Business & Social Science
IJRBS

Research in Business & Social Science

IJRBS VOL 9 NO 4 ISSN: 2147-4478

Available online at www.ssbfnet.com
Journal homepage: https://www.ssbfnet.com/ojs/index.php/ijrbs

How does gold and oil price volatility affect Turkish financial markets?

Hakan Oner(a), *Hande Kılıç Satici* (b)

(a)*Faculty of Economics, Administrative And Social Sciences, Nisantasi University, Istanbul, Turkiye*
(b)*Independent Researcher, Istanbul, Turkey.*

ARTICLE INFO

Article history:
Received 15 May 20
Received in revised form 29 May 20
Accepted 12 June 20

Keywords:
Gold Markets, Oil Markets, Turkish Financial Market, Granger Casuality Test.
JEL Classification:
E40, E44, G1

ABSTRACT

Gold and oil price volatilities are thought to have an impact on financial markets. The main aim of this study is to examine the effects of changes in gold and oil prices on Turkish financial markets. For this purpose, the effects of gold and oil price volatilities on nominal US dollar/Turkish lira exchange rate, Borsa Istanbul 100 Index and Turkey 10-year bond interest rates are used to represent Turkish financial markets are analysed by Granger Casuality Test. The study comprises daily data over the period of June 1, 2010 - April 30, 2017. According to the results of the analysis, there is no causality relationship from gold and oil prices to Turkish financial markets. On the other hand, it is concluded that there is a one-way causality relationship from BIST100 index to Turkey 10-year bond interest rate and two-way causality relationship between BIST 100 index and nominal US dollar/Turkish lira exchange rate.

Introduction

Oil is used as a vital input for many sectors while maintaining the economic activities. The rise in oil price increases the cost of production for oil exporting countries and thus leads to inflationary pressures on the prices of final goods. Inflationist price pressure creates a domino effect, therefore spill over to other sectors and causes an increase in inflation rates in the national economy (Harun et al., 2018)

The Arab-Israeli wars in the Middle East between 1948-1973 put pressure on oil prices so that in 1973, the oil crisis started to be experienced with the Arab countries declaring that they would not export oil to the countries next to Israel. The fact that the oil crisis experienced in 1973 was highly influential on real economic activities caused the oil price fluctuations to be monitored more closely. Fluctuations in oil prices create risks and uncertainties in the economy and negatively affect the expectations of economic agents (Kilian, 2014; Kilianand Lee, 2014).

The fixed exchange rate system which is indexed to the gold has not been implemented due to some problems in the United States economy in the 1960s. Since then, gold has started to be traded in financial markets like currencies. The financial crisis experienced after the exchange rates were allowed to fluctuate revealed the importance of gold and caused them to be called “safe harbour” in uncertainty environments.

Since the beginning of the 1970s, the fluctuation of gold and oil prices has led to an increase in the effects on real economic activities. Therefore, the price movements of these two commodities have been closely monitored by the financial market participants (Bordo, 1993).

The main reason for studying on gold and oil prices volatilities can be explained as follows: The reason for the analysis of gold prices is that the interest in metals has increased in international financial markets and that the central banks increase the amount of gold in reserve. This trend creates a significant increase in demand for gold, which causes prices to rise in the global market and affect other

* *Corresponding author. ORCID ID: 0000-0001-9595-1498*

https://doi.org/10.20525/ijrbs.v9i4.733

macroeconomic variables. The reason for the analysis of oil prices is that the fluctuation in oil prices affects macroeconomic factors directly or indirectly.

For this purpose, a literature study on similar topics was examined and then econometric analysis was performed to investigate causality and the results were discussed.

Literature Review

In academic literature, generally, the relationship between gold and oil prices volatility and stock prices was examined. Although the nominal US dollar/Turkish lira was rarely used in these studies, studies examining the effects on Turkey's bond interest rates could not be determined. Therefore, the academic literature review includes the following academic studies including the effects of gold and oil prices on other macro-economic variables.

