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Investigating the Relationship among Different Types of Commodity Price Indices and Stock Market Returns through ARDL Approach

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ABSTRACT

The trend of investing in stock markets is increasing rapidly as they were considered as best opportunity for gaining significant returns in most of the developing countries. However in times of financial crisis 2008 when the most of the stock exchanges were crashed, then oil, gold and other commodity investments gain popularity and are considered as safe investments and many investors diversify their portfolios in these alternatives. This study is aimed to investigate the relationship among different types of commodity indices such as metals, crude oil, agriculture, food and beverages and fuel and non-fuel and stock market returns in Pakistan for the period of February 1995 to December 2016 using ARDL approach. Our results suggest that metal, food and beverages and crude oil indices have positive relationship with KSE 100 index returns in long run while fuel and non-fuel commodity indices have negative relationship with stock market returns in long run. The short run results shows that metal, food and beverages, crude oil and agriculture commodity indices have positive relationship with KSE 100 index returns in short run, whereas fuel and non-fuel indices are negatively associated with Pakistani stock market returns in short run. The results of this study can be beneficial for the policy makers, Government, foreign and local investors of Pakistan because this gives a guideline to the investors for their portfolio diversification and for gaining more investment opportunities by investing in different types of commodities or KSE 100 index in Pakistan.

KEYWORDS: Commodity price indices, KSE 100 returns, agriculture, crude oil, metals, food and beverages, fuel and non-fuel, ARDL bound test

1. INTRODUCTION

Financial system of a country is an integral part which transfers the surplus funds. The stock market is considered as a major ingredient of this system because it accelerate economic growth and debate on this topic suggests that the relationship between economic growth and financial system is two way or sometimes one way causality that is running from financial system to economic growth (e.g., Enisan & Olufisayo, 2009; Van Nieuwerburgh, Buelens, & Cuyvers, 2006). The main task of these stock markets is to speed up the transactions and contribution towards fair prices of securities that are trading in markets (Sadri & TayebiSani, 2012). The association between different types of macroeconomic variables and stock market returns has been of keen interest of the researchers such as (Chen, Roll, & Ross 1986; Levine & Zervos 1996; Ho 2017; Kumar & Batra 2017).

Investors always seek the optimal level of risk and return for making their decisions. The volatility in stock market returns is believed to play important role in portfolio selection, diversification and risk management. This study is undertaken to investigate the relationship among commodity prices indices and KSE 100 index returns. Commodity investment gets widespread attention in the periods of high financial markets volatility during 19th century because of having potential for portfolio diversification and protection from inflation. The commodity future contracts are formulated when the United States Congress endorsed the Grain Future Act to control the pricing seasonality of commodities in 1922. According to Domanski & Heath (2007) the trading activities of exchange traded commodity derivatives is almost tripled from 2002 to 2005. G. Gorton & Rouwenhorst (2006) suggest that commodity futures can generate returns similar to stock returns. There are many factors which differentiate stock investments and commodity investments such as storage and transportation, GOVT policies, weather conditions (Shahzad, Raza, & Awan, 2014).

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The commodity future exchange was established in 2007 in Pakistan. Being a new investments avenue, it offers inflation shield, hedging and portfolio diversification. The global financial crisis 2008 motivated investors to spread their portfolios in other investments by portfolio diversification and then at that time, commodity investments offer a suitable direction to hedge their risk. The commodities i.e. metal, energy and agriculture have long standing history for the mitigation of risk and as a store value (G. Gorton & Rouwenhorst, 2006). Commodities are considered as real assets because they have unique tangible features and that can be the production process. However theses real assets can be further divided into two groups, durable and non-durable assets. The durable assets are those that are used in the production process such as transport vehicles and non-durable are those that are consumed in wealth production process such as fuel for transport vehicle. The commodity price is dependent upon the short term supply and demand factors. For example bread, wheat, sugar, tea is the daily consumption items and has large demand. The prices of these commodities have increased due to the its correlation with inflation (Kat & Oomen 2006; G. B. Gorton, Hayashi, & Rouwenhorst 2013).

