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Price Volatility Spillover in Ship Demolition Markets

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ABSTRACT

World ship demolition activities are mainly carried out in Bangladesh, China, India, Turkey and Pakistan. Conducting in so few countries leads to a high level of competition among countries, as well as being influenced by each other's prices. So, there is no natural situation for each other to follow their prices, and this can be reflected as a flow of information to the variances of the prices. When this information flow exists, volatility spreads can be observed between the prices. In this context, this study aims to determine the flow of information between the major countries operating in the demolition sector in the world by using the causality in variance method. The dataset covers the dates between 8th January 2013 and 24th December 2018 and consist of 309 observations on a weekly basis. According to the results, there are volatility spillovers from Turkish demolition prices to all other country prices except China in terms of both general cargo and tanker ships. In addition, there are volatility spillovers from Pakistani tanker demolition prices to Bangladeshi and Indian prices. These results reveal that the demolition business entities of other countries follow the Turkish prices in determining general and tanker demolition prices, and Pakistani prices only in determining tanker demolition prices. Thus, the volatilities in Turkish and Pakistani prices are reflected in the prices of the other demolition countries. On the other hand, Chinese has a special position since its prices are not affected by the other prices and do not affect the other prices.

Keywords: Volatility Spillover, Demolition Prices, Demolition Countries.

JEL Classification: C58, L11.

Gemi Hurdası Piyasalarında Fiyat Oynaklık Yayılımı

ÖZ

Dünya gemi söküm işlemleri çoğunlukla Bangladeş, Çin, Hindistan, Pakistan ve Türkiye'de yapılmaktadır. Az sayıda ülkede yapılması, fiyatlarının birbirlerinden etkilenmelerinin yanı sıra ülkeler arasında yüksek derecede rekabet ortamının olmasına neden olmaktadır. Bu yüzden birbirlerinin fiyatlarını takip etmelerinden daha doğal bir durum yoktur ve bu durum fiyatların varyanslarına bilgi akışı şeklinde yansımaktadır. Bu bilgi akışı mevcut olduğunda, fiyatlar arasında oynaklık yayılımları gözlemlenmektedir. Bu çerçevede bu çalışma, dünyada hurda piyasasında aktif olan ana ülkelerin fiyatları arasındaki bilgi akışını varyansta nedensellik yöntemiyle tespit etmeyi amaçlamaktadır. Veri seti 8 Ocak 2013 ve 24 Aralık 2018 tarihleri arasını kapsamaktadır ve haftalık bazda 309 gözlemden oluşmaktadır. Sonuçlara göre, Türk hurda fiyatlarından hem genel yük hem de tanker gemi tipinden de olmak üzere Çin dışındaki tüm ülkelerin hurda fiyatlarına oynaklık yayılımları tespit edilmiştir. Ayrıca, Pakistan tanker hurda fiyatlarından Bangladeş ve Hindistan fiyatlarına da oynaklık yayılımları mevcuttur. Bu sonuçlar diğer ülkelerdeki hurda işletmelerinin genel yük ve tanker hurda fiyatlarını belirlerken Türk fiyatlarını izlediklerini ve tanker hurda fiyatlarını belirlerken de Pakistan fiyatlarını izlediklerini ortaya koymaktadır. Böylece, Türk ve Pakistan fiyatlarındaki oynaklıklar diğer hurda ülkelerinin fiyatlarına yansımaktadır. Diğer taraftan Çin ise, fiyatı ne diğer fiyatları etkileyen ne de diğer fiyatlardan etkilenen bir yapıda olduğu için özel bir konumdadır.

Anahtar Kelimeler: Oynaklık Yayılımı, Hurda Fiyatları, Hurda Ülkeleri.

JEL Sınıflandırması: C58, L11.

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1. INTRODUCTION

The shipping markets consist of freight market, sale and purchase market, the newbuilding market and the demolition market (Stopford, 2009: 177). The demolition market plays an important role by stabilizing the market (Jugović et al., 2015). Increasing revenues in the freight market, which is the main market, causes ship owners to order new ships which consequently causes an abundant transport capacity in the market. In such a case, when the demand for transport falls, the freight rates fall greatly since there is excess supply. Afterwards, ships with high operating costs become unable to do business in the market and are sent to demolition, and then freight levels come back to their equilibrium levels (Buxton, 1991).

