal exporter who will not see exporting as being as viable (relative to the base case).

## Performance

The established large shippers are likely to benefit from larger ships calling at the two New Zealand ports. This of course is subject to the bottlenecks being cleared with the use of public money. In this respect there will be some flow on impact for all exporters and importers since all will benefit from the infrastructure expenditure.

Some exporters will also benefit from perhaps lower freight rates (economies of scale) although this depends on the extent that port charges increase since the market power of the two main ports will increase. Possibly the two main ports will be less efficient relative to what they are under the base case.

The barrier to exporting for smaller firms will increase (relative to the base case) since services will be reduce and they are a price taker from both ship operators and ports.

### B.2.3 Ports

#### Structure

There will be a similar number of ports relative to the status quo, however there will be marked scale differences. Two ports will undergo major infrastructure works while other ports will either remain the same or be downsized. The two ports that are designated to receive large vessels will require capital works to increase capacity and also improve inland connections. We conservatively estimate that the investment required will be approximately \$500 million at the two ports and \$500 million on the land connections.

Large inland infrastructure projects will be needed to cope with the increases in land movements of cargo to meet ships at the two main ports. In between ship arrivals they are likely to be under utilised.

Other ports will shrink and become feeder services focused on service differentiation and improving links between themselves and the two designated ports.<sup>41</sup>

#### Behaviour

Strategic behaviour for ports is bifurcated. The two main ports face less competition and are likely to become less competitive relative to what they are in the base case. They will have more ability to increase port charges. Possibly, their bargaining power

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<sup>41</sup> Possibly, there will also be issues with the foreshore and seabed. We have not attempted to introduce these issues in this report.

with shippers (who are more diffuse and less organised than ship operators) will be greater. Less competition is also likely to mean that service levels are not as high relative to the base case.

For those ports not designated to receive bigger ships the strategic behaviour will be completely different. Some ports will struggle, particularly those who have been accustomed to much higher throughput. Rate payers in these districts may be faced with subsidising port activities. For other ports the feeder services developed could possibly keep them at a similar level of activity relative to the base case. Although the types of ships they will receive are likely to be smaller and possibly more frequent. Competition between these ports is likely to be intense.

## Performance

Profitability will also be bifurcated. For the two designated ports with a captive market profitability will be very strong. These ports will reap the rewards of market power and be able to price close to average cost relative to the base case. They will also be able to reap the rewards of productive efficiency (through scale).

Those ports who under the base case received frequent visits from international shipping will suffer the most since cross traders will no longer call at their port. They will have to reduce size and find other sources of revenue. There is a real possibility that rate payers will need to subsidise these ports.

Smaller ports are likely to be relatively unaffected by the changes. Although the type of ships calling at their ports will change quite dramatically, competition is likely to be intense so dynamic efficiency is likely to just as strong as it is in the base case.

### B.2.4 Coastal shipping

#### Structure

The Two Ports scenario is likely to have a major impact on coastal shipping. There are likely to be increased opportunities for feeder shipping services from the two major ports. Coastal shipping will be one mode of transport required to move the very large volumes delivered by the ever increasing size of cross traders. Since these cross traders can only stop at two ports in New Zealand the opportunities will exist for much greater use of coastal shipping relative to the base case.

This could possibly increase the number of coastal ships used and also encourage some diversification as the trade grows. This will be driven by the ability to exploit the significant cost advantages it already has over inland freight haulage.

#### Behaviour

Increased trade for coastal shipping will make the industry more profitable. Increased profits may encourage new competitors into coastal shipping. Competition, therefore is likely to be fierce.

Fierce competition will drive firms to seek new types of markets as they strive to differentiate themselves from competition. Levels of service are likely to be relatively high.

## Performance

At least initially coastal shipping will have increased profitability stemming from an increase in trade volumes from the two major ports, although they will be price takers (in terms of port charges) from the two major ports.

There will also be some increase in scale as trade volumes increase – given their competitiveness relative to inland transport – this means lower unit costs. However, there will be strong competition from new entrants which will limit the ability to increase profitability further. The ability of competitors to enter the market will also be easier relative to other stages in the shipping cycle, since shipping tonnage is cheaper and there is likely to be a large variety of ships available.

