DEVELOPMENT OF LOWER HARBOUR CHANNEL AT PORT CHALMERS

For

6,000 TEU SHIPS

ECONOMIC EFFICIENCY
&
ECONOMIC IMPACTS

Final Report

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Butcher Partners Ltd

ECONOMIC IMPACT – KEY POINTS

1. **The value of export cargo shipped through Port Chalmers in the last financial year (12 months to the end of June 2009) was $5.35 billion, or 14% of New Zealand's total export value. Port Chalmers is the country's third largest export port (by cargo value).**

2. **Port Otago itself currently generates direct economic output of $53 million per annum, $41 million of which is business and household income (including $21 million in wages & salaries), and 320 jobs. The inclusion of downstream multiplier effects means that operation of Port Otago currently generates regional output of $85 million per annum, $56 million of which is regional business and household income (including $26 million in wages and salaries), and generates 480 jobs in the region. In addition to this is all the employment and income generated by land freight taking cargo to and from the port.**

3. **New Zealand international cargo going to Singapore and beyond is expected to be carried on larger (6,000 TEU) ships from some time in the next decade. From an export cargo point of view it is strategically important that a South Island port be Port Chalmers. The major containerized export cargoes are, in order of importance, dairy, meat and by-products, wood products and wool. For each of these categories the "gravitational centre" of South Island production appears to be closer to Port Chalmers than to any other port.**

4. **If Port Otago is developed to enable it to handle these larger ships, then the region will benefit by having lower freight rates than if the cargo is shipped through Lyttelton or even Auckland or Tauranga. Even if Lyttelton has already been developed, at current cargo levels the net benefits for cargo being shipped from Otago and Southland through Port Chalmers rather than Lyttelton are expected to be $10.6 million per year, and by 2028 the benefits are expected to be $44 million per year. The Net Present Value of these benefits is estimated to be $202 million.**

5. **If the alternative port to Port Chalmers was Auckland or Tauranga, the net reduction in total freight costs for Otago and Southland businesses enabled by developing Port Chalmers is expected to be $73 million per year at current volumes, rising to $233 million per year by 2028 and having a NPV of $1,210 million. While these benefits may in part be realised by the freight companies and Port Otago, we would expect that in a reasonably competitive international freight market and with regional ownership of the Port, the vast majority of the benefits will accrue to Otago and Southland producers and residents.**

6. **If Port Otago is not developed and Lyttelton Port of Christchurch is the South Island hub for bigger ships, there will be a significant loss of container cargo through Port Chalmers. Direct port revenue is forecast to decline by $21 million per annum, and including multiplier effects there will be a decline in total regional output of $32 million per annum. Associated with this will be a decline of $21 million per annum in regional income, and the loss of 170 jobs.**

7. **By 2028, the loss of container cargo through Port Chalmers will reduce port output by $80 million per year, total regional income by $83 million, and total regional employment by 662 jobs. Land transport activity servicing the port**

will also decline, and this will cause the loss of a further $12 million per year in regional income and the loss of a further 128 jobs.

8. **A further 100 other shipping-related jobs and associated regional income may also be at risk, as would some manufacturing employment. Hence if port development does not take place, then the regional economy will lose a significant amount of economic activity including more than 890 jobs within 20 years.**

9. **Changes to transport costs and freight convenience brought about by cargo having to move to Lyttelton or Auckland for final export on larger vessels will affect Otago and Southland's cost-competitiveness. Freight increases of up to $600 dollars per container (Lyttelton) or $1200 (Auckland) would add 20% to 40% on to freight costs. For example, additional freight cost to ship through another port would add approximately $7 million to annual supply chain costs for the dairy industry alone. Manufacturing profits would potentially decline by 10 – 20 %,**

10. **These negative effects will reduce farming profitability and rural land values, and will affect manufacturers' location choices. This will put at risk existing regional manufacturing employment as well as future employment and population growth, property values and eventually civic amenities.**

EXECUTIVE SUMMARY

1. It is expected that within the next 10 – 20 years a significant proportion of international freight to and from New Zealand will be carried on 6,000 TEU ships. Introduction of these ships will be driven by international shipping lines and their quest for reduced costs through scale economies, and will reflect the requirement of other trades rather than just those to and from Zealand.

2. Port Otago Ltd wishes to deepen the Lower Harbour Channel to Port Chalmers to handle these larger vessels. Relevant considerations under the RMA are whether this is an efficient use of resources and what effects it will have on the ability of the community to provide for its economic and social well-being.

3. Butcher Partners Ltd has undertaken a basic partial Cost Benefit Analysis (CBA) of expansion of Port Chalmers. Only financial costs and benefits associated with freight costs have been considered in the CBA. Any costs and benefits associated with environmental impacts have been ignored. It is also assumed that overall freight costs for export cargo from New Zealand (including the costs of expanding port infrastructure) will be reduced by the use of 6,000 TEU ships, and hence the benefit of expanding Port Chalmers is assessed by calculating the reduction in internal transport costs achieved by exporting cargo directly rather than transshipping it through another hub port. The costs of developing Port Chalmers and exporting direct to overseas destinations include increases in port capital and operating costs, as well as the costs for international ships calling at Port Chalmers as well as the alternative hub port.

4. From an export cargo point of view there is strategic value in Port Chalmers being deepened. Major containerized export cargoes are, in order of importance, dairy, meat and by-products, wood products and wool. For each of these, the "gravitational centre" of South Island production appears to be closer to Port Chalmers than to any other South Island port.

5. Nonetheless, for the financial Cost Benefit Analysis a conservative "Lyttelton Developed" base case scenario has been adopted, which assumes that Lyttelton has already been developed to cope with 6,000 TEU ships. The CBA under this scenario simply compares the cost of upgrading Port Chalmers plus the costs of having ships call at Port Chalmers with the benefits associated with savings in internal transport costs to Lyttelton for existing Port Chalmers cargo. In terms of our analysis this is a very conservative assumption, given the significance of export cargo in deciding at which ports large ships will call, the gravitational centre of production for major export cargos and the possibility that the only other New Zealand port capable of handling 6,000 TEU ships with be Auckland or Tauranga. Other assumptions, detailed in the report, are also conservative in terms of the benefits estimated.

6. We have also considered an "Auckland / Tauranga Developed" scenario in which Auckland or Tauranga is expanded to handle 6,000 TEU ships and Lyttelton is not. The benefits of a Port Chalmers expansion are much higher in this scenario

because internal transport costs to Auckland / Tauranga are much higher than has been assumed in this analysis. On the other hand, the diversion costs for international shipping are also much higher. For the sake of simplicity our analysis considers only the benefits accruing to Port Chalmers "gateway" cargo.

7. Quite apart from the financial advantages of developing Port Chalmers in this scenario, there are strategic advantages in having more than one major port in New Zealand and in having at least one major port in the South Island. Risks associated with port closure (e.g. from natural disaster) are reduced, as are potential problems with developing another port's infrastructure to cope with the vast majority of international cargo. Finally, the benefits of taking South Island perishable commodities such as chilled meat and dairy products direct to market are retained.

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Costs and Benefits

8. We estimate that for the Port Chalmers "gateway" cargo which comes from Dunedin or further south and is destined for international markets via Singapore on 6,000 TEU ships, the development of Port Chalmers will provide benefits via reduced freight costs (net of international ship diversion costs) of $16.9 million per year for 2008 cargo volumes. On forecast cargo volumes, and assuming that the proportion of cargo carried on 6,000 TEU ships remains at 50 %, the annual benefits rise to $49.1 million per year by 2028.

9. The estimated $65 million capital cost of development is equivalent to $6.3 million per year over a 21 year lifetime, showing that even with only 50 % of current levels of cargo going on 6,000 TEU ships there will be substantial commercial net benefits from developing Port Otago. Over the next 20 years, the Net Present Value of Port Chalmers development is expected to be $202 million (see Table 1), assuming that Lyttelton has also been developed.

10. There may be benefits for cargo currently being transshipped through Port Chalmers, but these are ignored. When cargo volumes per vessel get large enough, there will also be benefits to cargo carried on routes other than via Singapore. These could significantly increase the benefits in the period beyond the study horizon.

