CONTAINERS, CONTAINER SHIPPING, TRENDS AND IMPLICATIONS

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I. Introduction

The 'box that changed the world' has come into the limelight in the last few years. This is more because of the shortages in port infrastructure throughout the globe than because of the causal relationship implied by the phrase. Regardless of what one chooses to believe, the effects of containerization and the recent developments in ship size strains the limits of the imagination. It demanded technological and engineering feats over nearly three decades.

In this paper, we shall review the container shipping industry before the current recession. Part II examines in brief the history of the development of container shipping. Part III examines the structure of the container manufacturing industry and the structure of container shipping industry. Part IV reviews the trends in container and ship size with its implications. Parts V and VI deal with container shipping in Canada together with the regulations on the movement of containers and container shipping companies. Part VII reviews the implications of the this industry becoming oligopolistic. Finally, a few concluding remarks are made.

II. History of the Development of Container Shipping

The entrepreneur Malcom Mclean has been credited with revolutionizing the container shipping industry in the early 1950s with the box that changed the world. However, use of containers to ship goods dates back to as early as 1920 in other modes such as rail. The first vessels purpose-built to carry containers began operation in Denmark in 1951 and the year 1956 has been credited when the container was introduced in the US trade.

A container is an aluminum or steel box held together with welds and rivets, with a wooden floor and two enormous doors at one end. Standardization of containers during the first twenty years, was one of the major problems faced as containers with different sizes and corner fittings were used in various countries. In the US, there are five common standard lengths, 20ft, 40-ft, 45-ft, 48-ft, and 53-ft. The 20ft container referred to as the TEU (i.e., twenty equivalent unit) is the most commonly used container.

* *The views expressed here are those of the authors and are not purported to be those of the Commissioner or the Competition Bureau, Industry Canada.*

The milestones in the container revolution were: McLean's innovation, the transformation of ports, accommodation with labor, standardization of containers, intermodal connection with trucks and railroads, and the demonstration of the system at Vietnamese ports to the U.S. government. By the 1960's containerization began to take hold and other companies began adopting it. The container revolution climaxed in the mid 1980s and growth has been steady since then.

Today, it is at the core of a highly automated system for moving goods from anywhere to anywhere, with a minimum of cost and complication. It transformed international trade in ways unimaginable. The use of containers has revolutionized cargo shipping. Local markets started becoming extinct and were suddenly transformed into international markets. Today, approximately 90% of non-bulk cargo moves worldwide by containers stacked on transport ships; and 26% of all containers originate from China.

III. The Structure of the Container and Container Shipping Industries

A. Structure of the Container Manufacturing Industry:

a. Supply of Containers - 1. *Production:* The majority of containers in the world is manufactured by two companies: China International Marine Group with 50%-60% of the market and Singamas with 10%-20%. It is estimated that the market share of the top four companies is in excess of 81% and the Herfindhal-Hirschman Index (computed by summing the square of the market shares of all the companies) is in excess of 3000.[1] The HHI is a measure of concentration and US antitrust authorities consider a HHI of 1000 or more as concentrated and 1800 as highly concentrated.

In terms of world output, world production of containers has been steadily increasing from slightly more than 1.1 million in 1994 to about **1.6** million in **the early 2000s.** The two largest manufacturers of containers are in China and the other major manufacturers are in Europe, in particular Western Europe. Since the 1990s production in Europe has fallen dramatically, particularly in Central/Eastern Europe. The only other country that is noteworthy in the manufacture of containers is the Republic of Korea.

2. *Leasing:* The four important firms in the container leasing market in 2006 were: Textainer with 15.7%, Triton with 14.2%, Florens Container with 10.5% and GESeaCo. with 10.4%. The HHI for the firms in the industry should exceed 658. Concentration in this market has decreased since the 1990s when GESeaCo had 50% of the market. In 2006 there was a major change in ranking when Textainer acquired Gateway to capture the leading position. Leasing companies own about 42% of all containers down from 45-47% in the previous decade.[2]

b. Demand for Containers

Global containerized trade has increased from 38.4m TEUs (full containers) in 1995 to 95m TEUs in 2006 and with that the demand for containers has increased. In 2011, world containerized trade is forecasted to reach 129m TEUs more than three times the amount in 1995. With this forecasted increase in trade, demand for containers which originates from shipping companies and leasing companies is expected to increase.[3]

Shipping Companies: Shipping companies account for 50 percent of the demand for all containers manufactured. Their demand is largely influenced by the volume of trade, as the volume goes up so does the demand. Price of containers and the cost of leasing containers also have an effect on the demand from container shipping companies.

