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Strong Ties Between Unsettled Global Economy & Maritime Economics: An Assessment of Today's Maritime Economy

İstikrarsız Global Ekonomi ve Denizcilik Ekonomisi Arasındaki Güçlü Bağ: Güncel Denizcilik Ekonomisine Genel Bakış

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ABSTRACT

Maritime sector has been severely affected by the global economic crisis of the years 2007-2008. The process of recuperation was quite long for the world economy as well as global maritime industry. With sudden decrease of cargo volumes on board of even from globally well-known shipowners' till the medium and small size ship management companies/shipowners were in urgent need of the cargo to fill up their vessels and to be able to compensate running cost of their fleets. Strategic partnerships among shipping lines have been emerged. The recovery period has been quite slow while some shipping lines declare bankruptcy and had to close down the business. Therefore, this review article aims to present current status quo of global maritime economy and the evaluation of existing and emerging trade lanes in recent years. This article helps researchers to point up the assessment of the general situation of world maritime trade. Remarkable articles on maritime economy, shipping business and international trade are evaluated in this paper.

Keywords: Maritime economics, shipping business, international trade, global crisis, world trade, shipping lines.

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ÖZET

Denizcilik sektörü 2007 -2008 yılları arasında yaşanan global ekonomik krizden oldukça etkilenmiştir. Yaşanan global ekonomik krizin etkilerini hem dünya ticaretinde hem de deniz ticaretinde atlatmak uzun yıllar almıştır. Ekonomik krizin etkisiyle gemilerinde yük hacmi düşen dünyanın en güçlü armatörleri, gemi işletmecileri, orta ve küçük çaplı hat işletmecileri ekonomik durağanlığı atlatmak ve gemi işletim maliyetlerini karşılayabilmek adına ortak gemi işletmeleri ve stratejik ortaklıklara kaymışlardır. Dolayısıyla bu derleme çalışması, sadece global ticaretin deniz ticaretine ve denizcilik ekonomisine etkisi alanında yayınlanmış, bilinen literatürü sunmasının yanı sıra 2020 yılı global ekonomik durum değerlendirmesi ve tahminleri sunarak araştırmacıları aydınlatmayı amaçlamaktadır.

Anahtar sözcükler: Denizcilik ekonomisi, deniz ticareti, uluslararası ticaret, global kriz, dünya ticareti, hat işletmecileri

1. INTRODUCTION

World global economy is directly affected by political developments, conflicts, currency fluctuations, countries' developments, industrial problems, production rates, emerging countries recessions, China's deceleration and weaker import demand in both developed and developing countries. The slowdown of global trade and Gross Domestic Product is due to rise of fluctuation in exchange currency and marked-up tariffs and price volatility on traded goods in massive economies. According to the President of World Trade Organization (WTO), Global maritime trade dropped at an average annual rate of 1% between 2008 and 2018. Current global trade market has gloomy atmosphere however hope is still alive. Apart from its direct effect on imports and exports, in some pioneer businesses has been slow down in production, uncertainty reached the peak and the business (Azevêdo, 2019). Trade tensions appear to have contributed significantly to the slowdown. Maritime business is one of the leading sectors in global economy. Thus, shipping is directly affected by political and social issues in the world. The year 2018 wasn't an easy year for both global and maritime economy since there had been dozens of slowdowns due to existing political problems. Therefore, maritime trade growth had its share as well. Global maritime economy seems like it dresses slowly the wounds after suffering mercilessly from economic downturn during between the years of 2007- 2015. From 2007 and on, remarkable fluctuations in the Container Ship Time Charter Assessment Index (New Con Tex) Baltic dry İndex, Istanbul Freight Index (ISTFIX) have been observed. According to the United Nations Conference on Trade and Development (UNCTAD) (2019), International Trade has been slowly risen up in 2018 while volumes reached 11 billion tons. Although international trade and global economy have performed some expansions, international global trade slackened in 2018. International cargo volume developed at 2.7 per cent in 2018 while in 2017 volumes performed better with 4.1 per cent in 2017. Slowdown in global economy that effected any type of

maritime cargo was wide-ranging. For instance, in 2017 the movement of container business in global ports declined to 4.7 per cent, down from 6.7 per cent (UNCTAD, 2019). In regard to data taken from WTO, world merchandise imports and exports grew 3.0 per cent in 2018 while world GDP has increased 2.9 per cent.