Table 1 Financial Costs and Benefits of Port Chalmers Development for Cargo to Singapore (compared to transshipment through Lyttelton)

	Savings on Internal Freight*	Ship Diversion Costs	**Sub-Total Freight Savings**	Capital Costs of Port Development	**Net Benefits**
Year 1	17.5	0.63	**16.9**	6.3	**10.6**
Year 20	50.7	0.63	**49.1**	6.3	**43.8**
NPV**	270	6	**264**	63	**202**

* For the 50 % of cargo going direct to Singapore

** Discount rate of 8 %

Numbers may not add due to rounding

11. If Lyttelton is not developed, then the alternative port for 6,000 TEU ships is presumed to be Auckland or Tauranga, and the net benefits of deepening Port

Chalmers are much greater. We estimate that for just the 50 % of "gateway" Port Chalmers cargo carried via Singapore, developing Port Chalmers would provide benefits via reduced freight costs (net of international ship diversion costs) of $80 million per year for 2008 cargo volumes, and by 2028 this would rise to $226 million per year. After deducting the capital costs, we expect that the development of Port Chalmers would generate commercial benefits over 20 years with a Net Present Value of $1,210 million (see Table 2).

12. In addition to this there would be benefits to other South Island cargo being able to be transshipped through Port Chalmers rather than through Auckland or Tauranga, and there would be strategic national benefits in not relying on only one port in New Zealand for major export and import cargo volumes.

Table 2 Financial Costs and Benefits of Port Chalmers Development for Cargo to Singapore (compared to transshipment through Auckland or Tauranga)

	Savings on Internal Freight*	Ship Diversion Costs	**Sub-Total Freight Savings**	Capital Costs of Port Development	**Net Benefits**
Year 1	88	8	**80**	6.3	**73**
Year 20	256	16	**240**	6.3	**233**
NPV**	1,365	91	**1,275**	63	**1,210**

* For the estimated 50 % of cargo going direct to Singapore
** Discount rate of 8 %
Numbers may not add due to rounding

13. The positive next benefits described here are robust to changes in the key assumptions. For example, even if the proportion of cargo being carried on 6,000 TEU ships dropped from the assessed 50 % to only 35 %, the two scenarios would still have positive NPV benefit of $120 million and $810 million respectively.

Economic Impacts

14. If Port Chalmers is not developed and 6,000 TEU ships go to other ports, we anticipate that cargo currently transshipped through Port Chalmers will go instead to other ports, and that the 30 % of existing Port Chalmers "gateway" cargo which comes to Port Chalmers from Oamaru and further north will go direct to Lyttelton instead. We also anticipate that 40 % of cargo coming from south of Dunedin will by-pass Port Chalmers and go direct to Lyttelton.

15. We estimate that if this were to happen, the Port and regional land freight industry would decline, and the Otago economy would lose 270 jobs and $31 million of regional income, including $15 million of household income, in the first year of 6,000 TEU ship operations. After twenty years, the loss would be 790 jobs and $95 million per year of regional income. In addition there would be around 100 further jobs and associated income lost in other industries associated with international cargo services (e.g. MAF inspections), and manufacturing employment would be at risk.

Table 3 Economic Impacts of Decline in Port Activity and Land Transport

Year	Total Output ($m)	Total Jobs	Total VA	Total Gross HHI
2008	43	218	26	12
2018	80	413	49	23
2028	153	790	95	45

100 further jobs and associated income lost in other industries associated with international cargo services
Employment, particularly in manufacturing, will also be at risk

16. Other industries in Otago would also be put at risk, particularly those for which freight costs on either output or inputs are a significant proportion of final product value. Land-based products are less likely to be at risk, with reduced profitability being reflected primarily in reduced land values, although some development of production at the margin will become non-viable.

17. While it is impossible to predict how many jobs are at risk, we estimate that something over 6,000 jobs depend on exports of manufactured goods, many of which are in Otago and some of which will be at risk if the port is not developed. Just as importantly, growth in this sector is likely to be curtailed as freight costs for inputs and finished products rise and as delivery times increase.

Summary

18. The evidence suggests that for export cargo at least, Port Chalmers has significant location advantages over Lyttelton for cargo currently going through Port Chalmers. If Port Chalmers can accommodate 6,000 TEU ships, then the net benefits of developing Port Chalmers are estimated to have a Net Present Value of $1,210 million just for cargo currently going through Port Chalmers. Even if Lyttelton is also developed, the net commercial benefits from deepening Port Chalmers have a Net Present Value of $202 million. Hence developing Port Otago would be an efficient use of resources from a commercial perspective.

19. While the benefits will be spread between export producers, shipping companies and Port Otago, we expected that a moderately competitive international shipping market and regional ownership of the Port Company will mean that a significant majority of the benefits will be retained by producers in Otago and Southland. Also, if development does not take place then the regional economy will lose a significant amount of economic activity including more than 890 jobs within 20 years.

1. BACKGROUND

Ship sizes are increasing and an increasing proportion of orders for new-build container ship specify capacities in excess of 6,000 TEUs. These can be compared to the 4,100 TEU capacities which are currently the largest ships transiting the New Zealand coast. The benefit of these larger ships is that they are expected to be able to shift cargo at significantly lower cost per tonne than can existing ships, whilst also providing additional tonnage capacity on those routes at the lower cost.

To handle these larger ships, Port Otago Ltd (POL) seeks to develop Port Chalmers by initially deepening the harbour channels and then improving wharves and berths and managing the logistical implications of larger container flow peaks. Various aspects of the development will require consent under the RMA.

The deepening of Port Chalmers channels has implications for economic efficiency (relevant under section 7 (b) of the RMA), and for regional income and employment (relevant under section 7 (b) and section 5 (2) of the RMA). This paper compares the financial outcomes and economic impacts over the next twenty years "with" and "without" the development of Port Chalmers.

2. ECONOMIC EFFICIENCY

At present the largest ships on the New Zealand services (4,100 TEUs) visit Auckland and Port Chalmers because, presumably, any additional costs of shipping and port operation from visiting the port are less than the additional internal transport costs associated with transshipping Port Chalmers cargo through Auckland.

Very few other ports in New Zealand could readily be developed to handle 6,000 TEU vessels. The expectation is that if Port Chalmers does not develop, then it will become primarily a feeder port, with small ships calling and aggregating cargo at hub ports (possibly either Lyttelton in the South Island and / or Auckland or Tauranga in the North Island[1]). Cargo from South Canterbury, Otago and Southland may also be railed to Lyttelton (or Auckland / Tauranga) for shipment depending on the competitiveness of rail with coastal shipping and the timeliness of the two modes.

In a comparative efficiency analysis of developing Port Chalmers there are several perspectives that could be considered. One is a full cost benefit analysis from the perspective of an optimal shipping network and infrastructure analysis for New Zealand, and discovering whether Port Chalmers should be a $6{,}000^{+}$ TEU capacity port in that context. Such an analysis is a major exercise, has not previously been undertaken for New Zealand and is completely beyond the scope of this project.

Another perspective, which is the one we have chosen, is to compare the benefits and costs "with" Port Chalmers development to handle 6,000 TEU ships, and "without" Port Chalmers development in the context of two likely scenarios. The first is the "Lyttelton Developed" scenario in which New Zealand's port infrastructure continues to develop along the lines of the last few decades, and Lyttelton develops the capacity to handle vessels of at least 6,000 TEUs [2]. The second is the "Auckland / Tauranga Developed" scenario, in which Auckland or Tauranga Port is developed to handle 6,000 TEU ships, but Lyttelton is not. In each scenario we have assessed the costs and benefits to Port Chalmers and its clients of developing a Port Chalmers $6{,}000^{+}$ TEU capacity, rather than

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1 Alternatively, smaller ships (i.e. 4100 teus or smaller) that are employed in overseas trades may still call at either at PC or Lyttelton, but major trades that are likely to use ships too large for PC's present channel will not be able to call at PC and cargo will be transported to a deeper port, either by feeder containership, or by land transport.

