ATTACHMENT:

NERA ECONOMIC CONSULTING REPORT:
PROJECT KOTAHI – BROAD REVIEW OF BENEFITS AND DETRIMENTS

8 September 2011

Project Kotahi - Broad Review of Benefits and Detriments

Chapman Tripp

NERA
Economic Consulting

Public Version
Prepared at Request of Counsel

Project Team

James Mellsop

Kevin Counsell

Will Taylor

NERA Economic Consulting
Level 18
151 Queen Street
PO Box 105 591
Auckland 1143
Tel: +64 9 373 7230
Fax: +64 9 373 7239
www.nera.com

Public Version
Prepared at Request of Counsel

Contents

1. Introduction

Project Kotahi is likely to involve several New Zealand exporters and importers (led by Fonterra and Silver Fern Farms, with other partners to be determined) pooling and coordinating demand for (container) transport services, on land and sea. In effect, the (container) transport procurement function of each partner would be pulled out and then outsourced to a new, profit maximising entity. That new entity (Kotahi) would also provide services to non-partners.

Kotahi would only be involved in international container transport, i.e., exports and imports of containers. To the extent that Kotahi is involved in domestic transport, our understanding is that this would only be in respect of domestic movements of containers, and movements of products to/from containers,[1] that would ultimately be shipped to (or from) overseas markets.

We have been asked to consider, at a broad level, the likely public benefits and detriments of Project Kotahi. At this stage we have not been asked to carry out a careful competition and efficiency analysis of each affected market[2] - rather, our analysis to date has been at a higher level.[3]

Nevertheless, our analysis has gone far enough to determine that the likely benefits and detriments would vary from segment to segment. Accordingly, in this report we start by describing the generic benefits (section 3) and detriments (section 4), and then turn to specific issues in respect of each affected segment: ocean carriage; ports; and domestic carriage (section 5).

In section 6, we present our preliminary quantification of the benefits and detriments of Project Kotahi. In the time available, we have drawn heavily on an analysis undertaken by the New Zealand Shippers' Council of the benefits of larger ships visiting New Zealand,[4] although we have made some alterations to this analysis, and supplemented it with some further quantification.

2. Conclusions

By coordinating and aggregating demand for container transport services, Project Kotahi is likely to bring forward port investment and the use of larger, lower (average) cost (per container) ships for New Zealand ocean carriage. If we assume that Project Kotahi would bring large ship visits to New Zealand forward by three years (to 2015), then the present value of net benefits (over the period 2012-2019) would be $78m-$204m.

---

1 For example, Fonterra currently transports some products on pallets in curtain-sided trucks, to be packed into containers at the port.

2 To this point, we have not analysed market definition. For example, we simply assume for present purposes that road, rail and coastal shipping fall within separate markets, although this may not be correct.

3 This is partly a function of the fact that the specific partners in, and customers of, Kotahi are not yet determined.

4 New Zealand Shippers' Council (2010), *The Question of Bigger Ships: Securing New Zealand's International Supply Chain.*

These figures are net of:

- Costs of the required port investment to enable large ships to visit; and
- Costs of the expected increase in resources required for domestic container transport. Because a likely outcome of Project Kotahi is a greater concentration of export container flows to a smaller number of ports than is the case today, containers would on average move further domestically under Project Kotahi than they would under the counterfactual.[5]

An alternative counterfactual is that, instead of large ships visiting New Zealand at a delayed date, New Zealand ports becomes spokes to Australian large ship hubs. Compared to this counterfactual, Project Kotahi would result in present value net benefits of $814m-$959m.

Project Kotahi is also likely to result in better utilization of domestic transport assets, having present value benefits of at least $[ ]m.

By aggregating demand for container transport services, Kotahi may lessen competition in domestic transport services and accordingly may be able to push down prices for those services. However, the level of aggregation in these markets would be:[6]

- Very small in the case of road (at most, the share of Kotahi would be approximately [ ]%, and even that is unlikely); and
- Larger but still relatively small in the case of rail (at most, the share of Kotahi would be approximately [ ]%, and even that is unlikely).

Given this level of aggregation and the likely countervailing power of KiwiRail,[7] any price effect would likely be immaterial for both road and rail, and we would not anticipate any material level of allocative efficiency detriment from Project Kotahi.

Project Kotahi would involve the participants coordinating their demand for one of their inputs, container transport services. The participants would otherwise continue to compete in their other markets, including their output markets and other transport markets. Accordingly Project Kotahi would have no material impact on the broad competitive pressures on

---

5 There would, however, be some offsetting factors which reduce domestic transport distances. One is that, by better utilising existing transport assets, Kotahi would eliminate some repositioning of empty containers, thereby eliminating the domestic transport distance associated with the repositioning leg. We have captured this separately by quantifying the benefits of increased utilisation. Another possible offsetting factor is that, to the extent that empty container repositioning remains, it may be more efficient for this to occur via road or rail, which could be a more direct route than repositioning that is currently undertaken by international ocean carriers along coastal routes.

6 It is not clear to us at this stage what the impact on coastal shipping would be – see the discussion in section 5.4.2 of this report.

7 Assuming that rail is a separate market from road, which is not clear. But if rail was in the same market as road, then the level of aggregation across that market would still be very small.

Fonterra, Silver Fern Farms and other participants, to be productively and dynamically efficient.[8]

In summary, Project Kotahi is likely to result in net present value benefits of at least $[ ]m-$[ ]m if the counterfactual is delayed large ship visits, or at least $[ ]m-$[ ]b if the counterfactual is Australian large ship hubs.[9]

3. Generic Benefits of Project Kotahi

3.1. Context

A key feature of transport supply is capacity lumpiness, whether the asset is a ship, wharf, rail or truck. By this we mean that capacity can only be added in (relatively) large, fixed increments, e.g., an additional ship or an additional truck, rather than incrementally for each unit of output.

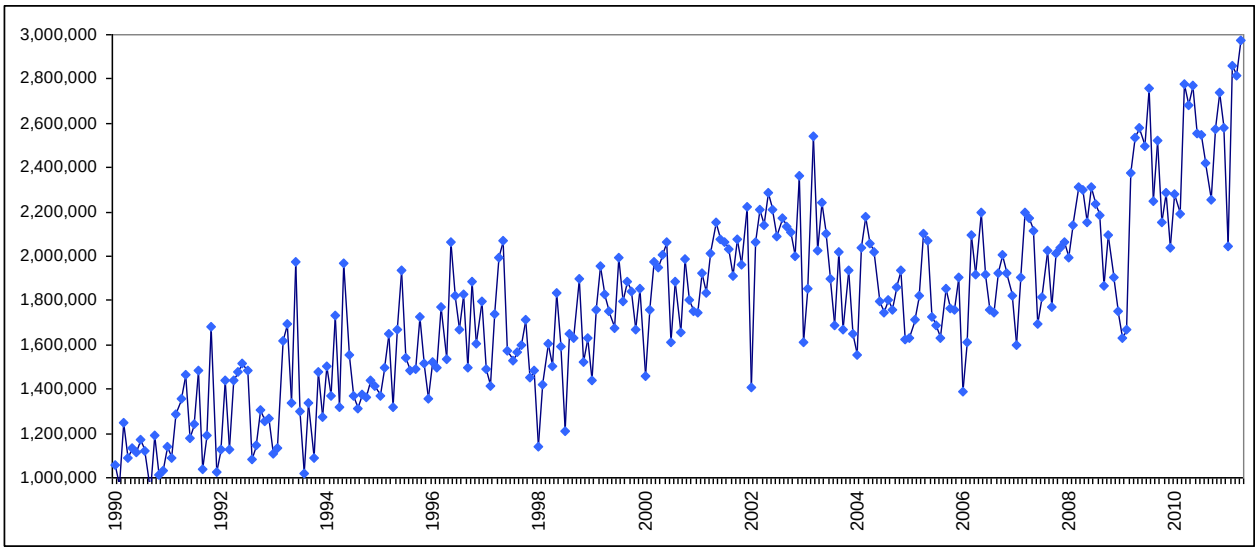
On the demand-side, particularly given the significance of agricultural products in New Zealand trade, demand for transport services can be quite seasonal and peaky. Figure 3.1 sets out a monthly time series of total exports (i.e. bulk and containerised) through New Zealand's seaports by weight since 1990.

---

8 We have analysed whether Project Kotahi will lead to any actual detriments. We understand it is possible that Project Kotahi arrangements will breach *per se* provisions of the Commerce Act, particularly section 30. We understand that with a *per se* breach, *actual* detriments do not matter, and the behaviour is simply deemed to substantially lessen competition. Because we do not think there will be any material *actual* detriments, we also do not think there will be any material detriments arising from any breach of a *per se* provision.

9 Note that to this point we have not quantified the effect of Project Kotahi on domestic transport externalities (e.g., CO_2 emissions, accidents and congestion). While containers might on average move further domestically under Project Kotahi than they would under the counterfactual, there would also likely be some switching away from road to rail and coastal shipping, which per tonne-kilometre have lower externalities. Furthermore, improved utilization would reduce externalities.

