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Upper North Island Supply Chain Strategy

Competition Assessment

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1. Executive summary

This report considers the potential impact on competition of alternative options for handling sea freight currently shipped via the POAL. A reduction in competition would reduce the discipline that drives firms to adopt the most cost-efficient means of supply, redirect resources to profitable use, provide cheaper and better products, and curb excess returns.

Our analysis follows broadly the approach the Commerce Commission might take in assessing the competitive effects of any application to approve a merger or acquisition. We take this approach because most of the scenarios would entail some form of arrangement or understanding between entities that might otherwise be in competition with each other. At its core, the Commerce Commission will compare the expected change in competition under a proposed arrangement with the level of competition that would occur if the arrangements did not proceed, and this is the approach we follow.

In contrast to the very specific proposals that are presented to the Commerce Commission to assess, this assessment is prepared as an input to policy advice, and hence the detailed design of any preferred arrangement is unknown; the analysis must necessarily also be 'broad brush'.

The Ports of Auckland and Port of Tauranga currently compete for ocean freight in the upper North Island. As the Port of Tauranga has influence over the governance of Northport, these ports are 'one head in the market' from a competition perspective. The existing market therefore has characteristics of a duopoly—a situation in which two suppliers dominate the market for a service.

Each port intensifies its competitive offering via inland freight hubs:

- The Port of Tauranga has hub in Auckland (Metroport), and partnership with Tainui to develop hub in Hamilton
- The Ports of Auckland has hubs in Waikato, Wiri, Bay of Plenty and Manawatu.

Consistent with economic theories of capacity competition between duopolies, market shares of imports and exports are inversely related to the total costs to importers and exporters from utilising supply chains via Auckland or Tauranga. As a result, a higher proportion of:

- containers are exported via Tauranga
- containers of manufacturing goods imported via Auckland
- cars are imported via Auckland.

Relative to existing arrangements, all but one option would reduce competition between ports in the upper North Island, to the detriment of New Zealand exporters and importers. Our analysis is summarised in Table 1 below.

Table 1 Impact of options on port competition

Scenario—POAL freight moves to:	Effect on competition	Economic impact
Northport	Substantial lessening of competition, upper North Island	higher prices, reduced service and innovation
Tauranga	Substantial lessening of competition, upper North Island	higher prices, reduced service and innovation
New port, fully owned by Tauranga	Substantial lessening of competition, upper North Island	higher prices, reduced service and innovation
New port, fully owned by Auckland	Increase in capacity competition	lower prices, improved service and innovation
New port jointly owned, competing operators	Substantial lessening of competition in ports, competition retained for terminal operation	On balance, higher prices, reduced service and innovation

We consider whether greater cooperation between New Zealand ports, increasing their market power in negotiations with shipping companies, would be a benefit to New Zealand. Shipping firms are on the 'buy' side of the market—the shipping companies purchase port services on behalf of New Zealand exporters and importers. To the extent shipping lines have market power, it is 'countervailing market power' to that of the port companies; this countervailing market power means that the shipping companies would be able to negotiate better terms with the ports than otherwise and some of that benefit would flow to exporters and importers.

If port companies in the Upper North Island were to gain additional market power, that market power would allow them to raise prices above those that would occur in the base case. These price increases can be expected to largely be passed through to New Zealand exporters and importers. The standard Cournot model of competition, would predict increases in port charges of 6 to 32 per cent, relative to existing charges at the Ports of Auckland, and 5 to 24 per cent relative to existing charges at the Port of Tauranga. A consistency of assumptions logic might suggest that exporters and importers may face price increases toward the higher end of this range under the scenarios that give rise to increased market power.

2. Introduction and approach

2.1 Introduction

This report considers the potential impact on competition of alternative options for handling sea freight currently shipped via the Ports of Auckland (POAL). It concludes that all but one option would reduce competition between ports in the Upper North Island, to the detriment of New Zealand exporters and importers. In our assessment, these competition effects would likely be sufficiently material as to warrant being considered alongside other benefits and detriments in preparing policy advice.

Our report unfolds as follows:

- this section introduces our report and outlines the options assessed and our approach
- we then discuss the nature and extent of competition under existing arrangements
- our third section explores how competition might be impacted under each of the alternative options
- finally, we set out our conclusions.

2.2 Scope of analysis—scenarios assessed

Several alternatives are being evaluated for handing freight currently shipped via the POAL. These scenarios are described more fully in the cost benefit analysis. In summary form, the proposals include:

1. *Base Case*: maintaining the current status-quo, whereby the Upper North Island is serviced by the Port of Tauranga (PoT) and POAL, and Northport to a lesser extent

2. *POAL freight moves to Northport*: managed closure of the POAL freight operations (excluding cruise ships), Northport develops capacity equivalent to the POAL, including appropriate levels of landside infrastructure and capacity to grow as levels of freight increase; PoT continues its planned development

3. *POAL freight moves to Tauranga*: managed closure of the POAL freight operations, PoT expands capacity to be able to accept the freight of the POAL in addition to its own, including appropriate levels of landside infrastructure and capacity to grow as levels of freight increase; no major development at Northport

4. *POAL freight moves to both Northport and Tauranga*: managed closure of the POAL freight operations, both Northport and PoT expand capacity to be able to accept the freight of the POAL, in addition to their own, including appropriate levels of landside infrastructure and capacity to grow as levels of freight increase.

5. *POAL moves to a new port*: managed closure of the POAL freight operations, a new port in the Upper North Island (either at the Manukau Harbour or Firth of Thames) is built that can handle the POAL freight task, along with appropriate landside infrastructure and capacity to grow as levels of freight increase. It matters for the competition analysis whether the new port is a joint operation with PoT or established independently by POAL as discussed further below.

2.3 Our approach

Our analysis follows broadly the approach the Commerce Commission might take in assessing the competitive effects of any application to approve a merger or acquisition (Commerce Commission, 2019). We take this approach because most of the scenarios would entail some form of arrangement or understanding between entities that might otherwise be in competition with each other.