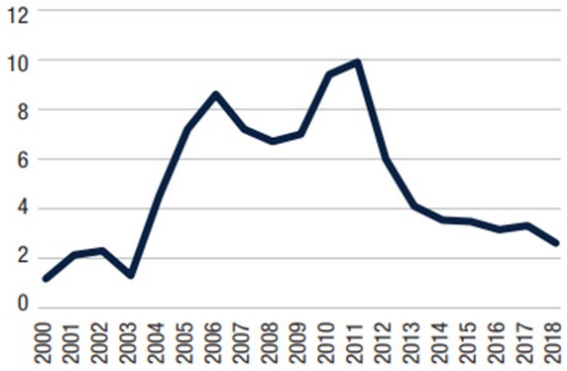


Figure 1. Annual growth of world fleet, 2000–2018 (Percentage of dead-weight tonnage) (UNCTAD, 2019).

As per UNCTAD 2019, as it is observed in above Figure 1, annual growth in world fleet in deadweight tonnage. The rise in annual growth of world fleet from 2003 to 2006 was remarkable until the economic downturn in late 2006 – the beginning of 2007. The effect of the financial crisis has been noted between the years of 2007 – 2011. Besides the developments in the global economy and world merchandise trade, international seaborne trade carried over to expend in 2011 tough at a slower rate than in 2010 (UNCTAD, 2012).

It is an undeniable fact that powerful ties among GDP growth, global commodity trade, seaborne trade, industrial production keep going unabated (UNCTAD, 2011). Figure 2 shows that in 2016 the drop of import rates in developing countries was the most remarkable.

