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THE INTERACTION BETWEEN STOCK PRICES AND COMMODITY PRICES: EASTERN EUROPE AND CENTRAL ASIA CASE*

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—Abstract —

The sharp increase in commodity prices since 2000s has important effects on many economic variables. Especially the upward trend in commodity prices had substantial effects on stock prices. The literature has continuing and growing interest to the dynamics of commodity price and their significant impact on economic and financial developments. There is growing evidence that commodity prices, stock prices moved together, and that the correlations between them have increased. Many studies investigated the interaction between stock prices and real

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and commodity prices and find strong interaction for developed countries. However, the effect of the commodity prices on stock markets in relatively less investigated for ECA countries. The purpose of this study is to investigate the long-run relationship between commodity prices and stock prices in ECA countries can by using a panel cointegration test.

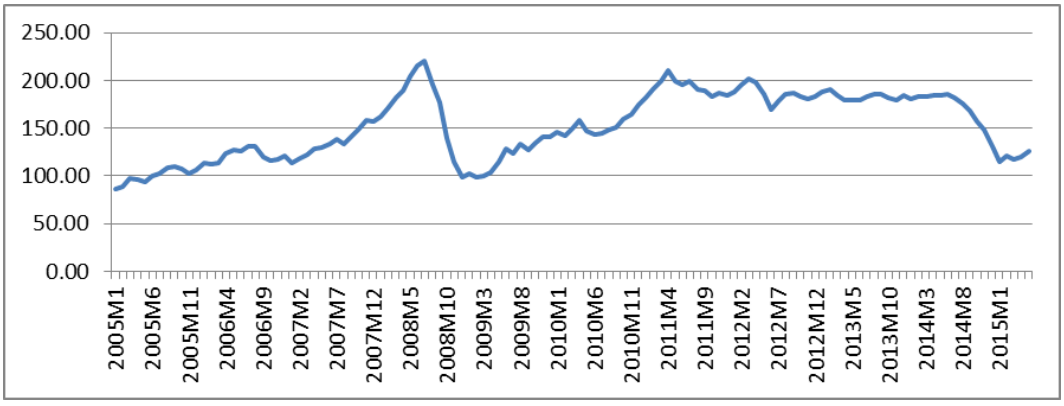
Key Words: *Stock Prices, Commodity Prices, ECA Countries*

JEL Classification: *C33, G12, Q02*

1. INTRODUCTION

The commodities especially oil, wheat, iron and rubber have an important role in economics because of they are the main components of many common goods in our lives. Especially an increases or a decrease in the commodity prices affects all of the economies in the world. In the last decade, the prices of many commodities volatility, with simultaneous and alternating phases of rising and falling trends. As shown in Figure 1&2 which displays All Commodity Price Index and Food Price Index indicates 2008 financial crisis and the decrease in last 12 months. Because of this, the prices of many commodities are the central issue for the world economy. Therefore, G20 emphasizes on volatility of commodity prices in its September 2009 Pittsburgh summit.

Table1. All Commodity Price Index, 2005 = 100, includes both Fuel and Non-Fuel Price Indices



Source: IMF

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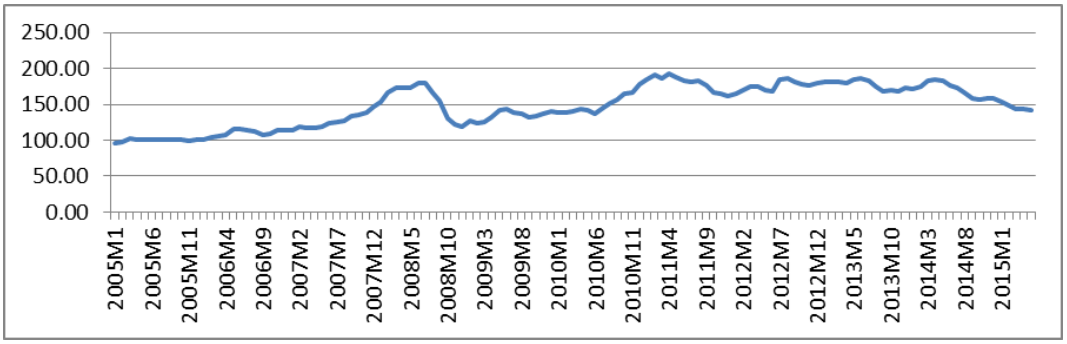
Table 2: Food Price Index, 2005 = 100, includes Cereal, Vegetable Oils, Meat, Seafood, Sugar, Bananas, and Oranges Price Indices



Source: IMF

Commodities are traded every day in commodity market as a financial instrument and a raw material for all commodities that we use in daily life. Commodity prices are important for the economy because they directly affect the prices. Moreover, commodities have effects on stock market as they are used as financial instrument and because of the effect on profitability of the corporate business. Therefore, analyzing the links between commodity and stock markets is very important for the investors, investment environment, economists, and economies.