Figure 3.1
Seaport exports (tonnes)



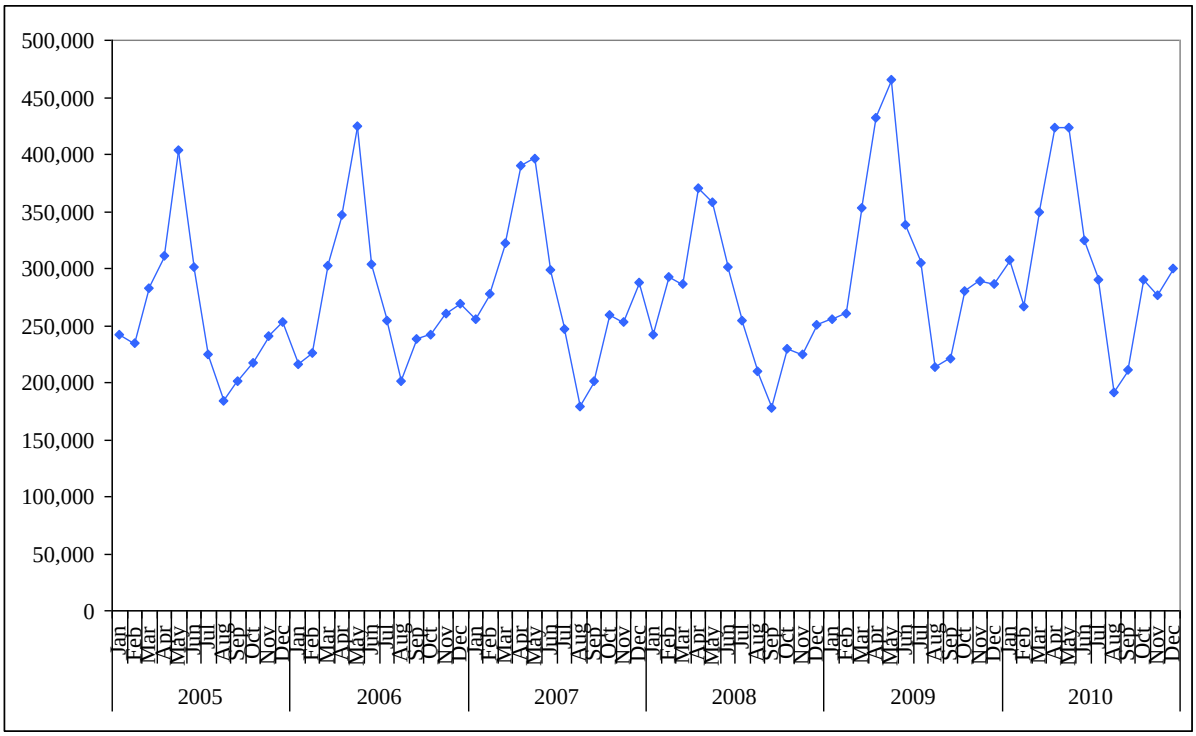
Source: Statistics New Zealand

Figure 3.1 demonstrates the volatility of exports passing through New Zealand's ports. Given that this data includes bulk (i.e. non-containerised) cargo (which is not part of Kotahi), it also useful to look specifically at the time profile of agricultural exports (which are predominantly containerised[10]). Figure 3.2 plots New Zealand's exports (through all modes of transport) of dairy, meat and fruit.[11]

[10] Approximately 87% (by gross weight) of 2008 agricultural (dairy, fish, fruit and vegetables, and meat) exports were containerised. Source: Statistics New Zealand data and Fonterra analysis.

[11] Our understanding is that the majority of agricultural exports are transported by sea.

Figure 3.2
Dairy, meat and fruit exports (tonnes)



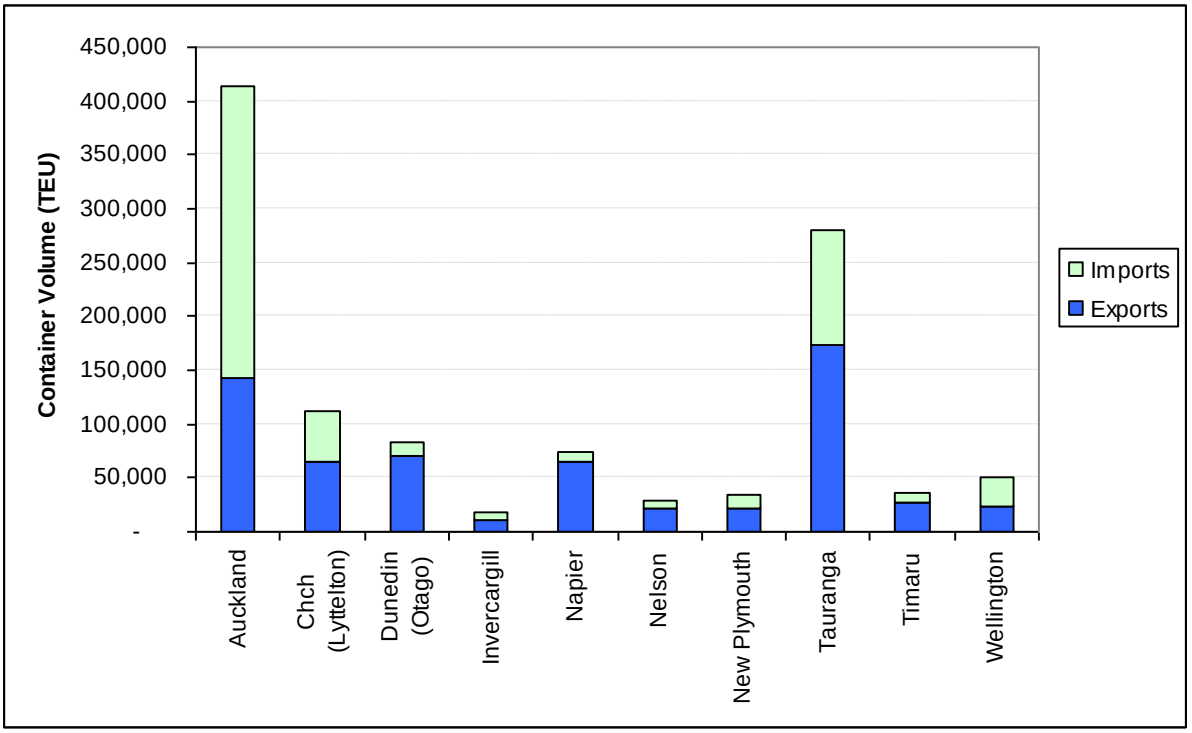
Source: Statistics New Zealand. Series is obtained by summing the following HS codes: Total Meat and Edible Offal (HS02), Fruit and nuts (HS 08) and Milk Powder, Butter and Cheese (HS range 0401 to 0406). Data are taken from the Statistics NZ "Quantity of principal exports (excl re-exports)" table on Infoshare.

The distinct peak occurring in May each year demonstrates the marked seasonality of New Zealand's agricultural exports.

For the size of its economy, New Zealand is also a geographically large country, with freight being fragmented across the relatively large number of ports. New Zealand has eleven ports capable of handling containers, with the majority of containers flowing through Auckland and Tauranga. Figure 3.3 shows the spread of container flows across New Zealand's ports, as estimated by the New Zealand Shippers' Council.[12]

[12] Note that neither Figure 3.3 nor the Shippers' Council data contain volumes at North Port, presumably on the basis that they are insignificant.

Figure 3.3
2008 container volume by port



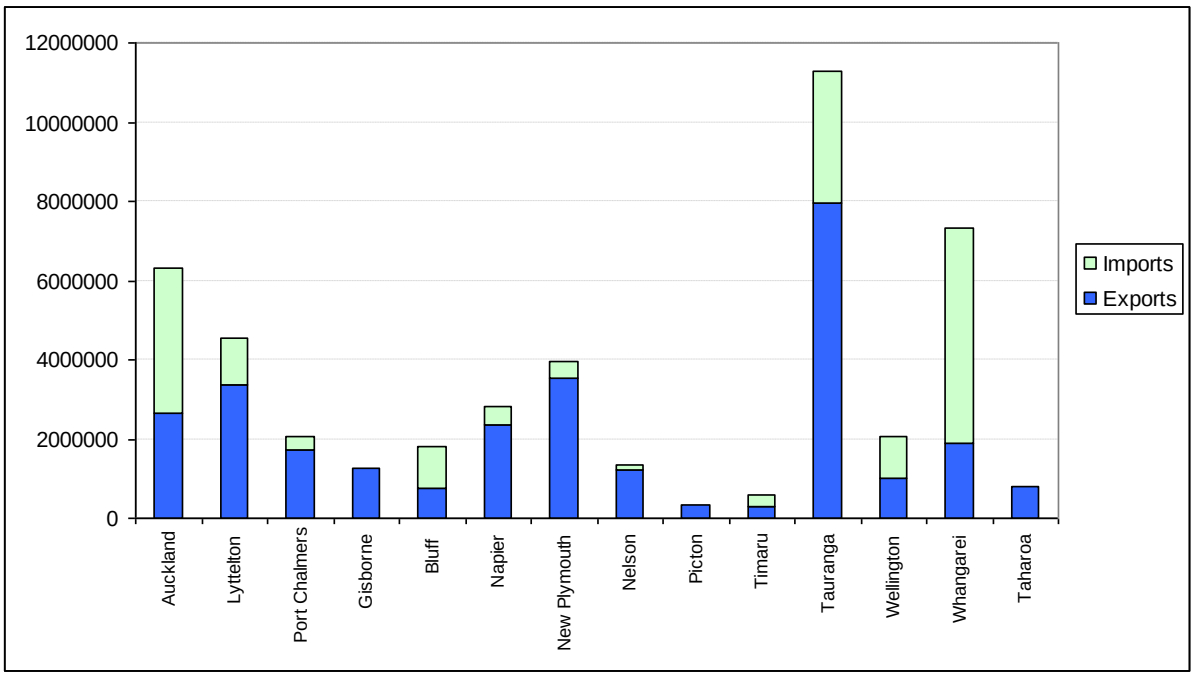
Source: New Zealand Shippers' Council

Total volumes are clearly dominated by Auckland and Tauranga. However, exports are more evenly spread.

A similar picture emerges if one analyses more recent data on total freight (i.e. bulk and containerized)[13] through New Zealand's ports. Figure 3.4 below plots total exports and imports by weight for 2010 through New Zealand's sea ports.

[13] Statistics New Zealand data does not distinguish between containerised and bulk freight.

