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Do Commodity Prices Matter for Second Hand Values? An Empirical Research on Capesize Market

Emtia Fiyatları İkinci El Değerler için Önemli midir? Capesize Piyasası Üzerine Bir Uygulama

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ABSTRACT

In this study, it is aimed to investigate the relationship between second hand values of Capesize ships and iron ore prices which is the basic loads of Capesize type ships. In this respect, the asymmetric causality test has been used to determine the causal relationships between the shocks contained in the series. This test examines the nonlinear relationships by separating the positive and negative shocks in the series. Considering that the reactions of the agents in the market may also change according to the type of shock (news), this method provides great advantage. The data set used in the study consists of 227 monthly observations covering the dates between July 1999 and May 2018. According to the results, positive shocks in iron ore price are the cause of positive shocks in the value of 5-year-old Capesize vessel. Furthermore, the negative shocks in the iron ore price are the cause of negative shocks in the value of 5 years old Capesize vessel. These results are hoped to bring a different perspective to the literature and open a new window to the researchers. In addition, iron ore prices for those who plan to invest in this sector can be said to be the leading indicator for second hand Capesize vessel values. Increasing shocks in commodity prices trigger shocks which increase the ship value, therefore, realizing the investment strategies by following the commodity prices can reduce the risks caused by uncertainty and even lead to significant profit opportunities.

Keywords: Capesize ship, Second hand value, Commodity price, Asymmetric causality.

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ÖZET

Bu çalışmada Capesize gemilerinin ikinci el değerleri ile bu gemilerin en temel yükü olan demir cevheri fiyatı arasındaki ilişkinin incelenmesi amaçlanmaktadır. Bu doğrultuda serilerin içerdikleri şoklar arasındaki nedensellik ilişkisini tespit etmek için asimetrik nedensellik testi kullanılmaktadır. Bu test değişkenlerdeki pozitif ve negatif şokları ayrıştırarak doğrusal olmayan ilişkileri tespit edebilmektedir. Piyasadaki ajanların gelen şokun (haberin) türüne göre farklı tepkiler verebilecekleri düşünüldüğünde, bu yöntem önemli bir avantaj sağlamaktadır. Çalışmada kullanılan veri seti 227 aylık gözlemden oluşmaktadır ve Temmuz 1999 ile Mayıs 2018 tarihleri arasını kapsamaktadır. Elde edilen sonuçlara göre, demir cevheri fiyatındaki pozitif şoklar 5 yaşındaki Capesize gemisinin değerindeki pozitif şokların nedenidir. Ayrıca demir cevherindeki negatif şoklar da 5 yaşındaki Capesize gemi değerindeki negatif şokların nedenidir. Bu sonuçların literatüre farklı bir bakış açısı kazandırması ve araştırmacılara yeni bir pencere açması umulmaktadır. Ek olarak, demir cevheri fiyatlarının sektöre yatırım yapacak olanlara Capesize gemi değerleri için öncü gösterge oldukları söylenebilmektedir. Emtia fiyatındaki arttırıcı şoklar gemi değerindeki arttırıcı şokları da tetiklemektedir, bu yüzden yatırım stratejilerini gerçekleştirirken emtia fiyatlarını takip etmek belirsizlikten kaynaklı riskleri azaltabilir ve hatta çok önemli kar fırsatları da sağlayabilir.

Anahtar sözcükler: Capesize gemi, İkinci el değer, Emtia fiyatı, Asimetrik nedensellik.

1. INTRODUCTION

Dry bulk shipping one of the most convenient and cost-effective method of global transportation of large volume cargoes (Dai et al., 2015), which are generally composed of five major bulks that are iron ore, coal, grain, bauxite/alumina, and phosphate (Wright, 1991). The bulk market is directly affected by the changes in the demands of these cargoes, since the structure of the market is derived demand (Branch, 2012:1). One of the most important factors affecting the demand for commodities is the prices of them.