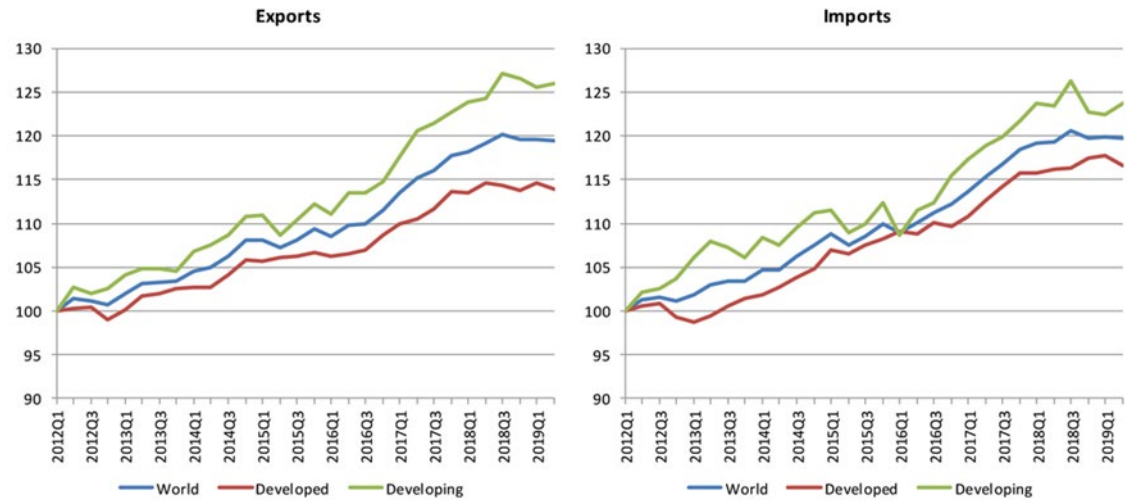
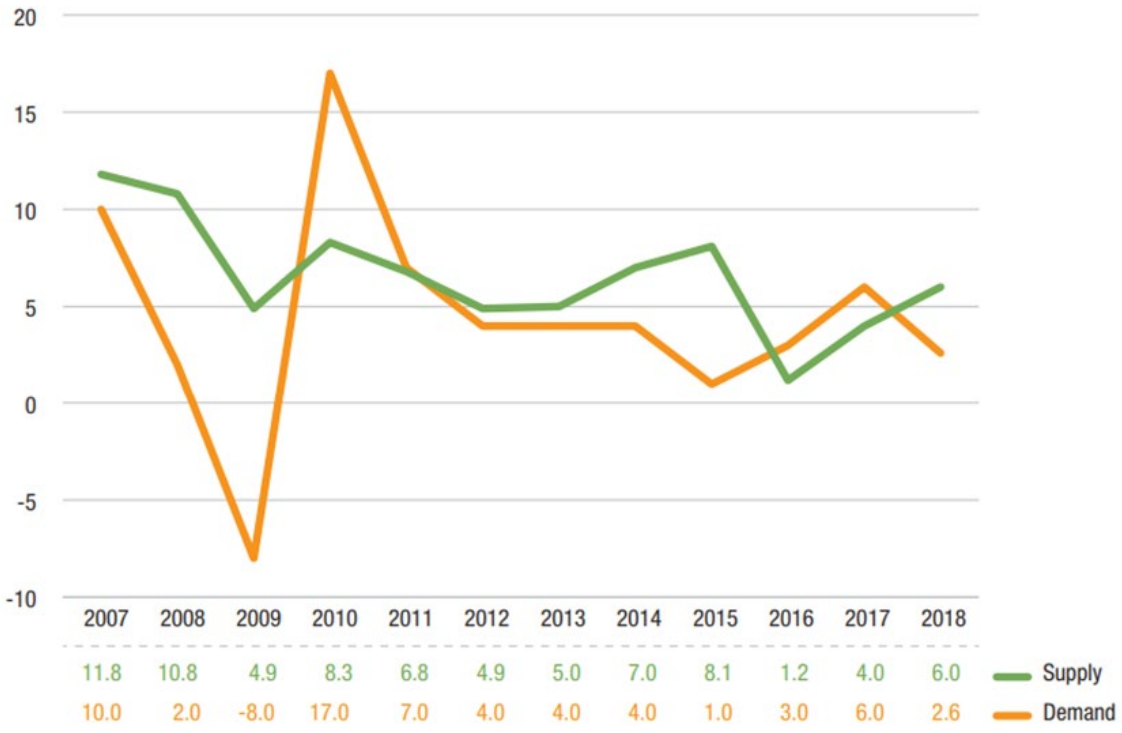


Figure 2. Merchandise exports and imports by region, 2012Q1-2019Q2 (Volume index, 2012Q1=100) (WTO,2019; UNCTAD, 2019).



Note: Data contains total capacity of the container-carrying fleet. Demand growth is based on million TEU lifts.

Figure 3. Growth of demand and supply in container shipping, 2007–2018 (Percentage) (Clarksons Research, 2019)

In Figure 3, decrease in supply boosts in 2007 and then the dramatic downfall in demand is observed in 2009. In the same breath 4.9 % of decline is marked in supply. The volatility in supply and demand is observed from 2007 to 2018 (rise in supply for 2014, rise in demand for 2014 and 2015). Considering that shipping market is one of the riskiest markets in the world, an entrepreneur may gain steam competition and makes use of an opportunity of the unstable economy. Thus, she makes the right step by foreseeing the future scope. That's why maritime companies may be generally taken into consideration as 'dinosaurs of classical economics' in which shipowners guarantee themselves with strategic partnerships, albeit no combination in restraint of trade (Stopford, 2009). As per global reports of 2019, the gap between supply and demand for trade finance still exists. One of the leading banks on a global arena states that supply is far from catching the demand although transactions of commerce finance are expected to be pure arbitrage and well-grounded asset class (Asia Development Bank Briefs, 2019). Therefore, the slew rate of supply seems to be reluctant.