Zhang & Wei (2010) analyzed the relationship between oil and gold prices by using Granger causality and cointegration analyzes during the sampling period, from January of 2000 to March of 2008. It was concluded that there was a strong correlation between oil and gold prices. While oil prices have risen, they have influenced gold prices, but they have determined that oil prices do not affect gold prices as they fall. Sharma & Mahendru (2010) analyzed the relationship between gold, stock prices, exchange rates, foreign exchange reserves and inflation by using the VECM (Vector Error Correction Model) method. The sampling period of the study is from January 2008 to January 2009. According to the results of the analysis, there was no relationship between stock price and foreign exchange reserves and inflation, but a significant relationship was found between stock prices, gold prices and exchange rates. Özer et al. (2011) analyzed the relationship between BIST 100 index and macroeconomic variables in their study using monthly data between 1996 and 2009. In this study Johansen-Juselius cointegration, VEC models and Granger causality tests were used. According to the study, the relationship between BIST 100 index and nominal exchange rate, gold prices, CPI, money supply and industrial production index was positive; The relationship between interest rate and foreign trade balance is negative.

Honey & Cinel (2011), using data from August 1995 to March 2011, examined whether or not gold prices had an impact on the ISE 100 index by using panel data analysis method, and the magnitude and direction of the effect in case of impact. According to the results of the study, the gold prices had no direct effect on the ISE 100 index but it was one of the parameters indirectly explaining the changes in the ISE 100 index. Wang & Chueh (2013) used the data from January 1989 to December 2007 to analyze the short and long-term interaction between gold prices, oil prices, interest rates and the US dollar by applying cointegration and causality analyzes. In the study, it was concluded that gold prices and oil prices had a positive impact on each other, while interest rates and US dollar had a negative impact on gold prices. Akgün et al. (2013), January 2000 - April 2013 between the monthly data used in their study, the impact of changes in gold and oil prices on the BIST 100 index was examined. According to the results of the study, while the BIST 100 index is significantly and positively affected by the changes in the oil price, the BIST 100 index is negatively affected by the changes in the gold price. Hussin et al. (2013) analyzed on the relationship between oil and gold prices (authors named oil and gold as stragetic commodities) and the Islamic stock market in Malaysia. Using data covering the period from January 2007 to December 2011, the study applies the co-integration analysis, Granger causality test, Impulse Response Function (IRF) and Variance Decomposition (VDC) analysis. It is concluded that there is no long-term relationship between gold and oil prices and the stock index in their study of monthly data between 2007-2011, in order to examine the relationship between gold and oil prices and the Sharia Exchange in Malaysia. As a result of the causality analysis of the study, two-way causality relationship between oil prices and stock index was determined.

Ciner et al. (2013), analyzed US and UK daily data between January 1990 and June 2010 using the gold price, oil price, exchange rate, bond interest rates and the relationship between the stocks were analyzed by quantitative regression method. According to the results of the study, it was determined that gold is a safe harbor against exchange rate and that the determined variables can be used for protection against each other. Patel (2013) analyzed the short and long-term relationship between Mumbai gold prices and Sensex, BSE 100 and Nifty stock indices between January 1991 and December 2011. According to the results of the analysis between the gold price and the three stock indices, a causality relationship was determined only in the gold prices towards the Nifty index. Monjazeb & Shakerian (2014) analyzed the relationship between gold and oil prices and banking stock index of seven selected countries. According to studying, a negative correlation was found between the gold prices and the stock index, and a positive relationship was found between the oil prices and the stock index.

Srinivasan & Prakasam (2014) examined the relationship between gold prices, exchange rate and stock prices in their studies using data from June 1990 to April 2014. According to the results of the cointegration test analysis, there was no consistent cointegration relationship between gold prices and stock prices. However, the exchange rate and gold prices and the exchange rate and the long-term relationship between the prices of stocks have been identified. Pioneer et al. (2015) used the daily data between January 2002 and November 2013 and analyzed the relationship between Borsa Istanbul 100 index, gold prices and real exchange rate variables. For this purpose, they applied Granger causality and Engle Granger Cointegration tests. In the analysis, the gold prices and real exchange rate reached the results of the reason that the Borsa Istanbul 100 index was Granger causal and the gold price was the Granger causal of the real exchange rate. Gökmenoğlu & Fazlolahi (2015) used the daily data between 2013-2014 in their study on the relationship between S & P 500 index and gold and oil prices. According to ARDL boundary test analysis method applied; in the short term, it was determined that the changes in gold and oil prices did not have any effect on the stock index, but that the changes

in gold and oil prices in the long term had an impact on the stock index. In order to determine whether there is a long-term relationship between BIST Gold Index and BIST 100 index,