2 It has been suggested that the analysis is based on a fallacy in that 6,000 TEU ships will not visit both Lyttelton and Port Chalmers on a single trip, partly because the costs of an additional port call are higher than the savings in internal transport costs for cargo from the second port to the primary one and partly because extending the total voyage time may make it impossible to retain a weekly service with the existing number of ships, and we are assured that having a regular weekly service, as opposed, say, to an 8 day service, is seen as essential by all parties involved. If this is the case, then the Cost Benefit analysis should focus on determining whether Lyttelton or Port Chalmers is the preferred port. While this is neither the focus of this report nor within the resources of this study, we have provided some analysis on the "centre of gravity" of production of the major export commodities. In the longer term, however, the number of ships required on a route and the ports at which they will call is a dynamic decision which will be driven by factors other than simply whether there is an additional call at Port Chalmers. In that context, we can reasonably assume that if expanding Port Chalmers and having an additional port call would generate a net benefit, then in due course that benefit will be realized by a competitive shipping industry and the port call will be made. For example, one alternative would be to call at one port on alternate trips and in the intervening trip to transship to the other port only that cargo which it is essential to get away on that particular week.

retaining the current 4,100 TEU capacity, and having some or all existing users send their cargo to the alternative port for aggregation and thence to international destinations on a 6,000 TEU ship.

The net capital costs of the Port Chalmers development are, in principle, the capital costs of development at Port Chalmers less any savings in port infrastructure costs which would otherwise be required at Lyttelton or Auckland / Tauranga [3] less any savings in road and rail infrastructure costs required to meet the additional internal transport. In practice we have ignored savings in costs of alternative port and land transport infrastructure.

The operating benefits of deepening are the savings in domestic transport for cargo being able to go through Port Chalmers rather than having to go to the alternative port of Auckland / Tauranga or Lyttelton less any the additional costs of international ships having to travel via Port Chalmers instead of going direct to their international destination

The "Lyttelton Developed" scenario implies much less net benefit to developing Port Chalmers than the "Auckland / Tauranga Developed" scenario in which Lyttelton is not developed. In the latter scenario, the costs of developing Port Chalmers would be somewhat higher than in the former[4], but the benefits of developing Port Chalmers would be the saving in domestic transport not only for existing Port Chalmers cargo otherwise having to go to a North Island port but also the net savings for existing Lyttelton cargo being able to be transported to Port Chalmers for trans-shipping rather than to Auckland or Tauranga. If there was no net benefit in the "Lyttelton Developed" scenario, we would need to consider the benefits of the "Auckland / Tauranga Developed" scenario in detail. At this stage we have made only a partial analysis of the "Auckland / Tauranga Developed" benefits by considering benefits to existing Port Chalmers cargo only. The net benefits in the partial analysis are enormous, and would increase much further if we were to incorporate benefits to Lyttelton cargo.

2.1 Assumptions

Base cargo volume scenarios have been developed for Port Chalmers in a recent report[5]. This shows cargo in 2008 being 103,000 containers equating to 138,000 TEUs of "gateway" volume and a further 63,000 containers of trans-shipments (see Appendix 1). Growth in "gateway" volume is assumed to be 5 per cent / annum over the next 20 years (see Appendix 2), and growth in transshipped volumes is assumed to be 7 per cent. To give some context to these growth rates, note that container cargoes in New Zealand have been expanding at about 8 % per annum for the last 20 years. This is due to a combination of trade growing faster than GDP and an increasing proportion of all cargo being containerized. While the latter factor may be getting close to its natural limits,

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[3] Some or all existing Port Chalmers cargo will have to be transshipped through Lyttelton (or Auckland or Tauranga) instead. This means Lyttelton will have to handle up to an additional 220,000 TEUs / year in 2008, rising to an additional 750,000 TEUs sometime between 2023 (8 % annual growth) and 2028 (6 % annual growth).

[4] Port Chalmers may need to advance its capital spending programme to cope with ex-Lyttelton cargo being trans-shipped through Port Chalmers.

[5] Port Chalmers Capacity Study. TBA Report

especially in the southern South Island, the economic emphasis on production for export and an increasing propensity to import means that container volume growth are expected to continue to outstrip GDP growth.

Our analysis assumes that:

- Once a 6,000 TEU port is developed and 6,000 TEU ships start to call at New Zealand, the approximately 50 %[6] of total Port Chalmers cargo which goes to international markets via Singapore will immediately transfer to the 6,000^{+} TEU vessel, and the remaining cargo will go via the smaller ships which will continue to service Otago[7]. In the longer term, other routes may also be serviced by 6,000 TEU ships and this would generate further benefits from the development of Port Chalmers. At this stage we have ignored these potential benefits because of the uncertainty as to whether and when they will occur. To this extent our estimate of benefits understates potential actual long term benefits.
- Subsequent growth in Port Chalmers container traffic continues at 5 % per annum over the next 20 years;
- If Port Chalmers is not developed, transshipment of containers from other ports would cease as soon as alternative ports could handle 6,000 TEU ships. Since many of these containers will want to be trans-shipped to the port being serviced by the 6,000 TEU ships, it is likely that all transshipped containers will go through that port. At this stage our analysis ignores any benefits to the transshipment trade from the development of Port Chalmers.
- If Port Chalmers is not developed, and the 6,000 TEU vessels were not to replace the existing 4,100 TEU service, there may be some redundancy within the current shipping channel if only ships smaller than 4,100 TEUs call at Port Chalmers. A 13.0 metre channel would not be required. There would be minor savings in cost, but this has been ignored in the Cost Benefit Analysis.

For cargo going on 6,000 TEU ships we assume:

Lyttelton Developed Scenario

- Existing Port Chalmers cargo from Oamaru and points further north will be transported directly to Lyttelton via rail, since freight rates to Lyttelton are less

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6 Main trades that will go into very large ships are Europe, SE Asia and Nth Asia trades (transshipped through Singapore) Combining all three trades in the one ship gives the volume required to justify large ships, especially when the voyage is combined with some or all Australian ports. These trades probably represent close to half of the containerized cargoes. The other major trades are North Asia direct, Australia and North America. They are likely to be split between <4000 TEU ships and >4000 TEU ships. North Asia will eventually grow into a large ship trade, but at present is not combined with Australian ports, and so is in about 3500 TEU ships. The Australian cargoes will be in a mixture, some small ships dedicated to the trade, and some large ships that call at both Australia & NZ. The USA cargoes will be in smaller ships to West Coast North America for at least 10 years, and are at present constrained by Panama canal to <4000 TEU ships to East Coast North America. In all, the total quantity of Port Chalmers cargo going in large ships is likely to be between 40% and 60% of the trades, say an average of 50% by the time facilities are built in NZ and 6,000+ TEU ships start calling.

7 Not all cargo will go on large vessels because shippers will continue to use the existing fleet of smaller ships which can provide higher frequency services and have lower commercial risks, advantages which may more than offset the cost efficiencies to be derived from larger vessels. There is also the fact that exports via the Panama Canal are currently limited to ships with a 32m beam, and that other destination ports may be better suited to services by smaller vessels. We also note that New Zealand is generally only one of several stops on a route and that the final mix of ships will depend on many factors other than port developments in New Zealand. Notwithstanding these comments, it is possible that 6,000 TEU ships will start to ply other routes and could potentially call at Port Chalmers.

than or the same as to Port Chalmers, and since Lyttelton, as the only South Island 6,000^{+} TEU port, would have better services than Port Chalmers. In this analysis we attribute no benefit to this cargo being able to go via Port Chalmers on large ships, although in fact there will probably be some benefit (which is why that cargo comes to Port Chalmers now) depending on which port has the more convenient international shipping services.

- The 26 % of cargo, which comes from Dunedin and the 51 % of cargo which comes from points further south is assumed to go either direct to Lyttelton or be transshipped through Port Chalmers to Lyttelton.
- The economic impact analysis assumes that forty per cent of the 51 % of cargo whose origin is from south of Dunedin will be transported to Lyttelton by land and will not go through Port Chalmers. If the direct to Lyttelton land transport component is less than the 40 per cent we have assumed (e.g. because of rail network capacity limitations), our estimate of negative economic impacts at the port will be overstated.

Auckland / Tauranga Developed Scenario

- All "gateway" cargo which currently is exported from Port Chalmers will be transshipped to Auckland.

2.2 Internal Transport Cost Differences.

2.2.1 Transshipment through Lyttelton

In this analysis, transport costs are taken to mean internal transport costs (including loading and unloading) and ship operating costs. Current container traffic through Port Chalmers by New Zealand origin / destination and the differences in costs for transport to Lyttelton rather than to Port Chalmers are shown in Table 4. We estimate that if all existing Port Chalmers cargo went to Lyttelton, the additional freight would be $300 / container, or $224 / TEU.