Usually when ships get older, their operational costs are increased and they are sent to demolition, but yet there is no fixed time for sending demolition (Evans, 1989). This depends on the current level of freight on the market and the expected freight income in the remainder of the ship's technical life (Strandenes, 2010). The demolition option is generally the last option for shipowners, and it is considered when the profitability decreases too much despite the cost-cutting measures (Buxton, 1991; Karlis and Polemis, 2016).

A great majority of the ship demolition operations are carried out in a small number of countries around the world which are India (30.3%), Bangladesh (30.0%), Pakistan (16.6%), China (15.0%) and Turkey (5.5%) in respectively (UNCTAD, 2018). Previously, ship demolition operations have been mostly carried out in Europe, but they have later shifted to eastern countries due to environmental concerns. Although demolition market is an environmentally uneasy sector, it also helps the economic development of the countries in which they are located (Sarraf et al., 2010; Mikelis, 2013; Jugović et al., 2015). In this respect, there is a strong competition among these few countries.

Since the demolition activities are carried out by a small number of countries around the world and it is inevitable to have an interaction between the prices offered. Monitoring the prices of competitors in order to developing pricing strategies is necessary for the business enterprises to sustain their long-term activities. The econometric expression of following prices is the flow of information, and the determination of the flow of information can be made by discovering the relationship between the variances of the prices. The arrived new information changes the variances of the prices, so that a volatility spillover to the destination from the origin of the information occurs. In order to determine the volatility spillover between demolition prices in major locations, this study carries out causality in variance test developed by Hafner and Herwartz (2006). According to the results of the study, the Turkish scrap industry has an impressive role in global terms in determining the demolition prices, despite the fact that in the amount of a small amount of ships in the world has been scrapped in the country. There is a flow of information from Turkish demolition prices to Bangladeshi, Indian and Pakistani demolition prices both in terms of general cargo and tanker ships. In other words, the volatility in the prices of Turkey is spreading to general and tanker ship prices of the other countries. Also, there are volatility spillovers from Pakistani tanker demolition prices to Bangladeshi and Indian prices. China stands out with its structure that does not affect the prices of other countries and is not affected by the prices of other countries. There is no similar study in the current literature, the related studies generally examine the relations of demolition prices with other factors. So, it is hoped that this study presents an original contribution to the literature by approaching the subject from a different perspective with a unique method.

The rest of the paper 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 results obtained from the analyzes are presented in the fourth section; and finally, conclusions are made in the last section.

2. LITERATURE REVIEW

When the demolition related studies have been investigated, it has been found that no studies have examined the effect of volatility spillovers between the demolition markets. Most of the studies in the literature carry out analyzes based on demolition prices; the relationship between international scrap price and ship demolition prices (Kagkarakis et al., 2016), the relationship between demolition price and the amount of vessel sent to the demolition (Açık and Başer, 2017), the relationship between the demolition price and the freight rate in the dry bulk market (Açık and Başer, 2018a), and efficient market hypothesis in ship demolition prices (Açık and Başer, 2018b). There are two more studies; one of them has investigated the probability of a ship to be scrapped in different locations and impact of some drivers on that probability (Knapp et al., 2008); and the other one has investigated the ship scrapping decisions of shipowners in several market conditions (Yin and Fan, 2018).