Açıkalın & Başcı (2016) used the daily closing time values of the indices between August 1, 2002 and March 17, 2015 as the data. error correction model and Granger causality tests were used. According to the results of the study, long-term co-integration between BIST 100 index and BIST Gold Market Index was determined. According to the results of Granger causality test, there is a one - way causality relation from BIST 100 index to BIST Gold Market index. Ayaydın & Barut (2016), Johansen-Juselius Cointegration, Impact-Response Functions, Variance Decomposition and Granger Causality Analysis methods were used in their study which examined the effect of gold and oil prices on stock returns between January 1997 and May 2016. In the results of study; A one-unit rise in oil prices, a 1.5-unit decrease in BIST100 stock yield and a one-unit increase in gold prices resulted in an increase in BIST100 stock yield of 0.5 units. As a result of Granger causality test analysis, two-way causality was determined between oil price and BIST100 index yield, while there was no significant causal relationship between gold prices and BIST100 index yield. Khan et al. (2016) examined the relationship between gold, oil and Pakistani Stock Exchange Index (ISE 100 index) in their studies using monthly data between 2000-2013. According to the results of the regression analysis method, a positive relationship was found between the variables.

Research and Methodology

Definition of Variables and the Model

The purpose of this study is to analyze the effects of changes in gold and oil prices on Turkish financial markets, which is consisting of the Istanbul Stock Exchange 100 index, the nominal US dollar/Turkish lira exchange rate and interest rates on Turkey 10-year treasury bonds. For this purpose, gold prices, oil prices and Turkish financial markets, the nominal US dollar/Turkish lira, Borsa Istanbul 100 Index and Turkey 10- year treasury bonds interest rates by taking data set a total of 1279 working days data between June 1, 2010 - April 30, 2017 periods and The Augmented Dickey Fuller unit root test and the Granger causality test were used. Granger causality test is the most preferred type of causality among researchers due to its ease of use and interpretation of the results of the analysis. Granger causality test is used to find the status and direction of the relationship between series.

Before the causality test analysis, it is useful to know the common trends of the series. For this purpose, it is useful to examine the statistical information of the series. When the statistics of the series are examined, it is concluded that the series do not move around their averages. In this case, the series are likely to contain unit roots. For causality analysis, the series should not contain unit roots. Augmented Dicker Fuller (ADF) unit root test is performed for this purpose. The Augmented Dicker Fuller unit root test shows that the series are non-stationary and have unit roots.

ADF test is analyzed by the following three equations:

$$\Delta y_t = (\rho - 1) y_{t-1} + u_t \quad (1)$$

$$\Delta y_t = \delta y_{t-1} + u_t \quad (2)$$

$$\beta_1 + \beta_2 t + \delta y_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta y_{t-i} + \varepsilon_t \quad (3)$$

Due to unit root problems of series, ADF unit root test was applied to series and the first differences were taken. As a result of the ADF unit root test analysis, the first difference values of the constant model are below the MacKinnon 5% critical value of -2,8635 and values of the trend and constant model are below MacKinnon 5% critical value of -3,4133. These results show that the series are stationary and have no unit root problems. Thus, the series became suitable for Granger causality test analysis.

The lag length specified in the information criteria is used in the Granger causality test. In the study, the lag delay lengths is used by the Akaike information criterion most frequently used by the researchers and the Akaike information criterion shows 1 lag for series.

Granger causality test is analyzed by the following two equations:

$$y_{1t} = \alpha_{10} + \beta_{11} y_{1t-1} + \beta_{12} y_{2t-1} + \gamma_{11} y_{1t-1} + \gamma_{12} y_{2t-2} + \delta_{11} y_{1t-3} + \delta_{12} y_{2t-3} + u_{1t} \quad (4)$$

$$y_{2t} = \alpha_{20} + \beta_{21} y_{1t-1} + \beta_{22} y_{2t-1} + \gamma_{21} y_{1t-1} + \gamma_{22} y_{2t-2} + \delta_{21} y_{1t-3} + \delta_{22} y_{2t-3} + u_{2t} \quad (5)$$

Are the changes in y_{1t} the cause of the changes in y_{2t}? The answer to this question is examined by Granger causality test. According to Granger causality analysis, volatility in gold and oil prices do not affect Turkish Financial Markets.

