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**[Review]**

# Studies on Supply and Demand Paradox in Shipping Market*

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## Abstract

**Purpose** – The purpose of the paper is to examine disconnection between supply and demand shipping market, which means shipowner has determined to raise capacity in bust period.
**Research design, data, and methodology** – The research method to be applied is first to look into conceptual theory about shipping market, and then to study imbalance of supply and demand situations in shipping on crisis, and next, to analyses paradoxical aspects traced.
**Results** – Shipping market is a volatile and cyclic characteristics, and its situations have to be examined very carefully. Since financial crisis has broken up in 2008, it is natural to think that world trade volumes has reduced rapidly, which means demand for shipping service has fallen, and accordingly, tonnage should be stagnated as well. However, shipping companies have put capacity into market as unexpectedly. This is because of economy of scale and time lag. Here, this can be explained in terms of paradox that is proved in this paper.
**Conclusions** – From careful research in this paper, it is found that supply and demand are not always got along with market situations, in other words supply side could be working well, in spite of depression time of demand situations in world shipping markets.

**Keywords:** Shipping, Supply, Demand, Market, Economy of scale, Time-lag.

**JEL Classifications:** D40, L90, L91, R40, R41.

## 1. Introduction

Shipping business is very volatile and has fluctuated aspects as well, and because of that, it is strongly asked to examine market situations of supply and demand mechanism carefully all the time. When it is neglected or misjudged to analyses about shipping markets, the result is sometimes serious and not east to recover as it was.

It is also come from supply and demand of transportation, and that of shipping business belongs to that mechanism, in addition, it is also kept in mind that some factors to affect shipping market in terms of both supply and demand, such as world economy of trade volumes, etc. as well as world fleet of shipping capacity, etc. Actually these factors are strongly related to overall shipping business in field that various parties got involved.

Shipping market is composed of supply and demand curve, then point of equilibrium marks price of shipping tariff. Following this scheme, people in the market have to determine what behavior they take. In shipping business of financial difficulty like after 2008, it is apparently supposed that shipowners have to decide how they manage their tonnage in the theoretical aspects, however it look appeared differently in real market. This is interesting and paradoxical fact to be found in this paper. Shipowner rather takes a strong action to invest and it is seen bold strategy not usually seen other part of business and industry. Shipowner's behavior to real market could be studied in depth.

In this paper, it is reviewed with market in transportation in general, which included supply and demand of transportation, and then some determinants influencing shipping markets in real terms, and shipping market has been studied in detail during world shipping crisis in late 2000, including freight rates and next, paradoxical side has

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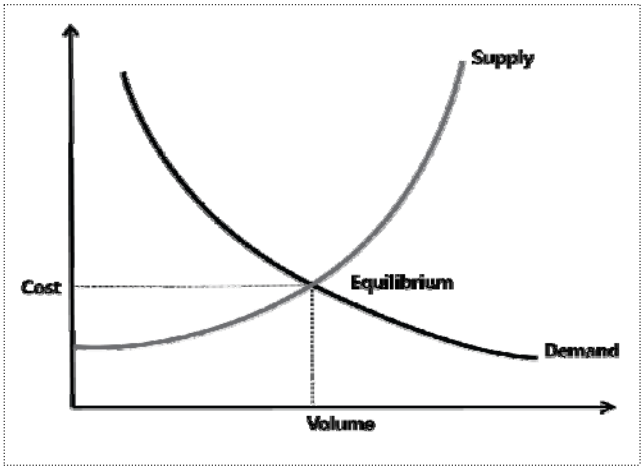
to be traced in terms of disconnection of supply and demand in shipping market, and then finally try to look at reason of such a paradox in question.

## 2. Markets in Transportation

### 2.1. Supply and Demand of Transportation

The concept of demand and supply are fundamental to economic theory and is widely applied in the field to transport economics. In the area of travel demand and the associated supply of transport infrastructure, the notions of demand and supply could be applied. However, it used to be said that the transport demand is a derived demand, and not a need in itself. The concept of equilibrium is central to the supply-demand analysis. It is a normal practice to plot the supply and demand curve as a function of cost and the intersection is then plotted in the equilibrium point as shown in Figure 1 (NPTEL, 2018).




Source : NPTEL (2018).