The relationship between ship demolition price and international scrap price is likely, since both of them supply the global steel market. Kagkarakis et al. (2016) have examined the relationship between ship demolition prices and international scrap prices using Granger causality analysis and impulse response analysis. They have found that there is a one-way causality from international scrap prices to ship demolition prices, and ship demolition prices reacts positively to the one-unit shocks coming from the international scrap prices. Also, these shocks cannot be discarded for a long time according to the results. These findings are consistent with the evaluation of the Mikelis (2013). The author has indicated that since the proportion of steel obtained from ship demolition is very low compared to steel obtained from other scrap sources, its impressive power on the scrap prices are also low. Thus, the ship demolition prices are affected by the global scrap prices. The other two studies analyze cases based on the relationship between the ship demolition price and freight rates. Açık and Başer (2017) have examined the relationship between freight rates and the amount of ships sent to the demolition. The results have revealed a negative relationship between the variables. When the freight rate levels in the market are satisfactory for shipowners, they continue to carry out their commercial operations. However, when the freight levels drop to the level where the carriers can not meet their operational costs, shipowners decide to send their ships to the demolition locations. Thus, a negative relationship between the freight rates and the amount of ships sent to the demolition occurs. In the decision to send demolition, the demolition prices in the market are as influential as the freight rates. The two rates influence each other and have a dynamic interaction. This interaction has been found worth examining by Açık and Başer (2018a). They have examined the relationship between the freight rates and the Indian demolition prices. Even though the data set they use is narrow due to the data constraints, they have found a significant relationship between the variables. Considering the previous study conducted by the same authors, increasing freight rates have negative effect on the amount off ship sent to the demolition. This situation generates a scarcity of ships in the market, which consequently causes a rise in the demolition prices offered by the scrapping locations. In addition, high freight rates indicate a high demand for maritime transport. Due to the derived demand structure, the increasing demand is also indicative of the economic revival. The buoyant economy also causes a high demand for steel, and this demand increases the rising trend of the demolition prices. These mechanisms also support the view that there is a positive relationship between freights and demolition prices. The last price-oriented study is conducted by Açık and Başer (2018b), and deals with whether the Effective Market Hypothesis (EMH) in the weak form is valid for demolition prices. This is important in terms of understanding the mechanism of the prices, as it partially sets out whether prices are generated independently or are influenced by other factors. As a result of the analyzes carried out for the prices in the 5 main demolition locations with the BDS test, it is determined that the EMH in the weak form is not valid in the all demolition prices. These results reveal that the prices are dependent on past values, predictable and can be manipulated since they are influenced by other factors.

From one of the two studies that approach the subject from a different angle, Kapp et al. (2008) have investigated the probability of a ship to be demolished in one of the major demolition locations by binary models. The results have revealed the negative relationship between freight rates and vessel disposal decisions by calculating the probability of being demolished. The probability decreases if the freight market conditions are satisfactory for shipowners. In addition, the authors have verified the positive relationship between demolition price and vessel disposal decisions by calculating the probability. In the other study, Yin and Fan (2018) have examined shipowners' decisions to send their ships to the scrapping in several market conditions, and analyzed the market separately as before and after crisis periods. They have found that since the freight rates have fallen to the depths, old and absolute ships have been sent to the demolition whose operational costs are too high compared to market averages. In addition, they have revealed that the majority of the ships sent to the demolition before the crisis belong to developed countries, while the majority of the ships sent after the crisis belong to developing countries.

The demolition price related ones of the literature have examined the relationship between price and other factors, and analyzed the structure of the demolition prices. However, no study has been found that examines the interrelationship between demolition prices. Since there are small number of major demolition locations in the world, there is a competitive environment in the market, and the demolition businesses are coerced to develop commercial strategies by monitoring each other's prices. At this point, the question of which locations follow which prices in order to adjust their prices in the market constitutes a big gap. Since the information flow requires change in variance and volatility spillovers, it is hoped that the causality in variance test used in this study will answer this question and contribute significantly to the existing literature. The results of the study conducted by Açık and Başer (2018b) strengthen our hope of achieving significant results, since the prices do not follow random walk and are influenced by some other factors according to the authors. The method used in the study is introduced in the next section.

3. METHODOLOGY

3.1. Causality in Variance

Many methods are used in the analysis of econometric relations between variables. The uses of these methods differ according to the purpose of the study, the type of data and the theory used. Since the aim of this study is to determine the flow of information between prices, variance-centered methods are seeming to be appropriate ones. Changes in variance reflect the arrival of information and show how the new information is evaluated in the market (Cheung and Ng, 1996). In addition, as the financial series are exposed to many unexpected events and shocks, they become non-linear (Bildirici & Turkmen, 2015). This causes the variances to be dependent on time, and since the constant variance assumption is distorted, the linear methods can lead to detection of wrong causality relations (Månsson and Shukur, 2009). Therefore, the distributions of the series are analyzed before the analyzes and their non-linearity is confirmed through Jarque-Bera statistics, as the non-normal distribution characteristics of the series can be interpreted as indication of their non-linear structures (Shahbaz et al., 2017).