Strong competition will encourage further dynamic efficiency gains which will also drive an increase in product variety and the possible development of market niches. There will also be limited ability to exploit economies of scale.

## B.3 Fewer ship operators

Fewer ship operators consider New Zealand a good place to do business and withdraw their representatives. This has the impact of limiting competition for the transport of New Zealand freight to its markets. It also assumes that no other ship operators see the opportunity in increased market share by entering the trade (in the way described in the first section).

There is also no change in the Commerce Commission approach to shipping.

### B.3.1 International ship operators

#### Structure

The reduction in ship operators will reduce competition for New Zealand inward and outward bound freight. While it is unlikely to increase the scale and frequency of cross traders coming to New Zealand (volume) it will have some impact on freight rates. Less competition is the main reason for this price effect.

We also expect little diversification in services or product differentiation, in fact it is more than possible that services options will either stagnate or be reduced because of less competition.

#### Behaviour

The increased concentration of ship operators means that orderly marketing behaviour will develop. Tacit rules will emerge over time that reduce effective

competition and keep up load factors. The impact will be that freight rates will increase and volumes remain the same (relative to the base case).

With the reduction in ship operators, their market power will increase resulting in increased revenue. The increased revenue will be extracted from ports and shippers who will have to pay more for ship operator services (relative to the base case).

However, higher charges are unlikely to bring about improved services or investment in new technology since ship operators have a captive market. Services will be provided on a “take it or leave” basis service since ship operators have little real competition. Also service levels are likely to stagnate relative to the base case.

## Performance

Ship operators are likely to be able to boost profitability by increasing freight rates. We have estimated freight price increases at 5%, although potentially, depending on competitors’ ability to re-enter the market, price rises could be substantially more than what has been suggested.<sup>42</sup> We will also see a reduction in efficiency as shippers and ports have less ability to influence ship operators (they are price takers).

Since ship operators are able to minimise costs and maximise profits, services could potentially be reduced along with the quality of that service. We also could expect little innovation in service delivery by ship operators because of less competition and high barriers to entry.

### B.3.2 Shippers

#### Structure

Little change from the base case.

#### Behaviour

Shippers are price takers in this market. They have limited bargaining power and few options. They can expect higher freight rates and a reduction in service levels (relative to the base case).

As well as declining service levels, the level of service innovation will suffer because of the lack of incentives for ship operators to provide improved service levels or think of innovative ways to improve service delivery.

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<sup>42</sup> Obviously, ship operators will push prices up to the point just below where they think competitors will consider entering the market. This could be 5%, 10% or 50%. We have used 5% only as a proxy, since the point we wish to make is that the situation will put New Zealand shippers and ports (and therefore the economy) in a worse situation relative to the status quo.

## Performance

The main performance issues are rising costs (perhaps by 5%) and declining service levels as ship operators exert their market power. For shippers we expect profitability to fall relative to the base case.

Dynamic efficiency will also slow (service levels, service variety and innovation in service delivery) since services are provided on a “take it or leave it basis”

### B.3.3 Ports

#### Structure

There is likely to be little change in the structure of ports. This includes little improvement in throughput or the volume or chances for diversification.

#### Behaviour

Similar to shippers, ports are price takers from ship operators. Ship operators will attempt to squeeze ports further because of their enhanced bargaining position.

There is strong competition between ports for business, possibly at the same level as the base case.

#### Performance

Performance is similar to shippers. They are faced with increased prices, decreased service levels, and little service innovation from ship operators which together mean a decline in profitability.

Ports will have every incentive to improve dynamic efficiency since competition to attract shippers will be just as intense as under the base case. And just as under the base case they will try and broaden service variety as much as possible.

Port returns will, however, decline and this could place pressure on local and regional authorities that own the ports.

### B.3.4 Coastal shipping

#### Structure

Coastal shipping is likely to grow as international ship operators (at the margin) become less interested in moving freight around New Zealand relative to the base case. While these changes are expected to be small, they could have major impacts for smaller coastal shipping companies.