Changes in commodity prices are related to the state of global economic activities in general. Sudden rise in the demand for commodities may not be met by the supply at the same rate, and this situation causes sudden increases in their prices. But also declines in commodity supply can also lead to price increases. If the increase in commodity prices is due to the demand-side shocks rather than supply-side ones, this is considered to be a sign of strong global economic activities (Tsioumas and Papadimitriou, 2018).

It is clear that commodity prices have a possible relationship with freight rates, given that they may be indicative of the demand for maritime transport, and this relationship is confirmed by many studies in the literature (Kavussanos et al., 2010; Kavussanos et al., 2014; Yu et al., 2007; Chou et al., 2015; Tsioumas and Papadimitriou, 2018). Considering the close relationship of the freights with the ship values, it is likely that the commodity prices may have an impact on ship values as well. Especially the second hand ship market is very liquid compared to the shipbuilding market, and prices are very

volatile in this market (Adland and Jia, 2015; Açık and Başer, 2018). The delivery of a ship ordered in the shipbuilding market can be made after 2 years, therefore the prices are not as volatile as the second hand prices (Başer and Açık, 2018). However, as Tsioumas and Papadimitriou (2018) have stated, changes in commodity prices are not generally demand-driven and may also be supply-driven. Therefore, examining the relationship between commodity price and ship value in a linear way causes some points to be overlooked. In addition, the maritime market is a very volatile and risky market (Jing et al., 2008) since it is exposed to many unexpected events, shocks and crisis. However, a study examining this possible relationship with this approach has not been found in the literature. In this context, this study aims to examine the possible relationship between commodity prices and second-hand ship values through the Capesize ships and iron ore prices. The iron ore commodity has been chosen since iron ore is a type of commodity mostly transported by Capesize vessel types (Stopford, 2009: 69).

The asymmetric causality analysis developed by Hatemi-J (2012a) is preferred in this study, which is a nonlinear method and allows to determine the asymmetrical causality relationship between the shocks in the series in four possible combinations; from positive to positive, from positive to negative, from negative to negative, from negative to positive. When the financial series are thought to be subject to too many unexpected events and shocks, it is inevitable that their structures become non-linear. In addition, the reactions of players in the market may vary depending on the type of shocks (news) they are exposed to. The variables that are subject to this study are also affected by many macro factors. Considering all these evaluations, it can be said that the asymmetrical causality test is quite suitable for the spirit of this study. As a result of the study, the unidirectional causal relationship between the iron ore price and the 5-year-old ship value is examined and two significant causalities are determined. The findings reveal that positive shocks in iron ore price are the cause of positive shocks in the ship value, and negative shocks in iron ore prices are the cause of negative shocks in ship value. Thus, it is hoped that this study provides important contributions to the maritime literature by approaching the subject from a different viewpoint with its novel method. Moreover, it is expected that these results will benefit the stakeholders who are interested in the Capesize shipping market in terms of reducing the risks of investment and being one step ahead in the market.

The remainder of the study is organized as follows; the relevant literature is reviewed in the second section; the method used in the study is introduced in the third section; the findings obtained from the analyzes are presented in the fourth section; and finally, evaluations are made in the last section.

2. LITERATURE REVIEW

Any similar study has not been found in the literature. Instead, there are several studies investigating the relationship between commodity prices and freight indices, and some other studies examining the second-hand values of the ships.

The main subjects of the commodity price and freight rate related studies are; economic spillover effect (Kavussanos et al., 2010, Kavussanos et al., 2014) and linear causality relation (Yu et al., 2007;

Chou et al., 2015; Tsioumas and Papadimitriou, 2018). The general results of these studies are as follows; there are return and volatility spillover effect between Panamax freight and commodity derivatives markets; commodity futures lead the FFAs in both in returns and volatilities; Baltic Capesize Index is a leading indicator for Asian Steel Index; there are some unidirectional and bidirectional causalities between freight rates and commodity prices. These studies confirm the relationship between the freight rates, which are the main determinants of ship values, and commodity prices.