Leasing Companies: Leasing companies account for 45 percent of the demand for all containers manufactured. Their demand largely depends on the profitability of leasing which in turn depends on the price of new containers, leasing rates, utilization rate, repositioning cost and other costs such as storage, management, and maintenance costs. The demand from these companies is between 750,000 to 800,000 containers. From 1995 to the mid 1999, the leasing industry was depressed due to the fall in price of containers. This imposed a cost burden due to different rates of depreciation for the older more expensive containers, as users chose to select new containers over older ones leading to a decline in the utilization of containers below 80%. This has negatively affected purchases of new containers by the top leasing companies over this period.

c. Pricing of Containers and Cost of Leasing

1. *Pricing:* The price of twenty foot containers was slightly above $2500 (US) in 1990. Since then, till the mid-1999 the price fell below $1400 (US). The downward trend in prices can only be explained by changes in production. One source describes it as "One explanation is the increase in competition dominated by China. ... But their price has been driven down partly by over-capacity in Chinese production facilities and partly because the factories are being funded by the State through local or regional agencies. As a result, the price quotes in mid-1999 are almost half of what they were in mid-1995. ... Unable to compete with China in terms of prices, many non-Chinese producers have closed down. This has enabled China to further drive down prices of new boxes."[4] After the mid-1999, prices rose to $1500 and $2100 in 2000 and 2005. In 2008 it was described as good as gold.

2. *Cost of Leasing:* The cost of leasing containers largely follows the price of containers. The fall in the prices of new containers is reflected in the fall in costs to leasing companies, which in turn resulted in lower lease rates. The falling

price of containers penalized leasing companies with older containers given the higher costs of depreciation (the annual depreciation rate is 6-7%) for older containers. The cost of leasing was also affected by the utilization rate of leased containers, the cost of repositioning used containers and the capital loss on older containers (if the depreciation period is reduced due to the increase in the rate of disposal). As a result, the rental cost fell from about $1.35 (US) per day in 1995 to less than $0.7 (US) a day in 1999. After this year, rental cost rose per day to $0.75 (US) in 2000.[5]

B. Structure of Major Container Shipping Companies/Groups

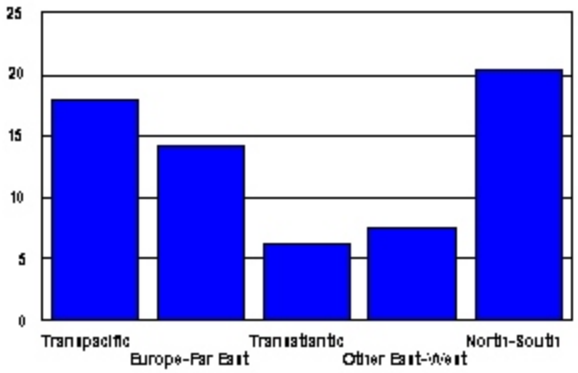
a. Supply of Shipping Services

The supply of container shipping services is provided by liner ships. These liner services are provided by companies that own and charter their fleet of vessels. The quantity of shipping services provided is directly related to trade volumes which incidentally is a major determinant of the number of companies, the number of ships and the volume of TEU capacity that these ships deploy on direct services between any two countries. GDP per capita and distance are also factors that determine the provision of direct liner services. Containers flow along east-west (trans-Pacific, Europe-Far East and transatlantic), north-south and regional routes.[6] The number of vessels employed in the major interregional routes are: China-U.S. (458); Hong Kong - U.S. (326); China-Germany (296); China-UK (266); China-Netherlands (259); Germany-Hong Kong (244); Hong Kong-Netherlands (220); and Hong Kong-UK (219).[7]

Of the 100 million TEU liner capacity provided in 2007, the combined share of the largest four companies - Maersk Line, MSC, CMA-CGM and Evergreen - was 38.4%. This share is much larger (49%) if one considers liner services provided by the top four companies or alliance - APM, CKYH Alliance, Grand Alliance and MSC (See Table 1 in Appendix). The fairly large market share is a result of the thirteen plus major acquisitions that occurred between 1996 and 2005. The HHI for the former was 449 and the HHI for the latter was 621. It is worthwhile pointing out that the ownership of containerships is less concentrated than its operation, as operators tend to charter a large proportion of their vessels which are owned by non-operating companies (estimated to be 50%+).