2. MATERIAL AND METHODS

Shipping is a quite adventurous and costly business. All or none principle is applicable in maritime industry. It is an undeniable fact that the high risk in maritime market emerges the application and usage of quantitative administrational innovation methods as in finance and economics. Aforementioned analyses were started in 1930's by Koopmans (1931;1932). The statistical researches regarding maritime trade mainly concentrates on transportation costs and

freight index. One of them is analyzed by Bulut et al. (2012) by applying fuzzy integrated logical forecasting methodology to forecast dry bulk time charter rates. Also applied vector autoregressive methodology is studied in the paper. Moreover, Chen et al. (2012) used autoregressive integrated moving average with explanatory variable (ARIMAX) and vector autoregressive model. Duru and Yoshida (2009) also use fuzzy time series methodology in order to forecast dry bulk shipping index. Cointegration analysis can be found also in several articles, particularly for non-stationary data. Addition to these analysis tools, panel data techniques are used to identify relationships in maritime trade.

2.1. Time Series Analysis in Shipping

Time series analyses is one of the techniques when forecasting takes place in maritime economics. Through time series data movements by time are determined (rise, decline or stability of the data). The main idea behind analysis time series data is to identify relationship and forecasting in time. The data consists of four main components namely cyclical, trend, seasonal, and irregular parts. Trend component gives information about how the data moves in the long-run time period. The cyclical component shed lights on the regular pattern of time series. The irregular part comprises important section for econometricians and statisticians. This part is mainly analyzed for forecasting and prediction. Enders (2014) related time series econometrics to find and analyze stochastic part of difference equations. Below equations can be given as an example for difference equations:

$$y_{t+1} = y_t + \varepsilon_{t+1}$$
$$\Delta y_{t+1} = \varepsilon_{t+1} \quad (1)$$

y_t = dependent variable at t time
y_{t+1} = dependent variable at t+1 time
ε_{t+1} = error term at t+1 time

Two comparison techniques that are stationary and non-stationary time series can be found (Priestley, 1983; Michis and Nason, 2017). According to Priestley (1983), non-stationary time series is comprehensive treatment whereas Dahlhaus concentrates on locally stationary time series. The case is to determine type of time series (stationary or non-stationarity) earlier in order to evaluate. In order to check stationary time series, unit root tests such as Dickey–Fuller, Augmented Dickey–Fuller and correlograms on autocorrelation and partial autocorrelation functions are applied. The decision on opting suitable time series model, several criteria are stated: Akaike, Bayesian, and Hannan–Quinn information criteria. The most popular method among time series is The Box–Jenkins method (Profillidis and Botzoris, 2018).

2.1.1. Autoregressive Moving Average Models

Autoregressive moving average models are mainly applied to find irregular part of the data and by finding this it is applied to forecast of data. ARMA estimation mainly consists of two parts. Moving average parts are integrated with the autoregressive part in ARMA models (Enders, 2014). The difference equation can be written as;

$$y_t = a_0 + \sum_{i=1}^{p} a_i y_{t-i} + x_t \quad (2)$$

y_t = dependent variable at t time
y_{t-i} = dependent variable at t-i time
$\sum_{i=1}^{p} a_i y_{t-i}$ = autoregressive part of equation

Adding moving averages part to the model, below formula will be formed;

$$y_t = a_0 + \sum_{i=1}^{p} a_i y_{t-i} + \sum_{i=0}^{q} \beta_i \varepsilon_{t-i} \quad (3)$$

$\sum_{i=0}^{q} \beta_i \varepsilon_{t-i}$= moving averages part of equation

It should be taken into account that if this equation has root equal or greater than one, the integrated model should be applied. This process called an autoregressive integrated moving average (ARIMA) model. To apply ARIMA methodology, the data must be stationary. In order to make the series stationary, the difference of data should be taken. Having differenced data, the ARIMA methodology could be applied the data. Stationarity means generally the series has constant mean, variance and covariance. The series shouldn't change over time (Enders, 2014).