**Figure 1:** Demand Supply Equilibrium

The demand for travel T is a function of cost C that is easy to conceive. The classical approach defines the supply function as giving the quantity T which would be produced, given a market price C. Since transport demand is a derived demand, and the benefit of transportation on the non-monetary terms (time in particular), the supply function takes the form in which C is the unit cost associated with meeting a demand T. Thus, the supply function encapsulates response of the transport system to a given level of demand.

Transport supply is the capacity of transportation infrastructures and modes, generally over a geographically defined transport system and for a specific period of time. Supply is expressed in terms of infrastructures (capacity), services (frequency) and networks (coverage). Capacity is often assessed in static and dynamic terms where static capacity represents the amount of space available for transport (e.g. terminal surface) and dynamic capacity are the improvement that can be made through better technology and management. The number of passengers, volume (for liquids or containerized traffic), or mass (for freight) that can be transported per unit of time and space is commonly used to quantify transport supply (Rodrigue, 2017).

Producing and supplying goods and services requires the input of resources such as raw materials, time, space and energy. These inputs are lost to other applications. The production costs are now defined as the value of the best possible alternative use of these resources. For the sake of simplicity, the production costs are expressed in monetary units, as happened in the case of the consumer benefits (Immers & Stada, 2007)

However, transport demand is transport needs, even if those needs are satisfied, fully, partially or not at all. Similar to transport supply, it is expressed in terms of number of people, volume, or tons per unit of time and space (Rodrigue, 2017).

People buy certain goods because they derive a certain utility from the consumption of these goods. People recognise that these goods represent a certain value to them and this reveals itself in their willingness to pay for the goods. This value can be called the benefit of the goods. It is needed a unit in which to express the benefit of goods. A monetary unit is the obvious choice because it can compare the degree to which various goods deliver various benefits (Immers & Stada, 2007).

### 2.2. Factors Affecting Shipping Markets

The fact that 2/3 of the total world trade of goods are done by maritime routes and that the sea is the least expensive trade route that is enough to see the importance of its existence for every maritime country. The whole world and overall world trade, in maritime and other sectors, are defined by the relationship between supply and demand and prices on the market. Precisely for this reason it is important to well understand these relations and their mutual impacts (Jugović, Komadina, & Hadžić, 2015)

Sea transport is a derived demand where shipping demand occurs as a result of seaborne trade. The demand determinants affecting sea transport include government and political factors, the world economy, seaborne commodity trade, average haul, and transport costs. On the other hand, determinants for shipping supply are fleet size and operational efficiency. The shipping supply function shows the quantity of shipping services by sea transport carriers that would be offered at each level of the freight rate, whereas the shipping demand function shows how shippers adjust their demand requirements to changes in freight rates.

In the shipping market, the supply and demand curves intersect at the equilibrium price, where both carriers and shippers have reached a mutually acceptable freight rate (Lun, Lai, & Cheng, 2010).

Some factors has affected shipping market related to supply and demand linking freight rates. From the many influences on the shipping market, particularly important five affecting the demand for sea transport and five affecting the supply. These are summarized in Table 1.

**Table 1:** Supply and Demand Factors in the Shipping

| Demand | Supply |
|---|---|
| The world economy | World fleet |
| 2. Seaborne commodity trades | 2. Fleet productivity |
| 3. Average haul | 3. Shipbuilding production |
| 4. Random shocks | 4. Scrapping and losses |
| 5. Transport costs | 5. Freight revenue |

Source : Jugović et al. (2015).

As far as the demand for sea transport is concerned (the 'demand function'), the five variables are the world economy, seaborne commodity trades, average haul, random shocks and transport costs. To explain the supply of shipping services (the 'supply function'), it can be focused on world fleet, fleet productivity, shipbuilding deliveries, scrapping and freight revenues.

Especially in terms of supply, shipping provides the principal mode of transport for the supply of raw materials, consumer goods, essential foodstuffs and energy to the global population. The world economy has the most important influence on the shipping demand because it creates the most demand of maritime transport by importing raw materials for production or trade of ready products (Jugović et al., 2015). However, as far as the demand side is concerned, shipbreaking and newbuildings determine the growth of the fleet and since the average economic lifespan of a ship has been about 25 years, only a small part of the fleet is in fall every year so the speed of adjustment to changes on the market is measured in years, not months. The key point in the shipping market model is the mechanism by which the supply adjusts when the shipping demand fails to turn out as expected.