b. Demand for Shipping Services

The demand for liner container services is a derived demand. It was initially used for transportation of high value manufactured goods but is now increasingly used for other types of cargo. As the demand for exports and imports increased so did the demand for containers but at a faster rate. United States, Germany, China, Japan, France and United Kingdom are the major trading nations in terms of value of world trade, accounting for 12.5%, 8.3%, 6.7%, 5.3%, 4.5% and 4.2% of the world trade of $78.9 billion.

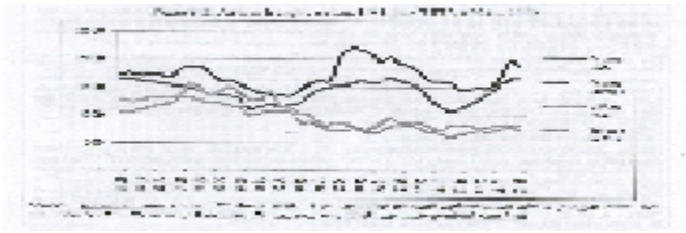


Demand for container shipping by major trade lanes (Transpacific, Europe-Far East, Transatlantic, Other East-West, and North-South) for 2005 is shown in the graph hereafter in millions of TEUs.

It is expected to grow by 10%, 7.6% and 7.8% for the years 2007, 2008 and 2009, respectively for the transpacific trade lane. For the Asia-North Europe trade lane, it is expected to grow by 11.1%, 9.3% and 4.2% for the years 2007, 2008 and 2009, respectively. For the Transatlantic trade lane, it is expected to grow by 7.8%, 9.7% and 3.4% for the years 2007, 2008 and 2009, respectively. The growth refers to the head-haul direction but this was before the recession. [8]

c. Pricing of Liner Services

The pricing of liner services or freight rates per TEU depends on the trade lane ranging from $2000 to $750. It is suggested that freight rates in liner shipping are prone to behave like a 'pig cycle'. This cyclical movement is because it takes time for supply to adjust to demand. The movement of freight rates per TEU are shown in Chart 1 for the major trade lanes. The chart reveals that there have been two major cycles since 1995 on two trade lanes - Asia to USA and Asia to Europe - falling from 1995 to 1997, rising from 1997 to 1999, falling from 1999 to 2001 and rising from 2002. For two other trade lanes - USA to Asia and Europe to Asia - freight rates have fallen from 1995 to 1999, risen from 1999 to 2000 and remained steady to about 2002.



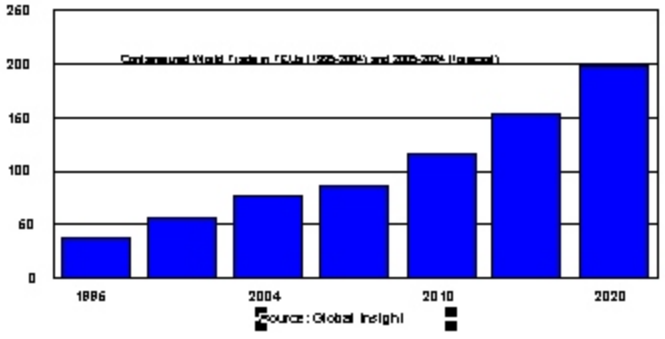
Since then, liner shipping rates have increased significantly on practically all routes and vessel sizes.[9] The main classical explanatory variables of maritime transport costs which previous research has shown to be relevant are: unit cargo

value, volume per transaction, geographical distance, bilateral trade volume, and trade balances.[10] Other explanatory variables are port characteristics (efficiency, infrastructure, conductivity and private sector participation), number of liner services providing direct services, GDP, etc.[11]

In sum, supply of containers is through two sources - production and leasing- and demand originates from shipping companies and leasing companies. Production is highly concentrated. The pricing of these containers has risen since the mid 1999 after its decline since the 1990s. The supply of container shipping services is provided by liners and the four largest companies account for 38.4% of liner capacity. The share is much larger (49%) if one includes alliances in the top four. Since these companies charter a large portion of their vessels, operation is more concentrated than ownership. Demand for liners arises from the major trading countries. The pricing of liner services or freight rates is cyclical i.e., a 'pig cycle'.