The prices of the production process includes cost of capital, raw material and wages, the increased cost of raw material cause a decrease in cost of capital if wages are held constant. Therefore the commodity prices and capital assets prices are negatively associated with each other as investigated by Fuertes, Miffre, & Rallis (2010) and Daskalaki & Skiadopoulos (2011). According to Silvennoinen & Thorp(2013) the association among stock prices and commodity prices is highly unstable and time-dependent. At the point when the business cycle is at its crest, commodity prices have a tendency to be higher, reflecting higher interest for raw material. This blasting business movement causes financing costs to be high and desires for development to back off making monetary resources perform poor. Products are influenced by here and now financial vacillations, though monetary resources are influenced by long haul development desires. Stocks and products being uncovered to various variables and occasions additionally display diverse return conveyances (Kat & Oomen, 2006). The stock investments and commodity investments show the outlier behavior in the tail and they both have non-linear patterns in return distributions and tail dependence. The tail dependence can cause dangerous effects from portfolio diversification perspective (Boerger etal. 2009; Delatte & Lopez 2013).

Pakistan's economy is facing many challenges now days such as economic policies, law and order situation, food and energy crisis causing cost of productions, a high rate of inflation and terrorism attacks which will ultimately affect the commodity prices and also the stock market. The Karachi Stock Exchange (KSE) was established in 1949 as Pakistan largest stock exchange. The KSE was defined as the best performing market of the world by Business Week in 2002 for its outstanding performance (Badshah et al. 2016). Previously Pakistan's stock market contains three stock exchanges namely, Karachi Stock Exchange, Lahore Stock Exchange and Islamabad Stock Exchange. On 11th January 2016 Pakistan Stock Exchange (PSX) was established as a result of merging its stock exchanges into one stock exchange.

In November, 1991 the KSE 100 index was introduced and it includes 100 companies from different sectors having highest market capitalization. These companies are from 35 different sectors of Pakistan. The KSE 100 index is widely used index used to measure the stock market performance of Pakistan. In January 2017, the index hits the overall time highest point of 49969 points[1]. KSE 100 index returns show higher volatility as compared to South Asian countries stock markets (Hussain et al. 2012). The historical performance of KSE 100 index was very impulsive. Figure 1 shows the fluctuation of KSE 100 index from 1995-2016.The index was dropped three times; firstly, the index was dropped by fourteen hundred points in first quarter of the year 2005. Secondly, it was crashed in June 2006 and loses fifteen hundred points and finally the last time in 2008 due to financial crisis. Throughout financial crisis the index lose ten thousand points, the board of directors of KSE has decided to place a floor in August, 2008, and this was later removed in December, 2008.

[1] www.psx.com.pk

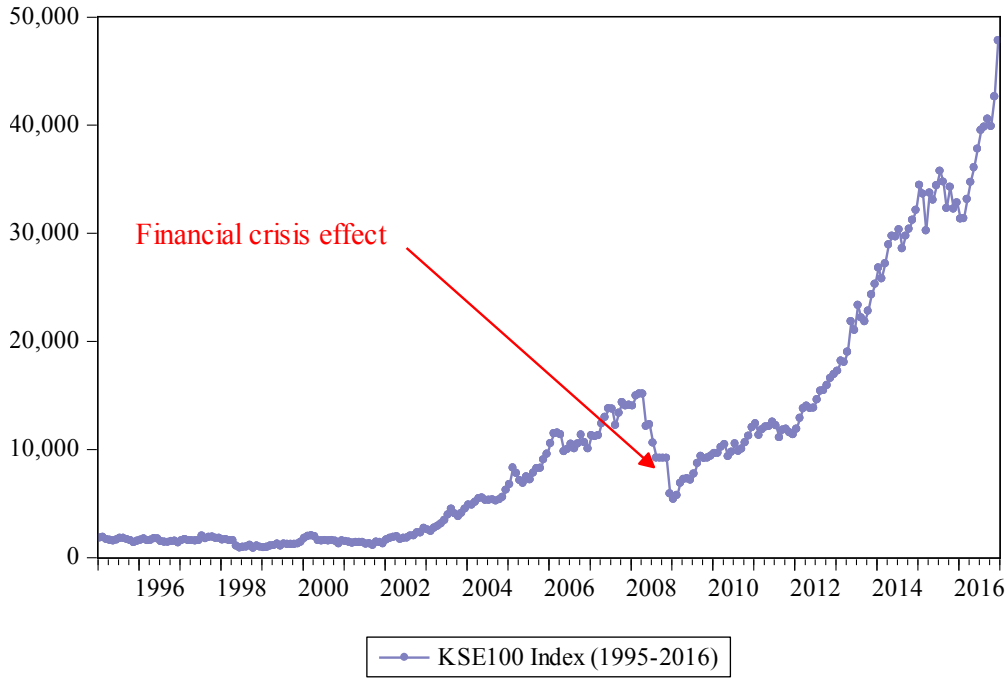

Figure 1.KSE 100 index price (1995-2016)