At its core, the Commerce Commission will compare the expected change in competition under a proposed arrangement with the level of competition that would occur if the arrangements did not proceed, and this is the approach we follow. In competition economics, the arrangements that would prevail if the proposal does not proceed is referred to as the counterfactual; in cost benefit analysis the arrangement is typically referred to as the base case. For consistency with the cost benefit analysis, we adopt the base case terminology.

There are, however, some significant differences between a formal competition analysis that the Commerce Commission would undertake and the assessment we present in this report. Firstly, the Commerce Commission would be presented with a very specific proposal to evaluate—that proposal would set out the parties involved, their respective interests in any arrangement, the contractual terms they propose to enter, and when, etc. By contrast, this assessment is being prepared as an input to policy advice, and hence the detailed design of any preferred arrangement is unknown; the analysis must necessarily also be 'broad brush'.

Secondly, the Commerce Commission will typically consider competition effects over a comparatively short-term horizon—in general, the Commission will consider entry and expansion possibilities over a two-year horizon, though it will extend the analysis depending on the facts of the case (Commerce Commission, 2019, p. 29). The planning horizon for the options being considered for the upper North Island supply chain is measured in decades; there is therefore a much greater degree of uncertainty as what changes might occur in supply technology and in demand for sea freight.

Thirdly, because of the general nature of the options contemplated, and the long planning horizons, there is not sufficient information to make tractable some of the analytical techniques the Commerce Commission might undertake in clearly defining the relevant markets and estimating the effects of a specific transactions and expected outcomes. Instead we highlight the likely impacts and, where possible, their expected magnitudes.

Finally, we do not consider what policy initiatives may mitigate any of the effects that we highlight. While it may be possible to regulate access prices, restrict cross-ownership or impose other limitations that reduce the detriments these considerations are outside the scope of this paper. However, we note that regulation is generally a second-best solution to maintaining a competitive market. As Yarrow & Decker (2014, p 10) observe:

> Such approaches [price regulation] are unobjectionable given the regulatory task, but they are only so because, in the relevant circumstances, the alternative of competitive discovery/determination of efficient prices is infeasible. That is, it becomes the best feasible option for the purpose of determining prices and costs for want of a superior alternative.

Some of the possible policy responses may also require consideration under the Commerce Act 1986. For example, limiting the ability of ports to compete across all freight types may amount to market allocating, which is prohibited in the cartel provisions in section 30A of the Commerce Act. It will be important to thoroughly consider such issues as policy is developed.

2.4 Competition and why it matters

The terms of reference for the Upper North Island Supply Chain Review set out the Government's interest in the future of New Zealand's ports, freight services and coastal shipping. That is:

- an overall goal of lifting and securing the economic well-being of New Zealanders, and in promoting opportunities for regional development and employment
- developing an efficient and effective transport and logistics infrastructure that is resilient and works in the national interest
- ensuring the best use of scarce resources, such as land, especially in metropolitan areas.

Competition will be central to achieving these objectives because competitive discipline drives firms to adopt the most cost-efficient means of supply, redirect resources to profitable use, provide cheaper and better services, and curbs excess returns.

Real world markets are not described by the textbook economic theory of perfect competition. Rather it establishes the formal structural conditions for certain theoretical equilibrium outcomes associated with allocative efficiency (a situation in which all resources are allocated to their most valuable use).[1] The theory of perfect competition is an equilibrium condition, in which all firms earn a normal rate of return and resources are efficiently allocated, such that there is no incentive for anything to change and hence the process of competition almost ceases to exist (Hayek, 1948). Firms in a perfectly competitive equilibrium do not alter their prices, do not advertise or differentiate their products or attempt to reduce their costs or innovate.

Real world competition is essentially about conduct; a process of rivalry between sellers (or between buyers) to win and retain sales (or supplies), analogous to a sporting competition. It implies independence of action and the absence of collusion or coordination, where the conduct of each rival affects and constrains the conduct of others. No entity in a competitive market can conduct themselves without regard to the behaviour of other entities.

The competitive process is the means by which the structural conditions are translated into the efficiency outcomes associated with competitive markets. It is the process by which firms try to undercut each other's prices, or improve their product range or service delivery relative to rivals, hence driving prices down to reflect economic cost and delivering to consumers the services they want by the most efficient and convenient means. It is also the process by which additional resources are

[1] For perfect competition these conditions are homogeneous products, an infinite number of buyers and sellers, the absence of economies of scale, independence of action, perfect information and free movement of resources. Perfect contestability extends perfect competition to accommodate economies of scale, replacing an infinite number of buyers and sellers with the complete absence of barriers to entry.

directed to the markets, products and areas of greatest consumer demand. In the real world, markets are generally in a state of disequilibrium rather than equilibrium.

When competitive is effective, no firm, or group of firms acting together, are able to restrict output and raise prices and profits above a normal return on the opportunity cost of the resources used to supply those services; and resources will move, at least in the long-run, from markets in which supply exceeds demand and returns are below normal, to markets in which demand exceeds supply and returns are above normal.

A concept which places more emphasis on the real-world process of competition, through which firms constantly vie to meet (and to create) consumers' needs at efficient costs and prices, is the concept of workable competition. The idea of workable, or effective, competition has been adopted as a benchmark for public policies which seek to promote competition. Maureen Brunt has described workable competition as (Brunt, 1970, p. 238):

> … a situation in which there is sufficient rivalry to compel firms to produce with internal efficiency, to price in accordance with costs, to meet consumers' demand for variety, and to strive for product and process improvement.

Under workable competition, some (or all) firms may have a degree of market power, but no firm has a substantial degree of market power. At any particular point in time, prices may deviate from costs and technologies can deviate from the most efficient ones available. However, workable competition is sufficient to drive the market towards efficient prices, outputs and costs. Firms continuously strive for competitive advantage against actual and potential rivals, and the market may always appear in a state of disequilibrium and change.