IV. Trends in Containerization / Ship Size - Implications

Trends in Containerization and Ship Size: Two major trends in containerization are evident form the statistics. First, from 1995 to 2004, containerized trade increased from 38.5million TEUs to 78.6million TEUs growing at an annual rate of 8.3 percent. This increase before the recession was forecasted to be 6.1 percent from 2005 to 2010 (i.e., an increase to 117.6million TEUs) and 5 percent in the decade after that (i.e., an increase to 199million TEUs). This is shown in the chart hereafter. As stated by UNCTAD's *Transport Newsletter* based on data from Global Insight "During the next two decades growth rates will slightly decrease, as the containerization of trade in goods will reach its technical maximum, and containerized trade will then grow at the same rate as global trade in goods in general."[12] Second, another observable trend is the growth in the use of the 40ft container, which is expected to replace the 20ft container the most commonly used container worldwide, since costs are related



to container and not to length. Transport Canada states "The share of maritime 20 foot units has been declining and can probably be expected to continue to decline. Likewise, the use of 40 foot high cubes (9'6") is also increasing and accounted for 38.2% of all maritime containers in 2005."[13] The lower cost for the FEU suggests the need to encourage the use of these larger containers.

Container ship size, over the last three decades, has increased from 975(TEUs) to 2,191(TEUs) (see Table 3) an increase of 125% with the largest container ship rising 342%. Perhaps, a more incisive view is the fact that 17 of the top 25 routes were served with vessels larger than 9,000 TEUs. According to Drewry Shipping

Table 3 - Trends in Container ship size

Year	Average Ship Size (TEU)	Largest ship in world fleet (TEU + Max. draft)
1980	975	3,057 - 11.6m
1990	1,355	4,409 - 14.0m
2000	1,741	7,200 -14.5m
2006-7	2,191	13,500 - 15.5m

Source: Drewry Shipping Consultants Ltd - World container cargo prospects, 25th IAPH World Ports Conference, Houston, 30 April 2007.

Consultants the average and largest container ship sizes will continue to increase.[14] This was also confirmed in the highlights of the 2007survey by *American Shipper* which reports that a rush of orders for mega-ships swells order books, to be exact there were 114 orders for ships of more than 10,000 TEUs which is more than ten percent of the capacity of the world's fleet.[15] This trend is expected to continue with constraints (18,000 TEUs) imposed by the Malacca Strait. This has also been accompanied by a specialization of ship design.

Implications: The above trends have had and are having numerous effects. Only the effects on ports and infrastructure with its resulting economic and global effect will be briefly mentioned.

Ports: Massive new ports and terminals are or have been built and expanded. This occurred together with the mushrooming of huge industrial complexes to ensure sufficient port capacity. Channels in several ports were deepened to accommodate the mega-carriers that were termed 'bemoths'. Ports began to be fitted with mammoth cranes and sophisticated equipment to accommodate the increase in container traffic and size of new ships.

Infrastructure: The transportation network infrastructure providing access to the major gateways and transhipment ports began to be addressed. To avoid congestion at these strategic gateways, the infrastructure development relating to rail and highways became a priority. Further, to accommodate the burgeoning cargo-freight, superhighways and super-corridors were built or were planned to ensure a seamless, efficient and effective transportation system. Constraints on rail movement and capacity were also being removed.

Economic effect: One expert describes the economic effect as "The container first affected these costs. The elimination of piece-by-piece freight handling brought lower expenses for longshore labor, insurance, pier rental, and the like.

Containers were quickly adopted for land transportation, and the reduction in loading time and transhipment cost lowered rates for goods that moved entirely by land. As ship lines built huge vessels designed to handle containers, ocean freight rates plummeted. As container shipping became intermodal, with a seamless shifting of containers among ships, trucks, and trains, goods could move in a never-ending stream from Asian factories directly to the stockrooms of retail stores in North America or Europe, making the overall cost of transporting goods little more than a footnote in a company's cost analysis."[16] In brief, increased containerization and ship size together with the other effects led to economies of scale, efficient use of capacity, container port efficiencies, reduced rates resulting from cost efficiency, time savings and increased trade together with reduced competition whose effect likely dampened the reduction in rates.