Figure 3.4
2010 total freight (bulk and containerised) by port



There appears to be a large number of ports for a country with New Zealand's characteristics. Table 3.1 presents a very simple comparison of New Zealand with the OECD countries that it is often benchmarked against.

Table 3.1
Comparable OECD countries (2010 values)

Country	Population (m)	GDP ($b, PPP. 2010 USD)	Land area	Container ports (volume > 50k TEU[14])	Container ports (volume > 20k TEU)
New Zealand	4.290	118	267,710 km^2	6	9
Ireland	4.671	172	70,273 km^2	3	3
Finland	5.259	186	338,145 km^2	4	6
Denmark	5.530	202	43,094 km^2	4	5
Singapore	4.741	292	697 km^2	1	1
Norway	4.692	255	323,802 km^2	1	6

Sources: GDP, population and land area statistics were taken from CIA World Factbook. and the "total area" values were used given that the figures for New Zealand do not split out "land" and "total". Container volumes are "full containers" and obtained from the following sources: New Zealand Shippers' Council, Irish Maritime Development Office (http://www.cso.ie/px/imdo/database/imdo/imdo.asp), Finnish Port Association (http://www.finnports.com/statistics.php), Statistics Denmark (http://www.statbank.dk/) and Statistics Norway (http://www.ssb.no/english/). Singapore only has one port.

Table 3.1 uses 2010 container volumes for all countries except for New Zealand and Ireland. The only data on New Zealand container flows is from 2008,[15] while Ireland has yet to release data more recent than 2009. While this is a necessarily simplistic comparison,[16] Table 3.1 shows that New Zealand's container volumes are spread across a larger number of ports than the comparison set. This suggests that lack of scale may be an issue for New Zealand ports.

Finally, New Zealand is geographically isolated from all of its export markets, making transport efficiency very important.

3.2. Generic Benefits

In this context, there are likely to be significant efficiencies from a mechanism to improve coordination of variable demand and lumpy transport capacity, increasing capacity utilization and reducing supply-side risk. Combining variable demands that are not perfectly correlated

[14] TEU is twenty-foot equivalent unit, and refers to the capacity of a standard container that is 20 feet long.

[15] Sourced from New Zealand Shippers' Council (2010), *The Question of Bigger Ships: Securing New Zealand's International Supply Chain* and Cubic Transport Services Ltd and Njord Ltd. (2009), "Domestic Container Supply Study", *Report for New Zealand Transport Agency*.

[16] E.g. we have not controlled for the absolute level of exports and imports in each country or the ability of the country to trade by means other than shipping (e.g. land transport such as trucking and rail).

would result in a "squarer" or flatter demand profile.[17] Such a mechanism would result in lower average transport costs and risks, and therefore lower prices. One way this could manifest itself is through "take or pay" contracts with carriers, thus transferring the risk of under-utilisation onto Kotahi.[18]

Furthermore, coordinated demand of freight should help to aggregate freight volumes at certain points, which should in turn assist in:

- Underwriting new investments in transport capacity, such as in port infrastructure (including inland ports); and
- Attracting larger ships to New Zealand ports (which also depends on ports, rail and road making the required infrastructure investment, e.g., in harbour deepening).

There are of course already market mechanisms that carry out a coordinating role between freight demand and supply. For example:[19]

- Freight forwarders aggregate demand by acting as agents to different shippers to consolidate shipments so as to match demand with supply. Fremont (2009) notes that freight forwarders specialize mainly in "Less than Container Load" shipments i.e., they reconsolidate into a single container consignments from multiple shippers that, on their own, would not have been large enough to fill a single container;[20] and
- Ocean shipping companies enter into "operating agreements" such as vessel sharing arrangements, slot chartering agreements, consortia and strategic alliances.[21] A number of economic rationales have been put forward for the existence of such operating agreements, but the main ones include the ability to aggregate demand to:
  - Obtain economies of scale;
  - Achieve critical mass; and

---

17 This is similar to the financial concept of portfolio demand where risk can be reduced by holding multiple securities whose returns are not perfectly correlated.

18 Note in this context the lower price due to a take or pay contract would not be a transfer as it would reflect an efficient risk reallocation.

19 Indeed, an advantage that large transport suppliers have is economies of scale and scope – a large and diverse customer base can reduce empty running.

20 Antoine Fremont (2009), "Empirical Evidence for Integration and Disintegration of Maritime Shipping, Port and Logistics Activities", OECD and International Transport Forum Joint Transport Research Centre, Discussion Paper No. 2009-1.

21 See Theo E. Notteboom (2004), "Container Shipping and Ports: An Overview", *Review of Network Economics*, 3(2), 86-106.

– Spread the level of risk associated with the large-scale capital expenditure required (without compromising service frequency).[22]

Ocean shipping companies also enter into "conferences" – formal agreements that have more focus on price setting rather than capacity management. Nonetheless, the rationale for these price setting agreements is similar to that for operating agreements: it is argued that because carriers have substantial capital outlay and face variable demand and lumpy capacity, the absence of a price setting agreement could otherwise lead to "destructive competition".[23]

The formation of Kotahi would also provide a coordinating mechanism, but from the demand-side and with the advantage of scale. Fonterra already accounts for approximately [ ]% of New Zealand's annual exports (by container numbers), and Silver Fern Farms accounts for a further approximately [ ]% (by container numbers).[24]

Furthermore, unlike the freight forwarders, the emphasis of Kotahi would be on matching containers with transport capacity and the balancing of import and export flows.

The concept of horizontal coordination has become of interest in the supply chain literature. As an example, Mason, Lalwani and Boughton (2007, 193) state:[25]

> *Transport provision often has to be reactive to fluctuating demand and hence it makes sense to pursue horizontally collaborative solutions.*

Cruijssen, Dullaert and Fleuren (2007) also consider horizontal cooperation in transport. They note that such cooperation is a means of attaining increased economies of scale, necessary to prevent rising transport costs, increased congestion and emissions "from becoming an even larger burden to welfare than they are at present".[26]

There are a number of recent examples of horizontal coordination between shippers, and case studies of these examples. For example, while they are competitors, Nestle and United Biscuits recognized that their transport flows were complementary, and implemented an arrangement to reduce empty running. A brief case study includes the following claim:[27]

---

22 See D. K. Ryoo and H. A. Thanopoulou (1999), "Liner alliances in the globalization era: a strategic tool for Asian container carriers", *Maritime Policy and Management*, 26(4), 349-367; and Renato Midoro and Alessandro Pitto (2000), "A critical evaluation of strategic alliances in liner shipping", *Maritime Policy and Management*, 27(1), 31-40.

23 See, e.g., William Sjostrom (2004), "Ocean Shipping Cartels: A Survey", *Review of Network Economics*, 3(2), 107-134; and OECD (2002), "Competition Policy in Liner Shipping", Final Report, DSTI/DOT(2002)2.

24 Fonterra exports approximately [ ] TEU containers per annum, and Silver Fern Farms exports approximately [ ]. The Shippers' Council report notes that 2008 containerised exports were 624,000 TEU, giving shares of [ ]% and [ ]% for Fonterra exports and Silver Fern Farm exports respectively.

25 Robert Mason, Chandra Lalwani and Roger Boughton (2007) "Combining vertical and horizontal collaboration for transport optimization", *Supply Chain Management: An International Journal* 12/3 (2007) 187–199, available at http://events.eft.com/SCHC/documents/Combiningverticalandhorizontalcollaborationfortransportoptimisation.pdf.

26 Frank Cruijssen, Wout Dullaert and Hein Fleuren (2007), "Horizontal Cooperation in Transport and Logistics: A Literature Review", *Transportation Journal*, Summer, 22-39.

27 http://www.igd.com/index.asp?id=1&fid=5&sid=43&tid=59&foid=52&cid=1168.

> *Between Oct 2007 and Feb 2009 the collaboration and reduction in empty running removed 280,000 truck kms from the roads. This has resulted in a reduction of 85,000 litres of fuel and a reduction of 223 tonnes of CO2. The collaboration has also generated a financial saving split between both businesses.*

Cruijssen, Dullaert and Fleuren (2007) state that, in Belgium and the Netherlands ("the European logistics center of gravity") they are aware of over fifty formal transport logistics collaborations. Various case studies in other jurisdictions were described at the "2010 Horizontal Collaboration in the Supply Chain Summit", with the presentations available at http://events.eft.com/SCHC/past-presentations-thanks.shtml. Included were case studies of:

- PharmLog, which is a distribution logistics collaboration between pharmaceutical manufacturers. PharmLog has six shareholders, and a much larger number of users. According to a McKinsey & Company presentation (but referenced to PharmLog itself), PharmLog has resulted in 20 – 30% savings (depending on the partner), increased flexibility and has offset volatility;[28]

- A distribution collaboration between Colgate Palmolive and Johnson & Johnson, which was described as resulting in transport cost savings between 10 – 30% per year to each destination, as well as benefiting carriers through (among other things) reduction of uncertainty around truck utilization;[29]

- Site sharing between TDG, Kellogg's, Kimberly-Clark and LPR, which resulted in transport cost savings, and environmental benefits in terms of reduced empty running of vehicles by 270,000 miles per annum, saving the equivalent of 30,000 gallons of fuel and 380,000 kg CO_2;[30] and

- Collaboration between LPR, Weetabix and TDG, which resulted in reduced transport costs for collection pallets from depots of £200,000 and reduction in empty running of 85,000 miles per annum, saving the equivalent of 9,000 gallons of fuel and 114,000 kg CO_2.[31]

We report further, consistent academic literature in section 6.3 of our report.

---

[28] McKinsey & Company (2010) "Identifying and assessing horizontal collaboration partnerships", presentation to EyeForTransport conference, 1 June 2010.