In accordance with the purpose of the study, causality in variance method is thought to be appropriate in order to find out the information flow between the demolition prices in the different locations. The method is a very common method and allows to determine the volatility spillover between the two variables (Bayat et al., 2015). It is particularly important for the financial data, as the transmissions between financial markets can be determined by this method (Koseoglu and Çevik, 2013).

The first founders of the method in the development stage are Cheung and Ng (1996). Cross correlation function (CCF) of squared univariate GARH residuals estimates form the basis of the method, however, when the processes of the volatilities are leptokurtic, corresponding CCF-based Portmanteau test may have troubles in relatively small samples on the occasion of significant oversizing (Nouira et al., 2018). Various methods have been developed for the overcoming of this problem. One of them is the volatility spillover test based on the Lagrange Multiplier (LM) principle developed by Hafner and Herwartz (2006). The authors have also used Monte Carlo in order to prove robustness of the LM approach against mentioned problems (Nazlioglu et al., 2013). The method is implemented through the Eviews 10 econometric software, and the results are presented in the next section.

3.2. Data

The dataset used in this study covers the dates between 8th January 2013 and 24th December 2018 and consist of 309 observations on a weekly basis, and it is presented in Table 1. It is derived from the weekly reports of the ship demolition market published by Athenian Shipbrokers SA (2018). The types of the contained variables are prices and they consist of the prices offered to the old ships by the ship demolition enterprises in the related countries. Unit pricing in this sector are made in US dollars per Light Displacement Tonnage (LDT). The measure of LDT is used for the indication of the steel contents of the ships, and the scrap price of a ship is calculated by multiplying the LDT by the current scrap price for that type of vessel (Allum, 2013:131).

Table 1: Descriptive Statistics of Raw Series

	General					Tanker				
	Ban.	**Chi.**	**Ind.**	**Pak.**	**Tur.**	**Ban.**	**Chi.**	**Ind.**	**Pak.**	**Tur.**
Mean	368	234	369	369	250.6	388.1	249.4	389.3	389.8	261.8
Med.	385	230	385	390	267.5	410	240	407.5	412.5	280
Max.	455	390	465	460	340	485	405	485	490	350
Min.	220	110	225	220	145	245	125	250	250	160
Std.D.	61.8	71.7	64.1	63.1	53.0	61.6	73.0	63.4	62	54.2
Skew.	-0.60	0.19	-0.58	-0.57	-0.36	-0.53	0.18	-0.54	-0.51	-0.34
Kurt.	2.17	2.01	2.10	2.15	1.87	2.09	2.02	2.02	2.08	1.85
J-Bera	27.5	14.4	28.4	26.4	23.6	25.6	14.0	27.8	24.8	23.2
Prob.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Obs.	309	309	309	309	309	309	309	309	309	309

Source: Athenian Shipbrokers SA, 2018

4. FINDINGS

The series should be stationary in order to be used in the volatility spillover analysis. Since the all series have been converted to return series via R_p=R_p-R_{p-1} formula, probably all data have become stationary. However, it is still necessary to apply unit root tests in order to achieve a definite conclusion. In this direction, firstly, augmented Dickey-Fuller (Dickey & Fuller, 1979) and Philips-Perron (Phillips & Perron, 1988) unit root tests are applied to the series and the results are presented in Table 4. According to the results obtained, all variables are stationary at level and I (0).