As a consequences of supply and demand functions, freight rate could be produced and adjusted in terms of equilibrium. When supply is tight freight rates rise, stimulating shipowners to provide more transport. When they fall, it has the opposite effect. Something kept in mind here that freight rate volatility might therefore be regarded as the main risk factor in the shipping industry. On the one hand, freight earnings are a shipping company's primary source of income such that freight rate volatility directly affects the profitability. On the other hand, the values of vessels are also directly determined by freight rates as the price of a vessel can be regarded as the present value of its future operational profits plus the discounted expected scrap value (Opitz, Seidel, & Szimayer, 2015).

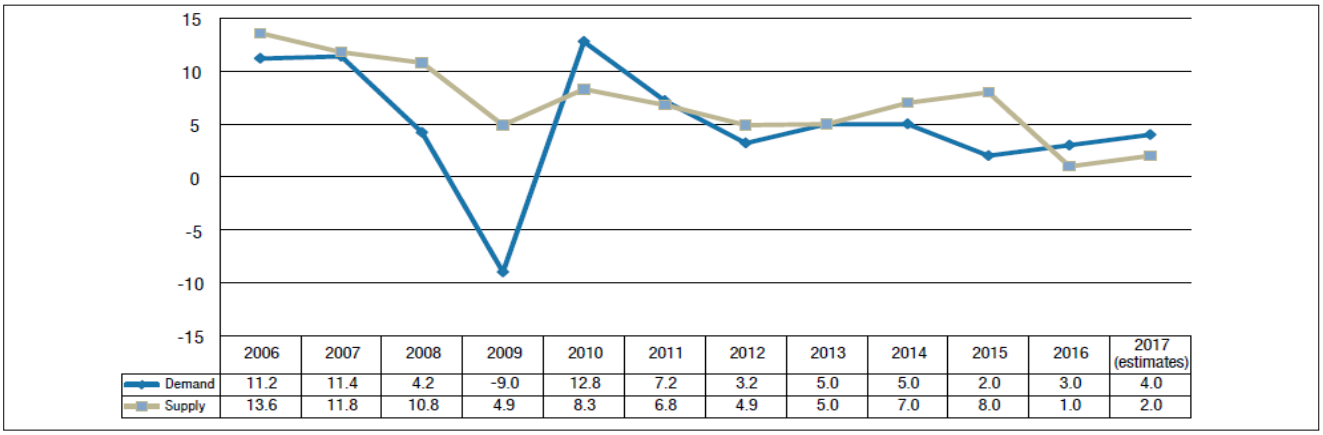
## 3. Markets in Shipping Crisis

### 3.1. Market Situations

If ships have been invested in, but trade does not grow as expected, expensive ships will become idle. As demand for ships is derived from seaborne trade, a change in seaborne trade will lead to a change in shipping demand. It is a rational decision for container shipping firms to increase their shipping supply when they are optimistic about the sea cargo volume. Demand for ships reflects the need for container shipping capacity. Such reflection suggests that a change in seaborne trade affects carriers' decisions on whether or not to expand, and their decisions can influence the supply of world fleet capacity (Lun et al., 2010).

As far as supply side is concerned, generally speaking, economic boom was due in large part to an abundance of available cash at low interest rates. Thus spurred by high yields, investors and banks have pumped hundreds of billions into the container shipping business, for then considered to be extremely profitable. Consequently, many companies in this market sector have heavily invested in new ships building at the height of the economic boom in 2006 and 2007. By the time these ships were delivered, demand for shipping goods had crashed as result of world financial crisis originated from USA in 2008, leaving the market with a surplus of very modern, very large vessels, and a greatly reduced order book (Kalgora & Christian, 2016). AS far as demand side is concerned, container trade has been clearly shown that it is very severe level of trade volumes not ever seen before, which means world trade is distorted in one way or another.