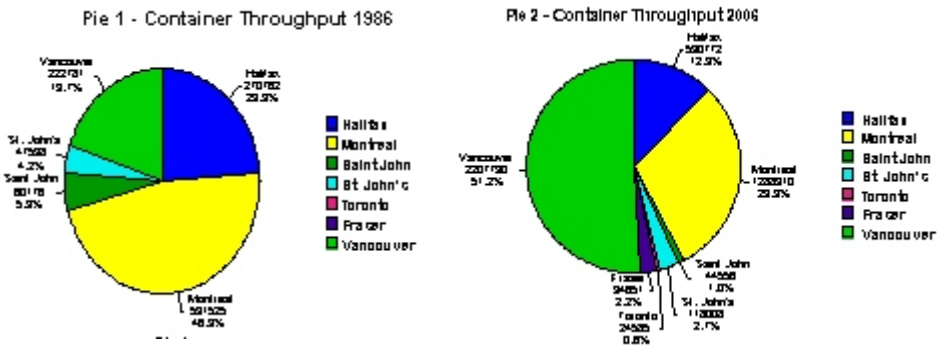
Global effect: Local economies and markets were transformed with access to the global economy. This process of transformation was facilitated with new supply chains. The global economy was becoming increasingly integrated and rapid growth of the information and electronic highway facilitated the process. All this was accompanied with changes in economic and political ideology, a reduction of regulatory and other barriers to entry including standardization which facilitated an increase in trade. This resulted in a container volume rising by 9.9 percent per year from 1982. Some writers go as far as suggesting a causal relationship between containerization and globalization but the evidence is not conclusive.

In sum, the effects of containerization and ship size strains the limits of the imagination. Imagine a container ship carrying containers to load a line of tractor-trailers 68 miles long. To achieve these results, it demanded technological and engineering feats over nearly three decades. It is safe to conclude as one historian that 'containerization has been an important dimension of globalization' enabling the transportation of manufactured and semi-manufactured goods efficiently at reduced costs to remote points in the globe.[17]

V. Container Shipping in Canada - Background, Trends and Implications

A. Background and Trends: The first container port built in Canada was in Montreal in 1968. Halifax built the second in 1969 and Vancouver the third in 1970. Since this early period, important changes have occurred in the volume of containers and the ranking of these ports. For the periods 1986 and 2006, the volume of containers through Canadian ports increased from 1.13m TEUs to 4.309m TEUs. The volumes and share are shown in the pie-charts. The pie-

charts reveal four major changes: the increase in volume of containers through the ports; the emergence of new ports; a change in the rank of the major container port; and a shift to the West Coast as the most important gateway for containers



to Canada together with a decline in the share of the Eastern seaports. For Vancouver, container volume has grown 891% over the period 1986-2006 compared to an increase of 142% for Montreal and 96% for Halifax.

Over the period 2003-2007, the volume of container throughput is shown in the table hereafter. The statistics indicate that for the three largest ports - Vancouver

Container Throughput 2003-2007

Ports	2003	2004	2005	2006	2007
Vancouver	1,539,058	1,664,906	1,767,379	2,207,730	2,307,748
Montreal	1,108,837	1,226,296	1,254,560	1,288,910	1,363,021
Halifax	541,650	525,553	550,462	530,772	490,071
St. John's	118,008	110,995	102,493	99,543	
Fraser	252,510	317,582	372,844	94,651	
Saint John	45,638	48,700	49,950	44,556	
Toronto	31,279	38,025	57,234	24,585	

Source: MARAD.

Montreal and Halifax- the change in container traffic in TEUs is 50%, 23% and -9%. Thirteen shipping conferences served Canada, seven on the West Coast and ten on the East Coast.