This study takes into account the different commodity price indices such as metal, agriculture, food and beverages, crude oil, fuel and non-fuel for the period of 1995-2016. Figure 2 show the price patterns of these commodity indices over the years. We can see that all commodity indices have reached at highest level before the 2008 financial crisis and all are dropped significantly due to the crisis.

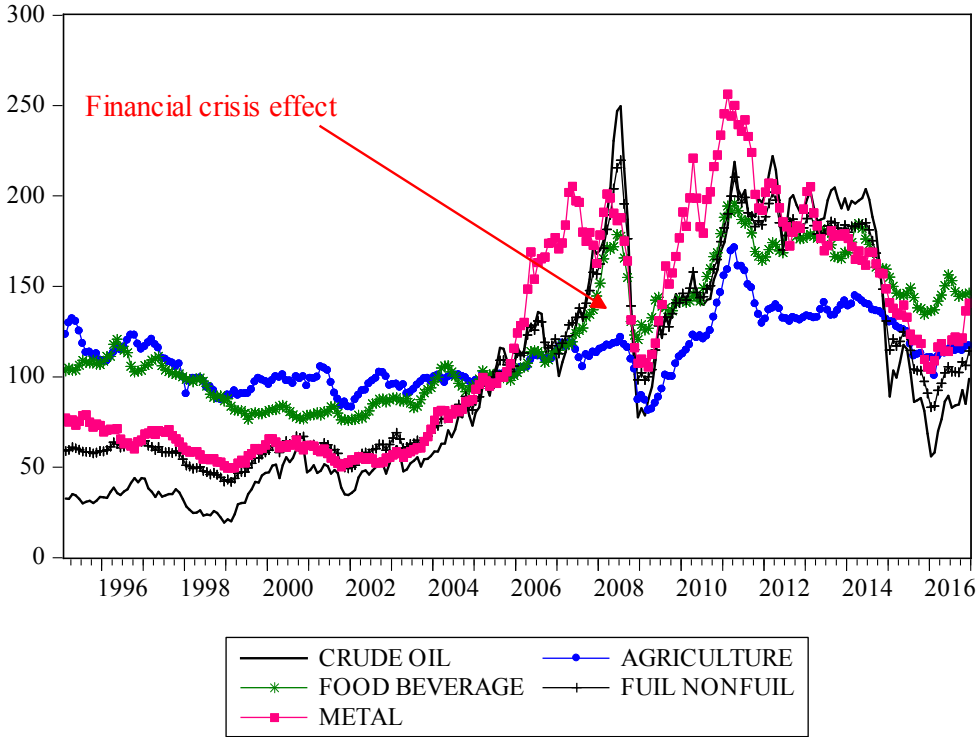

Figure 2. Commodity price indices over the years (1995-2016)

The main objective of this study is to investigate the association between KSE 100 index returns and different commodity index prices such as metal, agriculture, food and beverages, crude oil, fuel and non-fuel for the period of 1995-2016 using ARDL approach. The efforts have been made to find out the answer to the question that which sort of relationship exists between stock market returns and commodity prices in Pakistan.

2. LITERATURE REVIEW

The literature on association between macroeconomic variables and stock market returns is widely studies in past. Most of the research is conducted in developed economics; however the focus is now being diverted towards developing economics stock exchanges. The studies conducted in developed economies such as (Fama & French 1989;Humpe & Macmillan 2009;Gan, Lee, Yong, & Zhang 2006; Wasserfallen 1989;Poon & Taylor 1991;Abdalla & Murinde 1997). These studies found different factors explaining the stock prices such as, interest rates, industrial production, money supply, risk premiums, inflation etc. The studies conducted in developing countries(see for example, I. Ali et al., 2010, Tripathy, 2011, Nishat, Shaheen, & Hijazi, 2004, Ihsan, Ahmad, ul Haq, & Sadia, 2007). These studies found evidence that macroeconomic factors have impact on the stock prices of a country.

