

MARITIME INDUSTRIES - ARE THEY BECOMING MORE CONCENTRATED?

Joseph Monteiro and Ben Atkinson*

I. Introduction

Interest in concentration in an industry and in the economy in general has been stimulated from time to time for two basic reasons. The first, because it can influence the performance of an industry and the second, because of our concern with inequality and distribution of wealth and income in the economy.

Concentration played a key role in merger analysis of antitrust authorities before the mid 1960s, when structuralism dominated industrial organization. It still plays an important role in merger analysis and provides a starting point though it is not the focal point of their attention.

Nevertheless, increases in concentration usually attract attention as was recently the case when consolidation swept maritime shipping. An article entitled *Merger Mania*, questioned the benefits of these mergers and their occurrence in other maritime sectors began to attract further attention.

As could be expected, these mergers have raised questions among a number of observers? How will they affect rates, choices and competition? Are there barriers to entry in the industry? Will it affect the entry of new competitors in maritime industries?

In this paper, whether the maritime industry is becoming concentrated will be examined. Part II reviews the economic meaning of concentration. Part III reviews the structure of various maritime industries. Part IV briefly reviews concentration, mergers and antitrust authorities. Part V describes the behaviour of one or two key variables in these concentrated maritime industries. Finally, a few concluding remarks are made.

II. The Meaning of Economic Concentration

The term economic concentration has been employed in many different senses. The most commonly used sense in which it is employed is concentration of the economy as a whole and concentration in an industry. The former usually provides an indication of the distribution of wealth and income in the economy. The latter which is of interest here

* 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.

is usually taken to mean seller or producer concentration, i.e., the number and size distribution of firms which are shown by a concentration curve. Each point on the curve, which is convex from the origin, represents the concentration ratio associated with the corresponding number of firms on the horizontal axis (from the largest to the smallest) and the cumulative percent of the industry size (measured by output, employment or a similar size variable) on the vertical axis. The more unequal the size of the firm over any range, the more convex the curve will be. If the firms are arrayed from smallest to largest, the curve will be concave. This can be easily transformed into the *Lorenz curve* - inequality curve - by substituting relative for absolute number of firms on the horizontal axis (i.e. dividing the number by total).

The concentration ratio and Herfindahl-Hirschmnn index (HHI) are two measures of concentration usually used in structure-conduct-performance studies. The first is the sum of the market share of firms in descending order (largest, second largest, etc). In other words,

$$CR = \sum s_i \text{ where } s_1 > s_2 > s_3, \dots$$

Thus a four firm concentration ratio would involve four firms and a eight firm concentration ratio would involve eight firms. The second is simply the sum of the squares of market shares for all firms in an industry. In other words,

$$HHI = \sum s_i^2$$

The HHI varies between 0 and 1. The closer it is to 1, the more concentrated the industry. The HHI is less than the CR (i.e. $\sum s_i^2 < \sum s_i$ for s_i between 0 and 1) except in situations where the entire output is produced by one firm or a monopoly in which case both are equal to 1. For example, if there are five firms each producing 20% of the industry output, the HHI is 0.2 and the CR_4 is 0.8. The HHI also typically conveys more information than a CR_4 . For example, if there are six firms, one with 50% of the market and the other five with 10%, the CR_4 is 0.8 but the HHI in the case of five firms is 0.2 and in the case of six firms is 0.3, reflecting the larger variation in relative firm size even though the number of firms is greater.[1] By scaling the HHI by 10,000, market shares can be measured as percentages, a practice used by antitrust authorities in the U.S.

Besides the above two measures, there are various other measures of concentration: a) the absolute concentration index; b) the Rosenbluth index; c) the comprehensive concentration index; d) the Pareto slope; e) the Linda index; and f) the U index. In brief "any criterion that can be used to compare or rank distributions (e.g. probability distribution, frequency distribution or size distribution) can be used as a market concentration criterion." [2]

Apart from the various measures, economist's interest in concentration is because increases in it can facilitate collusion among firms and interdependent behaviour. As

a result, competition will seldom occur in an industry when concentration is very high. Whether concentration poses a serious threat to competition will vary with the ease with which new firms can enter the industry, the rate of growth of the industry, closeness of substitute products made by other industries and their competitive organization and other factors. On occasion, increases in concentration may sometimes increase competition, a situation that may arise when small inefficient firms merge to face larger rivals. Concentration by itself does not indicate the extent of competition in a market. On occasion a market with only two aggressive competitors could exhibit more competitive results than if there were six competitors. The behaviour of the firms in the market has to be examined. Nevertheless, there is usually a lurking suspicion among antitrust authorities that increases in concentration eventually result in market power associated with oligopoly and monopoly, since industry average exercise of market power increases with increases in the HHI.