The subjects of the second hand ship related studies that can be reached in the literature are; second hand ship valuation (Strandenes, 1984; Alizadeh and Nomikos, 2003), ship sale & purchase volume and second hand price volatility (Dai et al., 2015), price dynamics in different sizes of ships (Kavussanos, 1997), and volatility analysis compared with newbuilding prices (Adland and Jia, 2015). The general results of these studies are as follows; increasing sale & purchase volume reduces the second hand price volatility; price fluctuations in larger vessels are more volatile than smaller ones; volatilities in newbuilding prices are lower than volatilities in second hand prices.

As Lun and Quaddus (2008) have stated, the second hand values are based on the probability to profit now and in the future. Therefore, the second hand values of the vessels are directly related to the freight rates in the market, and it is quiet natural that there is a relationship between the commodity prices and the second hand values as the relationship between commodity prices and freight rates is confirmed by many studies in the literature. The fact that it has not been found any study examining this relationship in a nonlinear way constitutes the motivation of this study.

3. METHODOLOGY

The asymmetric causality test used in this study has been developed by Hatemi-J (2012a). This method determines the asymmetric causality by using the cumulative sums of the positive and negative shocks (Tugcu and Topcu, 2018). In this way, it can differentiate the causal impacts of negative and positive shocks (Shahbaz et al., 2017). This feature makes it possible to achieve very overlapping results with real-life problems, since agents in the markets may react differently according to the type of the shock (Hatemi-J, 2012a), and thus asymmetric positive and negative shocks may produce different causal impacts (Hatemi-J, 2012b).

Since the asymmetric causality test involves the Toda and Yamamoto (1995) process in its structure, the series do not have to be stationary, however, the value of the maximum degree of integration must be known (Umar and Dahalan, 2016). The unit root tests are used to determine this value, and if there is a unit root, extra lag(s) is added to the unrestricted VAR equations (Hatemi-j, 2012a). Then, some initial values such as the maximum number of lag, the number of bootstrap simulation repetition and the type of information criteria are determined, and analyses are carried out.

4. FINDINGS

The data set used in the study consists of 227 monthly observations covering the dates between July 1999 and May 2018. The iron ore price and the 5-year old Capesize vessel value are visually

presented in Figure 1. According to the graph, they mostly follow a parallel course, which may be due to the fact that the iron ore price also includes transportation costs.

Descriptive statistics for the variables used in the study are presented in Table 1 as raw data, logarithmic data and return data. According to the statistics of the ore data, the lowest price is observed as $ 27, while the highest price is observed as $ 82 in the covered period. The same statistics for the 5 years-old Capesize vessel are minimum $ 21 million and maximum $ 153,5 million. In the asymmetric causality test, the logarithmic forms of the series are used. By doing so, the discrete series become continuous and the processability of the data increases. In addition, better distribution properties can be obtained (Shahbaz et al., 2017).

Return series are obtained by using $R_p=ln_p-ln_{p-1}$ and are important since they provide information about the shocks and non-linearity of the series. If the Kurtosis values are significantly higher than 3, the sign of Skewness indicates the types of news (shocks) that the series are mostly affected. For instance, the Kurtosis values of both variables are very high, and the Skewness value of the vessel value is negative while the value of the ore price is positive. This situation shows that ore variable is more exposed to positive news while ship value variable is more exposed to negative news in the covered period.

Another most important information provided by the return series is related to non-linearity. Since the financial series are exposed to many unexpected events and shocks, this distracts their distribution from normal distribution characteristics due to the tail effects. Therefore, the lack of normal distribution characteristics of the series can be interpreted as a sign that non-linear methods can be used (Shahbaz et al., 2017). Jarque-Bera statistics in the return series test normal distribution, and the null hypothesis of this test indicates that the series are normally distributed. When the probability values of this test are examined, it is seen that the null hypothesis is rejected for both variables. In other words, variables are suitable to be examined by a non-linear method. The following step is to apply the unit root tests to the series in order to determine the maximum order of integration.