I. Ali et al.(2010) examines the relationship among different macroeconomic indicators and KSE 100indexfor the period of 1990 to 2008.They utilize different statistical techniques such as ADF unit root test, Johansen co integration and Granger Causality tests to find the relationship. The results show co integration between industrial production index and KSE 100 index. They found no relationship between macroeconomic variables and stock market prices.

Subhani, Gul, & Osman(2010) examine the monthly KSE 100 index prices and testing the response to the declaration of Consumer Price Index (CPI) for the period of 2004 to 2009. Their results show that KSE 100 prices and CPI has significant and negative relationship. Hussain et al.(2012) uses exchange rates, foreign exchange reserves, industrial production index, imports, money supply, and wholesale price index as macroeconomic variables and finds their impact on KSE 100 index. They applied unit root test, Johansen co integration, VECM and Granger Causality test. The study is conducted for the period of 2001 to 2010. They find long run association between macroeconomic variables and stock prices. Further they found exports and exchange rates as insignificant variables, and the Granger Causality test showed the bi-directional relation while exchange rates and foreign exchange reserves show uni-directional relationship with stock prices.

M. B. Ali(2011)conducted a study on Dhaka Stock Exchange for the period of July 2002 to December 2009 using multivariate regression model and Granger Causality tests. They found that monthly average growth in market capitalization, markets P/E's and industrial production index has positive while foreign remittances have negative impact on stock prices. Further no uni-directional causality exists between all independent variables and stock prices.

Singh, Mehta, & Varsha (2011)investigates the relationship between macroeconomic variables and stock market in Taiwan. Their analysis is based on portfolios rather than the single stocks. The findings reveal that exchange rate and GDP are affecting the stock prices while inflation, exchange rate and money supply show negative relation with returns. Garza-García & Yue(2010) explores the international determinants of stock market performance in China using co integration approach. Their findings suggest that the stock prices of Chinese stock market are determined by domestic variables like money supply, inflation, industrial production, exchange rates and short term interest rates. They also find that US economic and financial indicators are significantly related to the Chinese stock prices. The Granger causality test shows that Shanghai Composite Index is a major indicator for macroeconomic variables of China.

Macroeconomic variables including gold have also effect on the stock prices of an economy. In the times of financial crisis, metals such as gold serves a plate form and considered as safe haven for the investors to diversify their risk (Baur & McDermott, 2010).Wang, Wang, & Huang(2010) investigates the relationship between oil, gold, exchange rate and the stock prices of USA, China, Taiwan, Japan and Germany. Their findings suggest that co integration exists in USA stock market prices and independent variables and other countries shows no long term relationship among stock prices and gold, oil and exchange rates. Mishra, Das, & Mishra(2010)find the gold price volatility and the stock market returns in India. This study covers the period of January 1991 to December 2009. Based on the Granger Causality test and Vector Error Correction Model (VECM) their findings show that gold prices does Granger cause stock market prices and stock market prices also Granger cause the gold prices in India. They conclude that both variables are necessary to explain each other. Kilian & Park(2009) finds the impact of oil prices on US stock market. They conclude that the reactions of the stock market returns to the oil prices changes are depending on the demand and supply shocks in the oil market. The demand and supply of crude oil explains 22% variations in the stock market returns of U.S. Basit(2013) explores the impact of KSE 100 index on the oil and gold prices in Pakistan for the period of 2005 to 2011. The researcher takes gold and oil prices as dependent variables and KSE 100 index as independent variable. Regression results show no significant relationship among these variables.

Mensi et al. (2013)investigated the correlation and volatility spillover among gold, energy and food and beverages prices and stock markets for the period of 2000 to 2011. Based on the multivariate GARCH model with dynamic covariance and conditional correlation, their results show the significant transmission between S&P 500 and different commodity prices. They find high correlation between stock prices and gold and WTI index. Chan, Treepongkaruna, Brooks, & Gray (2011) applied the Markov switching model to find the relationship between stock returns and financial assets, commodities and real estate assets. They explain two different regimes such as expansion and crisis regimes. The crisis regime is characterized by the negative stock returns and has contagion between oil, real estate and stock prices.