As illustrated in Figure 2 that is growth of demand and supply in container shipping, 2006–2017, the overall market demand growth rate for containers shipping grew by 3 per cent in 2016, slightly better than the 2 per cent annual growth in 2015 (UNCTAD, 2017). Also the effect of the crises can be observed in Figure 2 which exhibits the supply and demand growth for 11 years. The most difficult times were the 2008 and 2009 where there was a huge gap between supply and demand. The vessel carrying capacity was increased however, due to the crisis there was a sharp decline in the demand which in turn makes it difficult to determine the rate in the market (Biyik & Tanyeri, 2018).




| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 (estimates) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Demand | 11.2 | 11.4 | 4.2 | -9.0 | 12.8 | 7.2 | 3.2 | 5.0 | 5.0 | 2.0 | 3.0 | 4.0 |
| Supply | 13.6 | 11.8 | 10.8 | 4.9 | 8.3 | 6.8 | 4.9 | 5.0 | 7.0 | 8.0 | 1.0 | 2.0 |

Source : Biyik and Tanyeri (2018).

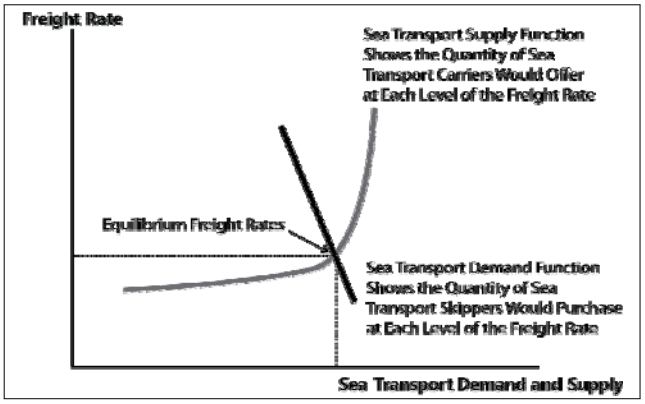
Notes: Supply data refer to total capacity of the container-carrying fleet, including multipurpose and other vessels with some container carrying capacity. Demand growth is based on million TEU lifts. Data for 2017 are projected figures.

**Figure 2:** Container Shipping Markets (Percentage)

## 3.2. Freight Rates

Price is the strategic tool of the marketing mix and the only element that generates revenue. Therefore, pricing decisions are both strategically and tactically important for the companies, particularly, in liner shipping industry which is an oligopolistic and highly volatile market. Despite the fact, price and pricing are the most neglected area of both marketing and liner shipping industry (Biyik & Tanyeri, 2018).

As it is seen from Figure 3 the supply curve has a J-shape which represents the amount of carrying capacity that the carriers offer at each level of the freight rate to sea transportation (Lun et al., 2010, pp.24-25). The sea transport function in Figure 3 represents the capacity at the each freight level and the demand for sea transport represents the shippers ready to purchase at each level of the freight rate. The intersection of the supply and demand curves is the equilibrium price in the shipping market (Biyik & Tanyeri, 2018).




Source : Lun et al. (2010).

**Figure 3:** The Freight Mechanism

The 2008 crisis had been the longest and most severe downturn for the modern merchant in the history of container-ships market. The freight rates in key container shipping trades, have slumped to nearly all-time lows, as ship owner struggled with low demand for their vessels. The crisis has fueled a cut-throat competition, and not all shipping line companies can survive (Kalgora & Christian, 2016).

In most of the examples in Table 3 that is N.Range European Import and Export Freight Rates for Selected Markets, the imbalance of rates between inbound and outbound shipments from Europe is due to the large inflow of goods imported from Asian markets to Europe during the economic boom and ECA throughout. Table 3 also indicates that the advantage possessed by European exporters was not maintained in 2009, however, but the rates for imports and exports are closer than the previous years (Gouvernal & Slack, 2012). The evidence from the WCSA is more ambiguous, with no clear pattern over the three years. However, the considerable spike in import rates in 2009 of WCSA is due to the rapid growth in the region's exports to Europe. Based on port data for the port of Rotterdam, container exports in 2009 from WCSA to the port were 410 per cent higher than imports.

**Table 3:** N.Range European Freight Rates (in €)

| | 2007 | | 2008 | | 2009 | |
|---|---|---|---|---|---|---|
| | imports | exports | imports | exports | imports | exports |
| China | 2,235 | 82 | 1,287 | 129 | 212 | 441 |
| SE Asia | 2,235 | 172 | 826 | 278 | 588 | 591 |
| Japan | 1,788 | 112 | 1,288 | 193 | 353 | 477 |
| Korea | 2,086 | 82 | 547 | 128 | 565 | 441 |
| Australia | 1,267 | 1,788 | 1,095 | 1,159 | 1,130 | 1,483 |
| ECSA | 1,325 | 200 | 1,425 | 1,300 | 1,225 | 650 |
| WCSA | 1,267 | 1,400 | 1,166 | 1,400 | 2,500 | 800 |

Source : Gouvernal and Slack (2012).