III. The Structure of Maritime Industries

The structure of maritime industries such as containers, container shipping, shipbuilding, crane manufacturing, classification societies, protection and indemnity clubs, vessel registries, and port operations will be briefly reviewed.[3]

Containers: 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. 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. Besides these ordinary containers, there are also specialized containers, eg. refrigerated containers, etc. In the 1990s, there were several manufacturers of containers in the world. A major restructuring of more than 20 manufacturers in the industry occurred in China. China International Marine Group (CIMC) was largely responsible for it. It set out on an aggressive expansion plan buying up Chinese competitors[4] that were affected by the downturn in the container market. Thereafter, it adopted a strategy of internal growth by cutting down manufacturing and overhead costs. By 1996, it was producing 20 percent of all containers manufactured in the world. Today, CIMC accounts for 60% of the market. The next most important manufacturer is Singamas followed by CXIH with 20% and 10%, respectively. In reefer containers, CIMC, Maersk Container Industries (MCI) and Singamas account for 66%, 20% and 14%, respectively.

It is estimated that the market share of the top four companies is in excess of 81% and the HHI (computed by summing the square of the market shares of the companies) for the industry should be in excess of 4000.[5] The two largest manufacturers are in China and the other major manufacturers are in Europe, more specifically Western Europe. The only other country that is noteworthy in the manufacture of containers is the Republic of Korea.

Container Liner Shipping: Shipping services for containers are provided by liner ships.

These liner services are provided by companies that own and charter their fleet of vessels. Between 1996 and 2005, thirteen major mergers and acquisitions occurred, these are shown in Table 1 in the Appendix. There were also other mergers not as large. This wave of mergers and acquisitions occurred in the late 1990s and early 2000 which some writers described as a merger mania. This, together with the corporate restructuring and formation of alliances have led to a more consolidated industry.

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 alliances - APM, CKYH Alliance, Grand Alliance and MSC (See Table 2 in the Appendix). The HHI of the former should exceed 449 and the HHI of the latter should exceed 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%+).

Shipbuilding: Shipbuilding can be classified into five major categories according to the type of vessel being built i.e., oil tanker, bulk carrier, container ship, LNG carrier and cruise ship. Regarding container ships, in 2002 Hyundai Heavy Industries, Samsung Heavy Industries, Hanjin Heavy Industries and China SB were reported to have the largest container shipyards in the world.[6] Their market shares were reported to be 13.1%, 12%, 9.1% and 4%, respectively.

By August 2007, the leading shipyards with orders were Hyundai Heavy Industries, Samsung Heavy Industries, Daewoo Shipbuilding & Marine Engineering, and Hanjin Heavy Industries. Their market share was 29.8%, 12.46%, 11.03% and 5.69%, this would mean that the HHI for the industry would exceed 1197. In terms of world output, world orders for ships as of 2007 were mainly in South Korea, China, Japan, Taiwan and Germany. South Korea accounted for 57.4% of future orders and all Asian countries accounted for 88.3%. Germany accounted for 3.6% and other countries accounted for 8.1%. China is building the world's largest shipyard which is expected to compete with Korea and Japan for a share of the ship building market. If it succeeds, the HHI will probably decline.

Crane Manufacturing: There are various types of cranes. A container crane (also known as a portainer, container handling gantry crane, quay crane, ship-to-shore crane, ship-to-shore gantry crane or a STS crane) is a large dockside crane in the form of a specialised type of gantry crane used to load and unload container ships, and only seen at container terminals.[7]

The largest manufacturer of ship-to-shore cranes is Zhenhua Port Machinery Company

(ZPMC). According to *World Cargo News*, ZPMC has occupied the position of the largest container crane manufacturer in the world for eight successive years starting from 1998. It entered the business in 1992. According to the order statistics in 2006, the company's market share of quayside container cranes and gantry cranes is approximately 74% and 50%, respectively.[8] The other manufacturers are: Liebherr Container Cranes, Kalmar Industries, TCM Corporation, Noell KCI Konecranes Kocks, Paccco, Mitsubishi Mitsui, Hyundai and Samsung. The top four companies account for 80% of the market and the HHI for the industry should exceed 3366. China dominates the crane manufacturing industry.

Classification Societies: Classification societies in the marine industry are non-governmental organizations or groups of professionals, ship surveyors and representatives of offices that promote the safety and protection of the environment of ships and offshore structures. They set technical rules, confirm that designs and calculations meet these rules, survey ships and structures during the process of construction and commissioning, and periodically survey vessels to ensure that they continue to meet the rules. [9]

The largest classification societies are: Nippong Kaiji, American Bureau of Shipping, Lloyds Register, and Det Norske Veritas. Nippong Kaiji accounts for 18.9% of the market and the largest four account for 66%, so the HHI for the industry should exceed 1097. The four societies are located in Japan, United States, United Kingdom and Norway. The ten largest classification societies have a market share of 85%.