Vivian & Wohar (2012) investigated structural breaks in commodity spot returns using GARCH model and cumulative sum of squares procedure using 28 different commodities form 1985 to 2010. Their findings show few commodity breaks during financial crisis. They suggest that commodity supply and demand factors are important determinants for volatility and commodities are considered as an asset class for diversification. The relationship among stock market and commodity prices suggest the need to take into account the energy, agriculture, food and beverages, metals and industrial products. The literature on stock market returns and commodity prices shows the price transmission form stock markets to commodity markets using different econometrics models. Therefore this study uses ARDL approach to find the relationship among different commodity indices and stock market returns of Pakistan.

3. RESEARCH METHODOLOGY

The targeted population of this study is Pakistan. This study uses secondary data of KSE 100 index prices and commodity index prices collected from Pakistan Stock Exchange (PSX) and IMF data base. This study uses monthly prices of indices in Pak Rupees from February 1995 to December 2016.The commodity price indices are given in Pak Rupees. This study uses metal, agriculture, food and beverages, crude oil and fuel and not fuel commodity indices to test their relationship on KSE 100 index returns using Autoregressive distributive lag (ARDL) approach. In order to achieve the goals of the study, different statistical techniques are used which is given as follows.

- Descriptive statistics
- Pearson correlation
- Unit root test
- Optimal lag selection criteria
- Autoregressive distributive lag (ARDL) bound test
- ARDL co integrating and long run form

The operational model of this study is as follows.

$$KSE\ 100\ RETURNS = \beta 0 + \beta 1\ (METAL) + \beta 2\ (AGRICULTURE) + \beta 3\ (FOOD\_BEVERAGES) + \beta 4\ (CRUDE\ OIL) + \beta 5\ (FEUL\_NONFUEL) + \mu$$

In this model, the dependent variable is KSE 100 returns which is computed by using compounding rate of return formula which is as follows.

$$\mathbf{R_t = ln\ (P_t / P_{t-1})}$$

Where

R_t = KSE 100 monthly returns

P_t = Closing value on day t

P_{t-1} = Closing valueon day t-1

All other variables are independent variables such as metal, agriculture, food and beverages, crude oil and fuel and non-fuel indices. Table 1 shows the measurement of variables used in this study.

Table 1. Measurement of variables

Variable name	Measurement
KSE 100 RETURNS	Karachi Stock exchange 100 index. It includes 100 firms from different sectors such as financial and non-financial. Its returns are calculated as Rt = ln (Pt / pt-1)
METAL	Is Metals price index. It includes Copper, Aluminum, Iron Ore, Tin, Nickel, Zinc, Lead, Uranium prices indices in Pak Rupees.
AGRICULTURE	Is Agriculture Raw Materials index. It includes Timber, Cotton, Wool, Rubber and Hides prices indices in Pak Rupees.
FOOD_BEVERAGES	It includes the price indices of Food and Beverages price index. Food price indices include the prices of Cereal, Vegetable Oils, Meat, Seafood, Sugar, Bananas, and Oranges Price Indices in Pak Rupees. Beverages price indices include Coffee, Tea and Cocoa prices indices in Pak Rupees.
CRUDE OIL	Is Crude Oil (Petroleum) price index. It is the simple average of three spot prices: Dated Brent, West Texas Intermediate and Dubai Fateh prices indices in Pak Rupees.
FUEL_NONFUEL	It includes the both Fuel and Non-Fuel price indices. The commodity fuel indices include Crude Oil (petroleum), Natural Gas and Coal price indices. The Non-Fuel price indices include Food and Beverages and Industrial inputs price indices in Pak Rupees.

This study uses ARDL approach to co integration to find the relationship among dependent and independent variables. There are many methods available for finding the long run relationships among variables. The most popular methods include fully modified OLS Phillips & Hansen(1990), the maximum likelihood based Johnson tests Johansen & Juselius(1990),Johansen(1991) and Engle & Granger(1987). These all methods require that all variables must be stationary at order 1. These models cannot be applied when the variables have the mixture of stationary levels. This problem is solved by newly developed ARDL approach to co integration. The ARDL approach is used to find the long run and short run relationship between variables of interest proposed by (Pesaran & Shin, 1998). Many researchers use similar approach in Pakistan's context such as (Shahbaz, Ahmed, & Ali 2008);Tian & Ma 2010; Hasan & Nasir 2008; N. Ahmad, Ahmad, & Yasmeen 2013;Majid & Yusof 2009; A. Ahmad, Ali, & Ahmad 2014).