There is one-way causality relationship between gold to oil prices. There is a one way causality relationship from BIST100 index to Turkey 10-year treasury bonds interest rate and two-way causality relationship between BIST 100 index and US dollar.

Ampirical Analyses

The data used in this study are obtained from Reuters data service and analyzed using E-views 9 econometrics program. Table 1 shows the statistical information of the series.

Table 1: The Definitiation of Variables

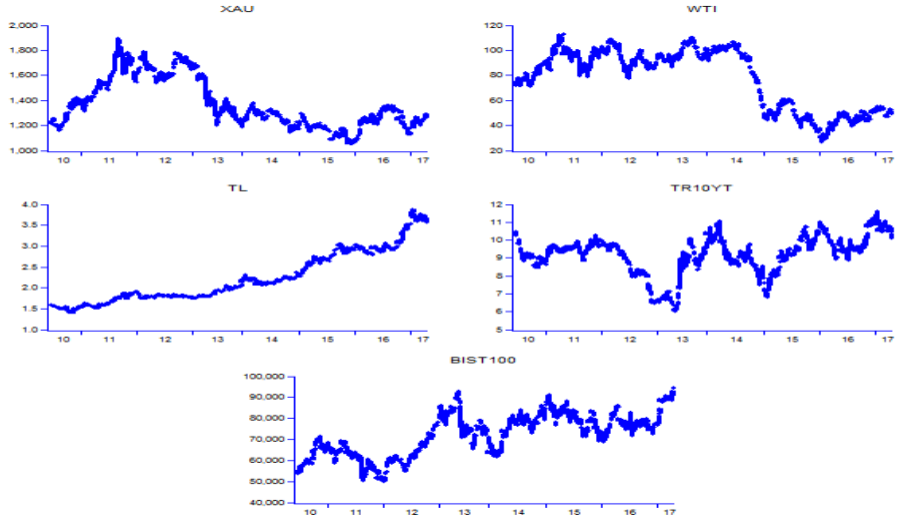
XAU	**Price of gold in US dollars**
WTI	US dollar price of American crude oil price
TL	Turkish lira value of US dollar exchange rate
BIST100	Borsa İstanbul 100 index
TR10YT	Turkey 10-year bond interest rate

It is useful to know the common trends of the series prior to the Granger causality test analysis. For this purpose, it is useful to examine the statistical information of the series. Descriptive statistical information such as maximum and average values, median, standard deviation, skewness, kurtosis, jarque-bera and probability values are presented in Table 2.

Table 2: Statistical Information of The Series.

	XAU	**WTI**	**TL**	**BIST100**	**TR10YT**
Mean	1370.67	77.37	2.2321	72375	9.17
Median	1309.34	86.71	2.0396	74487	9.34
Maximum	1897.10	113.39	3.8632	94634	11.62
Minimum	1051.36	26.68	1.4027	49836	6.0200
Std. Dev.	198.12	23.87	0.6073	10038	1.0771
Skewness	0.6458	-0.4469	0.7755	-0.2150	-0.7785
Kurtosis	2.2117	1.6527	2.5910	2.1444	3.5122
Jarque-Bera	122.03	139.30	137.12	48.86	143.17
P-Value	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	1279	1279	1279	1279	1279

As a result of 1279 observations, the average value of gold prices (XAU) between June 1, 2010 and April 30, 2017 was US $ 1370.67, the average value of oil prices (WTI) was 77.36 US dollars, the US dollar exchange rate (TL) average was 2.21 TL, BIST 100 index (BIST100) the average value of 72375, Turkey 10-year bond interest rates (TR10YT) average value was 9.16%. Graph 1 presents a graphical representation of the series.



Graph 1: Graphical Representation of The Series.

As shown in Graph 1, the series do not move around their average rates. In this case, the series are likely to include unit roots. For causality analysis, there is a need for the series not to have a unit root. Therefore, unit root test should be applied.