Table 2: Unit Root Test Results

			Level	
		Variable	**Intercept**	**Trend and Intercept**
General Demolition Prices	Augmented Dickey-Fuller Test (Dickey & Fuller, 1979)	Bangladesh	-13.09**	-13.11**
		China	-14.61**	-14.59**
		India	-13.10**	-13.13**
		Pakistan	-13.87**	-13.88**
		Turkey	-13.25**	-13.24**
	Philips-Perron Test (Phillips and Perron, 1988)	Bangladesh	-13.27**	-13.23**
		China	-14.55**	-14.53**
		India	-13.15**	-13.18**
		Pakistan	-14.16**	-14.15**
		Turkey	-12.84**	-12.82**
Tanker Demolition Prices	Augmented Dickey-Fuller Test (Dickey & Fuller, 1979)	Bangladesh	-13.51**	-13.52**
		China	-14.10**	-14.08**
		India	-13.44**	-13.46**
		Pakistan	-13.54**	-13.54**
		Turkey	-12.76**	-12.75**
	Philips-Perron Test (Phillips and Perron, 1988)	Bangladesh	-13.64**	-13.65**
		China	-13.98**	-13.96**
		India	-13.59**	-13.49**
		Pakistan	-13.77**	-13.76**
		Turkey	-12.35**	-12.33**

ADF and PP CVs for Intercept: -3.45 for 1%, -2.87 for 5%, -2.57 for 10%. ADF and PP CVs for Trend and Intercept: -3.98 for 1%, -3.42 for 5%, -3.13 for 10%. Significance Degrees: * denotes 10%, ‡ denotes 5%, ** denotes 1%.

It is determined that all the series are stationary with formal unit root tests. However, possible breaks in the structures of the series may lead to misleading results. Therefore, one break unit root tests of Zivot & Andrews (1992) and Lee & Strazicich (2013), which take into account the possible breaks in the structure of variables, are applied to the return series used in the study and the results are presented in Table 3. In addition, since the breaks in the series may be either at the level or both at the trend and the level, the analyzes are applied for two different situations. According to the results obtained, it is determined that all the variables are stationary at level when the structural breaks are taken into consideration.

Table 3: Unit Root Test Results with Structural Breaks

		Break in level					**Break in level and trend**				
	Test Items	**Ban.**	**Chi.**	**India**	**Pak.**	**Tur**	**Bang.**	**Chi.**	**Ind.**	**Pak.**	**Tur.**
General Demolition Prices	One break ADF test (Zivot & Andrews, 1992)										
	ADF Stat	-13.6***	-14.8***	-8.95***	-14.5***	-13.5***	-13.5***	-14.8***	-9.02***	-14.5***	-13.4***
	Break Date	159	145	161	160	143	159	145	161	160	175
	Fraction	0.51	0.47	0.52	0.51	0.46	0.51	0.47	0.52	0.51	0.56
	Lag	0	0	5	1	0	0	0	5	1	0
	One break LM test (Lee & Strazicich, 2013)										
	LM Stat	-13.5***	-14.8***	-8.80***	-14.4***	-13.7***	-13.3***	-14.7***	-8.63***	-14.3***	-13.3***
	Break Date	162	276	166	161	143	161	276	172	161	186
	Fraction	0.52	0.89	0.53	0.52	0.46	0.52	0.89	0.55	0.52	0.60
	Lag	2	0	5	1	0	1	0	5	1	0
Tanker Demolition Prices	One break ADF test (Zivot & Andrews, 1992)										
	ADF Stat	-14.0***	-14.4***	-9.08***	-14.1***	-13.0***	-14.0***	-14.4***	-9.15***	-14.1***	-13.0***
	Break Date	160	158	161	160	157	160	161	161	160	143
	Fraction	0.51	0.51	0.52	0.51	0.51	0.51	0.52	0.52	0.51	0.46
	Lag	0	0	5	0	0	0	0	5	0	0
	One break LM test (Lee & Strazicich, 2013)										
	LM Stat	-13.9***	-14.3***	-8.85***	-14.0***	-13.2***	-13.9***	-14.4***	-8.65***	-14.0***	-12.9***
	Break Date	161	170	166	161	143	161	162	170	161	186
	Fraction	0.52	0.55	0.53	0.52	0.46	0.52	0.52	0.55	0.52	0.60
	Lag	2	0	5	0	0	0	0	5	0	0

ZA (1992) CVs for Break in Level; -5.35 for 1%, -4.80 for 5%, -4.58 for 10%. ZA (1992) and LS (2013) CVs for Break in Level and Trend when λ=0.5; -5.11 for 1%, -4.51 for 5%, -4.17 for 10%. LS (2013) CVs for Break in Level; -4.23 for 1%, -3.56 for 5%, 3.21 for 10%. Symbols correspond to *10%, **5%, ***1% confidence intervals.