4. RESULTS AND DISCUSSIONS

4.1 Descriptive Statistics

Table 2 shows the results summary statistics of variables used in this study. The descriptive statistics i.e. mean, maximum, minimum, standard deviation, skewness and kurtosis are used to test the normality of the variables. The total numbers of observations are 263 where the returns of KSE 100 are minimum at -0.448 and maximum at 0.2411 and having an average return of 0.0125. The standard deviation of returns is relatively small this means the risk is less associated with returns. Similarly the average index price of agriculture, metal, crude oil, fuel and non-fuel and food and beverages are 112.1837, 118.2523, 99.4715, 106.9734 and 122.9137 with standard deviation of 17.9118, 58.2251, 62.2935, 50.7716 and 35.0659 respectively. The KSE 100 returns are negatively skewed while all other independent variables are positively skewed.

Table 2. Descriptive statistics

Variables	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
KSE100 RETURNS	263	-0.4488	0.2411	0.0125	0.0875	-1.0576	4.7692
AGRICULTURE	263	81.4500	171.3600	112.1837	17.9118	0.7319	0.1649
METAL	263	49.5500	256.2400	118.2523	58.2251	0.4519	-1.1709
CRUDE OIL	263	19.5400	249.6600	99.4715	62.2935	0.5533	-1.0324
FUEL_NONFUEL	263	41.9100	219.7400	106.9734	50.7716	0.5209	-1.1275
FOOD_BEVERAGES	263	75.8300	196.0000	122.9137	35.0659	0.4108	-1.1647

4.2 Pearson correlation

The results of Pearson correlation are presented in table 3. The correlation analysis is applied to check the relationships among variables. We can see that agriculture and food and beverages indices are negatively correlated with the KSE 100 returns, while all other variables are positively correlated with KSE 100 returns and with other variables also. The correlation among independent variables is significant at 0.01.

Table 3. Pearson correlation

	KSE 100 RETURNS	AGRICULTURE	METAL	CRUDE OIL	FEUL_NON FUEL	FOOD_BEVERAGES
KSE 100 RETURNS	1	—	—	—	—	—
AGRICULTURE	-0.014	1	—	—	—	—
METAL	0.013	.764**	1	—	—	—
CRUDE OIL	0.011	.722**	.921**	1	—	—
FEUL_NONFUEL	0.002	.767**	.947**	.994**	1	—
FOOD_BEVERAGES	-0.016	.838**	.880**	.878**	.919**	1
****. Correlation is significant at the 0.01 level (2-tailed).**						

4.3 Unit Root Test

In order to find the stationary of the variables of this study, unit root test is applied to the dataset. The purpose of this test is to find out the unit root in time series models (Phillips & Perron, 1988). The unit root test is applied to find the suitable model for time series data. Dickey & Fuller(1979) developed a test called Augmented Dickey Fuller test to find out the unit root of the data. The Dickey Fuller test has some drawbacks such as autocorrelation. To solve this problem Dickey Fuller developed Augmented Dickey Fuller (ADF) test. The ADF test confirms the stationary of the data on the basis of critical and calculated value. The ADF unit root test uses following equation used to test the unit root.

$$\Delta Y_t = \delta Y_{t-1} + a_t \quad \textit{(No trend, no intercept)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$\Delta Y_t = \theta_0 + \delta Y_{t-1} + a_t \quad \textit{(Intercept only)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$\Delta Y_t = \theta_0 + \theta_1 t + \delta Y_{t-1} + a_t \quad \textit{(Trend and intercept)} \ldots\ldots\ldots (3)$$

In above mentioned three equations, Y is a variable that got unit root or not. We use only second equation to test the unit root of variables with intercept only. Table 4 shows the results of ADF unit root test of dependent and independent variables. The results show that only dependent variable KSE 100 returns is stationary at level because it has greater absolute test statistics value than its 5% critical value. Similarly all other independent variables are non-stationary at level because they have lower statistics values as compared to their 5% critical values. Similarity when we convert all variables into first difference, they all become stationary. It means the series has mixture of stationary levels and according to Pesaran & Shin (1998)when the series has mixture of stationary levels then ARDL approach is best suitable to find the relationships among variables.