It is also important to distinguish competition from competitors. Effective competition is entirely consistent with the demise of individual competitors, or the expansion in some services by an entity and a retraction in the supply of those services by another entity. As competitors vie to offer consumers better products at cheaper prices and to adopt the most cost effective means of delivery, individual firms may adopt different strategies. Some will succeed and others will fail. As the High Court said in Queensland Wire Industries (Queensland Wire Industries Pty Ltd v Broken Hill Proprietary Company Ltd & Anor, 1989):

> Competition by its very nature is deliberate and ruthless. Competitors jockey for sales, the more effective competitors injuring the less effective by taking sales away. Competitors almost always try to 'injure' each other in this way.

It is this concept of workable, or effective competition, which we adopt in this assessment of the competitive effects of the options.

3. Base case—ongoing port competition

3.1 Relevant markets

An assessment of competitive effects involves considering the relevant market or markets—that is, the relevant range of economic activity. In competition economics, a market is the field of exchange (or potential exchange) between buyers and sellers and encompasses the factors that shape and constrain rivalry. It is these factors that limit the ability of a firm "to give less and charge more" (Re Queensland Co-operative Milling Association Ltd; Re Defiance Holding Ltd, citing Attorney General for the USA Report of the US Attorney General's National Committee to Study the Antitrust Laws (31 March 1955), 1976)

The High Court expressed the concept of a market as follows (Commerce Commission v Air New Zealand, 2011, para. 124):

> Without wishing to be definitive, while we see the heart of a market in economic terms as being the actual and prospective transactions between sellers and buyers, the broader ambit of a "market" looks to the rivalry between sellers for those who will buy their products, and encompasses the factors that directly shape and constrain that rivalry, as a matter of fact and commercial common sense. In particular, relevant participants in a market can include those whose responses to changes in market terms are material to the decisions sellers make regarding those terms; this embraces sellers of goods that are close substitutes (in supply or demand) and may also include participants in downstream transactions, to the extent that such transactions transmit significant competitive pressures upstream.

3.1.1 Ports are the site of a number of separate markets

A port is the site of a number of different activities, such as marshalling and stevedoring cargo, storing cargo, cleaning containers, and piloting vessels. Many of these are considered to be in separate markets for the purposes of competition analysis. There is relevant precedent to this effect in earlier decisions by the Commerce Commission and the courts.

Many of these markets are geographically limited to a single port. There is less likely to be a significant impact on competition within such a market as a result of a merger or other change in ownership structure *between* ports. Once the details of any transaction are finalised, this should be confirmed. For the purposes of this analysis we have focused on the markets for which there is inter-port competition.

3.1.1.1 Port infrastructure and marine services

The principal activities of a port are the ownership and operation of the wharf infrastructure and marine services including:

- the provision of wharf front berthage and adjacent loading and marshalling areas
- storage space for import/export goods
- on the seaward side, pilotage, towage and other services necessary to berth ships.

The scope of our analysis is restricted to consideration of the port services markets for containers and cars. We have not considered the markets for other forms of general cargo (bulk and break-bulk).

Cars

We understand that the majority (90%) of cars imported to the North Island arrive at POAL. A small number of cars arrive at PoT, which are likely for local sale. CentrePort in Wellington also handles some car imports. We understand that POAL has an advantage due to the lower land transport cost of hauling cars to distributors and dealers, many of which are in South Auckland. The limited specialised port infrastructure required for car vessels means that barriers to entry for an existing port are low and there may be some competitive constraint provided by these other ports, particularly PoT on prices at POAL.

This suggests that there is a North Island market for port infrastructure and marine services for imported cars.

Containers

A container terminal generally comprises a yard for storage, handling equipment to transport and stack containers (such as straddle carriers, rubber-tyred gantries and forklifts) and shore-based cranes to lift the containers on and off ships. We have not reached a definitive conclusion on the scope of the market. Container handling and servicing are probably separate markets to the provision and operation of the container terminal.[2] We have not formed a view on whether there are separate markets for dry containers and reefers (refrigerated containers), for full and empty containers, or for imports and exports. In analysing a specific transaction these details would be confirmed.

For the purposes of our analysis the relevant question is whether POAL and PoT compete in the same market to provide port services for containerised ocean freight. Those services provide the link between shipping and land transport (in both directions).

In its decisions, the Commission has generally defined port services markets to be regional, but general cargo has a much more limited catchment area (as it is less easy to transport and lower value than containerised cargo) which may have affected this choice. In Decision 453, the Commission found that the ability of ports to charge different tariffs for different types of cargo has important implications for defining the markets served by the port. In particular, the geographic boundaries of the port market are likely to vary for different products.

In Decision 533, the Commission noted that substitution between ports is partly a function of network effects: infrastructure will be provided and ships will call where cargo volumes are high, and cargo volumes are higher where better infrastructure is available and ships call. Shippers may avoid congested ports. The Commission also noted that commodity characteristics are important. For example, perishable, bulky or fragile product may go to the closest port, as might low value product to avoid intermodal costs. Containerised cargo tends to be more mobile and might be sent to a number of alternative ports; this can be enhanced by favourable transport contracts and regional

[2] Commerce Commission 2002 Decision 453: Port of Tauranga Limited/Owens Services Bay of Plenty Limited defined a market for container maintenance and cleaning services at Tauranga; Commerce Commission Decision 533: Port of Tauranga Limited and Toll Limited defined a container cargo handling market.

distribution centres. In addition, there is some indication that shipping lines subsidise land transport costs in respect of some freight in order to make a call at a particular port viable. In Decision 533, the Commission notes one shipping line stated that if it were to drop a port call, and it had a good relationship with a large exporter it would assist with transporting cargo to another port. At that time, some shipping lines were large customers of Toll (for rail transport).

In terms of the total costs faced by freight shippers and shipping companies, port charges are relatively minor and while they may not be significant in terms of the cost of switching to another port for some types of cargo, the Commission found that mobile containerised cargoes might consider a number of ports to be viable and defined separate North and South Island markets for port services for containerised cargo.