The series used in the time series studies should be of the same degree (not having a unit root) (Gujarati, 2010). In the series that have not been tested for stationarity, the unit root problem may occur and therefore the regression to be applied to the series may not reflect the truth (Newbold and Granger, 1974). In order to avoid this false regression problem, the series should be subjected to unit root testing.

Researchers are often using Dickey Fuller, Extended Dickey Fuller, and one of the Philips-Perron unit root tests. In this study, unit root examination is performed by using the most commonly used method, the Dickey Fuller (Dickey Fuller, 1981).

The results of the ADF unit root test level values are presented in Table 3.

Table 3: ADF Unit Root Test Level Values

	Constant		Trend & Constant		
Series	**ADF Test Statistics**	**P-value**	**ADF Test Statistics**	**P-value**	**Unit Root**
XAU	-1,5980	0,4833	-2,5398	0,3088	I(0)
WTI	-0,8709	0,7976	-2,3902	0,3844	I(0)
TL	0,7853	0,9938	-2,0369	0,5799	I(0)
BIST1	-1,9054	0,3300	-3,0006	0,1324	I(0)
TR10YT	-2,5288	0,1088	-2,8481	0,1802	I(0)

When compared to the MacKinnon 5% critical value in Table 4, the level values of the series are higher than the MacKinnon 5% significance values. These results show that the series is not stationary and has a unit root.

Tablo 4: Mackinnon Criticial Values

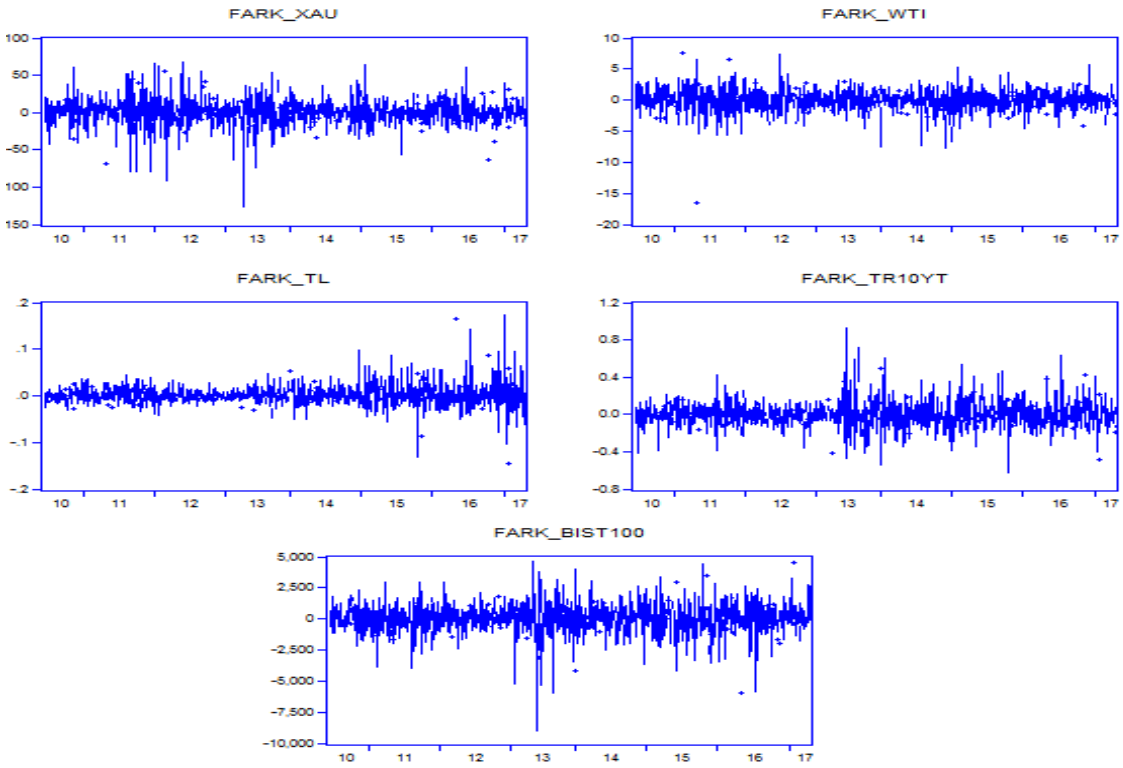
% Level	I(0)	I(1)
1	-3,4352	-3,9652
5	-2,8635	-3,4133
10	-2.5679	-3.1286

The first differences were taken by applying the ADF unit root test to get rid of the unit root. As a result of the analysis, the first difference values of the series are below the levels of MacKinnon with a critical value of 5%. These results indicate that the series are stationary and have no unit root problems.