Augmented Dickey-Fuller (1979) and Phillips-Perron (1988) tests are applied to determine the maximum degree of integration in the series, and the results are presented in Table 2. According to the results obtained, both tests indicate that the series become stationary when first differences of them are taken. According to these results, both series are I (1) and the maximum degree of integration is determined as 1. After determining this value, asymmetric causality test is applied.

Some initial values must be determined before the asymmetric causality test is applied. The maximum number of lags for the VAR equations in the test determined as 12 since the frequencies of the series are monthly. The maximum number of bootstraps for the calculation of critical values is selected as 1000. Finally, the AICc information criteria, which is the corrected version of the Akaike Information Criteria (AIC), is used to select the best model. After these values are determined, analysis is performed by using GAUSS codes written by Hatemi-J (2012a). The results of the test are presented in Table 2. According to the results, positive shocks in ore price are the cause of positive shocks of second-hand ship value, and negative shocks in ore price are the cause of negative shocks of second-hand ship value.

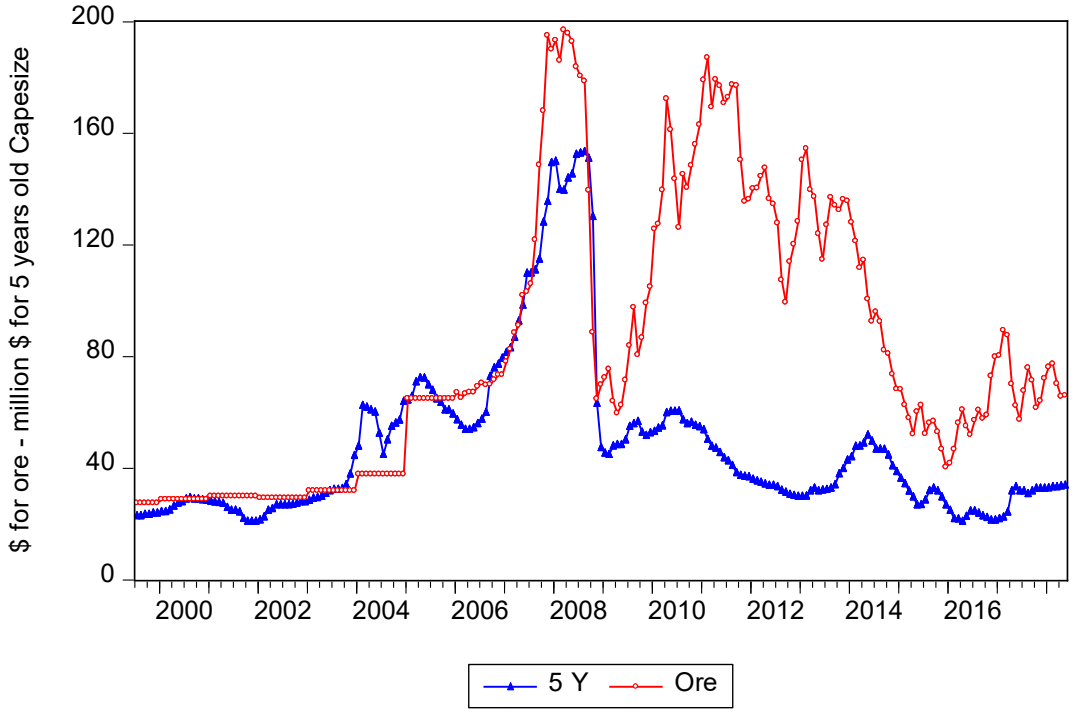

Figure 1. Graphical display of the variables (Bloomberg, 2018; Worldbank, 2018).