Remarks : ECSA(East Coast South America). WCSA (West Coast South America)

### 3.3. 0versupply in Shipping

The shipbuilding industry may be stuck in a vicious circle and as vessel replacement, one of the two key demand drivers, is endogenous to the shipbuilding and shipping markets. This could lead to vicious circles where low ship prices lead to increasing demand for new vessels, which in turn decrease vessel prices further.

From viewpoint of industrial organization, it has been discussed potential causes of overcapacity and oversupply. Three types of sources can be summarized as followed. First, economies shift to new industries and an economy's fundamental structure is altered, owing to technological, cost-related or demand-related changes, second, cyclical aspect as temporary disturbances owing to circles in the shipbuilding and shipping markets, changes in an economy's activity of negative economic shocks, overly optimistic expectation of future demand, which tend to return to its previous level over a few years, third, non-market-related sides as government measures and strategic decisions.

Especially, as for second reason, it is needed to describe more in details because economic crisis in 2007 is closely related to this matter. Negative economic shocks and/or overly optimistic expectation of future demand could contribute to excess capacity. Negative economic events, such as financial and economic crises, lead to a cyclical decline in demand and restrictions in financing for buyers and suppliers, thereby equally affecting the supply side and the demand side, and leading to overcapacity.

Another cyclical cause, similar to structural reasons, for a rapid decline in demand leading to oversupply can be related to an economic recession; in such a situation the lower demand for a product inclines companies to give customers price incentives to purchase the firms' goods. This was also the case in the shipping industry's leading yards to sell ever bigger vessels at low prices in order to be able to continue operating (OECD/ITF, 2015).

Based on the aforementioned explanations, Table 4 presents factors which could favour capacity expansion or curb capacity reduction in shipbuilding sectors. There is a strong link between excess supply and excess capacity. However, in most cases it can be distinguished the factors that affect capacity or supply in the first instance (OECD, 2017).

Although this report does not include a quantification of the impact of the aforementioned factors on supply and capacity section 6 analyses yard dynamics and reviews the literature in terms of yard entry and exit. Furthermore, section 7 provides an analysis on the non-market factors by looking at lessons from past experience of policy implementation in selected countries.

Overcapacities have sent prices plunging, which has doubled with a drop in the values of vessels, thus even their demolition cannot generate such income that would ensure the repayment of debts. For example, a five-year old Capesize vessel – so-called because they are too large for the Panama Canal and have to sail round Cape Horn – was sold for $19 million USD in early 2016, 40 percent below the normal listing price for a vessel that age of around $33 million USD. Nevertheless, preventive servicing might increase the life span of vessels, decrease their maintenance costs and make shipping more reliable. Due to oversupply, the effects of the crisis reach beyond seaborne trade: port terminal operators, railroads, trucking companies will also lose on revenues if, as Hanjin did, other companies go bankrupt and cannot get their cargo into ports (Laszlo, 2016). It is Obviously brought about the whole range of socio-economic effects (Viatkina, 2014).

**Table 4:** Factors Driving Supply and Capacity Expansion

| category | Factor | Affected in the first instance |
|---|---|---|
| Structural sources | Long lead times in adding shipyard capacity | capacity |
| | Capacity expansion problem | capacity |
| | Role of ship finance | supply/capacity |
| | Capacity to inventory vessels | supply/capacity |
| | Limited opportunities to re-orientate into other markets | capacity |
| | Technological shocks | supply/capacity |
| | Economies of scale | supply/capacity |
| | Low to medium entry barriers and high exit barriers | capacity |
| | Push from the buyers' side | capacity |
| | Overbuilding of capacity in customers' industries | supply |
| Cyclical sources | Vicious circle in the shipbuilding and shipping markets | supply/capacity |
| | Negative economic shocks | supply |
| | Overly optimistic expectation of future demand | capacity |
| | New entrants | capacity |
| | Divergence between good and bad performing firms | capacity |
| Non-market factors | Protectionist policies | supply/capacity |
| | Policies favouring new capacity investments or curbing restructuring | capacity |
| | Strategic capacity expansion to discourage new entry | capacity |

Source : OECD (2017).