Inland freight hubs, most often owned by a port, are used to aggregate container freight for delivery to a port. PoT has a hub in Auckland (Metroport) and has a partnership with Tainui Group Holdings to develop a hub near Hamilton. POAL has hubs in Waikato, South Auckland (Wiri), Bay of Plenty and Manawatū. These may indicate the geographic reach of the ports in terms of containerised freight. With the exception of the Manawatū hub these are all located in the upper North Island / so-called 'Golden Triangle'. There is some evidence that POAL may have a wider geographic reach (Charles River Associates (Asia Pacific) Ltd, 2002, p. 43).

Centreport and Port of Napier's container terminals handle a significantly lower volume than POAL and PoT. This is likely in part to relate to the geographic distribution of importers and exporters, which are concentrated in the areas closer to Auckland and Tauranga. However, it may limit the ability of the lower North Island ports to profitably impose a price increase (SSNIP). This would imply that there was a single North Island market.

3.2 The parties

The activity at three ports in the Upper North Island is being considered:

- Port of Tauranga,
- Ports of Auckland
- Northport.

Port of Tauranga owns 50% of the shares in Northport and of the four Board members, one is the Chief Executive of the Port of Tauranga and another the Chair of Port of Tauranga's Board. This means that Port of Tauranga is likely to be considered to be associated with Northport (in terms of s.47(3) of the Commerce Act) and our analysis is on the basis that Port of Tauranga and Northport are in effect a single entity. Ports of Auckland holds a 20% share in the company that owns the other 50% of Northport.[3] It is less likely that Ports of Auckland would be considered able to exert a *substantial*

[3] In the current configuration, Northport does not provide a significant competitive constraint to PoT (even if the ownership arrangements were ignored) because of the relative inaccessibility of Northport for import and export markets; there is currently no container terminal at Northport, which likely reflects these market dynamics.

degree of influence over Northport by virtue of this holding alone. We have assumed that they are not associated.

In respect of car importing and container trade:

- POAL and PoT provide container handling and storage in addition to berthage and marine services to container vessels.
- POAL and PoT provide berthage and marine services for car vessels as well as land-side storage for imported cars.
- Northport does not have a container terminal or car importing function at present.

PoT owns an inland port called Metroport at Southdown, Auckland. Metroport was built for receiving and distributing containerised cargo in response to a decision by the Australia New Zealand Direct Line (ANZDL) shipping company for its ships to call at Tauranga instead of Auckland. Metroport was established to compete particularly for imported containerised freight with POAL.

We note that Port of Tauranga also has interests in an inland hub near Christchurch and PrimePort in Timaru. As we consider these locations are unlikely to be in the same geographic market, we have not considered this interest further.

POAL has inland freight hubs in Waikato, South Auckland (at Wiri), Bay of Plenty and Manawatū.

3.3 Base case

The key customers for port infrastructure and marine services are shipping operators. It is our understanding that generally exporters and importers (shippers) do not deal directly with the port, although there are some exceptions to this, such as Kotahi.

The extent to which ports compete for different types of freight depends on several inter-related factors:

- Internal land transport costs (e.g. products in easily transportable packages, such as containers, generally have more choices).
- The economic margin of the product being transported (e.g. low value bulk products such as cement or logs may have limited choices).
- Logistical factors such as the timing and availability of road or rail connections, the use of product-specific transport and loading infrastructure (e.g. tankers and pipelines) or economies of scale and network effects in loading larger ships;
- The relative price/quality mix offered by the individual port, such as port charges, service quality, frequency of ship calls, ship capacity and connections to national and international destinations.

In Decision 533, the Commission noted that:

> The provision of export facilities for containerised cargo, which is largely considered to be non-captive, is actively contested in the North Island by POTL and the POAL in particular, and to a lesser extent by the port at Napier and Centreport in Wellington.

We consider this view is consistent with the current pattern of competitive activity observed in the port infrastructure and marine services market for containerised ocean freight. In the base case (often called the counterfactual in competition analysis) it is expected that planned developments at POAL will enable sufficient operating capacity for approximately 30 years from 2020, with the range being 28 to 35 years of operating capacity, depending on the forecast scenario and the estimate of capacity. This conclusion assumes that other constraints, such as dredging to enable larger vessels to access the entrance, will be addressed (i.e. the necessary consents will be obtained).

Over the relevant period for competition analysis then, we expect that POAL and PoT will actively compete for provision of port facilities to containerised ocean freight. The Port of Napier and Centreport will provide lesser competitive constraints.

With respect to the market for cars, as already noted the majority of the cars imported to the North Island arrive in POAL. Some car vessels use other ports (Centreport and PoT), and these cars form part of the local supply. Due to distance to market and therefore land transport cost, PoT is likely to provide the greatest competitive constraint on POAL in terms of car import facilities.

These conclusions are consistent with economic theories of capacity competition (Cournot) market shares are inversely related to costs—that is, shippers use a port less if a supply chain costs them more. So a:

- higher proportion of containers are exported via Tauranga due to its proximity to exporting producers
- higher proportion of containers of manufacturing goods is imported via Auckland because the port is closer to distributors
- higher proportion of cars are imported via Auckland as the majority of car dealers are in south Auckland.

4. Most scenarios reduce competition

4.1 Three scenarios eliminate port competition

The first three scenarios described in section 2.2 above, would involve the relocation of containerised ocean freight from POAL to:

- Northport
- Port of Tauranga
- a shared increase in capacity at both Northport and the Port of Tauranga.

As we have noted, in our view PoT and Northport are associated by virtue of the ownership and governance structure of Northport. This means that these first three options all entail a merger of the two main competing container terminal operators in the upper North Island; depending upon the precise boundaries of the relevant markets, these options may be characterised as 'merger to monopoly' for a range of port services in the upper North Island.

These three options would, therefore, all lead to a substantial increase in the market power of ports in the upper North Island.