Protection and Indemnity (P&I) Clubs: P&I insurance covers contractual and third party liability. It is a general concept which includes insurance for different types of risks: injury or death of crew, passengers and others; collision damage to vessels; other damage to third party property; pollution; cargo and other. P&I is one of the two broad areas of direct marine insurance and is traditionally insured by shipowners associations, the P&I Clubs. The other covers risks of damage to vessels (hull, machinery and suchlike), it is normally offered by commercial insurers.

The major Protection and Indemnity clubs are based in the United Kingdom. The United Kingdom Club has a market share of approximately 17%, followed by Britannia, Gard and Standard. These top four companies account for 52% of the market and the HHI for the industry should exceed 704.[10] There are also P&I Clubs in Scandinavia, Japan and the United States. The thirteen underwriting member clubs of the International Group of P&I Clubs ("the Group") between them provide liability coverage (protection and indemnity) for approximately 90% of the world's ocean-going tonnage.

Vessel Registries: To enjoy protection under international law, a vessel must possess a national character. This is obtained through registration of a vessel through its domestic

registry or through registration in other countries. If a vessel is registered in another country it is said to be flying a flag of convenience.

The important vessel registries are: Panama, Liberia, Bahamas and Greece. The size of a registry can be measured either by the number of ships registered or the gross tonnage. The largest share of vessel registry is in Panama with 22%. The market share of the top four countries is 42% and the HHI for the industry should exceed 626. Two-thirds of the world's tonnage uses a 'foreign flag'. For container ships (500 GT above), 73% of the world's TEU capacity uses a foreign flag. The emergence of new registries such as Marshall Islands or Vanuatu has slowed the increase in concentration of the top four.

Port Operations: Port operations are undertaken by marine terminal operators who engage in the business of furnishing wharfage, dock, warehouse, or other terminal facilities in connection with a common carrier. The size of marine container terminal operators is measured by the number of containers (twenty-foot) moving through it.

In 2002, the top four terminal operators throughout the globe accounted for 33.6% of all containers or 92.9 million TEUs. By 2005, they accounted for 39.2% or 156.3 million TEUs. The largest marine terminal operators throughout the globe are Hutchinson Port Terminals, APM Terminals, PSA Terminals and P&O Ports with market shares of 13%, 10.1%, 10.1% and 6% of the TEUs. The HHI for the industry should top 409. The HHI will fall considerably if it is calculated on the basis of percentage shareholding of each operator. Other terminal operators in the top ten are COSCO, DP World, Eurogate, Evergreen, MSC and SSA Marine. These ten account for nearly 50% of the world container port throughput.

Table 1 - Market Share and HHI in the Major Maritime Sectors

Sector	Market Share Top Four	HHI
1. Containers/Reefer Containers	81%/100%	4,000+/4952
2. Container Shipping Services	38.4%	449-621
3. Shipbuilding	29.8%	1,197
4. Crane Manufacturing	80%	3,366
5. Classification Societies	66%	1,097
6. P&I Clubs	52%	704
7. Vessel Registries	42%	626
8. Port Operations	39.2%	409+

* Please note the statistics indicated above may all not apply to the same year.

The above description indicates that South Korea specializes in shipbuilding, China in

container and crane manufacturing, Japan in classification societies, Liberia and Greece in vessel registries and Singapore in port operations. It also indicates that the building sectors (cranes, containers, and vessels) are the most concentrated maritime industries. For convenience, the market shares and HHIs of the major maritime sectors examined above are indicated in Table 1.

In sum, though HHIs on some of the sectors are high, the HHIs were not calculated for analysing market power. It is more suitable for indicting the degree to which specialization has occurred. More suitable measures of market power for some of the industries are needed to obtain a better picture as the relevant product or service on which the HHI depends has to be defined more precisely. For example, if one's concern is the trans-Atlantic lane between Rotterdam and Montreal, concentration on this lane is more relevant than on all trade lanes or concentration between Rotterdam and all points in North America.

IV. Concentration, Mergers and Antitrust Authorities

Concentration and Mergers

Concentration: A high level of concentration in an industry can result through internal expansion and growth or through the normal process of attrition (as a result of exit) or through mergers. Of the three routes, increased concentration by internal expansion has been looked on more favourable, especially if it increases efficiency and results in a better redistribution through lower prices. Concentration through mergers have often been looked on suspiciously, especially if it does not result in increased efficiency.