Table 5: Results of First Order Difference of The Series

	Constant		**Trend & Constant**		
Series	**ADF Test Statistics**	**P-value**	**ADF Test Statistics**	**P-value**	**Unit Root**
XAU	-34,3641	0,0000	-34,3623	0,0000	I(1)
WTI	-38,9502	0,0000	-38,9670	0,0000	I(1)
TL	-36,1477	0,0000	-36,2026	0,0000	I(1)
BIST100	-35,0611	0,0000	-35,0480	0,0000	I(1)
TR10YT	-32,9809	0,0000	-32,9838	0,0000	I(1)

Chart 2 shows the graphical representation of the series which were equally stabilized by taking the first differences.



Graph 2: Graphical Representation of First Difference Results

Granger causality test is the most preferred type of causality among researchers because of its ease of use and interpretation of the results of the analysis. The Granger causality test is used to find the status and direction of the relationship between the series. When applying the Granger causality test, firstly, the latency lengths that determine Akaike (AIC), Hannan-Quinn (HQ) and Schwartz (SC) criteria are determined. Following the inclusion of the dependent variable with the appropriate delay length, the Akaike, Hannan-Quinn and Schwartz information criteria values of all the regression models formed with all possible delays of the independent variable to be entered into the model are obtained. The lag length determined in the information criteria is used in the Granger causality test (Kaya and Açdoyuran, 2017). The delay length values for the information criteria are presented in Table 6.

Table 6: The Delay Length Values

LAG	LR	FPE	AIC	SC	HQ
0	NA	5156.496	22.73740	22.75766*	22.74501*
1	89.40961	4997.272*	22.70603*	22.82761	22.75170
2	42.24193*	5026.441	22.71185	22.93474	22.79558
3	22.37149	5135.856	22.73338	23.05759	22.85516
4	15.80686	5274.954	22.76009	23.18562	22.91994

Result and Discussion

The appropriate delay length value in the study is used by the Akaike information criterion (Akaike, 1974), which is the most frequently used by the researchers. In the study, the delay length value was determined as 1. Results after using 1 as delay length value in Granger causality test are shown in Table 7.

Table 7: Granger Causality Test Results

	Dependent Variable: XAU	
Independent Variable	**Chi-square**	**P-value**
WTI	6,6489	0,0465
TL	2,3925	0,1219
BIST100	0,0010	0,9747
TR10YT	0,1619	0,6874
	Dependent Variable: WTI	
Independent Variable	**Chi-square**	**P-value**
XAU	0,0969	0,7556
TL	0,0398	0,8418
BIST100	0,0037	0,9511
TR10YT	0,0515	0,8203
	Dependent Variable: TL	
Independent Variable	**Chi-square**	**P-value**
XAU	0,0186	0,8913
WTI	1,8286	0,1763
BIST100	9,0773	0,0026
TR10YT	0,3177	0,5730
	Dependent Variable: BIST100	
Independent Variable	**Chi-square**	**P-value**
XAU	0,7794	0,3773
WTI	0,0732	0,7867
TL	5,6898	0,0171
TR10YT	0,3296	0,5659
	Dependent Variable: TR10YT	
Independent Variable	**Chi-square**	**P-value**
XAU	1,9095	0,1670
WTI	2,1902	0,1389
TL	0,0398	0,8418
BIST100	31,257	0,0000
TL	0,0971	0,7553