Table 4. ADF unit root test

	Augmented Dickey Fuller (Level)		Augmented Dickey Fuller (1st Difference)	
Variables	**Test statistic**	**5% critical value**	**Test statistic**	**5% critical value**
KSE 100 RETURNS	-15.84	-2.87	-11.01	-2.87
AGRICULTURE	-2.17	-2.87	-12.44	-2.87
FOOD_BEVERAGES	-1.45	-2.87	-9.75	-2.87
METAL	-1.38	-2.87	-11.78	-2.87
CRUDE OIL	-2.02	-2.87	-10.13	-2.87
FUEL_NONFUEL	-1.72	-2.87	-9.61	-2.87

4.4 Optimal lag selection criteria

In order to run find the co integration and applying Vector Autoregressive (VAR) models we have to find the optimal lags of the dependent and independent variables which would be included in the models. There are different lag selection criteria's available for optimal lag order selection. These criteria's include final prediction error (FPE), Akaike's information criterion (AIC), Schwarz Information Criteria (SC) and Hannan-Quinn Information Criteria (HQ).Ivanov & Kilian(2001) suggest that for monthly VAR models, AIC criterion produce more accurate results whereas for quarterly VAR models with sample size smaller than 120, HQ given accurate results. When the sample size is more than 120 in quarterly VAR models SC criterion is suitable. Table 5 shows the results of lag selection criteria. We can see that FPE, HQ and AIC these all are supporting in favor of lag 2. This study uses monthly data and according to Ivanov & Kilian(2001) AIC is best optimal lag order criteria for our analysis.

Table 5. Optimal lags selection criteria

Lag	FPE	AIC	SC	HQ
0	617.0811	37.26811	37.35238	37.30202
1	404.5223	23.02988	23.61980*	23.26728
2	294.6917*	22.71264*	23.80819	23.15352*
3	314.633	22.77693	24.37813	23.42129
4	322.742	22.80014	24.90698	23.64799
5	352.8383	22.88567	25.49815	23.937
6	379.3377	22.95271	26.07084	24.20752
7	436.5141	23.08561	26.70938	24.54391
8	424.0604	23.04668	27.17609	24.70846
9	434.5415	23.05821	27.69327	24.92348
10	475.6628	23.13243	28.27313	25.20118
11	525.6504	23.21239	28.85874	25.48462
12	552.8239	23.23858	29.39057	25.71429

4.5 Autoregressive Distributive Lag (ARDL) bound test

This study applies a newly developed ARDL approach to co integration to our dataset. This model is developed by (Pesaran, Shin, & Smith, 1999). The advantage to this approach is that it is applied when our variables have different stationary order, and whereas our variable also have different stationary levels, so it is best approach to find the

objective of this study using ARDL approach. Table 6 shows the results of ARDL bound test with fix maximum lag length 12 being monthly data and optimal lag selection is selected by AIC criteria automatically by Eviews software. It shows the F-statistic value and lower bounds and upper bounds critical values. Pesaran et al. (1999) suggest that for existence of long run equilibrium the F-statistic vale must be higher than the lower and upper bounds critical values. The results of ARDL bound test shows that F-statistic value is greater than the critical values of lower and upper bounds at 5% confidence interval level. This seems to be the evidence for the existence of long run relationship between commodity price indices and KSE 100 returns. Once the long run relationship is established among the said variables, then it is allowed to proceed with the second step that involves the estimation of long run coefficients.

Table 6. ARDL bound test

F-statistic	23.78843	
	Critical Value Bounds	
Significance	I0 Bounds (Lower bounds)	I1 Bound (Upper bounds)
10%	2.26	3.35
5%	2.62	3.79
2.50%	2.96	4.18
1%	3.41	4.68

4.6 ARDL co integrating and long run form

Table 7a and 7b shows the results of ARDL co integrating and long run form. It consists of two parts, cointegrating form and long run coefficients. The cointegrating form results describe the short run association between commodity price indices and KSE 100 returns, while long run coefficients show the long run association between these variables. In this table the CointEq (-1) is the co-integrating equation. It must be negative and significant at 5% and in our results we found it as negative and significant at 1%, it means cointegrating equation is highly significant and it shows that 111.82% of disequilibrium from the previous year shock converges back to the long run equilibrium in the current year.

The remaining part of this table represents the short run associations among KSE 100 returns and different commodity indices. The results show that Metal price indices are significant at 5% and show a positive relationship with KSE 100 returns in short run. Crude oil price index is also significant at 5% and shows a positive relationship with KSE 100 index in short run. Agriculture and food and beverages price indices are also significant at 10% and show a positive relationship with stock returns in short run. The fuel and non-fuel indices are significant at 10% but show a negative relationship with stock returns.