Table 4 Additional Freight Rates to Lyttelton by origin

	Difference in freight cost to Lyttelton c.f. Port Chalmers		Proportion of total Containers		Weighted Freight Cost	
	$	$	%	%	$	$
Container Size	20 '	40 '	20 '	40 '	20 '	40 '
Nelson	-150	-225	0.21	0.04	-0.32	-0.09
Marlborough	-450	-575	1.14	0.14	-5.11	-0.81
West Coast	-450	-495	0.57	0.12	-2.54	-0.60
Christchurch	-400	-615	3.92	1.46	-15.68	-8.97
Mid Canterbury	-250	-375	1.61	0.51	-4.03	-1.90
South Canterbury	0	0	11.19	6.71	0.00	0.00
North Otago	0	0	1.73	0.54	0.00	0.00
Dunedin	400	615	12.81	5.59	51.22	34.38
South Otago	250	375	2.00	1.17	5.00	4.37
Central Otago	250	375	0.03	0.05	0.08	0.17

Table 4 (continued)

POGW	500	750	17.11	10.51	85.57	78.82
Bluff	350	400	6.50	1.22	22.76	4.88
Gore	450	550	2.74	0.63	12.32	3.45
Invercargill	350	400	5.83	2.25	20.40	9.01
Winton	350	450	0.00	1.69	0.01	7.60
Weighted Average			100.00		$300 / container $224 / TEU	
Weighted Average for cargo from Dunedin and further south only					$485 / container $362 / TEU	

If we assume that once Lyttelton is developed to cope with large ships, all cargo from regions where freight rates to Lyttelton are the same as or cheaper than to Port Chalmers (i.e. from Oamaru north) will go to Lyttelton direct, then our economic analysis of the benefits of developing Port Chalmers focuses only on the balance of cargo that would continue to go through Port Chalmers, and the additional cost for this to go to Lyttelton is $362 / TEU. Only the Singapore-bound portion of this balance of cargo would go on a 6,000 TEU ship, and we have assessed the benefits of saved internal transport costs on this cargo by multiplying the volume of cargo by the avoided additional freight cost to Lyttelton. We estimate the benefits to be $17.5 million in 2008, rising to $50.7 million in 2028, and having a Net Present Value (8 % discount rate) of $271 million (see Table 5).

Table 5 Annual Savings on Internal Transport for Port Chalmers Cargo to Singapore from Dunedin or further south going direct instead of via Lyttelton.

Year	Annual Direct Cargo (TEU/yr)	% of cargo going on big ships to Singapore	% of cargo coming from Dunedin or South	Containers affected / week	Annual Freight Savings on internal transport
2008	137,773	50%	70%	927	$ 17,450,288
2009	145,340	50%	70%	978	$ 18,408,686
2010	153,320	50%	70%	1,032	$ 19,419,453
2011	161,737	50%	70%	1,089	$ 20,485,437
2012	170,612	50%	70%	1,148	$ 21,609,642
2013	179,973	50%	70%	1,211	$ 22,795,232
2014	189,844	50%	70%	1,278	$ 24,045,547
2015	200,255	50%	70%	1,348	$ 25,364,103
2016	211,233	50%	70%	1,422	$ 26,754,609
2017	222,810	50%	70%	1,500	$ 28,220,975
2018	235,019	50%	70%	1,582	$ 29,767,321
2019	247,893	50%	70%	1,669	$ 31,397,992
2020	261,470	50%	70%	1,760	$ 33,117,567
2021	275,786	50%	70%	1,856	$ 34,930,872
2022	290,883	50%	70%	1,958	$ 36,842,995
2023	306,802	50%	70%	2,065	$ 38,859,300
2024	323,588	50%	70%	2,178	$ 40,985,439
2025	341,289	50%	70%	2,297	$ 43,227,372
2026	359,953	50%	70%	2,423	$ 45,591,378
2027	379,633	50%	70%	2,555	$ 48,084,079
2028	400,385	50%	70%	2,695	$ 50,712,452
Net Present Value (8 % discount rate)					**$270,786,574**

2.1.2 Transshipment through Auckland or Tauranga

For the "Auckland / Tauranga Developed" scenario we have focused only on all existing cargo through Port Chalmers, and have ignored potential benefits to cargo currently going through Lyttelton. We have estimates of freight rates from Port Chalmers to Auckland / Tauranga for dry and refrigerated containers both empty and full, both 20' and 40', and by rail and sea. We estimate that the average cost of transshipment of Dunedin containers through Auckland / Tauranga is $1,280 per TEU.

Using these rates we have assessed the benefits of saved internal transport costs on cargo going from Port Chalmers to international markets via Singapore as being $88 million in 2008, rising to $255 million in 2028, and having a Net Present Value (8 % discount rate) of $1,365 million (see Table 6).

Table 6 Annual Savings on Internal Transport for Port Chalmers Cargo to Singapore going direct instead of via Auckland.

Year	Annual Direct Cargo (TEU/yr)	% of cargo going on big ships to Singapore	Containers affected / week	Annual Freight Savings on internal transport
2008	137,773	50%	1,325	$ 87,982,334
2009	145,340	50%	1,398	$ 92,814,468
2010	153,320	50%	1,474	$ 97,910,638
2011	161,737	50%	1,555	$ 103,285,207
2012	170,612	50%	1,641	$ 108,953,316
2013	179,973	50%	1,731	$ 114,930,928
2014	189,844	50%	1,825	$ 121,234,868
2015	200,255	50%	1,926	$ 127,882,875
2016	211,233	50%	2,031	$ 134,893,647
2017	222,810	50%	2,142	$ 142,286,894
2018	235,019	50%	2,260	$ 150,083,394
2019	247,893	50%	2,384	$ 158,305,048
2020	261,470	50%	2,514	$ 166,974,945
2021	275,786	50%	2,652	$ 176,117,419
2022	290,883	50%	2,797	$ 185,758,125
2023	306,802	50%	2,950	$ 195,924,100
2024	323,588	50%	3,111	$ 206,643,849
2025	341,289	50%	3,282	$ 217,947,413
2026	359,953	50%	3,461	$ 229,866,459
2027	379,633	50%	3,650	$ 242,434,368
2028	400,385	50%	3,850	$ 255,686,320
Net Present Value (8 % discount rate)				**$1,365,274,614**

2.3 Port, Wharfage and Handling Costs

2.3.1 Port Capital Costs

Port Otago Limited estimates that the cost of upgrading the port to cope with 6,000 TEU ships will be around $50 million to dredge the channel to cope with the deeper draft of these ships, and a further $15 million to provide sufficient tug and crane facilities[8]. The dredging and the tug and crane purchase would need to happen prior to any larger ships calling, and expenditure is presumed to take place over the year prior to larger ships calling. The NPV of this expenditure is $63[9] million.

A recent study[10] has indicated the capital investment required to develop the container yard to cope with annual volumes of 750,000 TEUs and 1,000,000 TEUs and beyond in four stages, and has indicated likely times until each of these stages is required under assumed growth rates (6 %, 8 % and 10 %). If Port Chalmers is not developed and container volumes are correspondingly lower, then these additional costs can be deferred and an economic benefit is realized. However, we expect this potential saving to be more than offset by the additional costs to Lyttelton (or Auckland), which will have to develop faster than it otherwise would to cope with more containers. Since Port Chalmers and Lyttelton (or Auckland) combined will have to cope with fewer container movements[11] if Port Chalmers is developed than if it is not, development will probably lead to a net reduction in total combined port container yard costs. Ignoring this means that our analysis probably overstates the net capital costs (from a global perspective) of developing Port Chalmers[12].

We assume that handling costs for cargos going to export are similar at the various ports, and that handling costs at each end for the transshipped cargo are included in the internal freight rates we have used.

2.3.2 Differences in Port Operating Costs under Two Scenarios

There is little data available on the marginal operating costs at the three ports. We have assumed that operational cost increases at Lyttelton (or Auckland) with extra international cargo would be much the same as the cost savings at Port Chalmers with less international cargo (i.e. that the marginal benefits / costs of loading and unloading international cargo at the two ports would be equal and offsetting).

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8 The total capital cost for tug and crane is expected to be $25 million, but this overstates the net marginal cost, given that at some stage the existing tugs and cranes will have to be replaced anyway.

9 All benefits are assumed to accrue at the end of their respective years and hence the year 1 benefit is discounted. Year 0 costs are assumed to occur at the start of the year and hence are not discounted.