In the analysis of the effects of changes in gold and oil prices, which are the main subject of the research, on the Turkish Financial Markets using the Granger causality test method, US Dollar exchange rate, Borsa İstanbul 100 index and 10-year bond interest rates are dependent variables, gold and oil prices are independent variables. According to the Granger causality analysis, causality relationship from gold and oil prices to US Dollar exchange rate, Borsa İstanbul 100 index and 10-year bond interest rates could not be determined. Similar to this result, causality relationship from US Dollar exchange rate, Borsa İstanbul 100 index and 10-year bond interest rates to gold and oil prices rates could not be determined. According to the results of Table 7, where gold is an independent variable and the US dollar is a dependent variable, p value is determined to be quite close to the Mac kinnon critical value as 0.1219. If this result was below the critical value of Mac Kinnon 0.10, it would be a one-way granger causal relationship between gold prices and US Dollar exchange rate.

Apart from the main subject of the study, where gold prices is dependent and oil prices is independent variables, the one-way causality relationship between gold and oil has been determined. Where US Dollar exchange rate is dependent and Borsa İstanbul 100 index is independent variables, the one-way causality relationship has been determined between US Dollar exchange rate and Borsa İstanbul 100 index and two-way causality was determined between the 10-year bond interest rate and the BIST 100 index.

Conclusions

Oil prices can have an inflationary effect due to the fact that the increase in oil prices increases the prices of gasoline and the prices of gasoline are directly reflected in the inflation through transportation. Also, the rise in oil prices can be explained by the financial investment trend and is associated with growth. High oil prices adversely affect the economy, hitting growth, and subsequently stocks prices are affected. As a result, investors looking for alternative investments turn to gold. Therefore, oil prices have an indirect effect on gold prices. A similar situation occurred when it decided to cut oil cartel production in the 1970s, creating a recession in the 1970s, creating fluctuations in the global and US economy. For these reasons, this study has been carried out with the thesis that there may be a relationship between gold, oil prices and Turkish financial markets. A total of 1279 business days between June 1, 2010 and April 30, 2017, where gold markets, oil markets, Istanbul Stock Exchange 100 index, the nominal US dollar/Turkish lira exchange rate and interest rates on 10-year treasury bonds are open at the same time, are used as data in the analysis. According to the Augmented Dickey Fuller unit root and Granger causality test, it was observed that it had no effect contrary to expectations and no significant causality was found in the dates used in the study.

For the subsequent studies, it is useful to examine the effects of international financial indexes such as VIX, MOVE, DXY, GXY, OVX and American stock indices, US Fed policy rate changes, US 2 and 10-year treasury bond interest rates and EUR/USD exchange rate on the Turkish financial system for the purpose of developing academic literature.

References

Açıkalan S., & Başçı E. S. (2016). Cointegration and causality relationship between bist 100 and bist gold indices. *Yönetim ve Ekonomi*, 23(2), 565-574.

Akaike, H. (1974). A new look at the statistical model identification. *IEEE Transactions on Automatic Control*, 19(6), 716-723. https://doi.org/10.1109/TAC.1974.1100705

Akgün, A., Şahin, İ. E. & Yılmaz B. (2013). The effects of variations in gold and oil prices on bist 100 index. *Mediterranean Journal of Social Sciences*, 4 (10), 726-730. https: //doi.org/ 10.5901/mjss.2013.v4n10p726

Ayaydın, H., & Barut, A. (2016). Petrol fiyatları, altın fiyatları ve hisse senedi getirisi ilişkisi petrol fiyatları. *Balkan Sosyal Bilimler Dergisi*, 5, 13-26.

Balı, S., & Cinel M. O. (2011). Altın fiyatlarının imkb 100 endeksi'ne etkisi ve bu etkinin ölçümlenmesi. *Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi*, 25(3), 45-63.

Bordo, M.D. (1993). The gold standard, bretton woods and other monetary regimes: a historical appraisal. *NBER Working Paper* No: 4310.

Brooks, C. (2002). *Introductory Econometrics for Finance*. *Cambridge University Press.*

Ciner, Ç., Gurdgiev C., & Lucey B. M. (2013). Hedges and safe havens: an examination of stocks, bonds, gold, oil and exchange rates. *International Review of Financial Analysis*, 29, 202-211. https://doi.org/10.1016/j.irfa.2012.12.001.