One of the reasons for the situation that has evolved and now is aggravating into crisis is the deceleration of growth in global trade, and the slowing of the extent of globalization, to which the restructuring of the Chinese economy and the political climate around multilateral trade deals have contributed. In addition, shipping companies grew faster than even buoyant globalization justified. The average size of container ships has increased by 90 per cent in the past two decades, and total fleet capacity in 2015 was four times larger than that of 2000. Shipbuilding has accelerated since 2007, becoming “completely disconnected” from levels of demand. More and larger ships, combined with weak demand, have created overcapacity of up to 30 per cent.

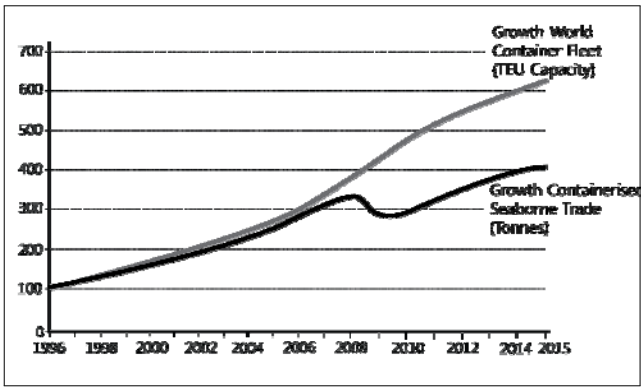
## 4. Paradox of Shipping Markets

The container market continues to struggle to handle surplus capacity among the larger vessels. Liner companies are working to consolidate their positions through mergers, acquisitions and alliances. In this cases, many larger vessels are returned to the tonnage providers as the liner companies and their alliance partners optimize their new trading networks. This strategy is aimed at increasing box rates, which is likely to be at the expense of tonnage providers, considering major challenges of increase in fuel prices (Potluri & Tejaswi, 2018). Despite the overcapacity issues, some liner companies continue to order super-large container vessels. To us, this is a bold strategy, since it is basically a long-term bet on manufacturing location.

### 4.1. Completely Disconnected

The development of the world container fleet over the last decade is completely disconnected from developments in global trade and actual demand: the growth of world seaborne trade ran remarkably parallel with the growth of average container ship capacity between 1996 and 2007, but has diverged since then, mainly because the stagnant growth path for seaborne trade between 2007 and 2010 was not followed by the container capacity that remained essentially on the same growth path as before and did not adjust for the stagnant global trade developments <Figure 4>. According to calculations by McKinsey (2015) there is a gap between supply and demand of approximately 20% that will persist until at least 2019. The effect of this overcapacity is low freight rates, which will undermine the profitability of the container shipping sector (OECD, 2015).

However, the acquisition of ever larger ships has been made possible to low asset prices in combination with easy access to finance. Large ships are relatively cheap, not in the least because of conditions of the shipbuilding industry, characterized by overcapacity, fuelled by public subsidies by main shipbuilding nations such as China and South Korea (main producers of the mega container ships). Easy access to finance is particularly the case for the shipping companies that are state-owned companies. These companies benefit from sovereign risk ratings rather than risk ratings related to the sector or their company.




Source : OECD (2015).

**Figure 4:** Disconnection of Container Shipping

Between 2002 and 2004 as shown in Table 4 that is annual growth rate of container shipping between 2000 and 2010, demand for containerized trade grew faster than the supply of container carrying capacity, so the industry ordered new tonnage. Usually, the new tonnage is delivered in a period time of two to three years, and from 2006, the supply of container ships on the market has been growing even faster than the demand (Kalgora & Christian, 2016). As the vessels ordered few years passed, continued to be delivered by the world’s shipyards, this led to a tremendous expansion of container ships fleet’s capacity. Thereafter, between January 2009 and January 2010, the world fleet’s total container carrying capacity increased by 8.3%; the difference in growth rates in 2009, amounted to an astounding 22.8 percentage points (Hoffmann, 2010).