Consequently, commodities influence world economy by affecting prices in fact. These prices may be commodity prices or share prices. Therefore, there will be a shock –negative or positive- to stock market that drags to an expansion or a recession the economy. The globalization causes the commodity price and stock markets in the world become more integrated. It was believed that the performance of stock markets would be affected by global commodity price. This study contributes to the empirical literature about the relationships between stock and commodity markets. In addition, this is an additional study to the empirical literature, which focused on the dynamics of the relation between commodity and stock markets. These findings also help us assess the macroeconomic implications of commodity price shocks for the ECA countries. The paper is organized as follows: Definitions of the markets and interaction is reviewed in section 2,

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literature is reviewed in section 3, Methodology and data is presented and results are given in section 4, and results are concluded in section 5.

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2. COMMODITY MARKETS, STOCK MARKETS AND INTERACTIONS BETWEEN COMMODITY PRICES AND STOCK PRICES

Commodities consist of the basic materials and natural resources used in virtually all production and manufacturing processes. Commodity market is a market where the commodities are traded. There are various types of commodities include "hard commodities" and "soft commodities" in the market. Hard commodities are those resources exist naturally and must be extracted for example gold, oil, copper, etc. While soft commodities are products mostly from agricultural such as corn, wheat, sugar, soybeans, etc. (Keong et al., 2014). On the other the commodity market enables the investors to trade goods. In commodity markets buy or sell the shares of raw materials that are the components of our daily life. Commodities are classified in different way by Farooki and Kaplinsky (2012) as follows.

Table 3: Three Primary Commodity Families and Their Sector of Use

Primary Sector	Category	Major Use	Examples
Soft Commodities	Industrial Crops	Input in manufacturers	Timber
	Fisheries	Final Consumption (with limited processing)	Prawns, cod
	Cereals		Rice, wheat
	Beverages		Tea, Coffee, Cocoa
	Livestock		Cattle, Dairy
Hard Commodities	Precious Metals	Input in manufactures	Gold, Silver,
	Ferrous Metals	Infrastructure and	Iron Ore and Steel
	Non-Ferrous Metals	Input in manufacturers	Copper, Zinc, Lead,
	Rare earths and	Input in manufacturers	Cerium Plutonium
Energy	Petroleum products	Fuel for industrial usage	Oil, Naturel Gas and Coal.
	Coal	Final consumption	
	Nuclear		Nuclear power
	Renewables		Renewable power

Source: Farooki and Kaplinsky, 2011

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Stocks represent individual shares of ownership in corporate businesses. Stocks can be purchased directly from corporate business or they can be bought from and sold to stock investors on stock exchanges around the world. These markets that stocks are traded between investors called as stock markets. Stock market which is part of the financial markets, perform the following functions in an economy: 1) Raising capital for business 2) Mobilizing savings for investment 3) Facilitate company growth 4) Redistribution of wealth 5) Corporate governance 6) Creates investment opportunities for small investors 7) Government raise capital for development projects 8) Barometer of the economy. Both stocks and commodities are bought and sold on physical trading floors and through electronic trading networks without physical goods ever being exchanged. On the other hand, the fundamental differences between the stock market and the commodities market are the products they deal with, and thus the manner in which they work. The stock market deals in ownership shares of a company. In addition, while a share of stock represents an actual ownership in the company, it is essentially in electronic form but Commodities are actual iron, oil, wheat, or rubber and these are the components of the daily life commodities. Moreover, futures market contracts for commodities are like stocks, but they do not indicate ownership of a commodity; they indicate a right to own it from a contract. In the Table 4, we can see the economic indicators of major stock exchanges.

Table 4. Major stock exchanges of issued shares of domestic companies (as 30 January 2015)

Stock Exchange	Headquarter	Market Capitalization (USD bn)	Monthly Trade Volume (USD bn)
New York Stock	New York City	19.223	1.520
NASDAQ OMX	New York City	6.831	1.183
London Stock	London	6.187	165
Japan Exchange	Tokyo	4.485	402
Shanghai Stock	Shanghai	3.986	1.278
Hong Kong Stock	Hong Kong	3.328	155
Euronext	Amsterdam-Brussels-Lisbon-Paris	3.321	184
Shenzhen Stock	Shenzhen	2.285	800
TMX Group	Toronto	1.939	120
Deutsche Börse	Frankfurt	1.762	142

Source: World Federation Exchange Monthly Reports

Table 5, reports stock market indicators for the some selected ECA countries examined. These ratios are also used in the work of Demirgüc et all. (1996) and

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Levine et all (1996) measure the role of stock market in economic growth. Demirgüc et all. (1996) expressed that the ratio of stock market capitalization to GDP reflects the degree of activity with the liquidity and the turnover ratios. So that if we analyze the data we understand that the stock markets of ECA countries are quite large in terms of market capitalization, also these countries are considerable in terms of number of listed companies. The liquidity ratios are relatively very high in Turkey and Russian Federation while the other countries are low. This means that financial deepening is low in many ECA countries.