2.1.2. Autoregressive Conditional Heteroskedastic Models

Autoregressive Conditional Heteroskedastic models (ARCH) are used to determine and predict the volatility. In general, first differences are modelled in this methodology and the model used to check whether the variances differ by time. Kavussanos (1996) applied ARCH methodology to tanker market in order to assess price risks.

2.1.3. Vector Autoregregressive Models

Vector autoregressive model is developed by Christopher Sims (1980). Gujarati and Porter (2009) explains these models as "the term autoregressive is due to the appearance of the lagged value of the dependent variable on the right-hand side and the term vector is due to the fact that we are dealing with a vector of two (or more) variables". Geomelos and Xideas (2014) apply this methodology in order to forecast spot prices in bulk shipping.

2.2. Linear Regression

Linear regression is the most basic methodology to be used in Maritime Economics. It is a prediction of connection between the dependent and independent variables. Therefore, linear regression exposes if the single action has any relationship to response. Different subjects within maritime economics are studied and explained in linear regression. Yazir and Sahin (2017) examined the impacts of share prices, volatility and interest rate on put options through a linear regression approach. Being able to present solutions for the coercions in the maritime economics. The Black-Scholes Merton (BSM) model is used to provide option pricing, pricing and risk management. However, in order to calculate put and call options, Linear regression models were found more efficient than The Black-Scholes Merton model according to the data analyses. By using linear regression model, the effects of variable parameters such as volatility and interest rates on option premium, freight rates are analyzed (Yazir and Sahin, 2017). Simple Linear Regression is convenient to use for finding relationship between to continuous variables in which formula is found below:

$$y= \beta1+ \beta2x+e \quad (4)$$

y — Dependent Variable / Explained Variable / Regressand
x — Independent Variable/ Exploratory Variable/ Regressor
$\beta1$ = intercept
$\beta2$ = coefficient of regressor
e = error term

2.3. Freight Index Measures

Index measures are generally one of the methods used in maritime economics and determining a specific system of a financial institution. Freight market indices are applied to show not only composite effect of a system but also by merging various individual series in different time spans. Many examples can be given to show the appliance of freight index such as Drewry, Baltic Exchange, Tramp Data Co., J.E. HYDE. The combination of qualitative and quantitative methods is observed in the literature. Freight index is calculated different alternative indices in pursuant of age of ships as qualitative measures of shipments and route particularities. Late researches indicate that previous and

current index measures can justify fluctuations resulting with simultaneous results. In long term, freight market indices the cessation of commodity rates, maritime trade and life expectancy in various years, albeit the log-linear model is just reference and far from being a noteworthy model due to the artificial regression prospects (Duru and Yoshida, 2011; Duru et al., 2010; Duru, 2010). Therefore, the research that has been conducted by Başer and Açık (2019) analyses the World Gross Domestic Product (GDP) as a measure of economic activities and Baltic Dry Index (BDI) as a measure of dry bulk freight rates. The correlation analysis between BDI and GDP have shown that there has been an important positive correlation.

2.4. Likert Scale

Likert scale is the one of the common measures that is used as a research method in Maritime Sector. While collecting data of strategic factor by the respondents in maritime sector, Likert scale gives the researcher flexibility to assess the respondents answers regardless geographical constraints. By this methodology, correlations can be grouped and an importance-based narrative for the performance, challenges and competitiveness of maritime companies or partners are developed. The competitiveness within maritime clusters are categorized (Stavroulakis *et al*., 2019). As an example, the content validity is one of the pioneer evaluation methods in maritime economics. In port economics especially in port selection, to define priorities of shipping lines and customers that effect port competitiveness is defined by Likert scales (Talley, 2012).