Not surprisingly, concentration among industries has been a matter of concern and has from time to time attracted the attention of numerous politicians. As far back as 1969, the Economic Council of Canada in its publication *Interim Report on Competition Policy* expressed considerable concern about the high levels of concentration in many Canadian industries. It stated "the higher the level of concentration the more likely it is that certain undesirable practices will occur"[11], such as explicit or implicit agreements and anti-competitive trade practices. According to the Council, ability to maintain high profits over long periods of time is a sign "that something is amiss in the efficiency of resource use." [12]

The Council pointed out that "mergers between competitors and between competitors and suppliers have an immediate and sometimes substantial effect on the structure of the industry." [13] The Council was also cognisant of the fact that high concentration may be required to maximize efficiency in some industries.

Mergers: In Canada, mergers and acquisitions of transportation undertakings were reviewed by the Canadian Transport Agency since 1967. In 1976, when the *Competition Act* was extended to cover services, mergers in transport service industries were also reviewed by the Competition Bureau. This dual regulatory process was the subject of criticism by the National Transportation Act Review Commission resulting in the review of transportation mergers being relegated to the Bureau in 1996. In 2007, based on the recommendations of the CTARP, the *Canada Transportation Act* was amended and transportation was again made subject to a dual regulatory process.

In the US, ocean carrier mergers are not subject to the *Ocean Shipping Reform Act 1998* or its predecessor the *Shipping Act of 1984*. Acquisitions by any person, directly or indirectly, of voting securities or assets of any other person (i.e. mergers) were specifically excluded from the jurisdiction of the FMC but remained subject to the antitrust laws of the United States. Ocean carrier mergers are reviewed by the DOJ and Federal Trade Commission. An example of the latter is the recent Carnival/Royal Caribbean/Princess transaction.

In the EU, initially there was uncertainty as to whether competition rules applied to the transportation sector. In 1988, EC Regulation 4260/88 provided for the application of Articles 85 and 86 to ground and maritime transportation. This was confirmed in the 1989 Ahmed Saeed judgment that Articles 85 and 86 were fully applicable to the transportation sector. Mergers among ocean carriers are under the purview of the European Commissions and the respective national competition authorities. An example is an intervention by the Commission to prevent a merger between British Airways and British Caledonian in 1987[14] and the investigation by the Merger and Monopoly Commission in the UK.

Concentration and Antitrust Authorities:

Concentration and market share played a key role in the thinking of antitrust authorities and jurisprudence during the structural approach to merger enforcement. Since the 1970s, this approach has undergone substantial revision.

Canada: Concentration was not mentioned before 1986, in the *Combines Investigation Act* now the *Competition Act*. In 1986, it appeared in the *Competition Act* for the first time in section 92. Concentration by itself does not raise any specific issue under the *Competition Act*. It is only mentioned once in subsection 92(2) wherein it states that for purposes of this section “the tribunal shall not find that a merger or proposed merger prevents or lessens, or is likely to prevent or lessen, competition substantially solely on the basis of evidence of concentration or market share.” According to the Canadian Merger Guidelines the Bureau will not challenge a merger on the basis that the merging parties will be able to unilaterally exercise greater market power than in the absence of

the merger, where the post-merger market share of the merged entity would be less than 35 percent. Or in the case of interdependent exercise of market power by two or more firms where the post-merger share of the market accounted for by the four largest firms in the market would be less than 65 percent or the post-merger market share of the merged entity would be less than 10 percent. As market share and concentration increase above these thresholds, the likely effect of a merger on competition gives rise to concern. An assessment of market shares and concentration is a starting point in the Bureau's analysis.

US: Concentration and market share statistics played a key role in the US in the assessment of mergers in the 1960s. In *United States v. Philadelphia National Bank* (1963), the Supreme Court stated "a merger which produces a firm controlling an undue percentage share of the relevant market, and results in a significant increase in the concentration of firms [i.e., an increase in the percentage of the area's commercial banking business controlled by the two leading firms from 44 percent to 59 percent] in that market is so inherently likely to lessen competition substantially that it must be enjoined in the absence of evidence clearly showing that the merger is not likely to have such anti-competitive effects."^[15] This approach changed radically after the 1970s when the structuralists approach was challenged, in particular by Chicago economists. As a result, high concentration in a market ceased to be viewed as a reason for initiating antitrust action.

Nevertheless, it provides a starting point for merger analysis today. According to the 1992 Horizontal Merger Guidelines, the US antitrust authorities divide the spectrum of market concentration as measured by the HHI into three regions those below 1000 as unconcentrated those above 1000 or more as moderately concentrated and those above 1800 as highly concentrated. Whether mergers raise significant competitive concerns in the later two regions depends on factors such as lessening of competition through coordinated interaction, lessening of competition through unilateral effects, entry barriers, absence of efficiencies and absence of imminent failure. Since the above statistics may either understate or overstate the likely future competitive significance of a merger, the following conditions are considered: changing market; and degree of difference between the products and locations in the market and substitutes outside the market.