The descriptive statistics of the data set used in the study are presented in Table 4 as a return form. This table also provides information about the linearity of the series. The fact that the series are not normally distributed is a sign that they are not linear. Their linearity can be determined through Jarque-Bera statistics showing the distribution of the series. The null hypothesis of this test indicates that the series are normally distributed, and the null hypothesis is rejected for all series according to the probability values presented in the table. This can be interpreted as a sign of non-linearity of the series. Moreover, Kurtosis and Skewness values show the types of shock (news) that the series is exposed to most during the period under consideration. If the Kurtosis value is greater than its normal value (3), the sign of the Skewness value indicates the type of shock (news) that is mostly exposed. A more robust condition can be expressed as being greater than 6, and the values of all variables are greater than this value. When examining Skewness values from the table, it is seen that it is negative for all variables, which indicates that all demolition prices are more exposed to negative shocks (news) in the covered period.

Table 4: Descriptive Statistics of Return Series

	General					Tanker				
	BAN.	**CHI.**	**IND.**	**PAK.**	**TUR.**	**BAN.**	**CHI.**	**IND.**	**PAK.**	**TUR.**
Mean	0.000	-0.003	0.000	0.000	-0.000	0.000	-0.003	0.000	0.000	-0.000
Med.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Max.	0.125	0.194	0.083	0.125	0.125	0.115	0.209	0.075	0.093	0.126
Min.	-0.100	-0.485	-0.096	-0.095	-0.223	-0.123	-0.441	-0.119	-0.121	-0.214
Std.D.	0.026	0.046	0.023	0.024	0.033	0.023	0.043	0.020	0.021	0.030
Skew.	-0.06	-3.90	-0.41	-0.14	-1.66	-0.73	-3.36	-0.80	-0.68	-1.73
Kurt.	6.54	44.9	6.08	6.94	12.5	9.17	40.6	7.72	8.78	13.7
J-Bera	161	23419	131	200	1317	516	18806	319	453	1645
Prob.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Obs.	308	308	308	308	308	308	308	308	308	308

Source: (Athenian Shipbrokers SA, 2018)

In addition to making inferences about the non-linearity of the variables through their distributions, Ljung & Box (1979) test is also applied and the implications for nonlinearity are tried to be strengthened. According to the LB statistics the null hypothesis of the test has been rejected in selected lags which indicates that all the series are not independent and identically distributed (i.i.d.) through time. These results confirm that the series contain nonlinear structures and that they are leptokurtic. Then, the volatility spillover analysis is carried out.

Table 5: The Ljung-Box Statistic of the Return Series for Several Lags

	Variable	Q (4)	Q (8)	Q (12)	Q (16)
General	Bangladesh	35.028***	44.744***	60.208***	63.614***
	China	14.285***	15.232*	25.175**	28.316**
	India	39.926***	57.693***	62.728***	64.790***
	Pakistan	28.199***	34.847***	45.024***	52.678***
	Turkey	26.156***	40.350***	51.892***	55.844***
Tanker	Bangladesh	25.841***	33.476***	43.278***	45.758***
	China	15.990***	17.062***	30.217***	32.384***
	India	32.975***	48.948***	50.546***	53.756***
	Pakistan	28.398***	32.692***	41.547***	48.201***
	Turkey	32.246***	49.802***	56.871***	61.519***

Symbols correspond to *10%, **5%, ***1% significance levels.

The results obtained from the analyzes are presented as separate tables for two demolition types. In addition, a crosstab from is used to facilitate interpretation of the results. Firstly, the analysis of tanker demolition prices is applied and the results are presented in Table 6. According to the results obtained, several significant volatility spillovers from demolition prices of Pakistan and Turkey to other countries are determined. There is a volatility spillover from demolition prices in Pakistan to Bangladesh and India. On the other hand, there are several volatility spillovers from Turkish demolition prices to all countries except China.