Dickey, D. A., & Fuller W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, 74(366a), 427-431. https://doi.org/10.2307/2286348

Dickey, D. A., & Fuller W. A. (1981). Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica*, 49(4), 1057-1072. https://doi.org/10.2307/1912517.

Gökmenoğlu, K. K., & Fazlollahi N. (2015). The interactions among gold, oil, and stock market: evidence from s&p500. *Procedia Economics and Finance*, 25, 478- 488. https://doi.org/10.1016/S2212-5671(15)00760-1

Granger, C. W. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica: Journal of the Econometric Society*, 37(3), 424-438. https://doi.org/10.2307/1912791.

Harun M., Mat S. H. C., Fadzim W. R., Khan S. J. M., & Noor M. S. Z. (2018). The effects of fuel subsidy removal on input costs of productions: leontief input-output price model. *International Journal of Supply Chain Management*, 7(5), 529-534

Hussin, M. Y. M., Muhammad, F., Razak A. A., Tha G. P., & Marwan N. (2013). The link between gold price, oil price and islamic stock market: experience from Malaysia. *Journal of Studies in Social Sciences*, 4(2), 161-182.

Kaya, E., & Açdoyuran B. (2017). Finansal dolarizasyon unsurları olarak kredi dolarizasyonu ve mevduat dolarizasyonu ile hisse senedi getirileri arasındaki ilişki. *Dicle Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 7 (14), 325-344.

Khan, A., Naseem I., & Khan M. K. (2016). Relationship of ınternational oil prices, gold prices and stock returns: evidence from KSE, ERSED, International Conference on Emerging Research for Sustainable Economic Development, February 2-3, Dubai, 75-96.

Kilian, L. (2014). Oil price shocks: causes and consequences. *Annual Review of Resource Economics*, 6(1): 133-154. http://dx.doi.org/10.1146/annurev-resource-083013-114701

Kilian, L. Lee T. (2014) Quantifying the speculative component in the real price of oil: the role of global oil inventories. *Journal of International Money and Finance*, 42: 71 87. https://doi.org/10.1016/j.jimonfin.2013.08.005.

MacKinnon, J. G. (1996). Numerical distribution functions for unit root and cointegration tests. *Journal of Applied Econometrics*, 11(6), 601-618. https://doi.org/10.1002/(SICI)1099-1255(199611)11:6%3C601::AID-JAE417%3E3.0.CO;2-T

Monjazeb, M., &Shakerian M. S. (2014). The effects of gold price and oil price on stock return of the banks in Iran. *Arabian Journal of Business and Management Review*, 3(10), 86-91. https://doi.org/10.12816/0016502

Newbold, P., & Granger C. W. (1974). Experience with forecasting univariate time series and the combination of forecasts. *Journal of the Royal Statistical Society*, 197(2), 131-165. https://doi.org/10.2307/2344546

Öncü, M., Çömlekçi A., İstemi Y., Halil İ., & Bar M. (2015). Yatırım araçları arasındaki eşbütünleşme (bist100, altın, reel döviz kuru). *Abant İzzet Baysal Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 15(1), 43-57.

Özer, A., Kaya A., & Özer N. (2011). Hisse senedi fiyatları ile makroekonomik değişkenlerin etkileşimi. *Dokuz Eylül Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 26(1), 163-182.

Patel, S. A. (2013) Causal relationship between stock market indices and gold price: evidence from India, *IUP Journal of Applied Finance*, 19(1), 99-109.

Sharma, G. D., & Mahendru M. (2010). Impact of macro-economic variables on stock prices in India. *Global Journal of Management and Business Research*, 10(7), 19-26.

Srinivasan, P., & Prakasam K. (2014). Gold price, stock price and exchange rate nexus: the case of India, *The IUP Journal of Financial Risk Management*, 11(3), 52-63.

Wang, Y. S., & Chueh, Y. L. (2013) Dynamic transmission effects between the interest rate, the US dollar and gold and crude oil prices. *Economic Modelling*, 30, 792–798. https://doi.org/10.1016/j.econmod.2012.09.052.

Zhang, Y. J. W., &Yie M. (2010). The Crude oil market and the gold market: evidence for cointegration, causality and price discovery. *Resources Policy*, 35(3), 168–177. https://doi.org/10.1016/j.resourpol.2010.05.003.