10 Port Chalmers Capacity Study. POL in conjunction with TBA.

11 Since cargo from Dunedin and points south will go direct to export through Port Chalmers rather than being transshipped through Dunedin and then to export through Lyttelton.

12 We have ignored the potential extra costs at Port Chalmers, but we have also ignored the capital savings at Lyttelton which would probably be even greater than the Port Chalmers additional costs. In year 1, Port Chalmers will have to cope with 30,000 fewer direct containers from north of Dunedin and 60,000 fewer transship containers, but Lyttelton will have to cope with those 90,000 containers as well as the additional 30,000 of containers from Dunedin or points south which will now be transshipped through Lyttelton.

2.4 Differences in International Shipping Costs under Two Scenarios

There will be a decrease in the base cost of international shipping (this being the whole point of the increase in vessel size), which will occur whether or not Port Chalmers' facilities are upgraded (assuming that some other port provides the necessary port facilities and that shipping lines introduce large vessels). If Port Chalmers is not upgraded, then cargo will still be carried on the large capacity ships, but will go through other ports. We do not need to calculate the underlying international freights savings from bigger ships because this will accrue in both scenarios.

2.4.1 Cost per Call at Port Chalmers

We have estimated the costs of vessels calling at Port Chalmers in addition to Lyttelton or Auckland. Using data on fuel costs and average dry charter rates for this size vessel, we estimate that it will cost an additional NZ$12,000 per trip for ships going from Lyttelton to Singapore (via south of New Zealand and Sunda St) to stop in at Port Chalmers. The additional cost is low because the additional distance is only 23 nautical miles, since the shortest route from Lyttelton is past Otago Peninsula and below Stewart Island. In principle a call at Otago might seem economic for a ship picking up more than 33 containers[13] per trip, but in practice there will be other fixed overheads associated with an additional port call, which raises the breakeven number of containers. The additional cost for a vessel coming from Auckland / Tauranga to Port Chalmers is NZ$156,000 per trip, which is economic only for uplifts of more than 120 containers per trip[14]. The details are shown in Table 7.

Table 7 Costs of Diversion to Port Chalmers for 6,000 TEU ship – by routes

	Lyttelton – Singapore via Port Chalmers	Lyttelton - Sydney / Brisbane via Port Chalmers*	Auckland / Tauranga - Singapore
Extra distance (nautical miles)	23	166	509
Speed (knots)	25.2	25.2	25.2
Extra hours steaming	0.9	6.6	20.2
Extra hours for berthing etc	2	2	2
Total Extra time (days)	0.12	0.36	0.92
Ship cost / day ($US)	$35,000	$35,000	$35,000
Total extra time cost ($US / ship)	**$4,300**	**$ 12,700**	**$ 32,800**
Fuel use (tonnes / day @ 25.2 knots.)	210	210	210
Speed (knots)	25.2	25.2	25.2
Fuel Cost per tonne ($US)	$300	$300	$300
Fuel Cost per n.m.	$104	$104	$104
Total Extra Fuel Cost ($US)	**$2,396**	**$17,290**	**$53,000**
Total Cost ($US) US$0.55 = NZ$1	**$6,696**	**$30,000**	**$85,8000**
Total Cost (NZ) / ship call (rounded)	**$12,000**	**$54,000**	**$156,000**

Source: Oxley Shipping Consultants[15]

Lyttelton – Singapore direct is via South cost of NZ; Auckland-Singapore direct is via Cape Reinga and Sunda St

[13] $12,000 per diversion and a saving of $362 / container

[14] $156,000 per diversion and a saving of $1,280 / container

[15] Time charter rates are based on the costs for 2003 – 2005 adjusted to long term trend prices (1993 – 2009) using the Howe Robinson containership charter index. The fuel consumption of this size vessel is about 210 tonnes of HFO a day, at a speed of 25.2 knots, or 34.7 tonnes per 100 miles. Present fuel prices are US$300 / tonne (6 Apr 09). This is off a peak of US$500/t in late 2007, and an average of approx US$300/t since 2002. For this analysis, US$300/t has been used.

2.4.2 Annual Costs and NPV of International Diversions

We assume that the number of containers going on large ships is related to the number of containers on routes likely to be serviced by large ships. During the forecast period only the route to Singapore is likely to be serviced by 6,000 TEU ships, and we expect there to be only one ship a week until volume on that route from Port Chalmers exceeds 3,000 TEUs per week. This will not occur in the analysis period for the "Lyttelton Developed" scenario, and under the "Auckland / Tauranga Developed" scenario will occur in 2024.

Under the "Lyttelton Developed" scenario the additional cost of diversion for ships on the route to Singapore is $0.63 million per year, with a NPV of $6 million over the next 20 years. Under the "Auckland / Tauranga Developed" scenario, the additional cost is $8.1 million per year until 2024, when a second ship is required on the run to cope with the increase in cargo, and the additional cost is $16 million per year. The NPV of the diversions over the next 20 years is $91 million (see Table 8).

For interest we also show the diversion costs in the "Lyttelton Developed" scenario for the route to Sydney / Brisbane, but have not included these costs or related benefits in the analysis.

Table 8 Annual Diversion Costs by Route

		Lyttelton - Singapore		Auckland / Tauranga – Singapore		Lyttelton – Sydney / Brisbane	
	Ships affected / week	Diversion Cost per trip ($)	Annual Diversion Cost ($m)	Diversion Cost per trip ($)	Annual Diversion Cost ($m)	Diversion Cost per trip ($)	Annual Diversion Cost ($m)
2008	1	12,000	0.63	$156,000	$ 8.1	$ 54,000	$ 2.8
2009	1	12,000	0.63	$156,000	$ 8.1	$ 54,000	$ 2.8
2010	1	12,000	0.63	$156,000	$ 8.1	$ 54,000	$ 2.8
2011	1	12,000	0.63	$156,000	$ 8.1	$ 54,000	$ 2.8
2012	1	12,000	0.63	$156,000	$ 8.1	$ 54,000	$ 2.8
2013	1	12,000	0.63	$156,000	$ 8.1	$ 54,000	$ 2.8
2014	1	12,000	0.63	$156,000	$ 8.1	$ 54,000	$ 2.8
2015	1	12,000	0.63	$156,000	$ 8.1	$ 54,000	$ 2.8
2016	1	12,000	0.63	$156,000	$ 8.1	$ 54,000	$ 2.8
2017	1	12,000	0.63	$156,000	$ 8.1	$ 54,000	$ 2.8
2018	1	12,000	0.63	$156,000	$ 8.1	$ 54,000	$ 2.8
2019	1	12,000	0.63	$156,000	$ 8.1	$ 54,000	$ 2.8
2020	1	12,000	0.63	$156,000	$ 8.1	$ 54,000	$ 2.8
2021	1	12,000	0.63	$156,000	$ 8.1	$ 54,000	$ 2.8
2022	1	12,000	0.63	$156,000	$ 8.1	$ 54,000	$ 2.8
2023	1	12,000	0.63	$156,000	$ 8.1	$ 54,000	$ 2.8
2024	1 (2 *)	12,000	0.63	$156,000	$ 16.2	$ 54,000	$ 2.8
2025	1 (2)	12,000	0.63	$156,000	$ 16.2	$ 54,000	$ 2.8
2026	1 (2)	12,000	0.63	$156,000	$ 16.2	$ 54,000	$ 2.8
2027	1 (2)	12,000	0.63	$156,000	$ 16.2	$ 54,000	$ 2.8
2028	1 (2)	12,000	0.63	$156,000	$ 16.2	$ 54,000	$ 2.8
NPV Ship Diversion Costs (8 %)			$6		$91		$28

* In the "Lyttelton developed" scenario, only one ship is required to pick up existing Port Chalmers cargo which is closer to Port Chalmers than to Lyttelton. In the "Auckland / Tauranga Developed" scenario, the ship is required to pick up all existing Port Chalmers gateway cargo, and by 2024 this exceeds 3,000 teus / week.

3 NET BENEFITS OF DEVELOPING PORT CHALMERS

By combining the benefits and costs of developing Port Chalmers, we estimate the overall net benefit or cost of doing so.