[29] Antonio Bianchi (Inventory Planning & Logistics Director Europe) and Massimo Visconti (Business Innovation Strategist Visconti Lab), "The Horizontal Collaboration in the Supply Chain "Logistics Platforming"", presentation to EyeForTransport conference, 2 June 2010.

[30] Peter Surtees (Director European Supply Chain, Kimberly-Clark) and Mike Branigan (Chief Executive, TDG), "Achieving the Full Potential of Supply Chain Collaboration", presentation to EyeForTransport conference, 2 June 2010.

[31] Peter Surtees (Director European Supply Chain, Kimberly-Clark) and Mike Branigan (Chief Executive, TDG), "Achieving the Full Potential of Supply Chain Collaboration", presentation to EyeForTransport conference, 2 June 2010.

4. Generic Detriments of Project Kotahi

4.1. Introduction

We understand it is possible that Project Kotahi arrangements will breach *per se* provisions of the Commerce Act, particularly section 30. We understand that with a *per se* breach, *actual* detriments do not matter, and the behaviour is simply deemed to substantially lessen competition.

In this section of our report, we analyse the possible *actual* detriments of Project Kotahi. Regarding any *deemed* detriments, we note that the Commerce (Cartels and Other Matters) Bill contains a clearance regime for "collaborative activities". On its face, that regime appears very relevant for Project Kotahi, and its introduction may therefore lead to the elimination of any deemed detriments of Project Kotahi.

4.2. Allocative Efficiency Detriments

The formation of Kotahi would coordinate the actions of several buyers of container transport services. This would have the potential to create buyer power. If that was the case, then Kotahi may be able to exercise market power over suppliers of transport services, resulting in allocative efficiency detriments. We analyse the allocative inefficiency effects on each affected segment more carefully in section 5 of our report.

It is possible that Kotahi would provide services to competitors of the Kotahi partners. For example, Kotahi may provide services to another meat processor. Accordingly an issue to consider is whether Kotahi could somehow facilitate collusion in markets for the outputs produced by the partners and customers of Kotahi (e.g., meat products). Since Kotahi is only concerned with international container freight (and any domestic transport movements of those containers and products to/from containers), it is only international markets for these products that could be affected.

One theory might be that information exchange regarding export market destinations might facilitate such coordination, e.g., allocation of foreign output markets. However, it is not obvious why Kotahi would provide a better mechanism for this type of coordination than exists anyway, i.e., there are other ways in which competitors could exchange such information absent Kotahi. Moreover, the Kotahi information flows will be one-way, in that while a (non-Kotahi partner) customer would provide its information to Kotahi, that customer would be unlikely to receive information about (Kotahi partner) rivals' exports.

Indeed, we would expect Kotahi customers (non-partners) to be concerned about sharing their confidential information with Kotahi. Kotahi has confirmed that customer information will be quarantined, i.e., customer specific data will only be available to Kotahi management, service providers and the customer in question. Information provided to limited partners and their board representatives will be at an aggregated and anonymous level.

One argument might be that if all competitors in a particular industry were Kotahi partners then the problem of one-way information flows would not exist. However, even if this was

the case, and this facilitated output market collusion, it is unlikely that the colluding rivals would have market power in international output markets, due to the presence of other international rivals.

Finally, Kotahi would be focused on freight for international output markets, not freight for domestic output markets. Therefore even in the unlikely event that Kotahi would facilitate collusion, that collusion would relate to overseas markets for the products, not New Zealand markets.

4.3. Productive and Dynamic Efficiency Detriments

Project Kotahi would involve the participants coordinating their demand for one of their inputs, container transport services. The participants would otherwise continue to compete in their other markets, including their output markets and other transport markets. For example, Fonterra would continue to compete:

- With independent processors for raw milk supply;
- With Goodman Fielder and other suppliers in the domestic dairy (output) markets; and
- With international dairy companies (and New Zealand independent processors) in global dairy (output) markets.

In addition, Fonterra would continue to arrange its own domestic distribution, i.e., it would not coordinate this (ex-factory) transport with Goodman Fielder or other suppliers (rivals). Thus, there would be no effect on competition within these domestic and international dairy markets. The only services effected for Fonterra would be the container exports of dairy products and container imports of packaging and ingredients.

Similar points apply to Silver Fern Farms, which would continue to compete with foreign and domestic meat processors.

Accordingly Project Kotahi would have no material impact on the broad competitive pressures on Fonterra, Silver Fern Farms and other participants, to be productively and dynamically efficient.

5. Specific Market Benefits and Detriments

5.1. Introduction

Having outlined the generic benefits and detriments of Project Kotahi, we now analyse more specifically the affected segments, as the benefits and detriments do vary among them. We have defined three relevant segments:

- Ocean carriage, being the transport of containers from a New Zealand port to an overseas port;
- New Zealand ports; and

- Domestic carriage, being the transport of containers between two New Zealand destinations (one of which may be a port) and the transport of products to/from containers. Within domestic carriage we analyse trucking, rail and coastal carriage (shipping). We have not carefully analysed the relevant antitrust market definition, but we think there is likely to be a degree of substitutability between these transport modes, depending on distance, time sensitivity and transaction costs.

5.2. Ocean Carriage

Arrangements between ocean carriers are currently exempted from the Commerce Act (section 44(2)). Also, Fonterra has provided us with evidence that regular weekly ocean carriage capacity for New Zealand has reduced by approximately 28% from 2008 to 2010, which we note from Figure 3.1 above coincides with a general increase in exports. While we understand that some of this capacity has been replaced, this is by vessels with more irregular services (and reduced origin and destination port coverage). Reduced capacity is likely to result in higher prices, particularly in light of the increasing exports depicted by Figure 3.1.

In light of these factors, and the likelihood that ocean carriers can relatively easily switch further capacity away from New Zealand,[32] it seems unlikely that Kotahi would have the ability to push ocean carriage prices below the competitive level.

Furthermore, it is our understanding that the ocean (container) carriers are all foreign-owned. Therefore any increase in the bargaining power of New Zealand exporters over the ocean carriers can (generally) be considered a public benefit.[33, 34]

New Zealand is a small market for ocean carriers (1% of annual global container throughput, according to the Shippers' Council),[35] and is likely to be expensive to service, given its geographic isolation. New Zealand is currently serviced (on a regular basis) by relatively small ships, being those up to 4,100 TEU.[36] To put this into perspective, major trading lanes

---

32 Subject to demand on other routes.

33 The "generally" caveat relates to the likelihood that there may be some foreign financial interest in Kotahi participants, meaning that some of the extracted surplus may just be a transfer between foreigners.

34 There is a literature discussing a potential "waterbed effect" when buyer power is exercised. The proposition is that the price advantage bargained by the strong buyer results in it taking downstream market share from its rivals, which in turn reduces their bargaining power with suppliers. Whether or not this proposition is valid, a waterbed effect is unlikely in the present case, because the rivals of Kotahi partners would have the option of using Kotahi's services (as customers). For examples of the literature, see Inderst, Roman and Valletti, Tommaso M., "Buyer Power and the Waterbed Effect" (March 2011), *The Journal of Industrial Economics*, Vol. 59, Issue 1, pp. 1-20, 2011 (available at SSRN: http://ssrn.com/abstract=1794832 or doi:10.1111/j.1467-6451.2011.00443.x); and Zhiqi Chen, "Dominant Retailers and the Countervailing-Power Hypothesis," *RAND Journal of Economics*, 34, 4 (Winter 2003): 612-625.

35 New Zealand Shippers' Council (2010), *The Question of Bigger Ships: Securing New Zealand's International Supply Chain*, page 6.

36 New Zealand Shippers' Council (2010), *The Question of Bigger Ships: Securing New Zealand's International Supply Chain*, page 8.

are serviced by ships up to 14,000 TEU,[37] with reports of 18,000 TEU ships to be operated by Maersk in 2013.[38]

According to the Australian Government Productivity Commission (2005), larger ships have lower average costs per TEU because:[39]

- The capital cost of a ship does not increase linearly with ship size;
- Fuel costs do not increase linearly with ship size;
- Crew size changes little with the ship size; and
- There are economies of engine size, crew accommodation and navigational equipment.

By coordinating, aggregating and focusing freight volumes on a smaller number of ports, Project Kotahi should:

- Increase the attractiveness of New Zealand ocean shipping routes to the ocean carriers, by improving scale, lowering risk and reducing multiple stops;
- Increase utilization of ships, and encourage the use of larger ships, with lower average costs (including fuel and therefore carbon emissions); and
- Increase competitive tension between the ocean carriers (while there might be fewer, larger ships, the attractiveness of entering the market would be increased by Kotahi, keeping competitive pressure on the incumbents).

Furthermore, according to the New Zealand Shippers' Council, New Zealand is at risk of being marginalized by the shipping companies, and becoming a spoke to Australian port hubs.[40,41] This is at least partly because certain Australian ports are already undertaking significant investment to become 7000 TEU ship capable. The Shippers' Council argues that hubbing through Australia prior to reaching major international hub ports such as Singapore would raise transport costs for New Zealand exporters and importers (for example, additional handling or transhipment charges would be incurred at the Australian port and if a longer route is taken there would be additional fuel costs).

---

37 New Zealand Shippers' Council (2010), *The Question of Bigger Ships: Securing New Zealand's International Supply Chain*, page 8.

38 See http://www.worldslargestship.com/

39 See, e.g., section D.1 of Australian Government Productivity Commission (2005), *Review of Part X of the Trade Practices Act 1974: International Liner Cargo Shipping*, No. 32, 23 February 2005.

40 See, e.g., page 17 and page 29 of New Zealand Shippers' Council (2010), *The Question of Bigger Ships: Securing New Zealand's International Supply Chain*.