EU: Concentration has been more a matter of concern in the EU than other jurisdictions because of concerns about exploitation, fairness and distribution of wealth. Surprisingly, it did not have any law against mergers^[16] until 1989 when it passed its first EC regulation on the control of concentration (4064/89), though before that year it approached the problem of merger through Article 82. Since 2004, EC 139/2004

applies to all concentrations with a Community dimension.

According to the EC Commission Guidelines “The overall concentration level in a market may also provide useful information about the competitive situation. In order to measure concentration levels, the Commission often applies the Herfindahl-Hirschman Index (HHI).”[17] The Commission is unlikely to identify horizontal competition concerns in a market with a post-merger HHI below 1000. It is also unlikely to identify horizontal merger concerns in a merger with a post-merger HHI between 1000 and 2000 and a change in the HHI below 250 or a post-merger HHI above 2000 and a change in the HHI below 150, except where special circumstances are present.

In sum, most antitrust authorities use concentration as a starting point in their analysis of mergers since they have shed their structural approach to merger analysis.

V. What Has Happened Since Concentration Has Increased in the Maritime Industries?

Two dimensions of performance of the maritime industries where applicable will be briefly reviewed. It should be noted that the description does not imply that the results were the result of concentration, it could be because of other factors, typically supply and demand. These observations are related to a period before the current recession.

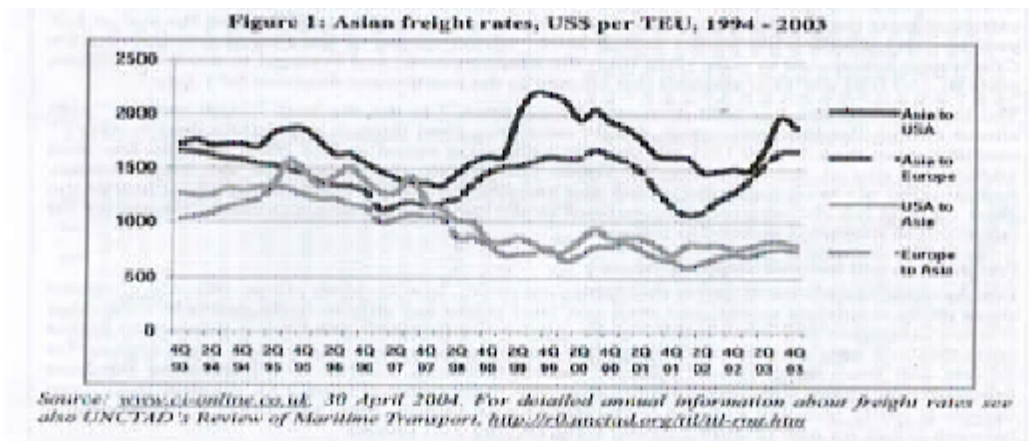
Prices or Rates

Containers: 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.”[18] After the mid-1999, prices began to rise to \$1500 (US) in 2000. In mid 2005, the price had risen dramatically to \$2,100. The cost of leased containers had also risen up about 40%. The cause of the problem was the shortage of Corten steel in China.

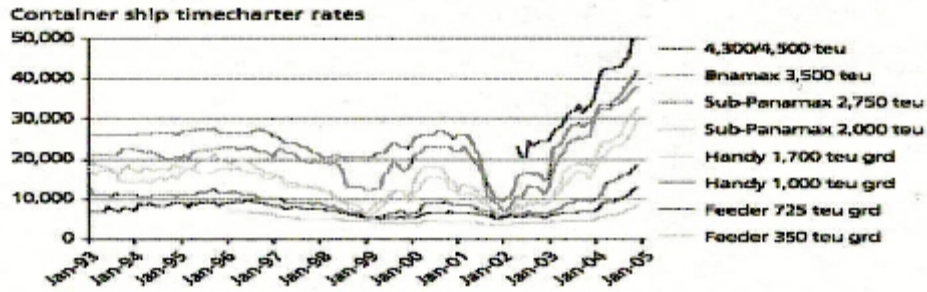
Container Liner shipping: The pricing of liner services or freight rates per TEU depends on the trade lane ranging from \$2000 to \$750. It is suggested that freight rates in liner shipping are prone to behave like a 'pig cycle'. This cyclical movement is

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.[19] Charter rates for ships are shown in the following chart. After



declining from January 2001 to January 2002, they have nearly doubled and there is



strong pressure on carriers to raise freight rates to shippers to defray the costs of the more expensive charters. This can be seen in the container ship time-charter rates

shown in the chart. Since the current recession, the rates have fallen dramatically.