3.1 Savings in Internal Freight and Costs of International Diversions

We estimate that the freight cost net benefit of developing Port Chalmers if Lyttelton is an alternative port has a current NPV of $264 million for the 50 % of cargo going via Singapore. This is a combination of NPV savings of $270 million in internal transport costs and additional NPV costs of $6 million for international shipping which diverts to Port Chalmers to pick up cargo en route to Singapore (see Table 9). If Lyttelton is not developed and the alternative port is Auckland, then we estimate that for just the Singapore-bound cargo going through Port Chalmers, the development of Port Chalmers has a commercial NPV benefit of $1,275 million. This is a combination of NPV savings of $1,365 million in internal freight costs and additional NPV costs of $91 million for international shipping which diverts to Port Chalmers from Auckland / Tauranga to pick up cargo.

Table 9 Annual Freight Savings and Ship Diversion Costs for Port Chalmers – Singapore cargo

	If Alternative Port is Lyttelton			If Alternative Port is Auckland		
	Internal Freight Savings ($m)	Costs of Diversion ($m)	Net Annual Benefits ($m)	Internal Freight Savings ($m)	Costs of Diversion ($m)	Net Annual Benefits ($m)
2008	17.5	0.63	16.8	88.0	8.1	79.9
2009	18.4	0.63	17.8	92.8	8.1	84.7
2010	19.4	0.63	18.8	97.9	8.1	89.8
2011	20.5	0.63	19.9	103.3	8.1	95.2
2012	21.6	0.63	21.0	109.0	8.1	100.8
2013	22.8	0.63	22.2	114.9	8.1	106.8
2014	24.0	0.63	23.4	121.2	8.1	113.1
2015	25.4	0.63	24.7	127.9	8.1	119.8
2016	26.8	0.63	26.1	134.9	8.1	126.8
2017	28.2	0.63	27.6	142.3	8.1	134.2
2018	29.8	0.63	29.1	150.1	8.1	142.0
2019	31.4	0.63	30.8	158.3	8.1	150.2
2020	33.1	0.63	32.5	167.0	8.1	158.9
2021	34.9	0.63	34.3	176.1	8.1	168.0
2022	36.8	0.63	36.2	185.8	8.1	177.6
2023	38.9	0.63	38.2	195.9	8.1	187.8
2024	41.0	0.63	40.4	206.6	16.2	190.4
2025	43.2	0.63	42.6	217.9	16.2	201.7
2026	45.6	0.63	45.0	229.9	16.2	213.6
2027	48.1	0.63	47.5	242.4	16.2	226.2
2028	50.7	0.63	50.1	255.7	16.2	239.5
NPV *	270	6	264	1,365	91	1,275

* Rounded

For cargo to Sydney and Brisbane, there are potential savings if 6,000 TEU ships start to service those routes. While we have ignored that possibility in this analysis, as cargo increases there may come a point when such services are offered, and to that extent this analysis understates potential benefits of developing Port Chalmers.

3.2 Net Costs and Benefits of Port Chalmers Development

The capital cost of developing the port and Lower Harbour Channel to handle 6,000 TEU ships is $65m. Given that half this takes place over the year before the large ships start to call and half in the first year of operation, this has a NPV of $63 million, which is equivalent to an annual cost of $6.3 million over a 20 year life. Given that the net freight benefit in the conservative "Lyttelton Developed" scenario is $17 million in 2008, the development is an efficient use of resources even at current freight volumes. The project has an overall NPV benefit over the next 20 years of over $200 million (see Table 10). If the "Auckland / Tauranga Developed" scenario, the net freight benefit is $73 million at 2008 cargo volumes, and the project has a commercial NPV benefit of $1,145 million (see Table 11). Unless there are large environmental costs, deepening the channel and developing Port Chalmers to cope with 6,000 TEU ships will constitute an efficient use of resources.

Table 10 Net Benefits of Otago Lower Harbour Channel Development – Alternative is Lyttelton

	Savings on Internal Freight*	Ship Diversion Costs	**Sub-Total Freight Savings**	Capital Costs of Port Development	**Net Benefits**
2008	17.5	0.63	**16.8**	6.3	**10.6**
2028	50.7	0.63	**49.1**	6.3	**43.8**
NPV**	270	6	**264**	63	**202**

* Cargo to Singapore only

** Discount rate of 8 %, results are rounded

Table 11 Net Benefits of Otago Lower Harbour Channel Development – Alternative is Auckland or Tauranga

	Savings on Internal Freight*	Ship Diversion Costs	**Sub-Total Freight Savings**	Capital Costs of Port Development	**Net Benefits**
2008 ($m/yr)	88	8	**80**	6.3	**73**
2028 ($m / yr)	256	16	**240**	6.3	**233**
NPV ($m) **	1,365	91	**1,275**	63	**1,210**

* Cargo going to international markets via Singapore only

** Discount rate of 8 %

3.3 Sensitivity Testing

The conclusion is highly robust to changes in assumptions. The fact that the net freight benefits in year 1 are almost three times as great as the annualized cost of the development ($17 million compared to $6.3 million) means that even if there is no annual growth in cargo and no increase in the proportion of total cargo going on 6,000 TEU ships beyond the 50% assumed for year 1, the development of Port Chalmers is still an efficient use of resources. It also means that project capital costs would have to almost treble before the project was not an efficient use of resources from a commercial perspective.

The analysis also implies that it would not be efficient to delay port development beyond the date when 6,000 TEU ships would otherwise start to arrive. The only circumstance in which delaying port development would be efficient is if 6,000 TEU ships did not start to service the New Zealand trade at all because the economies of scale did not make it worthwhile, or if environmental costs exceeded the benefits of development.

A key assumption is that 50 % of export cargo from Port Chalmers will go on 6,000 TEU ships. Reducing this figure to 35 % still leaves very significant positive benefits. The net benefits of the development reduce from $202 million to $120 million in the "Lyttelton developed" scenario, and from $1,210 million to $81 million in the "Auckland / Tauranga Developed" scenario.

3.4 Comparison of Export Cargoes through Lyttelton and Port Chalmers

The principal export cargoes (values and container numbers) going through Port Chalmers, Lyttelton and the two ports combined are shown in

Table 12. This data shows that by far the most important cargoes are dairy and meat (including by-products), followed by timber and wool.

If we look at where these good are produced within the port hinterlands, as proxied by the number of people employed (see Table 13), we see that the vast majority of production takes place either closer to Port Chalmers than to Lyttelton, or approximately equidistant between the two ports (in the area around Timaru). From the perspective of export cargo then, Port Chalmers would appear to be the preferred port in terms of internal transport distances. Also, Port Chalmers is likely to be dredged to a greater depth and hence provide greater flexibility in terms of departure times than is Lyttelton.

Obviously a much greater volume of import cargo goes to Lyttelton than goes to Port Chalmers, because the former has a much greater population and industrial base. However, we understand that imports are less time-critical and tend to come from a wider range of origins and through a much wider range of shipping links than is the case with exports. To this extent the origin of exports is more important than the destination of imports in deciding which port is more important to develop.

We are not able to conclusively state that Dunedin is the preferred port overall, but it seems clear that it is the preferred port regarding export cargo.

Table 12 Export Cargo through Lyttelton and Port Chalmers (2008)

	2008 $m			Export Containers 2007	
	Lyttelton	Port Chalmers	Combined	Otago Actual	Total Implied
Meat	$ 318	$ 1,591	$ 1,589	14,732	18,153
Fish	$ 164	$ 173	$ 350	2,270	4,948
Dairy	$ 520	$ 2,932	$ 2,521	16,194	19,137
Fruit and Horticulture	$ 101	$ 36	$ 149	1,068	3,410
Other Food	$ 265	$ 240	$ 518		-
Wine, spirits etc	$ 64	$ 69	$ 111		-
Chemical, plastic, rubber	$ 122	$ 112	$ 186		-
Hides, Skins & Leather	$ 89	$ 59	$ 149		-
Wood & paper	$ 136	$ 124	$ 250	4,762	11,113
Wool etc	$ 296	$ 112	$ 442	1,263	5,732
Other fibres & fabrics, carpet, felt	$ 4	$ 9	$ 16		-
Clothing & Footwear	$ 9	$ 1	$ 7		-
Non-metallic minerals	$ 2.3	$ 0.2	$ 5		-
Basic Metals case)	$ 170	$ 99	$ 298		-
Tools, machinery etc.	$ 966	$ 149	$ 730		
Other				6619	18,033
TOTAL	$ 3,226	$ 5,707	$ 7,320	46,908	80,528

Table 13 Employment by industry by region (2005-06)

	Otago & Sland	Timaru, Mackenzie, Waimate	Other Canterbury	West Coast	Marlborough
Meat works	5,703	963	3,116	186	117
Dairy Process	980	517	432	246	27
Sawmilling, Chipping, Plywood	1,626	277	2,204	299	259
Wool Scours	74	69	52	-	-

Source: Infometrics using various Statistics New Zealand data sources

4. ECONOMIC IMPACTS IN THE REGION

4.1 Overview

Economic impacts arise directly from the activities of the port. We have developed a regional input-output model for Otago and have incorporated into that model information on the existing income and expenditure patterns of Port Chalmers. We have then calculated output, value added, household income and employment multipliers for Port Chalmers operations as well as for rail and road freight.