B. Implications: One of the pressing questions in the mind of most planners is whether the present infrastructure is adequate to meet the growing volume of container traffic. In this regard, three papers are of interest [18] and the matter was reviewed by the Standing Committee on Transport. The first paper by Ircha in 2001 is concerned with whether the use of mega-size ships can serve Canadian ports. His finding indicate that "Vancouver and Halifax appear to be appropriate

sites for these major terminals, [although] the 'green field' sites at Prince Rupert and Canso may prove to be better choices." However, the latter two sites need to be developed. The 2005 paper by Maloni and Jackson for US and Canada indicate that "... the ports expect capacity issues to worsen in the next ten years, implying current congestion problems will also deteriorate." The 2006 paper by Padova states "Given the existing excess capacity among Canada's container ports and the planned capacity enhancements, these ports appear to be well positioned to accommodate a doubling of Canadian container volumes (to roughly 8 million TEUs) by 2015." The difference in the findings of the papers reflect the different time periods in which the studies were undertaken, the differences in the scope of one study (which includes Canada and the US) and major ongoing infrastructure investments (some of which have already produced results eg. the Port of Prince Rupert). A recent article [2005] with regard to the Port of Vancouver states "...terminal operators earlier this year warned shipping lines that they can only accept a 10 percent increase in container volume. Gordon Houston, the port's chief executive, said Vancouver must spend more than $1 billion to build a new terminal or expand an existing one every two years to accommodate projected growth."[19]

C. Findings of the Standing Senate Committee on Transport and Communications

The Standing Committee recognized that container transportation must be viewed as a system and made two recommendations specifically with regard to containers: increasing the supply of containers to Canadian shippers; and increased funding to provide increased capacity to handle future growth in the container transportation industry. The first was to be achieved by harmonizing Canadian container regulations with those of the US and removing Customs Tariff on point-to-point container movement in Canada. The second was to be achieved through: funding port terminal projects to provide capacity; establishing a research program focused on national transportation policies and issues; and establishing an independent National Gateway Council to bring national and international players in container transportation system.

In sum, over the period 2002-7, of the two major Canadian ports that have shown an increase in container throughput, the increase at Vancouver is quite dramatic. The implication of this is whether the infrastructure is adequate to accommodate this increase. Some studies call for development of 'green field' sites and others call for an expansion of the existing infrastructure if the trend in growth continues.

VI. Regulations on Movement of Containers/Container Shipping

In this section, regulations on the movement of international containers and container shipping will be briefly mentioned.

Containers: International containers are subject to regulations in Canada. There are three basic regulations that cover foreign equipment in Canada: *Canada Shipping Act*, *Coastwise Trading Act*, and the *Customs Act*. In addition, there are tariffs and regulations and 'D' Memorandums issued by the Canada Border Services Agency (i.e., CSBA formerly Canada Customs and Revenue Agency). The CBSA's tariff 9801.10 restricts the use of international marine containers to 30 duty free days in Canada with one incidental move (inward or outward) for domestic carriage following international traffic. This tariff restriction is viewed as uneconomic because it has the effect of promoting inefficient movement of empty containers. The 30-day restriction may be extended to 24 months under extraordinary circumstances. If the 30-day restriction is exceeded the containers duty-free status is forfeited. Duty is minimal or free, depending on the Most Favoured Nation clauses. Rules for the incidental move of domestic carriage following international traffic are also provided for.[20] Rules also apply to in transit containers with loads and without loads (i.e., empty) that originate outside of Canada.[21] A type of cabotage called 'sufferance warehouse pick-up' is permitted by the CBSA during the 30-day period.[22] On April 2009, the Department of Finance proposed changes to the tariff on temporarily imported cargo containers increasing the duty free days to 365 and removing the restriction on domestic movement. This was accepted under certain conditions.

Container Shipping: In Canada, the most relevant regulations are those contained in the *Canada Shipping Act* and those made pursuant to it that apply to shipping in general. *The Canada Shipping Act* and *Coastwise Trading Act* requires movements of goods within Canada or its territorial waters by ship or any other mode must be done using Canadian registered conveyances. Licences for foreign flagged vessels are provided for in certain situations where no Canadian ship exists (unlike the *Jones Act*). Regulations more specific to containers are the requirements set out in the *Safe Containers Convention Act* and the *Safe Containers Convention Regulations*. These cover the safety aspects in regards to the construction and maintenance for containers on international movements. Besides domestic regulations the international regulation of particular relevance is *IMO Circular 134* which provides guidance on serious structural deficiencies in containers.

In sum, regulations apply to the movement of international marine containers in Canada and to container shipping. The former affects the efficiency with which they can be employed. In brief, regulations have not kept pace with the developments that have occurred on other fronts and in some other countries.