Market power is essentially the inverse of competition. At its core, market power is the ability of one or more suppliers in a market to sustain prices above long-run costs, including a return on capital and accounting for risk, without margins being eroded by the competitive activity of rivals and/or entry. Market power may involve the power to do things other than raising price, for example, to engage in exclusionary conduct, but these actions are ultimately directed at maintaining or increasing the firm's power over prices. In capital intensive industries such as ports, an increase in market power may also reduce motivation for service innovation, such as incentives to develop inland transport hubs and innovate with logistics companies. An increase in market power by the port companies in the upper North Island could be expected to reduce the incentive for these forms of service innovation simply because the ports would face less rivalry from competing ports.

Economic theory robustly predicts that efficiency is more likely to result if a buyer (in this case an exporter or importer or its agent) can negotiate with more than one supplier. For example, more trade will occur where a buyer can negotiate with more than one supplier. To illustrate, suppose that marginal cost is known to be $1, while the buyer's value (as perceived by the sellers) is equally likely to be $2 or $4. With two sellers, if competition is sharp enough to yield gross margins below 50 percent,[4] the competitive price is below $2 and efficient trade takes place. This efficiency is jeopardized if the two sellers merge. If the merged firm can commit to a price, its profit-maximizing price will be $4. Half of the time, the buyer's value will be $2, and no transaction will occur; trade is inefficiently lost.[5]

[4] Nothing of importance turns on this margin assumption; other examples could be readily constructed with different duopoly margins.

[5] To maintain the monopoly price of $4 the seller must at least sometimes let the buyer walk away, destroying joint value to obtain more for itself. For a more general exposition of this point by a distinguished competition economist, see (Vickers, 1996).

Much more generally, a buyer able to deal with two or more suppliers can more readily employ an auction or bidding system to pitch one supplier against the other. With private information, an auction typically yields greater buyer welfare and overall efficiency than does negotiation with a single supplier. Indeed, Bulow & Klemperer (1996) have shown, quite generally, that no amount of bargaining power will be as valuable to a buyer as having more than one supplier.

In short, competition is a highly effective way to achieve efficiency in the presence of private information about buyer value and seller costs. However, all three options described above would eliminate competition between POAL and the PoT, and therefore result in a substantial lessening of competition for port services in the upper North Island. The increase in market power by the port companies could therefore reasonably be expected to result in reduced service innovation, higher prices for exporters and importers, and a reduction in exports and imports than would occur in the base case.

4.2 A new port may increase or decrease competition

Two of the scenarios would involve a new port, located either on the:

- Firth of Thames
- Manukau Harbour

However, from a competition perspective, the Firth of Thames scenario is more like a merger of the POAL and PoT services as we understand the proposed port would be designed for all freight operations of the POAL and the PoT. The competition considerations are therefore the same as for the first three options—a substantial reduction in port competition in the upper North Island.

Similar competition considerations as the first three options would also arise if a new port on the Manakau harbor was to merge freight activities for both the POAL and PoT.

The construction of a new port at Manakau and operated by POAL independently from PoT would result in an increase in port capacity in the upper North Island. An increase in capacity operated independently by POAL, relative to the base case, would increase competition at least in the short-to-medium term until port capacity in the upper North Island approached full utilisation.

The two cornerstone economic models applied in competition economics for understanding how firms interact and compete for market share in markets that are not perfectly competitive (that is, almost all real-world markets) are "Cournot" or quantity competition, and "Bertrand" or price competition. Under Cournot quantity competition—the model that best reflects competition between ports—firms may behave as though they set quantities based on their knowledge of demand and the quantities they expect other firms to set. Hence, an increase in capacity will typically lead to increased competitive pressure, and hence lower prices and increased trade.[6]

[6] The alternative model is Bertrand price competition; under this model, each firm behaves as if it sets price given its belief about how the other firms will price.

A variation of the new port scenario could entail the creation of a single new port, with competing port operators. Hence, the competitive landscape under such a scenario would change from the base case of competition between two integrated port companies (POAL and PoT), to a scenario in which there was no competition between ports in the upper North Island, but competition would continue between port operations.

A competing port operators, but single port, scenario would reduce competition relative to the base case because it would still eliminate competition between ports in the upper North Island (while retaining competition between operators). The potential problems of increased market power, leading to higher prices and reduced service innovation from ports would be similar to the first three scenarios.

Competing port operators, however, raises the prospect of competition benefits still being achieved in that aspect of the supply chain. However, the detail of the proposed arrangements would matter. Competing port operators at ports not owned by those operations will require complex contracting ex ante and appropriate controls ex post. These contracts may need to govern characteristics such as pricing, the quality of service, whether the operators may develop in-land hubs and exclusive arrangements with logistics firms, and how the arrangements might adapt to unforeseen randomness. The detail of such arrangements may give rise to competitive effects.

At this stage of development of the options, it can be said that a single port, with competing operators, would reduce competition relative to the base case, but would retain the prospect of competitive benefits relative to the options that would eliminate all competition between ports in the upper North Island.

4.3 Countervailing market power of shippers

The Working Group commented that competition had not driven efficiencies and rationalisation in the port sector as had been hoped; it argued that these gains: (UNISC, 2019, p. 17):

> had not happened because competition lies offshore with global shipping lines who take advantage of the existing supply chain and the lack of cooperation between port owners … Consequently, most industry stakeholders agree greater cooperation is needed and for port operations to collectively learn how to influence international shipping lines rather than the other way around.

The inference is that greater cooperation between New Zealand ports, increasing their market power, would be a benefit to New Zealand. That inference is not supported by any evidence or theory in the Working Group report and seems improbable.

Shipping firms are on the 'buy' side of the market—the shipping companies purchase port services on behalf of New Zealand exporters and importers. To the extent shipping lines have market power, it is 'countervailing market power'; this countervailing market power means that the shipping companies would be able to negotiate better terms with the ports than otherwise and some of that benefit would flow to exporters and importers.

If port companies in the upper North Island were to gain additional market power, that market power would allow them to raise prices above those that would occur in the base case. New Zealand

exporters and importers might reasonably be considered price takers in international markets—that is, exporters (and importers) are not of sufficient size to profitable raise (or lower) world prices above (or below) competitive levels. As price takers, exporters and importers will therefore bear any increase in charges by New Zealand ports, in the first instance.