We have estimated expected Port Chalmers revenue over time on a 'with" and "without" development basis. On the "with" basis, Port Chalmers is deepened sufficiently to accommodate 6,000 TEU ships, and "gateway" activity at the container terminal (i.e. activity excluding transshipments from other ports) rises from 138,000 TEUs in 2008 to 395,000 in 2028[16]. Transshipments rise from 84,000 TEUS to 364,000[17] over the same period if the port is developed.

There is uncertainty as to the loss of "gateway" cargo if Port Chalmers is not deepened. For freight going on 6,000 TEU+ vessels, we expect that the 30 per cent of current Port Chalmers cargo from Oamaru and points north, for which freight to Lyttelton is already as cheap as, or cheaper than, to Port Chalmers but which is currently attracted to Port Chalmers by the international services, will go to Lyttelton direct. Moreover, at least forty per cent of the existing "gateway" cargo from south of Dunedin going on 6,000 TEU ships will cease to go through Port Chalmers because the cost of transport direct to Lyttelton via land will be less than the cost of land transport to Port Chalmers and then coastal shipping to Lyttelton. The total loss of gateway cargo will be 35,000 TEUs in 2008 rising to 100,000 TEUs by 2028[18]. Transshipped cargo is expected to fall to nothing if Port Chalmers is not developed.

We have assumed that cargo which no longer goes through Port Chalmers will no longer generate associated road and rail freight activity, of which we assume 50 % would be based in the region. We estimate the economic impacts of this loss of activity based on the reduction in containers through the port from each area and the average freight rate per container to the port from each area.

4.2 Direct and Total Impacts of Port Chalmers Operations

Data from Port Otago Ltd suggests that current activity at the Port generates direct output of $53 million per year. Associated with this is $41 million of business and household

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16 The TBA report expects gateway volumes to be between 400,000 and 530,000 TEUs by 2028.

17 The TBA report expects transshipments to increase to between 360,000 and 570,000 by 2028.

18 While it is easy to assume that these containers will go by rail direct to Lyttelton, it is necessary to confirm the capacity of rail to handle large increases in volume. With perhaps 100,000 containers (weighing an average 12 tonnes) presumed to go via rail to or from Lyttelton by 2028, this implies perhaps 1.2 million tones of freight / year, including almost 1 million tonnes per year going north and 0.3 million tones per year going south.

income (including $21 million of wages and salaries) and 320 jobs. We have estimated regional multipliers for the Port (see Table 14). Once these multiplier effects are taken into account, we estimate that operation of Port Chalmers generates total regional output of $85 million. Associated with this is $56 million of business and household income (including $26 million of wages and salaries) and 480 jobs.

Table 14 Otago Economic Multipliers & Impacts for Port Otago & Land Freight

Industry	Output Multiplier	Total Employment / $m direct Output*	Total Value Added : direct output	Total Household Income : Direct Output
Port Otago	1.57	8.3	1.04	0.49
Land Freight	1.82	8.3	0.79	0.39

* Based on data for 2008 financial year.

4.3 Total Impacts of Not Developing Port Chalmers

We have assessed the economic impacts of the loss of container trade if Port Chalmers is not developed by estimating the loss of income to the port and applying the port multipliers to this loss of income[19].

Economic Impacts of Reduced Port Activity

We estimate the loss of container cargo will reduce income to Port Chalmers by $21 million per year in 2008. Once multiplier effects are taken into account, we estimate that this will lead to a decline in total regional output of $32 million per year, a decline in regional income of $21 million (including $10 million of wages & salaries), and a loss of 170 jobs. By 2028 the loss of container cargo will reduce income to Port Chalmers by $80 million per year. Associated with this will be a loss in total regional income of $83 million including $39 million of wages & salaries, and a loss of 662 jobs (see Table 15).

Economic Impacts of Reduced Land Transport Activity

We have also assessed the associated reduction in output of the land transport industry in the region, and have applied average multipliers for the road and rail freight sectors to estimate total economic impacts arising from the reduced freight going to the port. We estimate the loss of container cargo will reduce direct income to the land transport industry in Otago by $5.8 million per year in 2008. Associated with this will be a loss in total regional income of $4.5 million per year (including $2.2 million per year of wages & salaries), and a loss of 48 jobs. By 2028 the loss of container cargo will reduce income to the regional Land Transport sector by $15 million per year. Associated with this will be a loss in total regional income of $12 million per year (including $6 million per year of wages & salaries), and a loss of 128 jobs (see Table 16).

[19] The results are approximate because the multipliers ignore economies of scale which may arise between now and 2028, and because marginal input costs (which are responsible for the flow-on or multiplier effects) will probably be less than average costs.

Table 15 Economic Impacts of Reduced Port Activity

	Loss of Transship Container (TEUs)	Loss of Direct Trade containers (TEU)	Direct Loss of Output at Port * ($m)	Total Declines in Regional Activity			
				Output ($m)	Jobs (FTEs)	Regional Income ($m)	Wages & Salaries ($m)
2008	84,441	34,835	21	32	170	21	10
2009	90,859	36,723	22	34	182	23	11
2010	97,763	38,713	23	37	195	24	11
2011	105,190	40,810	25	39	208	26	12
2012	113,180	43,020	27	42	223	28	13
2013	121,775	45,349	29	45	238	30	14
2014	131,021	47,804	31	48	255	32	15
2015	140,967	50,391	33	52	273	34	16
2016	151,666	53,117	35	55	292	37	17
2017	163,175	55,989	38	59	312	39	18
2018	175,555	59,017	40	63	334	42	20
2019	188,872	62,207	43	68	358	45	21
2020	203,197	65,569	46	73	383	48	22
2021	218,605	69,112	49	78	410	51	24
2022	235,178	72,845	53	83	439	55	26
2023	253,005	76,779	57	89	470	59	28
2024	272,180	80,925	61	95	503	63	29
2025	292,804	85,293	65	102	539	68	32
2026	314,987	89,896	70	109	577	72	34
2027	338,847	94,746	75	117	618	78	36
2028	364,510	99,856	80	125	662	83	39

* Average lost revenue of $172 / container

Loss of Transship Containers: See Appendix 1

Loss of Gateway Containers from North of Dunedin = G x L x 30 %

Loss of Gateway containers from South of Dunedin = G x L x 51 % x T

Where G = Gateway containers (see Table 5)

L = proportion of trade on Large ships (6,000 TEUs) – (see Table 5)

T = proportion of freight from south of Dunedin which bypasses Port Chalmers (40 %)

Table 16 Economic Impacts of Reduced Land Transport Activity

	Direct Loss of Output* in Otago Freight Industry	Total Decline in Regional Output	Total Decline in Regional Employment	Total Decline in Regional Income	Total Decline in Regional Wages & Salaries
2008	5.8	10.5	48	4.5	2.2
2009	6.1	11.0	50	4.8	2.3
2010	6.4	11.5	53	5.0	2.5
2011	6.7	12.1	56	5.2	2.6
2012	7.0	12.7	58	5.5	2.7
2013	7.4	13.4	61	5.8	2.8
2014	7.7	14.0	64	6.1	3.0
2015	8.1	14.7	68	6.4	3.1
2016	8.5	15.5	71	6.7	3.3
2017	9.0	16.3	75	7.0	3.5
2018	9.4	17.1	78	7.4	3.6
2019	9.9	17.9	82	7.8	3.8
2020	10.4	18.8	87	8.1	4.0
2021	10.9	19.8	91	8.6	4.2
2022	11.4	20.8	95	9.0	4.4
2023	12.0	21.8	100	9.4	4.6
2024	12.6	22.9	105	9.9	4.9
2025	13.3	24.1	111	10.4	5.1
2026	13.9	25.3	116	10.9	5.4
2027	14.6	26.6	122	11.5	5.6
2028	15.4	27.9	128	12.1	5.9

Freight on cargo north of Dunedin: G x L x 30 % x $439 x R
Freight on cargo south of Dunedin: G x L x 51 % x $439 x R x B
Where G = Gateway containers (see Table 5)
L = proportion of trade on Large ships (6,000 TEUs) – (see Table 5)
R = proportion of freight to port which is held by Regional businesses (50 %)
B = proportion of freight from south of Dunedin which Bypasses Port Chalmers (40 %)

4.3.1 Other Shipping-Related Activities

The reduction in international shipping activity at the port will also reduce employment in other directly-related activities including import and export agencies and Ministry of Agriculture staff engaged in border security. Adding customs agents and other agencies and applying typical multipliers suggests that a least 100 other jobs and associated regional income could be at risk.