Shipbuilding: The price index of new shipbuilding (at the time of ordering) rose to a peak of 180 in 1992 from about 100 in 1988 and has declined from then onwards. From 1993 to 1998, it held steady at an index level of around 150. It sharply fell in 1998 to a level of 120, rose to 133 in 2001, fell down again and began rising after 2003. The traditional view about the behaviour of shipbuilding prices is that it rose and fell with demand, like other commodities. This was true for the period until 1992. Thereafter, however, prices fell sharply despite the increase in demand due to the expansion of capacity outstripping demand. The fall in prices in 1998 has been linked to the Far East Economic crisis and in particular the collapse of the Won.[20]

Crane Manufacturing: Crane prices have risen sharply since 2000 and high demand is as much of a factor as rising steel prices and higher component prices. Terminal operators tendering for ship-to-shore container cranes this year have been given a nasty shock by price increases. One source attributes the increases to demand pull and supply push.[21] This was before the current recession.

Protection and Indemnity (P&I) Clubs: Since the start of 2002, P&I rates have been increasing. Claims in 2007 were double those in 2004. It is not the number of claims which is causing the increase in costs but their average size (6m vs 9+m). There appears to be a fundamental shift in the long term pattern of P&I claims. "The main drivers behind the rise in the value of large claims are new legislation and tougher regulation, particularly on environmental liability. ... secondary factors behind the spiralling costs of claims are the size, number and value of ships and their cargo." [22] Other factors are increases in the cost of repair and crew shortage. Most clubs are seeking double digit increases and 'this inflationary trend is almost certain to continue into 2008 and possibly beyond'.

Port Operations: The primary source of revenue for MTOs is from charges levied for stevedoring and related activities. Indices of stevedoring cost worldwide are not available, though they may exist for a few countries. For example, for Australia the stevedoring revenue and cost per TEU decreased over the period 1998/9 to 2005/6 from \$161.03 and \$150.88 to \$152.14 and \$128.66 (i.e., margin increased from \$10.15 to \$23.48). Further insights may be gained by examining the rates of return on assets for the major terminal operators. For example, for PSA Corporation (Singapore) they were 9.90 and 15.52 over the same periods (being in the double digits for the entire period).

Supply of Products or Services

Containers: 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 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. In 2004, the market for containers was so tight that container manufacturers in China told the world's largest shipping line that they could fill only half of the carrier's orders.[23] The *Journal of Commerce* in Nov. 5, 2007 reported shortage of containers in the US and in 2008 described it as 'good as gold'. Barriers to entry do not appear to be insurmountable due to a number of new entrants.

Container Liner shipping: In 2004, the *Journal of Commerce* stated "There's a severe shortage of vessels available for charter, and rates are going through the roof." [24] "Besides the shortage of containers, exporters also face a shortage of vessel capacity. It began last spring when U.S. exports began to surge just as several lines switched vessels that had been deployed on U.S. routes to more profitable trades, particularly the Asia-Europe and intra-Asia routes." [25] With the current recession, it is predicted that it will take five years to clear the current overcapacity.

Shipbuilding: Global shipbuilding output has increased steadily since 1988 from slightly above 10 million gross tons (mgt) to 32mgt in 2003 (after peaking at 35mgt and falling dramatically in 1975). Some forecasters expect output to increase from present levels. Output which depends on capacity is influenced by: physical facilities; productivity; and workforce. In 2001, OECD estimated global capacity to be around 23mgt which was expected to increase to 27mgt. by 2005.

Crane Manufacturing: Since 2000, the production of cranes have reached an all time high. Given, the increase in world wide shipping and investment in infrastructure this is not surprising. Levels of activity at ZPMC are at a record level. Of the 334 cranes listed for delivery, ZPMC accounted for 223 (67 per cent). Its order books showed 85 for delivery in 2005 and the number jumped to 150 in 2006. This momentum seems to be growing with the huge Euromax order which stretches into 2008.[26]

Protection and Indemnity (P&I) Clubs: The tonnage insured by P&I Clubs has increased from 483.7million grt in 1998 to 650+million grt in 2008, even though the market share of coverage remains about the same. They have also been expanding in the Asian market. New entry into the market faces two barriers: technological knowledge on P&I risks and network of representatives; and very large economies of scale. These two barriers "restrain most non-life insurance companies as well as specialist re-insurers from operating in the P&I markets." [27] In the re-insurance market, higher levels of cover can only be provided by P&I Clubs.

