THE RELATIONSHIP BETWEEN COMMODITY PRICES AND STOCK PRICES: EVIDENCE FROM TURKEY[*]

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─Abstract ─

Many studies have found strong relationship between stock market and economic growth. Because of this strong relationship, we need to examine many factors that have impact on the stock market more closely. Despite the high importance of commodity prices, only few studies have emphasized the impact on stock prices. For this reason, in this study, by using time-series analysis, the relationship between and the impact of commodity prices on stock market will be examined. The long-run relationship and causality will examined with an econometric model. The results obtained from the examination of relationship between commodity prices and stock market would provide to discussions about drivers of stock prices. Due to importance of such impact, findings obtained from the case of Turkey will be interpreted. These findings will help in the decision making process of the investors. In addition, the findings of this study are important for policy-makers to strengthen the stock markets to promote economic growth.

Key Words: *Stock Market, Stock Prices, Commodity Prices, Cointerration*
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1. INTRODUCTION

In the last decade, extreme fluctuations in commodity prices affected the world economy. Especially because of the expansion in the world economy after the 2000s investors increased their attention to commodity prices (Büyükşahin, Haigh, & Robe, 2008).

Policymakers and market participants focused on the dynamics of commodity price volatility because of the impact on economic growth and financial development (Saadi Sedik & Cevik, 2011).

On the other hand the main research area in finance is the factors that affect the stock prices and the sensitivity of stock prices to those factors. Therefore, understanding the stock market behavior becomes to the main aim for investors in emerging markets (Soenen & Johnson, 2009).

The interaction of the commodity markets with financial markets has been an important area for researchers. There is growing evidence that equity and commodity markets are interconnected and that the correlations between commodities and equities have increased since the early 2000s (Olson, J. Vivian, & Wohar, 2014).

Many studies have found strong relationship between stock market and economic growth. Because of this strong relationship, we need to examine many factors that have impact on the stock market more closely. Especially policymakers, with the contribution of these studies increased their interest to commodity prices because of the effect on inflation. The importance of volatility of commodity prices for the world economy is highlighted by the G20 in its September 2009 Pittsburgh Summit (Creti, Joëts, & Mignon, 2013).

Despite the high importance of commodity prices, only few studies have emphasized the impact on stock prices. For this reason, in this study, by using time-series analysis, the relationship between and the impact of commodity prices

on stock market will be examined. The purpose of this study is to investigate the effect of the commodity prices on Stock prices in Turkey. Main idea of this study is quite simple. Commodity price increases have effects on stock prices. Commodity price increases often come on the back of a sharp demand increase due to booming economic activity (Kilian, 2009). If prices of commodities that are used in the production process (energy, metals, raw materials) increase because of the increasing costs, firm profits will decrease and therefore have less profit to distribute (Lombardi & Ravazzolo, 2013). Then this will cause a pressure on stock prices and stock prices probably will decrease. This study contributes to the empirical literature about the relationships between stock and commodity markets. With findings of the study we can assess the macroeconomic implications of commodity prices for the Turkish economy.

2. LITERATURE REVIEW

There is an important literature investigating the relationship between commodity prices and many financial markets. This section presents a short literature review of papers that focus on the dynamics between commodity prices and equity markets.

Gorton and Rouwenhorst (2004) studied the interaction between equity and commodity assets and analyzed the commodity futures contracts and equity average returns. They found a considerable relation between them. (Delatte & Lopez, 2013) (Gorton & Rouwenhorst, 2004).

Sadorsky (1999) studied the relation between oil prices and stock prices. By using a Vector Autoregressive (VAR) model Sadorsky indicated the importance of the oil price for the industrial production (Chan, Treepongkaruna, Brooks, & Gray, 2011) (Sadorsky,1999).

Thuraisamy, Sharma, & Ali Ahmed, (2013) in their paper, they tested interaction between the Asian equity market volatility, crude oil and gold futures. They find

that volatility shocks in equity markets have relation with crude oil and gold futures markets. (Thuraisamy, Sharma, & Ali Ahmed, 2013).

Rossi (2012) further studied the relation between equity, commodity, and the exchange rate markets and found that country's equity market value has significant ability to predict the commodity price index for several primary commodity-exporting countries (Rossi, 2012).

Tang and Xiong (2010) found that investment that flowed into commodity markets between 2006 and 2010 have caused increases in the volatility of primary commodities by increasing their cost (Tang & Xiong, 2010).

Soenen & Johnson, (2009) present changes in commodity prices effected the the stock markets of South American countries (Soenen & Johnson, 2009).

Kang, Hu, & Chen, (2013) studied the relationships between international food commodity prices and stock prices in China. The empirical results show that China's stock markets interacted with many food commodity futures (Kang, Hu, & Chen, 2013).

Delatte & Lopez (2013), in their paper, they studied the relation between equity and commodity markets and found that integration of some commodities with equity indices started in the beginning of the 2000s (Delatte & Lopez, 2013).

Chan et al. (2011) found that stock returns affected from financial assets, commodities and real estate assets by using a general Markov switching model (Chan et al., 2011).