41 In fact, Maersk Line New Zealand managing director Julian Bevis is quoted as stating he "believes there is even a long-term possibility the country may lose all direct international callers and accede to a feeder role via Australia" (http://www.portstrategy.com/news101/australasia/nz-ports-future-under-scrutiny).

Hubbing through Australia would also probably extend transport times and reduce reliability. This would be particularly problematic for perishable products, and would more generally increase holding costs for shippers. By way of example, the Shippers' Council notes that transit delays for chilled meat would reduce its economic value by up to 50% and make export of chilled product an unviable business model.

Project Kotahi would reduce this marginalization risk by facilitating and speeding up the required investment in New Zealand ports.

As a final comment, Project Kotahi might have external effects on exporters and importers who are not partners in Kotahi or who otherwise do not purchase its services. Some of these external effects might be negative. For example, in the same way that the Shippers' Council worries about the costs of New Zealand ports becoming feeders to Australian hubs, there may be some New Zealand shippers who would be concerned about their local port becoming a feeder to one of the New Zealand 7000 TEU capable ports.

On the other hand, there would also likely be significant positive external effects, as even shippers outside of Kotahi may benefit from the larger ships visiting New Zealand (and they are likely to have the option of joining Kotahi as customers or partners).

Whether a particular (non-Kotahi using) shipper is likely to be better or worse off as a result of Project Kotahi would depend on that shipper's location, product and shipping origin/destination, among other things. But on the basis of:

- The quantification in section 6 of this report finding that the benefits of lower ocean shipping costs are likely to materially exceed the detriments of higher domestic transport costs; and

- Fonterra's analysis that for every $[ ] it spends on landside logistics, it spends $[ ] on ocean carriage;

it seems reasonable to assume that the externalities would be positive on balance.

5.3. Ports

For the reasons already discussed, ocean carriage costs would likely reduce if 7000 TEU ships could be attracted to New Zealand. However, at the moment no New Zealand port has the infrastructure to berth such a ship (for example, approach depths are too shallow).

It is likely that the required infrastructure investment would occur earlier under the factual (Project Kotahi) than under the counterfactual (no Project Kotahi). Consider the investment incentives under the counterfactual, using a game theoretic framework. If one port did make the required investment and consequently attracted significant new volumes of freight, then the investment might be profitable. However, if one port did make that investment, then others would probably feel that they needed to follow suit for competitive reasons. Accordingly, the freight would continue to be split, and the investments might not be profitable. Anticipating this reaction from other ports, no single port would want to make the investment in the first place.

By aggregating freight volumes at certain ports, Project Kotahi should assist in underwriting investments in port infrastructure, such as dredging to enable 7000 TEU ships to service New Zealand.

5.4. Domestic Carriage

5.4.1. Trucking

In line with the case studies described earlier, Project Kotahi is likely to result in trucking utilization improving, lowering average costs and carbon emissions, and freeing up resources.

Depending on the container volumes that Kotahi controls, it might be able to exercise market power over trucking firms. However, the extent of any allocative inefficiency resulting from the exercise of buyer power is likely to be immaterial, as the level of aggregation in trucking is likely to be very small. Using data on total road freight volumes from the 2008 National Freight Demands Study (NFDS)[42] and Fonterra's own data on its road freight volumes, we estimate (see Appendix A) that Fonterra's annual volume of export cargo transported by road represents approximately [ ]% (by tonne-kms) of all road freight transported (including cargo transported for both domestic and export and import markets).[43] Similarly we estimate that Silver Fern Farms' annual volume of export cargo transported by road is only [ ]% of all road freight transported. The extent of aggregation in road transport would therefore be very small, as would Kotahi's market share of road transport (at [ ]%). While we have estimated aggregation based only on Fonterra and Silver Fern Farms in this instance, even if all meat and horticulture exports (with road freight volumes estimated from NFDS data) were partners in Kotahi, its market share of all road freight would only be [ ]%.

Furthermore, even if the level of aggregation was material, there would be a limit to how much buyer power Kotahi could exert over trucking firms, because Kotahi would have an interest in ensuring that trucking firms earn sufficient cash to continue investing and maintaining a high level of service.

The exercise of buyer power would amount to Kotahi extracting "economic rent" from the supply-side of the market, i.e., from the trucking firms. As Noll (2005) notes, a necessary condition for the exercise of buyer power to generate excess profits is the presence of these rents.[44] The forms of rent that could be extracted are Ricardian rents (loosely, rents earned by a firm with relatively low costs), quasi-rents and monopoly rents. While we have not studied the trucking market carefully, we would be surprised if there were monopoly rents in the New Zealand trucking market, as it is likely to be workably competitive.[45] There might be some

---

42 Richard Paling Consulting (2008), "National Freights Demands Study", Report prepared for Ministry of Transport, NZ Transport Agency and Ministry of Economic Development, September.

43 These market shares assume that the market is appropriately defined to include all forms of truck transport, and not just container transport by truck. For supply-side substitutability reasons, this seems like a reasonable assumption.

44 Roger Noll (2005), "Buyer Power and Economic Policy", *Antitrust Law Journal*, 72, 589-624.

45 Rockpoint (2009, 9) states: "The market for road transport is intensely competitive, evidenced by the low average profitability achieved by owner drivers and small truck fleet owners." Rockpoint Corporate Finance Ltd (2009) "Coastal Shipping and Modal Freight Choice", report for the NZ Transport Agency.

Ricardian rents, but the main source of rent that could be extracted by Kotahi would likely be quasi-rents – rents that allow trucking companies to earn a return on their investments, including the sunk costs of capital expenditure. (Note that costs here are sunk if they "cannot quickly be switched to other productive uses without occurring any switching costs" – Noll, 2005, p.601).

As Noll (2005) explains, a firm with buyer power can extract quasi-rents in the short-run, but this cannot be sustained in the long-run. The investments will eventually wear out or become obsolete, and since suppliers do not receive sufficient quasi-rents to recover their investment, they will not re-invest. This might also eventually force some suppliers to exit the market. Thus as Noll (2005, p.621) states: "in the long run monopsonists have a positive incentive to keep suppliers in business, and so will find it in their interest to make certain that purchase contracts enable suppliers to recover their costs".[46]

5.4.2. Coastal Carriage

A likely outcome of Project Kotahi is a greater concentration of export container flows to a smaller number of ports than is the case today. This might result in the average export container moving further domestically than it does today, with the idea being that the saved ocean carriage costs more than offset the potentially higher domestic transport costs.

Greater domestic transport distances are likely to mean a switching of some volumes from road to rail and also potentially to coastal shipping, including New Zealand-owned firms. The relevant effects would include:

- More resources used to provide coastal carriage, e.g., more fuel, and potentially over time more ships;
- Lower externalities per tonne-km, particularly CO_2, accidents and congestion. Rockpoint (2009, 207) estimates that externality costs (excluding congestion) are 1.4 cents per tonne-km for (heavy vehicle) road, 0.2 cents per tonne-km for rail, and 0.1 cents per tonne-km for coastal carriage; and
- Potential allocative inefficiency if Kotahi is able to exercise buyer power over coastal carriers (subject to the same type of constraints discussed above in respect of trucking). It is not clear to us at this stage though that this impact would be material or relevant. We understand that neither Fonterra nor Silver Fern Farms currently use New Zealand-owned coastal carriers for export containers,[47] but instead use the ocean carriers for coastal shipping, as this is more cost-effective for export containers.[48] In this regard, the discussion of increased buyer power under section 5.2 of this report is likely to be relevant.

---

46 See also OECD (2008), "Monopsony and Buyer Power", DAF/COMP(2008)38 at p.22.

47 Although New Zealand-owned coastal carriers are used by Fonterra for domestic transportation of imported packaging and ingredients.

48 This is perhaps why the NFDS data that we analyse in Appendix A does not record any movements by coastal shipping for either the dairy or meat industries.

5.4.3. Rail

As already noted, potentially greater domestic transport distances under Project Kotahi are likely to mean some switching of volumes from road to rail – the evidence is that rail becomes more competitive with road the greater the transport distance.[49] An illustration of this is that the average haul length for rail is roughly 100km greater than it is for road freight.[50]

The relevant effects would include:

- More resources used to provide rail transport, e.g., more fuel, and potentially over time more trains. However, the need for new trains would be mitigated by improved utilization. Kotahi would balance import and export flows that already travel by rail, thus reducing the occurrence of empty return legs;[51] and

- Lower externalities per tonne-km, particularly CO_2, accidents and congestion, as discussed above.

KiwiRail is the only supplier of rail services in New Zealand, and so is likely to have a degree of countervailing power against Kotahi, at least if rail is considered a separate market from the other domestic transport modes. Furthermore, rail in New Zealand has a history of failing to earn its cost of capital,[52] and so there are unlikely to be any monopoly rents for Kotahi to extract. Accordingly Kotahi's ability to exercise buyer power against KiwiRail would also be constrained by the quasi-rent issue discussed above in respect of trucking.

In addition, as with road, any allocative inefficiency from the exercise of buyer power by Kotahi is likely to be limited by the very small aggregation that occurs. As we show in Appendix A, Fonterra's use of rail transportation for export cargo amounts to approximately [ ]% of rail freight, while the equivalent figure for Silver Fern Farms is [ ]%. Even if Kotahi were to include all meat exporters and all horticultural exporters, the level of aggregation in rail transportation would remain small, with Kotahi having only a [ ]% share (as shown in Appendix A).

Finally, while Heatley (2009) is skeptical of some of the New Zealand Government's claims about the environmental benefits of rail, he does state (page 66):[53]

---

49 For a discussion in the context of New Zealand rail, see Dave Heatley (2009) "The history and future of rail in New Zealand", *New Zealand Institute for the Study of Competition and Regulation Research Report*, and section 18.3 of Rockpoint (2009) "Coastal Shipping and Modal Freight Choice", *Prepared for the New Zealand Transport Agency*.