Table 1. Descriptive statistics of the variables

	Ore	5 Y	Ln Ore	Ln 5 Y	R Ore	R 5 Y
Mean	82.2	48.1	4.22	3.73	0.00	0.00
Med.	67.3	36.5	4.20	3.59	0.00	0.00
Max.	197.1	153.5	5.28	5.03	0.53	0.27
Min.	27.5	21.0	3.31	3.04	-0.45	-0.72
Std. D.	49.1	29.9	0.61	0.49	0.09	0.07
Skew.	0.73	2.03	0.00	0.85	0.14	-3.67
Kurt.	2.39	6.94	1.77	3.21	10.8	40.5
J.B.	23.9	304.3	14.1	28.1	573	13757
Prob.	0.00	0.00	0.00	0.00	0.00	0.00
Obs.	227	227	227	227	226	226

Table 2. Unit root test results

		Level		First Difference	
	Variable	Intercept	Trend and Intercept	Intercept	Trend and Intercept
ADF	Capesize 5 Y	-2.1764	-2.2060	-8.5843*	-8.6044*
	Ore	-1.8857	-1.6840	-10.879*	-10.909*
PP	Capesize 5 Y	-1.8778	-1.8898	-8.5495*	-8.5660*
	Ore	-1.7242	-1.3902	-10.725*	-10.738*

Critical values:-2.57 for 10%, -2.87 for 5%, -3.45 for 1% at Intercept; -3.13 for 10%, -3.42 for 5%, -3.99 for 1% at Trend and Intercept.

Table 3. Asymmetric causality for 5 years old ship

		Commodity => Capesize			
		$C^{+}5^{+}$	$C^{+}5^{-}$	$C^{-}5^{-}$	$C^{-}5^{+}$
Opt. Lag; VAR(p)		2	3	3	3
Additional Lags		1	1	1	1
Test Stat (MWALD)		5.02	3.04	306	3.39
Asym. chi-sq. p-val.		0.08***	0.38	0.00*	0.33
Critical Val.	1%	15.6	0.00	0.00	0.38
	5%	6.49	0.00	0.00	0.00
	10%	5.52	0.00	0.00	0.00

5. CONCLUSIONS

In this study, the effect of the shocks in the commodity price on the second hand price of the ships is examined by a non-linear method through Capesize vessel and iron ore prices, and significant results are obtained. Capesize ships are one of the largest ship types used in dry bulk transport and are mostly used in transoceanic distances for iron ore transportation. Therefore, it is inevitable to be affected by the changes in iron ore price.

In the literature, any similar study examining the relationship between ship value and commodity prices has not been found. Only the studies examining the relationship between freight market and commodity prices have been found. The fact that this study is examining this issue and approaching the subject from a different angle makes it distinctive.

As a result of the study, it is determined that the positive shocks in the iron ore price are the cause of the positive shocks in the second hand price, and the negative shocks in the iron ore price are the cause of the negative shocks in the second hand prices. This results may be attributed to two reasons; demand-driven impact and cost-driven impact. Demand-driven impact can be explained as: the increase in commodity prices is stem from increased demand for commodity, and this demand growth the increases in ship values due to the increasing freight rates. Just the contrary, decrease in demand for commodity results in decrease in its price and demand for transportation. Then a depreciation in ship values occurs due to the falling freight rates. Cost-driven impact can be explained as: since the iron ore is the raw material of steel production, an increase in the price increases the new construction prices, which leads to an appreciation of the second-hand ship values. On the contrary, when the iron ore prices decrease, it is reflected negatively on the ship's values as production costs decrease.

Further studies may examine the targeted relationship by increasing commodity and ship types in order to make the possible relationship more generalizable. Moreover, if the relationship between ship value and commodity prices is analyzed by including the data after May 2018, it may be possible to reveal the impact of the recent shocks experienced in the financial markets of Turkey and the World due to the foreign trade restrictions on the commodity prices and second hand values of the ships. Also newbuilding prices may be included in the model and the results can be more generalized. The relationship can also be examined for another type of maritime markets such as crude oil transportation or LNG transportation. In addition, the subject can be approached from different perspectives by using methods such as time-varying or lagged causalities.

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