Coastal shipping is more likely to slightly expand and diversify its service range as international ship operators limit services and maximise profits.

## Behaviour

These small changes at the margin are likely to increase opportunities for coastal shippers to arbitrage as international services stagnate. While it is difficult to tell where these opportunities will present themselves it will show up in increased profitability for coastal shippers and encourage a focus on differentiating and improving service features of the coastal shipping business.

Competition, however, will remain fierce amongst coastal shippers and there is a possibility of new entrants further competing for profits.

## Performance

We expect a slightly improved profitability (relative to the base case) driven by increased opportunities to improve throughput (scale), service variety and innovation. While these improvements are likely to be imperceptible in the short run, over time it is likely they will have a major impact on the coastal shipping sector.

## Appendix C :Detailed CGE modelling results

The NZIER static CGE model contains information on 131 industries and 210 commodities in its basic form. It captures the various inter-linkages between these sectors, as well as their links to households (via the labour market), the government sector, capital markets and the global economy (via imports and exports).

Most importantly for this task, the model contains freight margin commodities – that is, the model explicitly splits out the use of freight to facilitate trade. For example, meat and dairy exports require freight; similarly, without any productivity changes, an increase in exports requires a proportional increase in freight. This means we can assess how changes in freight prices are transferred through the rest of the economy.

The amount of freight each commodity requires for each final demand transaction (to local industries, to households, to governments or to exports) is based on empirical data from the New Zealand economy. Some commodities, like timber or logs, require a large amount of freight to facilitate trade; services like going to a bar or movie require none. The database has been sourced initially from Statistics New Zealand 1995/96 Inter-Industry tables, updated using the subsequently released 2003 Supply and Use tables, and finally 'up-scaled' to 2010 levels using latest Statistics New Zealand macroeconomic data.

## C.1 Detailed results

### C.1.1 Interpreting the results

#### C.1.1.1 Direct, indirect and induced effects

To analyse the detailed modelling results we take a systematic approach of tracking the impacts as they flow through the economy, beginning with the direct impacts on the freight industry.

We then analyse the flow-on or indirect and induced impacts. Freight is a key margin industry that facilitates trade, and in particular international trade. Key export and import industries such as agriculture, forestry and mining (exports) and clothing and machinery (imports) would be expected to benefit from a more developed local freight sector<sup>43</sup>. Similarly, service sectors that do not use freight as a margin industry would not be expected to benefit.

The specific scenario will determine the size of each of the above indirect effects.

#### C.1.1.2 Macroeconomic effects

The national results flow logically from the direct and indirect impacts. We focus on key macroeconomic variable of Gross Domestic Product (GDP).<sup>44</sup>

## C.2 Direct impacts

For the Hubbing and Fewer Ship Operator scenarios, the direct impacts fall on the sea freight sector as higher prices push output down. However, for the Two Ports scenario, higher port productivity slightly raises sea freight output. The trade-off is the higher level of domestic road freight required to accommodate international trade from just two ports.

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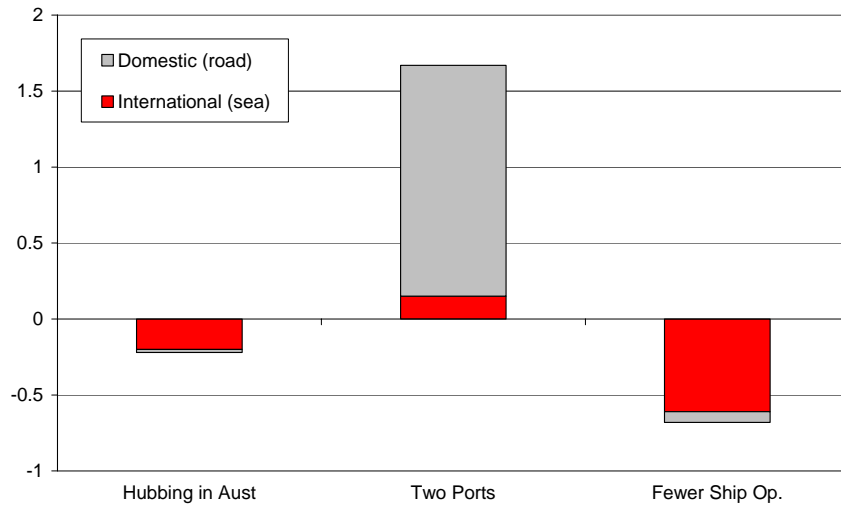
<sup>43</sup> We would normally also consider the supplying industries that will benefit from increased freight but we are focusing on the benefits of improving freight as a margin or facilitating service.