50 See, e.g. Table 6.8 of Booz Allen Hamilton (2002), "Development of a New Zealand National Freight Matrix", *Land Transport New Zealand Research Report 283*.

51 These empty legs occur when, for example, Fonterra sends an empty train south from Auckland to pick up dairy products and brings it back to Auckland for export.

52 See Dave Heatley (2009) "The history and future of rail in New Zealand", *New Zealand Institute for the Study of Competition and Regulation Research Report*.

53 Dave Heatley (2009) "The history and future of rail in New Zealand", *New Zealand Institute for the Study of Competition and Regulation Research Report*.

The physical characteristics of rail transport offer energy efficiency and environmental advantages over road transport. Within a future scenario of increasing demand for freight, increasing fuel prices, increasing road congestion and greenhouse emission constraints, modal shift from road to rail appears to be an attractive proposition. Large-scale modal shift has been elevated to a key target of the government's National Transport Strategy; however the Strategy is strangely silent on how a shift of this magnitude is to be achieved.

6. Quantification of the Benefits and Detriments of Kotahi

6.1. Introduction

In this section we quantify, to the extent possible at this stage, the benefits and detriments of Kotahi.

As we discussed earlier, the aggregation of freight volumes is likely to improve the utilization of ocean container ships and lower ocean carriers' risk, leading to cost reductions for carriers. In effect, fewer resources would be needed to provide the same ocean carriage services. While these reduced resources would be foreign-owned and therefore the reduction would not be a direct benefit to New Zealand, we would expect Kotahi (and other shippers) to appropriate some of the increased surplus, resulting in a benefit to New Zealand. Furthermore, as discussed earlier, any increase in bargaining power by New Zealand shippers over ocean carriers would allow a greater appropriation of any increase in surplus, and this can generally be considered a benefit to New Zealand.

While this benefit would be realized for the current configuration of small ships servicing New Zealand, it would also encourage the use of larger ships with lower average costs. Our initial approach to quantifying this benefit is therefore to draw on the analysis in the Shippers' Council report, which estimates the net benefit of larger ships servicing New Zealand. In doing so we also capture some of the other effects identified in the qualitative discussion earlier:

- The benefit arising from mitigating the risk of hubbing through Australia;
- The detriment arising from the increased infrastructure investment required at ports to accommodate larger ships; and
- The detriment arising from the increased domestic transport resources required to aggregate cargo volumes at the ports serviced by larger ships.

The other benefit that we have quantified, which is not captured in the Shippers' Council estimate of the benefit of larger ships, is that arising from increased utilization of domestic transport services e.g., by reducing empty return legs for road and rail, thereby lowering transport costs.

To this point we have not quantified the effect of Project Kotahi on domestic transport externalities (e.g., CO_2 emissions, accidents and congestion). While containers would on

average move further domestically under Project Kotahi than they would under the counterfactual, there would also likely be some switching away from road to rail and coastal shipping, which per tonne-kilometre have lower externalities. Furthermore, improved utilization would reduce externalities.

6.2. Net Benefit of Large Ships

6.2.1. Shippers' Council Cost Saving Estimates and NERA Adjustments

The Shippers' Council has quantified the benefits of larger ships visiting New Zealand, arising from combining the capacity of existing shipping services. The Shippers' Council quantification approach estimates the total supply chain costs for shipping (estimated) 2010 volumes for the three current weekly South East Asia services, and estimates the cost savings that could be achieved if larger ships were used for that same volume of cargo. We have not reviewed the detailed assumptions and calculations undertaken by the Shippers' Council, as the description of the methodology in its report is insufficient to fully replicate its approach.[54] However, the broad approach taken by the Shippers' Council, of estimating cost savings from larger ships, appears to us to be reasonable. We therefore report the results of the Shippers' Council estimation, subject to some of our own modifications discussed below, as a high-level indication of the likely benefits of larger ships.

The Shippers' Council estimates of the total supply chain costs consist of the following cost categories:

- Ship voyage costs: these are the operating cost, capital costs, fuel costs and port costs to the ocean carriers. As the ocean carriers are foreign-owned, any savings in ship voyage costs are not necessarily a benefit to New Zealand in their entirety. The extent of pass-through to New Zealand shippers depends on factors such as the level of competition and the shape of the demand curve. There is a well-known paper by Hausman and Leonard (1999) finding that a monopolist with a linear demand curve will pass-through 50% of any variable cost savings (and all other "typical" demand curves will yield greater pass-through).[55] In the present case, not all of the cost savings would be variable (at least in the short-term). On the other hand, the ocean carriage market is not a monopoly, and Kotahi may have some bargaining power. On balance we think it is appropriate (and conservative) at this stage to assume that 50% of any ship voyage cost savings achieved by larger ships would be passed through to New Zealand exporters and importers (and would therefore be a benefit to New Zealand);

- Carbon costs: this is the social cost of CO_2 emitted by the ocean freight services for New Zealand export and import cargo. Emissions from international marine travel are exempt

[54] We note also that, while we have not been able to make any changes to the data underlying the Shippers' Council calculations, there is some data that would warrant further investigation as to whether it could be updated, such as the bunker fuel price, NZ-US exchange rate, and the international price of CO_2.

[55] Jerry A. Hausman and Gregory K. Leonard (1999), "Efficiencies from the Consumer Viewpoint", *George Mason Law Review*, 73, 707-727.

from both the New Zealand Emissions Trading Scheme and the Kyoto Protocol,[56] so a separate calculation of the social cost of carbon emissions is appropriate in this instance;

- Cargo aggregation costs: these are the costs of transporting cargo by road/rail/coastal shipping to aggregate it at a big-ship capable port. As noted above, this captures the detriment of increased domestic transport resources required to aggregate cargo. We assume that these costs would be incurred by the shippers (i.e., New Zealand exporter and importers) and therefore any cost increases are detriments to New Zealand in their entirety;

- Time costs: these are the additional costs of holding inventory and the depreciation costs of perishable goods, both of which the Shippers' Council estimates are larger with big ships due to the additional time needed to move goods by road/rail/coastal shipping from each region to the big-ship capable export port. The Shippers' Council quantifies these as the costs incurred by shippers, and they can therefore be considered an additional cost to New Zealand;

- Port investment costs: as noted above, the port investment cost is a detriment (although it allows larger ships, which itself is a benefit). The Shippers' Council estimates the average investment cost necessary for ports to become big-ship capable, and converts this to an annualised figure based on depreciation and a cost of capital. For our purposes we have removed the annualised port investment cost from the Shippers' Council figures, and instead taken the entire average investment cost in the year it is incurred (which, as we discuss further below, we assume is one year before large ships start servicing New Zealand). The Shippers' Council uses a different port investment cost for each of three different scenarios that it analyses, and we discuss as follows how we have applied these costs to our own analysis:

  – Consider first the Shippers' Council scenario 3, which assumes one weekly 7000 TEU service and one weekly 2700 TEU service. In this scenario the Shippers' Council uses an annualised port investment cost of $48 per TEU. The Shippers' Council notes that in order to service 7000 TEU ships, two of New Zealand's ports would need to invest, and it estimates that the average investment cost required to be 7000 TEU ship capable is $109m per port. For our purposes we therefore assume that the upfront investment cost is $218m i.e., $109m for each of the two ports;

  – Shippers' Council scenario 2 assumes one weekly 6000 TEU service and one weekly 4100 TEU service. The Shippers' Council uses an annualised port investment cost of $22 per TEU. It is not clear how this number is derived, but relative to the $48 for scenario 3, it is likely that some smaller investment cost is assumed since the required ship size is smaller. For our purposes we assume that half of the $218m investment cost from scenario 3 is incurred upfront in scenario 2 i.e., $109m for both ports ($54.5m each); and

[56] See http://www.climatechange.govt.nz/emissions-trading-scheme/participating/fossil-fuels/faq.html

- Shippers' Council scenario 1 assumes two weekly 5000 TEU services. In this scenario the Shippers' Council uses a zero annualised port investment cost, presumably on the basis that some ports in New Zealand can support 5000 TEU ships that are not fully laden and the volumes will be such that this is the case. For our analysis we also assume that no upfront port investment cost is required in this scenario.

- Landside infrastructure investment costs: The Shippers' Council also includes a discussion of whether any landside infrastructure investment is necessary to support larger ships. It concludes that no rail, road or coastal shipping infrastructure is necessary, beyond that which is already planned, and therefore it does not include any additional cost of landside infrastructure in its port investment cost estimate; and

- Overseas transhipment costs: for a scenario where goods are hubbed through Australia, the Shippers' Council estimates the cost of overseas transhipment in Australia. We understand that this cost is incurred by the ocean carriers, and we assume that the entire cost is passed-through to New Zealand shippers. The Australian hubbing scenario assumes that small ships continue to be used for ocean carriage of cargo from New Zealand to Australia, but the cargo is then shipped on larger ships from Australia to Singapore. Note also that the other costs outlined above are also included in the Australia hubbing scenario, with the exception of port investment costs and cargo aggregation costs (since no New Zealand investment or aggregation occurs in the Australia hubbing scenario).

The Shippers' Council calculates these total supply chain costs for three different big ship scenarios, and estimates cost savings (per TEU) relative to both the status quo and a counterfactual where New Zealand ocean container cargo is hubbed through Australia (while retaining the same ship sizes between New Zealand and Australia as in the status quo). The Shippers' Council then determines total cost savings by multiplying cost savings per TEU by the total volume of import and export containers shipped through South East Asia in 2010 (at an estimated 508,000 TEU). A summary of the supply chain costs per TEU is shown in Table 6.1, with most entries taken directly from the Shippers' Council report with the exception of the ship voyage cost and port investment costs, which are adjusted as described above.