Table 5. Some Selected ECA Countries' Stock Market Indicators

	Stock Market Capitalization % of GDP		Market Liquidity Ratio % of GDP		Turnover Ratio to market capitalization		Number of Listed Domestic Companies	
Country	**2005**	**2012**	**2005**	**2012**	**2005**	**2012**	**2005**	**2012**
Armenia	0.9	1.3	0.0	0.0	3.7	0.8	198	12
Georgia	5.5	6.0	0.6	0.0	13.6	0.2	257	133
Kazakhst	18.4	11.5	1.9	0.5	14.9	3.3	62	74
Kyrgyzst	1.7	2.5	0.5	0.1	34.1	3.4	8	18
FRY	10.8	5.8	1.6	0.3	18.3	5.4	57	32
Monteneg	46.5	94.6	4.6	1.1	14.8	1.2	19	33
Rus.Fede	71.8	43.4	20.9	36.3	39	87.6	296	276
Serbia	20.6	18.3	2.5	0.7	15.3	3.7	864	1086
Turkey	33.4	39.1	41.7	44.2	154.9	136.5	302	405
Ukraine	29.0	11.7	0.8	0.7	3.6	5.2	221	198
Uzbekista	0.3	n.a	0.3	0.2	184.7	n.a	114	132

Source: WorldBank, 2014

3. LITERATURE REVIEW

Over the last decade, increases in the commodity prices have an unexpected volatility. For the policymakers commodity prices and its significance of correlations with stock markets are at central issue in the world of economics.

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Furthermore, the analysis of relationships between commodity and stock markets is a topic of interest for financial players because many investment portfolios are included raw materials together with stock classes. Sadorsky (1999) studied the relation between oil prices and stock prices by using a VAR model that includes a short-term interest rate and industrial production. They found that there is a relation between oil price and other variables (Sadorsky, 1999). Hamilton (2003), Jimenez et all. (2005) and Kilian (2008) studied impact of oil prices on economic growth. They find that a shock on oil prices have an impact on economic growth. Gorton and Rouwenhorst (2004) showed that commodity market price have a large impact on the stock price. Chiou and Lee (2009) studied the WTI daily oil prices on S&P 500 stock returns data from 1992 to 2006 using a model with oil price fluctuations. They found that fluctuations in oil prices have impact on stock returns. Choi and Hammoudeh (2010) studied the relation between commodity prices of Brent oil, WTI oil, copper, gold and silver, and the S&P 500 index and found that commodity prices have effected portfolios in stock markets. Filis et al. (2011) analyze the interaction between oil prices and stock markets by differentiating oil-importing and oil-exporting countries. Their study showed that there is an interaction between oil and stock prices for oil importing and oil-exporting economies. Killian and Vigfusson (2011) found that an unexpected increase in real price of oil affected economic growth. To sum up, the commodity prices increasingly important role in explaining equity markets Wen et al. 2012, Büyükşahin and Robe, 2010, Tang and Xiong, 2010 revealed the financialization of commodities have complex relations between different commodities or the interactions between commodities and financial assets. Even further, Buyuksahin et al. (2010) found that commodity and stock markets could move like a “market of one” in times of fluctuations. As this literature, review indicates that the interaction between commodity prices and stock prices needs new empirical findings about the interaction within the different countries.

4. MODEL AND DATA

This section defines variables and describes data. We collect a set of panel data from 10 of ECA countries over the period 2012M01–2015M05. Data frequency is the most important issue in examining the interaction between the stock prices and

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commodity prices. Data for 10 countries captures interaction between the commodities and the stock prices. Therefore, the monthly data is used in this study. The data's for all countries obtained from IMF International Financial Statistics (IFS) iLibrary system.