The long run coefficients show the relationship between dependent and independent variables in long run. The results show that crude oil, food and beverages and metal indices are significant and positively associated with KSE 100 returns long run, while fuel and non-fuel indices are negatively associated with stock returns in long run. Further agriculture indices are not related with KSE 100 returns in long run.

Table 7a. ARDL co integrating form results

Co integration form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
KSE 100 RETURNS LAG 1	0.06984	0.064844	1.077057	0.2825
METAL	0.003929	0.001831	2.146251	0.0328**
METAL LAG 1	0.001697	0.001736	0.9776	0.3292
FUEL_NONFUEL	-0.026838	0.013865	-1.935649	0.0541*
FUEL_NONFUEL LAG 1	-0.010391	0.012325	-0.843123	0.4000
FOOD_BEVERAGES	0.006203	0.003366	1.843137	0.066*
FOOD_BEVERAGES LAG 1	0.001381	0.003193	0.432424	0.6658
CRUDE OIL	0.014973	0.007632	1.961794	0.050**
CRUDE OIL LAG 1	0.004868	0.006779	0.718087	0.4734
AGRICULTURE	0.004144	0.002146	1.930941	0.054*
AGRICULTURE LAG 1	0.000937	0.002069	0.453066	0.6509
CointEq(-1)	-1.118225	0.093744	-11.928437	0.000***
*** Significant at 1%				
** Significant at 5%				
* Significant at 10%				

Table 7b. ARDL long run form results

Long Run Coefficients				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
METAL	0.001436	0.000617	2.325793	0.0209**
FUEL_NONFUEL	-0.013114	0.00475	-2.760768	0.0066***
FOOD_BEVERAGES	0.002411	0.00108	2.232307	0.0265**
CRUDE OIL	0.008079	0.002852	2.832545	0.0055***
AGRICULTURE	0.000778	0.00057	1.365693	0.1733
Constant	0.05887	0.043292	1.359834	0.1751
*** Significant at 1%				
** Significant at 5%				
* Significant at 10%				

5. CONCLUSION AND POLICY IMPLICATION

This study is an attempt to investigate the relationship between different types of commodity indices and stock market returns of Pakistan for the period of February 1995 to December 2016. The major commodity indices those are included in this study are agriculture, metal, food and beverages, crude oil and fuel and non-fuel indices. The major findings of this suggest that metal, food and beverages and crude oil indices have positive relationship with KSE 100 index returns in long run while fuel and non-fuel commodity indices have negative relationship with stock market returns in long run. The short run results shows that metal, food and beverages, crude oil and agriculture commodity indices have positive relationship with KSE 100 index returns in short run, whereas fuel and non-fuel indices are negatively associated with Pakistani stock market returns in short run.

The findings of this study suggest that metals, agriculture, crude oil and food and beverages have positive affect on the stock market returns in Pakistan in long and short run. It means in long or short run if the stock market is on peak, the commodity prices of metals, agricultures, crude oil and food and beverages are also on peak and on the other hand if the stock market crashes these commodity indices also drops. The fuel and non-fuel commodity indices are negatively associated with the stock market returns in Pakistan in long as well as short run. These indices include the commodities such as petroleum, natural gas, coal, food and beverages and industrial input products. This suggests that these fuel and non-fuel commodities are considered as alternate of investment in time of stock market downfall. If the stock market crashes as happen during financial crisis, these items offers alternate investment avenues and have potential for portfolio diversification in bad times. And when the prices of these fuel and non-fuel commodities decrease, there might be a rationale decision to invest in the stock market of Pakistan for gaining reasonable returns.

Based on these findings, this study can be beneficial for the policy makers, Government, foreign and local investors of Pakistan because this gives a guideline to the investors for their portfolio diversification and for gaining more investment opportunities by investing in different types of commodities or KSE 100 index in Pakistan. The limitations of this study are; firstly this study uses the prices of different types of commodity indices and the real prices of each commodity. Secondly, generalizability is another constraint of this study, because this study is the monthly prices of all variables. Hence the results of this study cannot be generalized in to other developing countries. The future research can be done by extending time period of the study in terms of daily prices and instead of using index prices, a research can be conducted on real prices of theses commodities.

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