Vessel Registries: Over the last few years, a number of shipping lines have sought foreign registries to stay competitive. The percent of total world fleet (DWT) in the four major foreign registries has increased from 34% to 42% from 1992 to 2005. In addition, a few new countries such as Marshall Islands or Vanuatu have joined the list of countries offering the benefits of 'foreign flags'.

Port Operations: Private sector container terminals have been increasingly handling global throughput. In 1991 these terminals handled 58% and by 2005 it had increased to 78%.[28] It is believed that this percentage is expected to increase in the future, especially with the increase in investment in infrastructure and privatisation. The major barriers to entry are: structural cost advantage of the incumbent, high switching cost, networks, legal and institutional barriers, exclusive concessions and availability of land.

VI. Concluding Remarks

In the 1990s, a wave of mergers and acquisitions swept the maritime industries, this has had an effect on the structure of the maritime industries. Not surprisingly, an examination of concentration indicates that the maritime industries are becoming more concentrated. Of particular interest is the concentration in container manufacturing, shipbuilding, crane manufacturing and classification societies whose HHI was above 1000 and in a couple of instances surpassed 3000.

As could be expected this has raised questions among a number of observers? How will it affect rates, choices and competition? Are there barriers to entry in the industry? How will it affect entry of other competitors into the maritime industries?

There are game theoretic models of market interaction (e.g. among oligopolists) that predict that an increase in market concentration will result in higher prices and lower consumer welfare even when collusion in the sense of cartelization (i.e., explicit collusion) is absent. Examples are *Cournot oligopoly*, and *Bertrand oligopoly for differentiated products*.[29]

The evidence on first glance may suggest that this may be what is happening in general, but a closer examination indicates that prices in most of the maritime sectors have been increasing recently due to a rapid growth in world trade which has caused major shifts in demand. As a result, any excess capacity that existed a few years ago was quickly absorbed creating shortages and rapid price increases. With the ongoing recession this has reversed.

More specifically, choices have not declined but costs and prices or rates have risen from 2002 given the upswing in trade and then fallen. Some studies suggest that profits in most of the maritime sectors have gone up and the good times will continue for these sectors but this has changed since the current recession. In other maritime sectors (eg. P&I), where this has not happened consolidation is likely to occur. Some writers point to the increase in barriers to entry with the emergence of global networks, vertical integration and a wide range of partnership arrangements between the maritime sectors which is not evident from an increase in concentration in each sector alone.

Bibliography

1. How CIMC became the Dominant Ocean Container Manufacturer in the World, Global Supply Chain, (excerpt from *Dragons at Your Door: How Chinese Cost Innovation is Disrupting Global Competition*, Ming Zeng and Peter Williamson, Harvard business School Press, 2007).
2. Concentration in Shipping and the Specialization of Countries in Maritime Sectors (1), *Transport Newsletter*, No. 24, Second Quarter, UNCTAD, 2004, pp. 5-16.
3. Concentration in Shipping and the Specialization of Countries in Maritime Sectors (2), *Transport Newsletter*, No. 24, Fourth Quarter, UNCTAD, 2004, pp. 9-17.
4. *Trade Facilitation and Multimodal Transport Newsletter*, No. 11, December 2000, pp. 17-20.
5. *Trade Facilitation and Multimodal Transport Newsletter*, No. 10, December 1999, pp. 13-15.
6. Briggs, Paul, Merger Mania, *Canadian Transportation & Logistics*, March 1998, pp.16/18.
7. Ostergaard, Tue, Sign of the Times, *The Journal of Commerce*, December 9-15, 2002, pp. 19-20.
8. Ircha, Michael, Serving Tomorrow's Mega-Size Container Ships, the Canadian Solution, *International Journal of Maritime Economics*, Vol. 3, 2001, pp. 318-332.
9. H. Simon, Top 20 Container Lines, Highlights of 2007 survey, *American Shipper*, Sep 2007, pp. 66-71.
10. Levinson, Marc, Container Shipping and the Economy, *TR News 246*, September-October 2006, pp. 10-12.
11. Levinson, Marc, *The Box: How the Shipping Container Made the World Smaller and the World Economy Bigger*, Princeton University Press.