VII. Implications of Container Shipping Becoming Oligopolistic

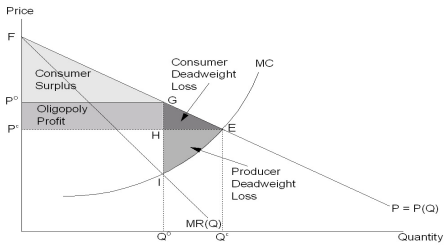
Market concentration has increased in niche markets, in order to demonstrate some potential implications of the container shipping industry becoming more

concentrated, it is useful to first review the basic economic theory of perfect competition. Specifically, firms engaged in perfect competition are considered by economists to be "price-takers", which means they take the market price as given and then adjust their quantities accordingly.

Graphically, the perfectly competitive equilibrium for an individual firm is shown in Figure 1 to be where its demand curve, P(Q), intersects the MC curve at the market price, P^C. Thus, this firm supplies Quantity Q^C at Equilibrium E. The economic welfare to the economy is then divided between the firm's consumers and the firm itself, where the Consumer Surplus is represented by Triangle P^CEF, and the Producer (Firm) Surplus is represented by the area below P^C and above MC.

The reason why firms are price-takers in this model is that there are no entry barriers. Thus, if the incumbents are making economic profits by pricing above P^C, then additional firms will quickly enter the market until all economic profits are eliminated. However, as entry barriers are introduced into the model, incumbent firms will be increasingly able to set the prices that they charge (they become "price-setters"). In other words, firms will have some market power.

FIGURE 1



For example, returning to Figure 1, an oligopolist will reduce its quantity and increase its price from the perfectly competitive equilibrium until its marginal revenue, MR(Q), equals its marginal cost, MC; it supplies Q^O at a price of P^O. As a result, a "Deadweight Loss" (DWL) will be created, which represents the welfare losses to the economy that neither the firm nor its consumers receive. In Figure 1, the consumer's portion of the DWL is represented by Triangle EGH, while the firm's portion of the DWL is Triangle EHI. Finally, there is a transfer of surplus from consumers to the firm in the form of oligopoly profits, which is shown in Figure 1 to be Rectangle GHP^CP^O. Whether this transfer is positive, negative or neutral is subjective.

In the context of the container shipping industry, this theory implies that as the market becomes more oligopolistic, consumers of container shipping services will be paying higher prices for lower quantities (and/or quality) of services. Lower quantities/quality of services could be reflected by smaller containers, more limited shipping times, slower service, and/or an increased likelihood that the product being shipped will be damaged during transit.

A second potential efficiency loss on the economy as a result of increased

concentration, which is not reflected in the DWL shown in Figure 1, is known as "rent seeking behaviour". In other words, firms might spend some of their resources to maintain or increase their market power, such as by lobbying governments to increase or maintain restrictions on entry (e.g., restricting foreign competition), or via anti-competitive practices such as predation or collusion. In fact, greater concentration can facilitate both explicit and tacit collusion by reducing the costs of coordination.[23]

However, there can also be *benefits* to increased concentration that are also not reflected in the DWL. For example, the possibility that a firm can increase its profits by "stealing" market share from its rivals might motivate that firm to offer a better product or service. Specifically, a container shipping firm might increase the quality of its services by offering larger containers than its competitors or by finding lower-cost methods of shipping goods (research and development). While these benefits might not completely eliminate the DWL shown in Figure 1, they do imply that the *potential* of entry by new firms, or the expansion of competing firms, might motivate incumbents to behave more competitively.

Thus, the degree to which greater concentration can lead to greater inefficiencies in the market depends, in part, on the ease with which consumers can switch between competing firms. In other words, if consumer switching costs are low, then a high market share for a firm might not necessarily imply significant market power, because that firm might decide that it needs to invest significant resources in order to maintain/increase consumer loyalty.

VIII. Concluding Remarks

The container has revolutionized worldwide shipping. The move that began in 1956 is continuing today and the volume of containers to be transported throughout the globe is expected to top 200 million TEUs by 2020. The structure of the container manufacturing industry is oligopolistic with two producers accounting for over 80% of the market share. Unlike container manufacturing, the container shipping industry is more competitive in structure. The largest four companies accounts for 38.4% of the global market capacity or the largest four companies including alliances account for 49% of total capacity.