Table 6.1
Shippers' Council Supply Chain Costs per TEU and NERA Adjustments

Cost per TEU (NZD)	Status Quo	Scenario 1	Scenario 2	Scenario 3	Australian hubbing
Ship voyage cost savings to NZ shippers (50% pass-through), relative to status quo	$0	$162	$157	$193	$161
CO_2 emission costs	$49	$29	$32	$27	$37

Overseas transhipment costs	$0	$0	$0	$0	$400
Upfront port investment cost	$0	$0	$109m	$218m	$0
Incremental[57] depreciation cost of perishable goods	$0	$11	$9	$4	$52
Inventory holding costs	$106	$120	$114	$112	$172

Source: Shippers' Council Table 6 and NERA Analysis

6.2.2. Net Present Value of Large Ship Benefits

The Shippers' Council report notes the benefits of large ships are unlikely to be realized immediately as no New Zealand port is currently capable of supporting large ships and the necessary infrastructure investment will take time. The Shippers' Council estimates that at least two to three years of lead time would be required for ports to acquire resource consents and complete the capital works necessary to be big-ship capable, with the capital works taking only one year to complete once resource consent has been approved. We therefore assume that these net benefits are not achieved until year four (2015) following the point at which Kotahi is operational (which we assume to be 2012); and that the upfront port investment cost to accommodate large ships is incurred in the year prior i.e., 2014.

It is important to note that the timing of the benefits and detriments of Project Kotahi are not well matched. In particular:

- The port investment costs would be a one-off detriment in year 3 (2014); and
- The large ship benefits would commence in year 4 (2015), and be repeated for either three years or indefinitely, depending on the scenario (as discussed further below).

It is common in benefit-detriment calculations of this sort to analyse benefits and detriments over a five-year time period, as benefits and detriments incurred after this period become more uncertain. However, because of the mismatch in the timing of benefits and detriments of Project Kotahi, and the continuation of the benefits beyond year 5, such an approach in the present case would present an inaccurate assessment of the net benefits of Project Kotahi. We think, therefore, that it is warranted in this circumstance to take a longer time period for our analysis – we adopt eight years, which takes our analysis out to 2019.

We estimate the benefits of large ships arising in the factual (with Kotahi) relative to two alternative counterfactuals:

[57] While it is not explicitly stated in the Shippers' Council report, it appears that the depreciation cost is the incremental depreciation cost relative to the status quo (which records a value of zero).

- The status quo, where New Zealand continues to be serviced by small ships in the short term,[58] but at some point container volumes grow to a point where they are sufficient to incentivize port investment and bring large ships to New Zealand. The Shippers' Council report notes the possibility of larger ships being accommodated through cargo volume growth, and estimates that volumes could be large enough by 2015. However, we assume that in this counterfactual it still takes three years lead time from that point for the investment to occur, and thus the large ship benefits are first achieved in 2018 in this counterfactual (with the port investment cost being incurred in 2017). Thus, for the years 2018 and 2019 in our analysis, the benefits from large ships servicing New Zealand in the factual are exactly offset by the same benefits in the counterfactual. In other words, the key benefit of Project Kotahi under this scenario is the bringing forward of large ship benefits by three years. Likewise the (port) cost in this scenario is just the timing difference between the cost of port investment incurred in 2014 in the factual and 2017 in the counterfactual; and

- The Australian hubbing counterfactual, where small ships continue to be used for ocean carriage of cargo from New Zealand to Australia, but the cargo is then shipped on larger ships from Australia to Singapore. We assume in this scenario that New Zealand does not become a hub to Australia until 2015, and thus in the first three years of our model (2012-2014) the costs incurred are those under the status quo. This assumption is conservative,[59] as at least one Australian port is already capable of servicing big ships.[60] Since there are no big ships servicing New Zealand in this counterfactual, there are no costs incurred for port investment and no benefits from big ships incurred at any point in our timeframe.

The Shippers' Council uses 2010 volumes to estimate the cost savings from large ships, and we therefore assume that the figures noted in Table 6.1 above are in 2010 real dollars. We have also assumed that these 2010 figures are unchanged in real terms (equivalently, costs increase at the rate of inflation), and thus we apply the above net cost savings in real terms to the 2012-2019 timeframe of our model.

Our approach is to estimate total costs for each scenario in the factual and both counterfactuals by multiplying the costs per TEU by the estimated volume shipped in each year of our analysis. Cost savings (equivalently, net benefits) of larger ships can then be determined by comparing the factual costs with counterfactual costs. We have estimated New Zealand container volumes shipped through South East Asia in these years by assuming

---

58 We note that the status quo is likely to differ slightly from what is analysed in the Shippers' Council report, as Maersk has recently replaced its 4100 TEU vessels with 2900 TEU vessels (see http://www.maerskline.com/link/?page=news&path=/news/story_page/11/New%20Zealand). All else equal, we would expect the 2900 TEU vessels to have higher average costs, and therefore the cost savings in the factual relative to the status quo would be even larger than we have calculated.

59 If Australian hubbing occurred in, say, 2012 the net benefits of Kotahi would begin accruing in that year, since even without big ships in New Zealand in the factual in 2012, there would still be cost savings relative to hubbing through Australia.

60 The Port of Melbourne completed channel deepening in 2009 giving shipping channels with 14 metres draught at low tide, which we understand allows 7000 TEU ships at high tide or at low tide if not fully laden. See http://www.portofmelbourne.com/channeldeep/

the 2010 container volumes grow at the rate of 4.5% per annum. This is based on the analysis in the Shippers' Council report where:

- The growth rate of exports is taken as 4% per annum, based on the mid-point of the Ministry of Agriculture and Forestry's 3% per annum projected growth rate for agriculture and forestry export volumes and the Ministry of Transport's long-term export growth projections of 5% per annum (as well as growth rates used by a number of ports in their expansion plans); and

- The growth rate of imports is taken as 5% per annum, based on a United Nations study showing containerized import trade growth increases by 1.5% for every 1% per annum increase in GDP, and a projected GDP rate of 3.4% per annum until 2020.

We have taken the midpoint of the 4% and 5% figures as we do not have data on the relative weight of exports to, and imports from, South East Asia.

The resulting net benefits are shown in Table 6.2. In present value terms (using a 10% real discount rate) the net benefits of Kotahi relative to the status quo (delayed large ship visits) range from $78m to $204m, while relative to Australia hubbing the net benefits range from $814m-$959m. The net benefits are considerably larger for the Australian hubbing counterfactual because of the higher costs of hubbing through Australia, in addition to the result that big ships do not occur at any point during this counterfactual, so the benefits of the factual continue through to 2018 and 2019. Note also from Table 6.2 that, in the status quo counterfactual, the port investment cost is incurred in 2017, and this shows up in the larger net benefit numbers in 2017 for scenarios 2 and 3. That is, the net benefits in the factual in terms of cost savings in 2017 are approximately $51m and $127m respectively, but when the (avoided) cost of port investment in the counterfactual is also included, these benefits increase to $160m and $354m respectively as shown in the table.

Table 6.2
Net Cost Savings from Large Ships in the Factual Relative to Counterfactuals

	2012	2013	2014	2015	2016	2017	2018	2019	Net present value (2012)
Net benefits of Kotahi relative to the status quo of delayed large ship visits									
Scenario 1	$0	$0	$0	$47m	$48m	$51m	$0	$0	**$100m**
Scenario 2	$0	$0	-$109m	$47m	$49m	$160m	$0	$0	**$78m**
Scenario 3	$0	$0	-$218m	$116m	$121m	$354m	$0	$0	**$204m**
Net benefits of Kotahi relative to Australian hubbing									
Scenario 1	$0	$0	$0	$266m	$278m	$290m	$303m	$317m	**$903m**
Scenario 2	$0	$0	-$109m	$266m	$278m	$290m	$303m	$317m	**$814m**
Scenario 3	$0	$0	-$218m	$335m	$350m	$366m	$383m	$400m	**$959m**

Finally, we note that the net benefits of larger ships estimated above only relate to container volumes on South East Asia services. As the Shippers' Council notes (p.44) there are other services to North Asia, the Americas and Australia on which these benefits can be realized. The figures above are therefore likely to be an underestimate of the net cost savings that can be achieved from larger ships servicing New Zealand. One approach to estimating the benefits on these other services is to assume that the unit cost savings per TEU are the same as estimated above for South East Asia, and apply these unit cost savings to volumes shipped through North Asia, the Americas and Australia. We have not undertaken this approach, as we have yet to fully assess whether there are other aspects which would make such an extrapolation difficult.

6.3. Net Benefit of Increased Utilization of Domestic Transport Services

As we have discussed earlier, coordination and aggregation of container volumes is likely to increase the utilisation of domestic transport services provided by all three domestic container transport modes of road, rail and coastal shipping. The increase in utilisation is likely to come from both reducing the occurrence of empty legs to reposition containers, and from better utilising the capacity of existing transport services. This can be considered a benefit to New Zealand as it frees up transport resources and lowers fuel costs.

In the Shippers' Council calculations discussed above, the additional costs of cargo aggregation are estimated on the basis of an increase in domestic transport costs as container cargo is now transported to the big-ship capable ports (rather than simply the closest port). As confirmed in discussions with two of the key authors of the Shippers' Council report,[61] the Shippers' Council analysis does not cover the increased utilization benefits of improved coordination – rather, the Shippers' Council cargo aggregation costs are determined with the status quo utilisation held constant. Therefore it seems appropriate to separately quantify these benefits.

Our approach to quantifying the benefit of increased utilisation is to draw on the case studies noted earlier which indicate that cost savings from horizontal collaboration in transport services are in the order of 10-30% of transport costs. The case studies we have reviewed do not imply that these cost savings arise from any increased buyer power of the horizontal collaborators over transport providers; rather, we assume that the cost savings are the result of improved coordination and utilisation of transport services.