If the shipping companies were a monopoly (they are not) then 50% of any increase in port charges could be expected to be passed back to exporters and importers, along with a reduction in import and export volumes. If shipping companies were perfectly competitive (they are not), then 100% of any increase in costs would pass back to exporters and importers. In a market characterised by a few large entities—an oligopolistic market—the level of cost pass-through would lie between the monopoly and perfectly competitive outcomes. Studies from other industries would suggest, as a rule-of-thumb, that about 80 per cent of any price increase by New Zealand Ports would flow through to higher charges for New Zealand exporters and importers. This estimate is explained further in appendix one.

4.4 Indicative price effects

In appendix B we apply a Cournot model of competition to provide indicative estimates of the price impacts of reduced competition for port services in the upper North Island. The estimate is developed by making several simplifying assumptions. As with the competition assessment above, the estimates presented in this appendix are also 'broad brush'.

Depending upon the chosen estimate of how trade responds to a change in prices, and whether an assumption of linear demand or constant elasticity better reflect the characteristics of demand for port services, the price increases due to increased market power might range from 6 per cent to 32 per cent relative to current Ports of Auckland prices and 5 per cent to 24 per cent relative to current Port of Tauranga prices. The Simonvska and Waugh (2014) study, from which we source the elasticity estimate for these calculations, used a model that assumes constant elasticity of substitution in estimating trade elasticities from data spanning 123 countries and accounting for 98 per cent of the world's GDP. Consistency of assumptions might therefore suggest that the price range derived from a constant elasticity demand are the better estimates; that is, exporters and importers might face price increases toward the higher end of the range.

5. Conclusion

This report considers the potential impact on competition of alternative options for handling sea freight currently shipped via the POAL. A reduction in competition would reduce the discipline that drives firms to adopt the most cost-efficient means of supply, redirect resources to profitable use, provide cheaper and better products, and curb excess returns.

We assess competitive effects by comparing the expected change in competition under the options evaluated in the cost benefit analysis with the level of competition that would occur if the arrangements did not proceed. Our analysis considers proposals which are outlined at a reasonably high level, and hence analysis is necessarily also be 'broad brush'.

We conclude that all but one option would reduce competition between ports in the upper North Island, to the detriment of New Zealand exporters and importers. Our analysis is summarised in Table 2 below.

Table 2 Impact of options on port competition

Scenario—POAL freight moves to:	Effect on competition	Economic impact
Northport	Substantial lessening of competition, upper North Island	higher prices, reduced service and innovation
Tauranga	Substantial lessening of competition, upper North Island	higher prices, reduced service and innovation
New port, fully owned by Tauranga	Substantial lessening of competition, upper North Island	higher prices, reduced service and innovation
New port, fully owned by Auckland	Increase in capacity competition	lower prices, improved service and innovation
New port jointly owned, competing operators	Substantial lessening of competition in ports, competition retained for terminal operation	On balance, higher prices, reduced service and innovation

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Appendix A Pass through of port price increases

The extent to which a price increase by a port is passed on by a shipping company to importers and exporters will depend on competitive pressure in the market for shipping services. In the extreme (and unrealistic) case of perfect competition, the price for shipping services would equal marginal cost. In this situation, an increase in the market power of the ports would result in all of the price increase by the ports being translated into increased prices for shipping, and exporters and importers would incur the full impact of the cost change. If New Zealand exporters and importers receive and pay the 'world price' (that is, are price takers), then all of the price increase by a New Zealand port would be borne by New Zealand exporters and importers (in the perfectly competitive scenario).

The other extreme case is if shipping companies were a monopoly. The shipping companies are not a monopoly, but an assumption of a monopoly marks the other end of the range of possible pass through amounts. If we assume that demand for shipping services can be represented by a linear demand curve, then the monopoly would pass through half the change in costs.[7] This result is shown in a stylised form in Figure 1 below.

A profit maximising monopoly will produce a quantity such that marginal revenue (MR) is equal to marginal cost (MC). A monopoly will target this quantity as a lower level of production would reduce profits as the revenue lost would exceed the cost reduction; similarly, a higher level of production would reduce profits as the additional cost would exceed the additional revenue.

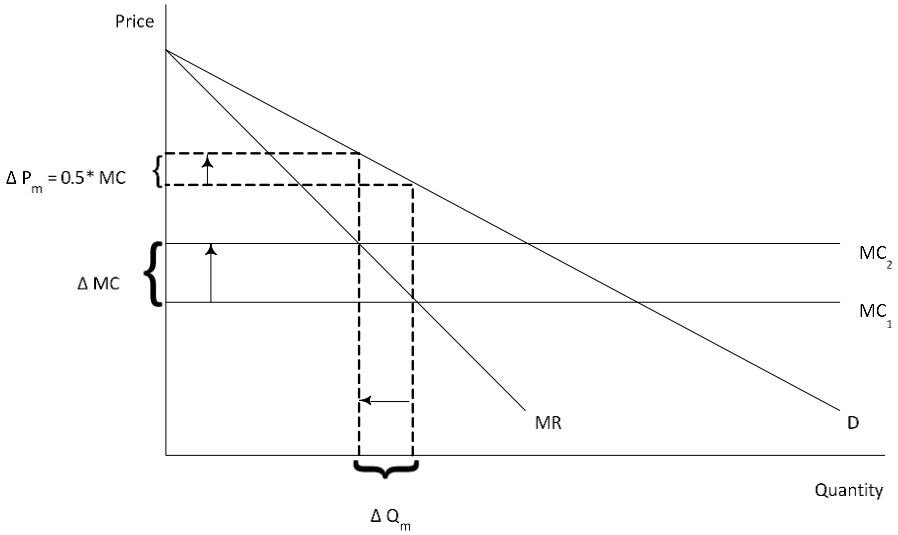
In Figure 1, this quantity is represented by Q_1 initially. When a monopolist produces the quantity determined by the intersection of MR and MC, it can charge the price determined by the market demand curve at that quantity, represented by price P_1 in Figure 1.