3. METHODOLOGY AND DATA

This study utilizes VAR and cointegration analysis in order to examine the impact of commodity prices on BIST. The empirical modeling framework consists of

three steps. First, the data is seasonally adjusted. Second, stationarity properties of the variables are investigated using unit root tests. Third, the cointegration relationship is tested (Nazlioglu, Erdem, & Soytas, 2013). The monthly data is used in this study. The data ranging from 2002M01 to 2014M06 for Turkey obtained from IMF eLibrary system and CBRT EDDS system. The study thus does not cover the period of the Financial Crisis of 2001, which heavily affected the country. And we use the price indexes to counteract the sudden rises of some commodities. The data's definitions are as follows. All Commodity Price Index, 2005 = 100, includes both Fuel and Non-Fuel Price Indices. Non-Fuel Price Index, 2005 = 100, includes Food and Beverages Indices and Industrial Inputs Price Indices. Agricultural Raw Materials Index, 2005 =100, includes Timber, Cotton, Wool, Rubber, and Hides Price Indices. Metals Price Index, 2005 = 100, includes Copper, Aluminum, Iron Ore, Tin, Nickel, Zinc, Lead, and Uranium Price Indices. Industrial Inputs Price Index, 2005 = 100, includes Agricultural Raw Materials and Metals Price Indices. BIST data is used as proxy for the stock prices.

4. EMPIRICAL RESULTS

Results of the ADF tests for unit roots and check for the presence of cointegrating relations between commodity market variables and BIST variable are shown below.

4.1. Unit Root Test

Time series variable can be divided into being stationary or non-stationary. A stationary time series variable is one whose statistical properties, such as mean, variance, autocorrelation, etc., are all constant over time. This can be tested by a unit root test using an autoregressive model (Kang et al., 2013). All of the variables tested by ADF unit root test for stationary. The lag length are chosen by the result of Akaike's Information Criterion and shown in the parenthesis. Table 1 illustrates that all variables have unit root and cointegrated of the same order, I (1).

Table 1: Results of ADF Unit Root Tests (2002M01-2014M06)

Level	Constant	Constant and Trend
All Commodity Price Index	-1.868887 (1)	-2.413416 (1)
Non-Fuel Price Index	-1.840105 (1)	-2.352440 (2)
Agricultural Raw Materials Index	-1.577696 (1)	-2.932743 (2)
Metals Price Index	-2.010828 (1)	-1.289298 (1)
Industrial Inputs Price Index	-1.861330 (1)	-2.060698 (2)
BIST	-1.461361 (1)	-1.950948 (1)
1st Difference	Constant	Constant and Trend
All Commodity Price Index	-8.688062 (0)*	-8.734437 (0)*
Non-Fuel Price Index	-8.159650 (0)*	-8.246725 (0)*
Agricultural Raw Materials Index	-8.841958 (0)*	-8.809187 (0)*
Metals Price Index	-8.709275 (0)*	-8.886692 (0)*
Industrial Inputs Price Index	-8.614203 (0)*	-8.700105 (0)*
BIST	-10.46145 (0)*	-10.46786 (0)*

* %1 level

4.2. JOHANSEN COINTEGRATION TEST

In our study, we employ the Johansen cointegration test procedure. If all of the variables are integrated of same order we can apply the cointegration test. Cointegration test indicates the long-term relationship between the variables. Cointegration test results are given in the following tables. In each table we have a test result for one commodity price variable. According to the results of cointegration tests there is no cointegration relationship between commodity price variables and BIST100 indices. This implies that there are no long-term relationships between any of the commodity price variables and stock prices.

Table 2: Johansen Cointegration Test Results for All Commodity Price Index (2002M01-2014M06)

	λ_{trace}	
	Trace Statistic	*%5 Critical Value*
None	24.49196	25.87211
At most 1	7.974154	12.51798
	λ_{max}	
	Max-Eigen Statistic	*%5 Critical Value*
None	16.51781	19.38704
At most 1	7.974154	12.51798

Table 3: Johansen Cointegration Test Results for Non-Fuel Price Index (2002M01-2014M06)

	λ_{trace}	
	Trace Statistic	*%5 Critical Value*
None	17.60512	25.87211
At most 1	5.912294	12.51798
	λ_{max}	
	Max-Eigen Statistic	*%5 Critical Value*
None	11.69283	19.38704
At most 1	5.912294	12.51798

Table 4: Johansen Cointegration Test Results for Agricultural Raw Materials Index (2002M01-2014M06)

	λ_{trace}	
	Trace Statistic	*%5 Critical Value*
None	16.35385	25.87211
At most 1	4.555999	12.51798
	λ_{max}	
	Max-Eigen Statistic	*%5 Critical Value*
None	11.79786	19.38704
At most 1	4.555999	12.51798

Table 5: Johansen Cointegration Test Results for Metals Price Index (2002M01-2014M06)

	λ_{trace}	
	Trace Statistic	*%5 Critical Value*
None	13.71385	25.87211
At most 1	4.835210	12.51798
	λ_{max}	

	Max-Eigen Statistic	%5 Critical Value
None	8.878642	19.38704
At most 1	4.835210	12.51798

Table 6: Johansen Cointegration Test Results for Industrial Inputs Price Index (2002M01-2014M06)

	λ_{trace} Trace Statistic	%5 Critical Value
None	19.90106	25.87211
At most 1	6.886764	12.51798
	λ_{max} Max-Eigen Statistic	%5 Critical Value
None	13.01430	19.38704
At most 1	6.886764	12.51798

5. CONCLUSION

In this paper, the interactions between stock market and commodity prices are examined. The interaction during the entire sample period (January 2002–June 2014) is investigated. Using multivariate Johansen tests to investigate the relationships between the commodity price variables and stock variables shows important results. Our results show that there is no relation between commodity and stock markets. The results from the whole sample reveal that any of commodity prices is not related to Turkish equity market. The results of this paper have implications for investors. There are three implications from our results. First, findings clearly presented that there is no evidence of the relation of commodity price and the stock prices. Second, our analysis imply that there is no evidence for effects of commodity prices on stock markets but one must research the effect of the commodity prices on stock markets solely. Third, our findings also imply that a boom or a recession at global economy increases or decreases the commodity prices but this rise or decline does not affect the stock markets.

Acknowledgments

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