**Table 4:** Growth Rate of Container Shipping

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D | 10.7 | 2.4 | 10.5 | 11.6 | 13.4 | 10.6 | 11.2 | 11.4 | 4.2 | -9.0 | 12.8 |
| S | 7.8 | 8.5 | 8.0 | 8.0 | 8.0 | 10.5 | 13.6 | 11.8 | 10.8 | 4.9 | 8.3 |

Source: Kalgora and Christian (2016).
Remark: (D) Demand (S) Supply

### 4.2. Content of Paradox

#### 4.2.1. Economy of Scale in Shipping

Shipping market is usually characterized in terms of supply and demand of trade volumes strongly depended on world economic situations, and the users of shipping service like shippers have to employ vessel to deliver their cargoes as well as service providers as shipping company have lent

their space of vessel based on shipping rates. But some important factors to be mentioned here are supply and demand elements as described in early part of this research, which is closely connected with shipping cycles.

What is meant is these factors have so influenced shipping markets that shipping company become to manage tonnage of their shipping fleet reflected market situations according to supply and demand. This meant the trade volume has raised the tonnage to be invested, this is basic economic principle. However, some different case is shown in this market situation, as OECD (2015) described a completely disconnected, that is shipping company having mega ship fleet like Maersk have expanded their tonnage after bust periods of shipping market of 2008 financial crisis, coping with low freight rates. This is purely opposite side of investment pattern in shipping markets.

Therefore, it is a investment of different strategy shipping company have exercised in the fluctuated shipping market, and can be paradoxical part of shipping investment. These strategies differ depending on the type of maritime transport companies. Container liners typically experience fluctuating revenues as the business cycle changes (Kang & Kim, 2017). Rather not escape from low freight rate, but involve into this shipping market, providing bigger capacity in line with low freight rates in terms of economy of scale. This is same effect of reduction of unit cost of vessel.

As shown earlier, this kind of shipping investment pattern has been shown mega shipping company, and it is not easy behavior for smaller shipping companies to practise to bust shipping market. Therefore, parties involved in this shipping business, as shipping company, shipbuilder and ship management company, have to prudently consider whether or not they have to invest, which means securing more shipping tonnage by newbuilding or borrowing.

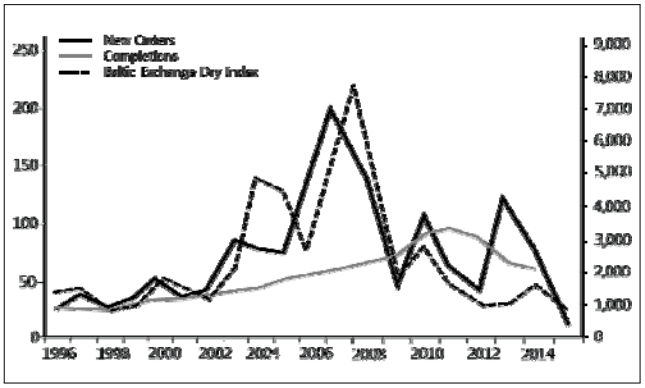
The reason this kind of completely disconnected investment happen is defined first economy of scale and time lag. In order to lower unit cost of shipping rate, shipping company has followed the different action it usually take a action, furthermore a time-lag of undertaking of vessel can play a role paradoxical situations as well.

### 4.2.2. Economy of Scale in Shipping

Economies of scale or significant learning economies could lead to overcapacity. The firm with the largest capacity or which adds capacity the first may have a cost advantage, putting pressure on all competitors to move quickly and aggressively (Porter, 1980).

In a similar vein, some industries can experience an increase of the minimum efficient scale (MES). In this scenario, larger plants are significantly more efficient than smaller ones, for instance, due to technological innovation and economies of scale. As a consequence, unless demand is growing rapidly the number of plants in the industry must shrink to avoid overcapacity. Unless every firm has several plants and can consolidate them, some firms will necessarily have to reduce market share, something they try to avoid. Therefore, firms will build larger new facilities to reach the MES, creating overcapacity. This mechanism occurred in the oil tanker shipping industry, where the new super-tankers are many times the size of the older vessels. The capacity of super-tankers ordered in the early 1970s far exceeded the market demand (Porter, 1980). A similar trend is currently taking place in the containership market as shown by a recent report by the International Transport Forum on mega ships (OECD, 2017).