4.4 Dynamic Changes to the Regional Economic Base

A change to transport costs will affect the region's cost-competitiveness, and this could affect economic activity. We have not made specific estimates of this because of the huge uncertainty involved. Rather, we show the value of exports associated with various sectors and the total regional value added, household income and employment associated with these exports (see Table 17). We are not able to specify what proportion of each of these exports originates from the Otago region.

Table 17 Economic Impacts of Loss of Export Production

	Direct Output ($m /yr)	Total Output ($m /yr)	Total Jobs FTEs	Total Income ($m /yr)	Total Wages & Salaries ($m /yr)
Dairy	2,932	5,659	17,269	1,818	712
Meat	1,591	3,914	18,106	1,273	796
Fruit and Horticulture	36	67	480	31	16
Fish	173	282	1,161	95	44
Manufactured Goods	738	1,203	6,369	502	274
Wood, Logs, Proc. timber	124	237	1,159	87	44
Other	112	228	228	1,261	92
	5,706	11,590	44,773	5,066	1,979

4.4.1 Impacts on returns to producers

We also give some indication of the significance to each of these sectors of an increase in freight rates. We show in Table 18 the effects on increased freight rates of $600[20](Lyttelton) per container is less than 1 % of total value for dairy products, meat, timber and manufactured products, slightly more for fish and around 5 % for fruit and horticulture, but it represents a significant increase of about 20 per cent in freight costs. For freight to Auckland at around $1200 per container, the percentages are twice as great. Note that even though the total freight costs from Otago are likely to fall compared to the current situation, which is the justification for shifting to larger vessels, freight costs are equally likely to fall for other locations and it is the relative cost between locations which tends to drive location decisions.

Table 18 Value of Goods per Container

	Export Value 2008 ($m)	Containers	Average Value per Container ($000)	$600 Additional Freight as % of value
Dairy	2,932	28,284	104	0.6
Meat	1,591	17,855	89	0.7
Fruit and Horticulture	36	2,982	12	4.9
Fish	173	4,289	40	1.5
Manufactured Goods	738	9,976	74	0.8
Wood, Logs, Proc. timber	124	12,432+bulk	???	< 1 ?
Other	112	3,424	33	1.8

On the face of it, and in spite of the large dollar values associated with likely freight increases, one would not expect these percentage differences to be sufficiently significant to affect location decisions. It is, however, obviously just one more of the factors which may finally convince a business as to where to locate. Also, these broad averages of

[20] This is a rough estimate of the additional cost of freight to Lyttelton including an allowance for the return of some containers empty.

freight as a percentage of f.o.b. value conceal specific relatively high-volume low-value commodities which will be much more sensitive to freight costs than the average for that sector.

We do not expect that the level of economic activity on land-based activities will be significantly affected since the land base is fixed, although it could obviously affect the profitability of those businesses and in the medium term we would expect this to be reflected in land prices. At the margin it could also change decisions as to whether to develop horticulture and convert marginal land to forestry.

The most likely area in which there could be an effect is in manufacturing, which in the medium term is mobile and which tends to gravitate towards large centres with cheaper costs including transport costs. In the case of manufacturing, the change in freight costs is about 1 % of product value, but if this 1 % comes straight off the profits it could be of the order of 10 - 20 % of profits[21]. Not only is the impact on cost and profitability a factor, but the loss of direct export shipping service also changes manufacturers' perceptions as to the desirability of staying in, or setting up, a business in Otago. Employment in the manufacturing sector in Otago has grown from 5,400 in 1996 to 5,900 in 2006. It is this employment growth that is most vulnerable to location decisions, and would be most at risk if Port Chalmers was not developed.

[21] Manufacturing in 2005-06 typically had operating surplus (EBITDA) equivalent to 10.5 % of output. After interest and tax, the figure is

APPENDIX 1 FORECASTS OF CONTAINER NUMBERS

Consultants TBA have recently advised Port Otago on options for long term developments at Port Chalmers. Their report contains the following forecast of container volumes.

Table 19 Base Case Container Forecasts

	2008	2013	2018	2023	2028
Gateway Volume (containers)	102,816	137,639	174,100	216,465	274,228
Transship Volume (containers	63,016	95,648	131,338	184,396	253,134
TEU : container ratios	1.34	1.38	1.40	1.42	1.44

Note: Volumes are combined inwards and outwards.
Other numbers in this report take the start and end forecasts and assume a smooth annual growth path between them

Table 20 High Scenario Container Forecasts

	2008	2013	2018	2023	2028
Gateway Volume (containers)	102,816	140,770	192,552	268,444	367,210
Transship Volume (containers	63,016	97,823	157,542	247,795	397,811
TEU : container ratios	1.34	1.38	1.40	1.42	1.44

Note: Volumes are combined inwards and outwards.

APPENDIX 2: COMMODITY GROWTH AND UNDERLYING FACTORS

Table 21 Volumes of Import and Export Cargo

	Containers	TEUs	Annual average growth 2004-2008	Future Growth Expectations*
Meat	28,284		3.7	12
Dairy	17,855		14.3	3
Horticulture & Fruit	2,982		7.0	7
Fish	4,289		6.3	6
Manufactured Goods	9,976		6.4	6
Wood, logs and timber	12,432		18.1	11
Other	3,424		-4.4	0
Imports	18,253		11.1	--
Sub-total Gateway	97,495		9.5	5.1
Transshipments	15,899			
Total	113,394	152,000		

Sources: Future growth for Sub-total Gateway – TBA report
All other figures: Port Otago Ltd.
* See Appendix for discussions on underlying reasons

Dairy
Strong growth has been experienced based on farm conversions, the installation of new dryer at Edendale. International dairy prices have dropped so likely to be less conversions going forward. Conversions take approx 5 years to reach full production capacity so recent conversions should still lead to increasing milk production.

Meat
Sheep numbers have dropped over recent years due to dairy conversions. Return on lamb exports will drive volumes over the long term. POL has relatively high market share in meat exports.

Fish
Market size is influenced by quota allocations. Fish volumes pass through port when the fishing vessel is discharged, this is a processing decision based on processing capabilities, storage and vessel maintenance etc. Fish then pass through export port based on proximity, service. Fish is a high value commodity so can absorb inland transport if required. Some industry sources believe fishing is a sunset industry for New Zealand. This view not shared by Sealord/Sandford who point to strong world demand and higher prices. However, we note that strong demand will drive price, but not necessarily volume in a quota-constrained market. Quota seems more likely to go up than down.

Manufactured Goods
Manufactured goods exported from POL include Aluminium boats, paper, confectionary, plastic goods and machinery. F&P are moving some manufacturing offshore. Cadbury is expanding with new crumb factory.

Wood and timber products.
Sector consists of log and woodchip exports which are generally conventional cargo and processed timber (including MDF) which is containerised cargo. The sector is generally influenced by NZ currency relative to trading partners, conventional freight costs, and Asia and US home building and construction markets. Korea and China are the main destination markets for NZ logs. Log tariff introduced by Russia and a reduction of tropical rain forest production should see demand for NZ (and Chile and Brazil) improve. US and Asian home building and construction markets have slowed. NZ dollar has weakened and freight costs have reduced. Returns from log exports have generally been poor. Primary issue for forestry exports is the state of US housing market.

Another primary driver of export volumes is the quantity of logs coming on-stream in the next decade, and the likely proportion which will be processed.

Other
Wool continues to have poor prospects. Volumes are likely to continue to decline.