With a linear demand curve, the marginal revenue curve is twice as steep as the demand curve. To sell more, a monopolist must reduce its prices, therefore the net additional revenue from the last unit sold is less than its average revenue on all units sold. Hence, for any shift in the marginal cost curve, the change in price will be half that of the change in costs. This effect is demonstrated in Figure 1 Cost pass-through by a monopoly

; that is, the increase in price from P_1 to P_2 is equal to half the increase in marginal cost from MC_1 to MC_2.

[7] A demand curve is the graphical representation of the relationship between the price of a good and the quantity of that good consumers are willing to pay at a certain price at a point in time. In reality, demand curves are rarely linear. If the price changes are relatively small, an assumption that the demand curve can be approximated as linear may be reasonable.

Figure 1 Cost pass-through by a monopoly



A more realistic description of shipping services is that the market can be characterised as oligopolistic—a market characterised as being dominated by a few firms. The two cornerstone economic models for understanding how firms interact and compete for market share in markets that are not perfectly competitive (that is, almost all real-world markets) are "Cournot" or quantity competition, and "Bertrand" or price competition.

Under Bertrand price competition, each firm sets price given its belief about how the other firms will price. Under Cournot quantity competition, firms may behave as though they set quantities based on their knowledge of demand and the quantities they expect other firms to set.

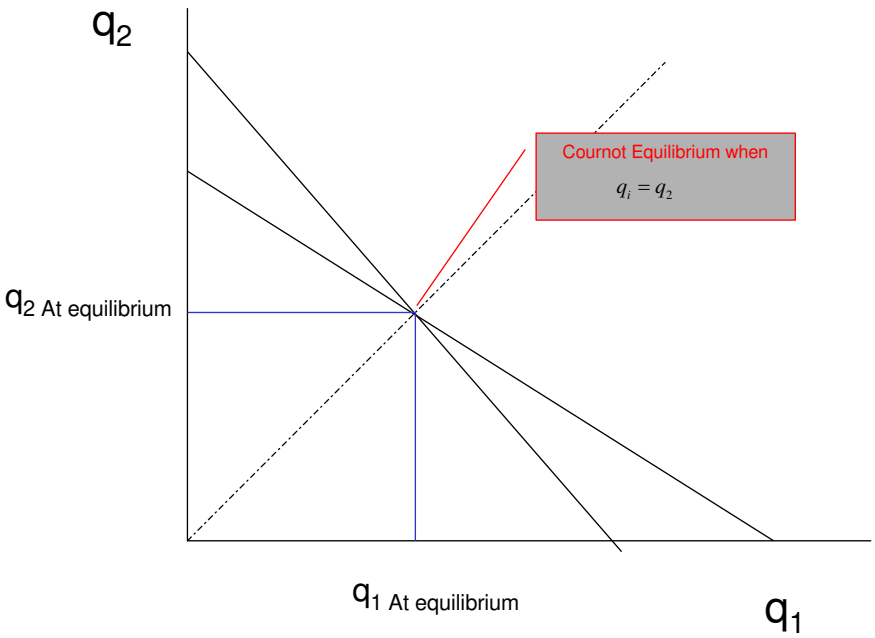
On the face of it, shipping companies would appear to exhibit Cournot competition, by investing in shipping capacity. In any event, economic theory shows that when limits exist on the production capacities of competitors (and the capacity of all shippers is limited by their ships), markets that might otherwise exhibit Bertrand competition yield Cournot outcomes (Kreps & Scheinkman, 1983). (This contrasts with textbook Bertrand competition in which each firm can potentially take all the market.)

An oligopolistic market, that exhibits Cournot competition, produces a level of cost pass-through that is between the monopoly and perfectly competitive outcomes. In a study often cited, (Kate & Niels, 2005, pp. 323 - 357) found that the price change in an oligopolistic market, with linear demand and a homogenous product, will be approximately equal to N/(N + 1) of the cost change, where N is equal to the number of firms in the market. In the case of the shipping market, if N is assumed to equal to 4, the expected pass-through would be 4 / 5 or 80%.

Appendix B Indicative price impact of reduced competition

Currently, Ports of Auckland competes with the Port of Tauranga. As noted in section 4, the Cournot model of competition best reflects competition between ports; that is, ports behave as though they offer capacity based on their knowledge of demand and the capacity they expect other firms to offer. This appendix applies the Cournot model of competition to provide indicative estimates of the price impacts of reduced competition for port services in the upper North Island. Given the limited brief for this aspect of the work programme, the estimate proceeds by making several simplifying assumptions. As with the competition assessment in the body of the report, the estimates presented in this appendix are also 'broad brush'.

The diagram below gives a general illustration of a standard Cournot model with two firms. It shows the best response function for two firms competing in quantities—in this stylised example, the firms are assumed to supply in equal shares. The best response functions show that if the output of firm 2 is zero, then the best response from firm 1 is monopoly output. Similarly, if the output of firm 1 is zero, then the best response from firm 2 is monopoly output. The intersection between the two best-response functions is the Nash equilibrium solution to the Cournot model. If marginal costs are the same for both firms, then both firms will supply the same quantity when in equilibrium (that is, $q_1 = q_2$).



The cost structure of port operations means each firm has high fixed costs as a proportion of total port costs—Charles River Associates (2002, p. 46) found that fixed costs (costs that are invariant to the volume of cargo carried) comprise as much as 60 per cent of total port costs. High fixed costs as a proportion of total port costs make port profits particularly sensitive to shifts in cargo volumes and asset utilisation, as total costs will grow at a slower rate than revenues, increasing port profitability as volumes increase (Commerce Commission, 2002, p. 23).