Table 1. Likert scale results of the port selection ranking criteria (Talley, 2012)

	Response rate (%)	*Mean*	*Std. dev.*
The port's berth capacity	95	6.33	.730
The port's flexibility in meeting your special needs	100	6.09	1.151
The navigation costs related to the port are reasonable	100	6.05	0.785
The availability of EDI capabilities	100	6.05	0.899
The average length of your ship's service time by the port	23	6.00	0.000
The cargo-handling charges of the port are reasonable	100	6.00	1.024
The cargo-handling information service	100	5.95	0.950
The cargo-tracing information service	100	5.95	1.133
The berth service fees of the port are reasonable	100	5.95	0.950
The quality of the personnel involved in port operations	95	5.86	1.195
The use of modern IT and computerized information systems by the port	100	5.82	1.140
The loading/discharging rate that the port or port terminal is capable of	23	5.80	1.095
The connectivity of the port/port terminal to a multimodal interface	86	5.68	1.293
The port's Management Information System	41	5.67	1.000
The frequency of freight loss and damage at the port	95	5.48	1.250
The port's shore container handling equipment	91	5.45	1.701
The terminal provides cost-effective multimodal operations	100	5.41	1.260
The frequency of departures that the port can facilitate	95	5.38	1.532
The average cargo dwell time	18	5.25	0.500
The port's ship container handling equipment	95	5.19	1.940
The efficiency of the port's/terminals multimodal operations	27	5.17	0.753
The capacity to handle the transferring of cargo from one mode to another	86	5.11	1.197
The assistance provided by the port with claims handling	95	5.05	1.627
The capacity of the container storage facility provided at the port	100	5.05	1.527
The range of warehousing services provided by the port (e.g. cross-docking; consolidation, palletization; packing; labeling; stuffing; de-stuffing; inventory management; continuous replenishment)	86	4.95	1.129
The reliability of the terminal's service operations for the multimodal interface	27	4.83	0.753
The provision of support services (e.g. incoming goods inspection; spare parts support)	86	4.74	1.284
The size of the port's container yards	100	4.59	1.709

The literature review in shipping lines presents that researchers generally take the view of shippers as a reference for selecting port choices. Whereas the latest improvements in liner shipping underline the importance of shipping lines preferences when it comes to decision making (Talley, 2012). In Table 1, the results of port selection indicated depending on which criteria shipping lines choose to call a port.

Table 2. An example of Likert scale ordinal order (source: author)

Value	**Importance**
1	Not important/Not applicable
2	Slightly important
3	Moderately important
4	Important
5	Very important

The restrictions of Likert-type scales (Carifio and Perla, 2008) when involving a numeric 'importance scale' were scrutinized and as the respondents were asked to consider the distances between the points of the scale equidistant, bias can be considered to have been retained at a minimum.

3. CONCLUSIONS

Maritime trade is very profound sector and constitutes the backbone of the global economy. Data provided from maritime trade among countries should be scrutinized very carefully. In time series economics, methodology must be chosen according to what researcher aims. ARIMA is one of the good options to forecast future movements in maritime trade, like tanker markets or dry bulk markets. Also, vector autoregression method could be applied to find out whether scrutinized variables explain variance of the same variables.

Researchers targeting to find out the view or expectations of sector players and seamen could conduct surveys including Likert scale analyses. Additionally, some freight rate indicators give a clue about the conjuncture of the maritime sector. The reviews have revealed that maritime economics research trends and models are considered to be developed in shipping in order to analyze the nature of maritime economics and variables that effect shipping economy directly. To forecast in maritime economics, the importance of the modeling application in maritime economics has an immense validity. However, strengthening the number of researches on modelling of maritime economics would significantly help the industry to progress.

When it comes to evaluate what future brings to maritime sector is still in suspense. The imbalance in supply and demand forms various problems for maritime sector. Since the shipping market, especially supply is unsteady, still market and expert predictions are needed in order to see what future forms (Başer and Açık, 2019). While economic growth triggers the demand, maintaining supply in balance is fundamental in sustainable economies. Albeit the political downturn is expected to be high in 2020 so that the normalization of trade relations is needed between leading and economically powerful countries.

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