Indeed, we note that studies in the operations research and transportation literature find similar cost savings, some of which are specifically attributable to the increased utilisation arising from horizontal transport collaborations. In particular:

- Cruijssen and Salomon (2004) estimate the cost savings from road transportation companies sharing orders to better match supply and demand, noting that these cost

[61] Nancy So and Peter Morris.

savings come from more efficient use of trucking resources.[62] Based on both a case study of road transportation for Dutch flower auctions and a simulation model, the authors conclude that cost savings generally range from 5% to 15% and are sometimes even higher;

- Krajewska et al (2008) estimate numerical solutions to a theoretical model of cooperation between transport operators.[63] For cooperation between two operators the authors show cost savings of 12%, and for various other simulation scenarios with cooperation between two to five operators they show cost savings of 20-30%. Using real-world data from freight forwarders in Germany they also show collaboration of three operators reduces costs by between 10-20%; and

- Ergun et al (2007) use a theoretical model to estimate the cost savings from minimizing truck repositioning of empty trucks to be in the range of 5.5% to 13%.[64]

To be conservative, we use 10% as the cost savings arising from increased utilisation of domestic transport services due to Kotahi. Ideally, these cost savings would be applied to the (factual) costs of Kotahi that are higher than counterfactual costs due to the cargo aggregation discussed above. However, we do not have the data to estimate these factual costs as there is insufficient detail provided in the Shippers' Council report to allow us to determine the cargo aggregation costs that relate specifically to Kotahi. We only have data on Fonterra's and Silver Fern Farms' domestic transport costs in the (status quo) counterfactual, and only for road and rail, but to apply the 10% to these costs is conservative because:

- We have not included coastal shipping costs;

- We have not included the costs of other Kotahi partners;

- We have not accounted for the higher costs in the factual due to cargo aggregation; and

- The case studies and literature that we have reviewed show cost savings of up to 30% have been achieved.

Fonterra has provided us with its expenditure on road transport of container cargo for the year ended 31 July 2011 of $[ ] and its expenditure on export rail freight for the year ended 31 March 2011 of $[ ]. For Silver Fern Farms, its 2010 calendar year expenditure on container road freight was approximately $[ ] and on container rail freight was approximately $[ ]. As an approximation we ignore the slight mismatch in the timing of these costs, and apply 10% to the total costs, yielding an annual cost saving of $[ ]. Over the 2012-2019 period of our

---

62 See p.6 and p.8 of Frans Cruijssen and Marc Salomon (2004), "Empirical study: Order sharing between transportation companies may result in cost reductions between 5 to 15 percent", CentER Discussion Paper No. 2004-80, available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=607062

63 M. A. Krajewska, H. Kopfer, G. Laporte, S. Ropke, and G. Zaccour (2008), "Horizontal cooperation among freight carriers: request allocation and profit sharing", *Journal of the Operational Research Society*, 59, 1483-1491.

64 O. Ergun, G. Kuyzu, and M. Savelsbergh (2007), "Reducing Truckload Transportation Costs Through Collaboration", *Transportation Science*, 41(2), 206-221.

analysis, the benefit of increased utilisation is the present value of these annual cost savings (at a 10% discount rate) of $[ ].

6.4. Summary and Sensitivity Testing

In summary, when both the net cost savings of large ships and the net benefits of increased utilisation are added, Project Kotahi is likely to result in net present value benefits of at least $[ ]m-$[ ]m if the counterfactual is delayed large ship visits, or at least $[ ]m-$[ ]b if the counterfactual is Australian large ship hubs.

We have tested the sensitivity of the above results to our assumptions regarding the rate of pass-through of cost savings to New Zealand shippers, and the annual growth rate of container volumes. In Table 6.3 we show the results for sensitivity to the pass-through rate. If the pass-through rate is very low, less than approximately 20%, the bottom of the net benefit range (given by the Shippers' Council scenario 2) becomes negative when the counterfactual is delayed large ship visits. Note also that the bottom of the net benefit range in the Australian hub counterfactual (which is given by the Shippers' Council scenario 2) decreases as the pass-through rate increases, because the ship voyage costs in scenario 2 are greater than those for the Australian hub counterfactual. Thus, because the cost savings for scenario 2 relative to the Australian hub counterfactual are negative, by increasing the pass-through rate it increases the magnitude of the (negative) cost savings, thereby lowering overall net benefits.

Table 6.3
Sensitivity Testing of Pass-Through Rate

	Range of net cost savings	
Pass-through rate	**Delayed large ship visits counterfactual**	**Australian hub counterfactual**
10%	[ ]	[ ]
20%	[ ]	[ ]
30%	[ ]	[ ]
75%	[ ]	[ ]
100%	[ ]	[ ]

In Table 6.4 we show the results from sensitivity testing the container volume growth rate. The net benefit results are not particularly sensitive to this assumption, with even the relatively low growth rate of 1% still showing large net benefits against both counterfactuals.

Table 6.4
Sensitivity Testing of Container Volume Growth Rate

	Range of net cost savings	
Container volume growth	**Delayed large ship visits**	**Australian hub**

rate	counterfactual	counterfactual
1%	[ ]	[ ]
3%	[ ]	[ ]
6%	[ ]	[ ]

Appendix A. Kotahi Market Share in Domestic Carriage

In section 5.4 we estimate the market share of Kotahi in domestic road and rail transportation, using data from the National Freight Demands Study. The NFDS reports total annual freight volumes for each of road (18.8 billion tonne-kms), rail (3.9 billion tonne-kms), and coastal shipping (4 billion tonne-kms) – see Table 1.1 of NFDS. These are total volumes for freight for both domestic markets and for imports and exports.

Fonterra has provided us with data on its own annual transport volumes over road and rail. For the year ending 31 July 2011, Fonterra road transport covered [ ]km, at an average of [ ] tonnes per truck, giving approximately [ ] tonne-kms. This includes container transport, transport of finished product to containers, and transport of imported packaging and ingredients, but it excludes transport of raw milk from the farm gate. For the same period, Fonterra transported approximately [ ] tonne-kms by rail.[65]

Similarly we have obtained data from Silver Fern Farms on road and rail transport volumes for container cargo. For the 2010 calendar year, Silver Fern Farms covered [ ]km by road and [ ]km by rail. Silver Fern Farms has also advised that the average weight per unit is [ ] tonnes for both road and rail, giving approximately [ ] tonne-kms transported by road and [ ] tonne-kms by rail.

In Table A.1 we calculate the share of these total freight volumes for the Fonterra and Silver Fern Farm volumes estimated above.[66]

Table A.1
Kotahi (Fonterra and Silver Fern Farms) share of road and rail transportation

	Road	**Rail**
Fonterra (tonne-kms)	[ ]	[ ]
Silver Fern Farms (tonne-kms)	[ ]	[ ]
Total Kotahi (tonne-kms)	**[ ]**	**[ ]**
Total freight volumes (tonne-kms)	18,800,000,000	3,900,000,000
Fonterra share of total freight (%)	[ ]	[ ]
Silver Fern Farms share of total freight (%)	[ ]	[ ]
Kotahi share of total freight (%)	**[ ]**	**[ ]**

[65] This figure includes some transportation of products to domestic markets, although this only makes up a very small portion. We have not been able to separately identify the domestic market volumes, and therefore the calculated market share figure is likely to be a slight over-estimate.

[66] Note that the Fonterra and Silver Fern Farm volumes do not include transportation of empty containers. However, it seems likely that the NFDS total freight volumes also exclude empty container transportation, and therefore our market share calculations are comparing like with like.

We have also estimated Kotahi share assuming all meat for export and all horticulture exported and imported is part of Kotahi. The estimate of horticulture and (total) meat freight volumes is based on data from the NFDS. For horticulture, from Table 3.70 of NFDS total domestic freight movements of horticulture are 4.2 million tonnes, of which 58% (2.4365 million tonnes, from Table 3.28 of NFDS) is exported and imported. Taking 58% of the total freight movements of horticulture of 1.07 billion tonne-kms yields 0.62 billion tonne-kms of horticulture products transported that relate to exports and imports. From Table 3.73 of NFDS, 93% of horticulture products are moved by road while 7% is moved by rail. If we apply these percentages to the above estimates of tonne-kms of export meat we determine that 577 million tonne-kms of horticultural products for export/import is transported by road and 43 million tonne-kms is transported by rail.

We undertake a similar calculation for meat: from Table 3.70 of NFDS total domestic freight movements of meat are 0.9 million tonnes, of which 97.5% (0.8773 million tonnes, from Table 3.26 of NFDS) is exported. Taking 97.5% of the total freight movements of meat of 0.24 billion tonne-kms yields 0.23 billion tonne-kms of meat products transported that relate to exports. From Table 3.73 of NFDS, 57% of meat products are moved by road while 43% is moved by rail. If we apply these percentages to the above estimates of tonne-kms of export meat we determine that 133 million tonne-kms of meat for export is transported by road and 101 million tonne-kms is transported by rail.

This then gives the results show in Table A.2, where we now include all horticulture and all meat exports in Kotahi's share of total freight.

Table A.2
Kotahi (dairy, meat and horticulture) share of road and rail transportation

	Road	**Rail**
Fonterra (tonne-kms)	[ ]	[ ]
All meat (tonne-kms)	133,349,600	100,597,067
All horticulture (tonne-kms)	577,276,464	43,450,917
Total Kotahi (tonne-kms)	**[ ]**	**[ ]**
Total freight volumes (tonne-kms)	18,800,000,000	3,900,000,000
Fonterra share of total freight (%)	[ ]	[ ]
Meat share of total freight (%)	0.71%	2.58%
Horticulture share of total freight (%)	3.07%	1.11%
Kotahi share of total freight (%)	**[ ]**	**[ ]**