A numerical example may help illustrate profit sensitivity when fixed costs are a high proportion of total costs. Assume fixed costs comprise 60 per cent of total costs for a port, with a profit margin of 8 per cent (calculated as profit divided by total accounting costs). If volumes were to increase by 5 per cent, with no change in price, total revenue would also increase by 5 per cent. However, total costs would increase less than proportionately, since 60 per cent of total costs are fixed. Under these conditions, a 5 per cent increase in volume for a firm with 60 per cent of total costs fixed would increase profit by 40 per cent.

Because port profits are sensitive to changes in volumes, the industry can be characterised by strong competition even in markets with only two competitors. In strongly competitive markets, a firm maximises its profits by expanding output until its marginal cost (that is, the cost of producing an additional unit) equals the market price. Firms in strongly competitive markets can therefore be assumed to have the same or similar marginal cost at the levels of output they produce. More efficient firms produce more and earn higher profits, because they have lower average costs, although their marginal costs at the level of output they produce is the same as their less efficient competitor.

In modelling indicative price effects from an increase in market power it is reasonable therefore to assume that marginal costs are the same for all firms.

In the Cournot model, firms maximise profits by simultaneously choosing the quantity to supply to the market. That is, they maximise:

$$\pi_i = q_i p(Q) - c q_i \tag{1}$$

where π_i is profit for firm i, q_i is the quantity supplied by firm i, Q is the total quantity supplied to the market by all firms, $p(Q)$ is the market price when Q units are supplied to the market and c is the firm's marginal cost.

In a duopoly, if firm i is to maximise its profit by setting quantity, the first order condition is:

$$\frac{d\pi_i}{dq_i} = p^d - c + q_i \frac{dP^d}{dQ^d}\frac{\delta Q^d}{\delta q^i} = 0 \tag{2}$$

Where superscript d represents the duopoly outcome. Since firm i takes the other firm's output as given:

$$\frac{\delta Q^d}{\delta q^i} = 1$$

And given the price elasticity of demand:

$$\varepsilon = \frac{dQ^d}{dP^d}\frac{P^d}{Q^d}$$

We can rearrange equation (2) to obtain the price-cost margin, which is often referred to as the Lerner Index:

$$\frac{P^d - c}{P^d} = -\frac{q_i}{\varepsilon Q^d} \tag{3}$$

We compare the prices under the duopoly structure, P^d, where POAL and PoT compete, with the price they would set acting as a single profit-maximising firm (monopoly), P^m. In the first instance, we assume that price elasticity of demand is constant ε at every level of quantity.

The monopolist's profit maximising rule is:

$$\frac{P^m - c}{c} = \frac{1}{\varepsilon} \tag{4}$$

From equations (3) and (4) we obtain:

$$\frac{P^m}{P^d} = \frac{\left(\frac{q^i}{Q} + \varepsilon\right)}{1 + \varepsilon} \tag{5}$$

The implied percentage increase in price in moving from duopoly to monopoly is thus dependent on the initial market share and the elasticity of demand.

In the market for shipping containers in the upper North Island, the current market shares of the Ports of Auckland and Port of Tauranga are as follows:

Table 3 Container market share, TEU, 2018/2019

	Volume, TEU, million	**Market share %**
Ports of Auckland	0.94	43%
Port of Tauranga	1.25	57%

Source: POAL presentation to UNISC workshop, held at Sapere (Auckland) 14 February 2020

Port of Tauranga presentation, held onsite 12 February 2020

The elasticity of demand refers to the change in behaviour of buyers in response to a change in price. Simonvska and Waugh (2014) estimate the elasticity of trade, which estimates the change in trade given a change in trade costs. This is an equivalent concept to the price elasticity of demand for trade. Their benchmark estimate is 4.14 and the elasticity range is 2.79 to 4.46.

Table 4 gives estimates of the percentage increase in prices relative to existing charges at the Ports of Auckland Port of Tauranga for this range of elasticity:

Table 4 Price changes implied by a range of price elasticities - constant elasticity demand curve

Price elasticity of demand	**-2.79**	**-4.46**
Percentage price increase—Auckland	32%	16%
Percentage price increase—Tauranga	24%	12%

Now, suppose that demand is linear. If ε is the elasticity at the observed quantity supplied when POAL and PoT are competing (Q^d), the market demand curve is given by:

$$P = \left(\frac{\varepsilon - 1}{\varepsilon}\right) P^d + \frac{P^d}{Q^d \varepsilon} Q \tag{6}$$

where $Q$is the quantity supplied to the market. The monopolist chooses quantity Q^m to maximise

$$\pi^m = Q^m (P^m - c) \tag{7}$$

and so sets:

$$Q^m = Q^d \frac{P^d(1-\varepsilon) + \varepsilon . c}{2P^d} \tag{8}$$

Substituting (3) yields:

$$Q^m = Q^d \frac{\left(1 + \frac{q_i}{Q^d}\right)}{2} \tag{9}$$

Substituting (9) into (7) and rearranging:

$$\frac{P^m}{P^d} = 1 - \frac{\left(1 - {}^{q_i}/_{Q^d}\right)}{2\varepsilon} \tag{10}$$

The results for the range of elasticity values are given below.

Table 5 Price changes implied by a range of price elasticities - linear demand assumption:

Price elasticity of demand	**-2.79**	**-4.46**
Percentage price increase—Auckland	10%	6%
Percentage price increase—Tauranga	8%	5%

Hence, depending upon the chosen estimate of elasticity, and whether an assumption of linear demand or constant elasticity better reflect the characteristics of demand for port services, the price increases due to increased market power might range from 6 per cent to 32 per cent relative to current Ports of Auckland prices and 5 per cent to 24 per cent relative to current Port of Tauranga prices. The Simonvska and Waugh (2014) study, from which we source the elasticity estimate for these calculations, used a model that assumes constant elasticity of substitution in estimating trade elasticities from data spanning 123 countries and accounting for 98 per cent of the world's GDP. Consistency of assumptions might therefore suggest that the price range derived from a constant elasticity demand—the estimates shown in Table 4 above—are the better estimates; that is, exporters and importers might face price increases toward the higher end of the range.

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