The datas are as follows:

Table 6: Data Definitions

Data	Contents
Stock Prices (SP)	Share Prices as index for every country
Oil Price (OIL)	Crude Oil (petroleum), Dated Brent, light blend 38 API, fob U.K., US$ per barrel
Iron Price (IRON)	China import Iron Ore Fines 62% FE spot (CFR Tianjin port), US dollars per metric ton
Rubber Price (RUBBER)	Rubber, Singapore Commodity Exchange, No. 3 Rubber Smoked Sheets, 1st contract, US cents per pound
Wheat Price (WHEAT)	Wheat, No.1 Hard Red Winter, ordinary protein, FOB Gulf of Mexico, US$ per metric ton

We consider the stock market prices as dependent variables for the stock market indicator. Due to the data restrictions, we use only four main commodity prices as independent variable. We selected oil, iron, rubber and wheat prices as commodity prices that affects the stock prices. These four commodities are the main commodities for the whole goods and services. Therefore, this selection of the variables is reasonable.

4.1. Methods and Findings

In this section, we will introduce the methods that used in the study and the resulting empirical findings. This study contributes to the empirical literature about the relationships between stock and commodity markets for the ECA

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countries. Panel unit root tests of Levin, Lin and Chu test is applied to test if there are unit roots in panel data sets. In the second step, Pedroni's panel cointegration test is used to examine the cointegrating relationship.

4.2. Panel Unit Root Analysis

Main issue before estimating the model is to test if the variables are stationary or not. We performed panel unit root test on the dependent and independent variables. We follow the approach of Levin, Lin & Chu panel unit root test. Results of this test in levels and differences are reported in the Table 5. The LLC panel unit root test results in Table 7 suggests that both stock prices, oil prices, iron prices and rubber prices are I(1) variables.

Table 7. Results for panel unit root test. The choice of lag levels is based on the Schwarz Information Criterion. The LLC tests were computed using the Bartlett kernel with automatic bandwidth selection. ***, ** and * indicate significance at the 1%, 5% and 10% levels.

Variables	**Levin, Lin & Chu**
Individual Intercept	
SP	0.97354
OIL	2.30423
IRON	2.15372
RUBBER	-1.29921
WHEAT	-1.59650
Individual Intercept and Trend	
SP	0.36339
OIL	5.05918
IRON	2.98896
RUBBER	6.17715
WHEAT	-1.39116
Individual Intercept	
ΔSP	-16.7527***
ΔOIL	-6.44536***
ΔIRON	-7.22967***
ΔRUBBER	-3.48752***
ΔWHEAT	-3.78984***
Individual Intercept and Trend	
ΔSP	-15.6122***
ΔOIL	-8.08513***
ΔIRON	-7.62236***
ΔRUBBER	-1.54904*

ΔWHEAT	-3.39474***

4.3. Empirical Results

All of the variables under investigation are integrated of order one so we can examine whether a long-run relationship exists. We examined the long-run relationship between the variables. Pedroni at his pioneer study in 2000 and 2004 developed cointegrated panels illustrated by heterogeneity and fixed effects. Pedroni proposed seven statistics to test long-run relationship. The results of Pedroni's panel cointegration test are reported in Table 8. Pedroni panel cointegration tests have no any evidence of cointegration. For the six of seven statistics significantly we cannot reject the null of no cointegration. Thus, stock, oil, iron, rubber and wheat prices do not move together in the long run.

Table 8: Pedroni's panel cointegration tests. The null hypothesis is that there is no cointegration. Under the null hypothesis all the statistics are distributed as standard normal distributions

Dependent Variable: Stock Prices		
Independent Variables: Oil Prices, Iron Prices, Rubber Prices, Wheat Prices		
Intercept		
	Statistic	*Prob.*
Panel v-Statistic	1.264224	0.1031
Panel rho-Statistic	-0.088014	0.4649
Panel PP-Statistic	-1.305742	0.0958
Panel ADF-Statistic	-0.203417	0.4194
	Statistic	*Prob.*
Group rho-Statistic	0.224497	0.5888
Group PP-Statistic	-1.830245	0.0336
Group ADF-Statistic	-0.212380	0.4159
Intercept and Trend		
	Statistic	*Prob.*
Panel v-Statistic	-0.056683	0.5226
Panel rho-Statistic	0.689856	0.7549
Panel PP-Statistic	-1.372621	0.0849
Panel ADF-Statistic	-0.207832	0.4177
	Statistic	*Prob.*
Group rho-Statistic	0.742869	0.7712
Group PP-Statistic	-2.185683	0.0144
Group ADF-Statistic	-0.832439	0.2026

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5. CONCLUSION

In this paper, we have examined the relationship between stock market and commodity prices in a panel cointegration. The interaction during the entire sample period (January 2012–May 2015) is investigated. Using Pedroni's panel cointegration test 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. Estimates indicate that the interaction between commodity market and stock market is uncertain. We need to expand the study a wide area. On the other hand, this result is expected because of the stock market indicators. In the Section 2 we said that the liquidity ratios are relatively very high in Turkey and Russian Federation while the other countries are low. Therefore, we may expect that if the ratios there will be no relation between the commodity prices and the stock prices.

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