Containerization has been accompanied by two major trends. First, there has been a significant growth in container throughput and second, this has been accompanied with an increasing size in container ships. Evidence of the latter is widespread, seventeen of the top twenty-five routes are served with ships exceeding 9000 TEUs and recently, Samung Heavy Industries began taking orders for ships larger than the largest ships. This has mammoth implications for ports and infrastructure and require huge investments. It has resulted in two major impacts: economic and global. The first has reduced costs of transporting containers and led to seamless service. The second, has transformed local

economies into global. As a result, some writers go as far as saying that there is a causal relationship between containerization and globalization but it is safer to conclude that it is an important dimension of globalization.

Like developments in the rest of the world, containerization has also gripped Canada. Canada's first container port was opened in Montreal in 1968. From 1986 to 2006, the volume of containers through Canadian ports increased from 1.13m TEUs to $4.309m TEUs. Over the last few years the growth has been spectacular. It has led to billion dollar investments in projects like the Pacific Gateway, the Atlantic Gateway and Prince Rupert Port and new terminals at Robert Banks, Melford and Sydney should be completed in the new future.

Besides increasing capacity at ports, the efficiency of the container transportation system depends on network efficiency together with regulations on containers and container shipping. The effectiveness of the network is undermined by poor integration within and throughout the system. Restrictions on domestic use, entry/exit and customs duty have a similar effect. Future directions to enhance its effectiveness and retain its competitiveness in North America include investment in advanced security technology and intermodal infrastructure, use of information technology along the supply chain to share information and modernizing the regulatory framework.

Finally, the trend of the container industry becoming more oligopolistic on some routes has implications. Theory suggests that higher concentration can lead to economic inefficiencies, both in the form of an increase in the deadweight loss to the economy, as well as to an increase in rent-seeking behaviour and anti-competitive activities. On the other hand, greater concentration can also motivate firms to maintain their market power in positive ways, such as by investing more resources into research and development. Therefore, the net effect of increased concentration depends, in part, on the significance of consumer switching costs.

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APPENDIX 1
Table 1 - Major Carrier/Groups Share of Shipping Capacity (July 2007)

Carrier/Group	Rank	TEUs	%	Charter
APM	1	1, 805, 005	16.1	924491
CKYH Alliance*	7, 11, 13, 15	1, 302, 080**	11.6	826574
Grand Alliance@	5, 9, 10, 23	1,242, 587@@	11.1	508904
MSC	2	1,146, 291	10.2	NA
New World Alliance#	8, 12, 18	890, 845##	8	537163
CMA CGM	3	808, 159	7.2	NA
Other Carriers (in top 20)	4, 6, 14, 16, 17, 19, 20	2, 104, 547	18.8	1059163
Other Carriers (not in top 20)	21- (ex 23)	1, 898, 957	17	
TOTAL		11, 198, 471	100	

* CKYH Alliance=COSCO, Hanjin Shipping Group, K Line, and Yang Ming. **TEUs of members=424,237, 340,678, 283,798, and 253,367. @ Grand Alliance = Hapag Lloyd group, NYK group, OOCL, and MISC Berhad. @@ TEUs of members=490,700, 346,072, 341,823, and 63,992. # New World Alliance= APL, MOL, and Hyundai. ## TEUs of members=366,209, 321,727, and 202,909. **Source**: *American Shipper*, September 2007, pp. 67-71.

Footnotes

1. See Reference 1 in Bibliography.
2. See Reference 2 in Bibliography, p. 2
3. See Reference in 3 and 4 in Bibliography.
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20. A vehicle or container is allowed to engage in transportation of goods from one point in Canada to another point in Canada provided it: a. Is moving in the general direction of the delivery point of the international load; b. Has entered Canada empty to pick up goods for export; c. Will be picking up a load for export after the delivery of the international load, or; d. Is a part of the return movement of the conveyance or container to its country or origin.
21. They cannot be used for domestic service. Empty containers are free to move between any number of Canadian points.
22. If an import load is discharged at a carrier's terminal, third party warehouse, or drop yard awaiting customs clearance, the container may be used to pick-up or deliver goods (exports or imports) from that location, to any location. Containers may be switched between any number of conveyances (truck, train, etc.) while enroute between points.
23. Note that in the economic literature, "tacit" collusion does not involve explicit communication between firms, and therefore is not illegal.