During the pursuit of economy of scale to ordering the ship, freight rate and oversupply is connected to each other. Figure 5 shows the high level of correlation between freight rates, proxied by the Baltic Dry Index (BDI), and new orders of vessels. Such a strong relationship confirms the interconnectedness of the situation in freight and shipbuilding markets. Moreover, capital expenditures in the global shipbuilding industry increased threefold within only three years between 2005 and 2008, indicating that the industry strongly increased its investments in 2005 at the same time as ship orders peaked.




Source: OECD/ITF (2015).

**Figure 5:** Freight Rates (BDI) and New Orders

### 4.2.3. Time Lag in Shipping

A further critical aspect in this context is irrational ordering behavior of shipping investors as a consequence of the time-to-build delay. As Greenwood and Hanson (2015) show in their behavioral model of shipping industry cycles, firms overinvest when the market is in a boom leading to overcapacity and low returns thereafter. Two main reasons are found. First, shipping investors overestimate the persistence of prevailing high freight rates and therefore overvalue their investments. Secondly, firms tend to neglect the investments of their competitors and order to much vessels. It is also found that the presence of time-to-build has an additional amplifying effect on ship price volatility and investments are overall lower compared to no time-to-build (Kalouptsidi, 2014). In general, modern financial

theory implies the independence of a company's investing and financing decisions (Opitz et al., 2015).

Long lead times in adding capacity may encourage firms to start new capacity projects early if they have overoptimistic expectations on economic growth (Porter, 1980). In this regard, expectations about future demand and those about competitors' behaviour are crucial. Since firms in such industries with long lead times of capacity expansion face an increased penalty if they are left behind without capacity, even risk-averse firms will be more prone to invest even though the capacity decision itself is risky. If the costs of supply shortage is higher than the cost of carrying excess capacity the firm has more incentives to err on its decision to expand capacity rather than on facing supply shortage during periods of high demand (i.e. similar cause of oversupply due to long delivery times of vessels). This depends closely on contractual penalties and bankruptcy legislation. In this regard, shipyards may be inclined to add capacity to avoid supply shortage in future times of strong demand (OECD, 2017).

In particular, the booming industry prior to the previous financial crisis led to an extreme increase of freight rates as the demand for maritime transportation services exceeded the supply. But vessel supply reaction is slow due to the time-to-build delay of typically 18 to 36 months. However, to participate in the booming market, shipping companies and investors ordered more and more new vessels or bought used ones on the second-hand market which also led vessel prices rise sharply. The high ordering activity culminated in an orderbook-to-fleet ratio of almost 80% at the end of 2008.

## 5. Conclusions

Supply and demand of shipping market is always sensitive and fluctuated nature it has, because of that, parties involved in this business have to be concerned with market situations all the time, otherwise it is always possible for every parties in shipping circles to face difficult situations that is not easy to get it over.

Financial difficulty in late 2000 has influenced to shipping business, rather maritime industry, which had suffered from really difficult situations of hard time business situations. Trade volumes has fallen sharply and shipping companies have been faced with real hardship, even one of world shipping company had gone to bankruptcy finally.

In this severe shipping environments, some strange phenomenon had been appeared in shipping markets after financial crisis of 2008, and it seems that paradoxical explanation could be possible in view of general economic supply and demand of shipping markets. Everybody can expect that trade volumes falls, then supply side of shipping tonnage should be down. However, it stranges enough that some bigger shipping carriers have to expand their capacity as OECD (2015) pointed out as completely disconnected, which means bigger carriers like Maersk of Danish mega shipping company had to acquire more capacity to employ their ship space in the market. It is because of matter of unit cost according to economy of scale in order to maintain competitive advantage than other shipping carriers.

In general terms, it is usual patters and way of investment hae been followed before financial crisis, even some periods after that crisis. World trade environments have categorized normal management of shipping business, and this is clearly shown to be consistent with tonnage management of shipping company. However, it is so hard to understand in financial difficulty that some paradoxical behavior is found as explained. This is finally to attract more shipper and for carrier to earn more revenue. Another fact revealed in this study is time lag to time to build, and it take at least up to 3 years to delay of delivery of newbuilding vessels. Therefore, these two fact is interpreted with the reason of paradox in shipping markets of supply and demand, after financial crisis reflected into world shipping business.

Finally speaking, it is closely monitored all the time that parties those who are working many shipping business, shipping company and shipbuilder, etc. have to study and follow what situations have developed in shipping, and it makes them more timely decision making and this is may be reasonable approach of shipping business investment.

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