Footnotes

1. See Church, J and Ware, R., *Industrial Organization, A Strategic Approach*, 2000, p. 429.
2. See Wikipedia, www.wikipedia.org
3. See Reference 2 in Bibliography, p. 2.
4. In 1993 CIMC reorganized and acquired another Chinese container builder. In 1994 it floated shares on the Shenzhen exchange and used the money to make a string of acquisitions in the next five years. It built two new factories and grew to control 42 subsidiaries.
5. See Reference 1 in Bibliography.
6. Lloyd's Fairplay and OECD Paper C/WP6/SNG(2004)1.
7. See Wikipedia, www.wikipedia.org
8. See Shanghai Zhenhua Port Machinery (Group) Co., Ltd., Annual Report of Year 2006, p. 25.
9. See Wikipedia, www.wikipedia.org
10. The EC Commission notes that their market share is 89% with the top four accounting for 46.57% in 1998-99. see Commission Decision of 12 April 1999, relating to a proceeding pursuant to Articles 85 and 86 of the EC Treaty and Articles 53 and 54 of the EEA Agreement (Cases No IV/D-1/30.373 - P&I Clubs, IGA and No IV/D-1/37.143 - P&I Clubs, Pooling Agreement), Official Journal of the European Communities, 19.5.1999, pp. L125/12-31.
11. *Proposals for a new competition policy for Canada*, Second stage, March 1977, p. 79.
12. Id., p. 80.
13. Id., p. 82.
14. Under Regulation 3975/87 which applies to air and is similar to Regulation 4260/88. See Waelbroeck M., & Aldo Frignani, *European Competition Law*, 1999, pp. 68-70.
15. United States v. Philadelphia National Bank (1963), CCH Trade Cases, No. 70,812, pp. 78,250-78,281. Numerous other cases also exist such as United States v. Aluminium Co, of America (1964), United States v. Pabst Brewing Co. (1966), etc.
16. Various reasons have been provided for this: most mergers involved mergers from a single member state or by third countries. Perhaps the more important reason was to encourage undertakings to achieve a certain size which would enable them to compete with international companies.
17. Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings, *Official Journal of the European Union*, 5.2.2004, p. C 31/6.
18. Recent Trends in Liner Shipping Freight Rates, *Transport Newsletter*, No. 24, 2nd Quarter 2004, p. 13.
19. Leach, Peter, T. "Will the good times continue?", *The Journal of Commerce*, September 17, 2007, pp. 16-20.
20. *Overview of the international commercial shipbuilding industry*, *The European Community*, Background Report, First Marine International Limited, May 2003.
21. Cranes price surge - demand pull and supply push, *World Cargo News*, November 2005.
22. See Market Review, Marine Insurance 2008, AON Limited, UK.
23. Mongelluzzo, "Bill, Have cargo, need boxes", *The Journal of Commerce*, April 26, 2004, pp. 12-14,
24. Leach, Peter, T. "Sizzling hot market", *The Journal of Commerce*, March 1, 2004, pp. 12-14.
25. Left behind - shortages of equipment and vessel capacity bedevil exporters especially in the Midwest, *The Journal of Commerce*, Nov. 5, pp. 32-34.
26. Another massive surge in container crane orders, *World Cargo News*, July 2005.
27. See Footnote 10.
28. Port Economics the Business Case, David Bayne, Port Economist, Drewry Shipping Consultants Ltd., 2006.
29. See Footnote 1.

APPENDIX 1

Between 1996 and 2005, 13 major mergers and acquisitions occurred, these are shown in Table 1.

Table 1 - Mergers and Acquisitions (1996-2005)

Acquirer	Target	Year of Acquisition
Hamburg Sud	Allianca, Transroll Nav SA, Ellerman Services and Kien Hung Shipping Co.	1998, 1999, 2002 and 2003
A.P. Moller	Safmarine, Sea-Land and Royal PONL	1999, 1999 and 2005
CMA	CGM and Bollore (Delmas)	1996 and 2005
Hanjin	DSR-Senator	1977
Evergreen	Lloyd Triestion	1988
CSAV	Norasis	2000
Hapag-Lloyd	CP Ships	2005

Source: Drewry Shipping - Cited in Port and Shipping Industry - New Growth Paradigm and Its Strategic Implications, Harun Johari, 5th Asean Ports & Shipping Conference, June 12, 2007.

There were also mergers not as large such as purchase of Trans Pacific Lines by Wan Hai Lines in 2002, Neptune Orient Lines' acquisition of American President Lines in 1997, CP's acquisition of Italia Line and Maersk Sealand's acquisition of Torm Line. This wave of mergers and acquisitions occurred throughout the decade which some writers described as a merger mania. This together with the formation of alliances and major corporate restructuring have led to a more consolidated and concentrated industry which led some writers to describe the port industry as oligopolistic. The share of the top twenty carriers by region are: Europe/Mediterranean 51.3%; China, Hong Kong, Taiwan (24.1%); Japan (10.3%); Korea (5.9%); Singapore (5.7%) and South America (2.7%). (See Liner shipping connectivity between pairs of destinations, *Transport Newsletter*, No. 32, Second Quarter, 2006, p. 9.)

Table 2 - 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 ^o	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.
^o 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.