Table 6: Tanker Demolition Causality in Variance

		To				
		Bangladesh	**China**	**India**	**Pakistan**	**Turkey**
From	**Bangladesh**	x	[0.315] 0.8542	[2.805] 0.2459	[2.143] 0.3425	[1.471] 0.4791
	China	[4.479] 0.1065	x	[1.788] 0.4089	[1.974] 0.3727	[3.837] 0.1468
	India	[4.401] 0.1108	[0.283] 0.8681	x	[2.174] 0.3372	[2.374] 0.3051
	Pakistan	[6.662] 0.0358**	[0.209] 0.9006	[5.100] 0.0781*	x	[1.268] 0.5304
	Turkey	[16.172] 0.0003***	[0.187] 0.9107	[19.435] 0.0001***	[5.972] 0.0505*	x

When the results of the analysis for the general cargo ships are evaluated, the situation is partially different as seen in Table 7. Pakistan's impressive feature is eliminated, and unlike a previous statement, a new volatility spillover from Indian prices to Turkish prices are determined. The impressive power of Turkey still continues as in the tanker demolition prices, and there are volatility spillovers to all countries except China.

Table 7: General Cargo Demolition Causality in Variance

		To				
		Bangladesh	**China**	**India**	**Pakistan**	**Turkey**
From	**Bangladesh**	x	[0.187] 0.9109	[1.070] 0.5855	[0.278] 0.8701	[2.296] 0.3172
	China	[1.697] 0.4281	x	[1.215] 0.5448	[0.255] 0.8803	[2.723] 0.2562
	India	[1.955] 0.3762	[0.570] 0.7521	x	[0.855] 0.6521	[5.440] 0.0659**
	Pakistan	[3.856] 0.1454	[0.336] 0.8452	[1.134] 0.5673	x	[0.582] 0.7474
	Turkey	[5.565] 0.0619*	[0.204] 0.9030	[4.742] 0.0934*	[6.223] 0.0445**	x

5. CONCLUSIONS

The change in the variance shows how the new information is reached and to what extent it is evaluated in the market. In this context, it is seen that there is a flow of information from Pakistan tanker demolition prices to Bangladesh and India tanker prices. In other words, the scrap stakeholders in the Bangladesh and India regions act according to the information from Pakistan prices when determining their prices. Thus, volatility spreads from Pakistan to the other countries occur. Similarly, there are information flows from tanker demolition prices of Turkey to demolition prices of all countries except China. Demolition businesses in Bangladesh, India and Pakistan determine their prices according to the information flow from Turkish prices, so price volatility in Turkey are reflected in the prices of the other countries.

In general cargo demolition prices, the situation is changing for Pakistan and the impressive role of the prices of Pakistan is eliminated. Unlike the situation in the tanker prices, price volatility spread from Indian prices to Turkish prices are determined. For Turkey, the situation is the same and there is volatility spillover to all countries except China. Turkey's price decisive role continues. The interaction between Turkish and Indian demolition prices shows that both countries are affected by each other's prices. While determining the prices, both countries evaluate the information coming from each other.

The demolition prices in China are in a very interesting position as they are neither affected nor affecting. Other countries do not track Chinese prices while determining their prices, and China does not follow the prices of other countries in determining prices as well. In this respect, China has an independent position in the demolition price market despite its big share on the amount of demolished ships in the world.

In accordance with the results of the study conducted by Açık and Başer (2018b), the volatility spillovers mainly from Turkish prices and partially from Pakistani prices to all other prices constitutes supportive findings for invalidity of the EMH in these markets. Since they adjust their prices according to the information flow from these countries, random movement of their prices becomes impossible. However, the source of the basic information flow and China's independent position still need to be investigated. Different models and methods including steel related variables can provide more descriptive results. Apart from EMH related study, there is no other study to compare the results in order to widen the discussion. Therefore, it is hoped that this study presents an original contribution to the literature by approaching the subject from a different perspective with a unique method.

Further studies may examine the relationship between variables in a time-varying manner or in such a way that they may separate the shocks they contain. In addition, more generalizable relationships can be obtained by examining the relationship with a larger dataset, since the major limitation of the study is data availability, and demolition prices have only been achieved since 2013.

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