<sup>44</sup> We also report the change in private consumption, which is a measure of economic welfare (how 'well off' we are). Many economists see welfare as a better measure of economic benefit than GDP. However, to be consistent with our earlier report, we have focused on GDP in this report.



**Figure 20: Impacts on the freight industry**

Percentage change in output



Source: NZIER

### C.2.1 Flow-on impacts

The results for the downstream industries, which use freight as a margin industry are negative for each of the three scenarios. Higher freight prices and costs cannot be avoided (freight is a requirement to facilitate trade) and therefore eat into these industries' growth. Agricultural industries in horticulture (apple and pear, kiwifruit) see reductions of up to 0.149 in value-added as exports fall. Forestry and coal mining sectors, heavy users of freight see reductions in value-add of up to -0.14% and -0.415% respectively.

Only industries that do not use freight see any benefit, and even then the benefits are small: service industries like accommodation and bars and restaurants increase value-added by up to 0.080% and 0.026% respectively.

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**Table 9: Flow-on results**

% change in value added, relative to BAU

Scenario	Hubbing in Aust	Two Ports	Fewer Ships
Apple and Pear	-0.048	0.027	-0.149
Sheep and Beef	-0.041	0.008	-0.129
Meat Production	-0.029	-0.008	-0.090
Kiwifruit	-0.027	0.006	-0.084
Dairy	-0.012	-0.001	-0.038
Coal	-0.133	0.132	-0.415
Forestry	-0.045	-0.146	-0.141
Paper	-0.030	-0.298	-0.092
Ships and boats	-0.023	0.024	-0.072
Accommodation	0.026	-0.017	0.080
Bars and restaurants	0.008	-0.027	0.026
Sports and recreation	0.004	0.000	0.014

Source: NZIER

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### C.3 National results

Table 10 summarises the results at the national level. It shows a decrease in GDP, relative to the BAU, of 0.021% (\$38 million) for Hubbing in Australia scenario; 0.023% (\$43 million) for the Two Ports scenario; and 0.065% (\$120 million) for Fewer Shipping Operators scenario.

In the Hubbing and Fewer Ships scenario, the economy declines as increased freight costs reduce both exports and imports. This is the primary driver of the results. In the Two Ports scenario, increased domestic freight costs outweigh the reduced international freight costs.

The secondary driver of results is the flow-on costs of reduced production in exports and the increased costs of imported intermediates. In the long run this is reflected in lower wages, which in turn means lower incomes and private consumption.

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**Table 10: National results**

Scenario	Hubbing in Aust	Two Ports	Fewer Ships
Real GDP (% change)	-0.021	-0.023	-0.065
Real GDP (\$NZm)	-38	-43	-120
Real wage (% change)	-0.022	-0.047	-0.068
Private consumption (% change)	-0.017	-0.019	-0.053
Real exchange rate (% change)	0.011	-0.002	0.035
Imports (% change volume)	-0.028	0.023	-0.087
Exports (% change volume)	-0.038	0.010	-0.119

Source: NZIER

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## C.4 Limitations

We have provided quantitative evaluation of possible future freight scenarios, however we have not modelled specifics by exogenously imposing the infrastructure requirements of the scenarios. It is uncertain where the costs of such infrastructure would fall – if governments and ratepayers foot the bill, then either other government expenditure must be reduced, or taxes must be increased. The former is simply a expenditure transfer, while the latter has bigger indirect flow-on impacts. Neither are captured within this modelling. The estimated impact on freight prices and productivity have been captured however, and the key interactions between freight as a margin service and the rest of the economy.