Relationship between Gold and Oil Prices and Stock Market Returns

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Abstract: This study objective to examine the relationship between gold prices, oil prices and KSE100 return. This study important for the investor whose want to invest in real assets and financial assets. This study helps investor to achieve the portfolio diversification. This study uses the monthly data of gold prices, KSE100, and oil prices for the period of 2000 to 2010 (monthly). This study applied Descriptive statistics, Augmented Dickey Fuller test Phillip Perron test, Johansen and Jelseluis Co-integration test, *Variance* Decomposition test to find relationship. This study concludes that Gold prices growth, Oil prices growth and KSE100 return have no significant relationship in the long run. This study provides information to the investors who want to get the benefit of diversification by investing in Gold, Oil and stock market. In the current era Gold prices and oil prices are fluctuating day by day and investors think that stock returns may or may not affected by these fluctuations. This study is unique because it focuses on current issues and takes the current data in this research to help the investment institutions or portfolio managers.

Keywords: KSE100 return; descriptive statistics; co-integration test; unit root test; granger causality test

JEL Classification: G10; G20

1. Introduction

Gold has been used in market since 1971 as commodity. The importance of gold has been increased in the present world due to the financial crisis in the present economic world. The investors are investing in the Gold. In the recent decade the gold prices and oil prices rise day by day. Pakistan is in possession of 1339.25 tons of gold reserves. Pakistan is the 5th largest country in the world having gold reserve. The production of gold in Pakistan is very low and it has recently joined

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the group of gold producing countries because of Saindak Copper-Gold Project in Baluchistan (Daily Times, 2009). In Present situation gold has attracted the investors due to a little chance to go better outcomes in the stock market investments due to fragile economic and financial position in Pakistan.

In market a market where shares are traded, is called stock market or equity market. In 2002 Karachi Stock Exchange (KSE) Pakistan was declared as a best market in the world by the international magazine Business Week (Bloomberg Business Week, 2002) and with reference to Sheth (2008) also got leading status in global emerging market before 2007. Karachi Stock Exchange (KSE) is working as a main stock exchange of Pakistan watching worst sell-off positions in the present situations. Investors are showing low interest in the stock markets and investing in highly solid investment like gold due to rising trend in gold prices.

The purpose of this study is to explore the relationship between the Gold prices, Stock market return and Oil prices. The data is taken from KSE100 return, Gold price and Oil prices from 2000 to 2010(monthly). This study applied Descriptive statistics, Augmented Dickey Fuller test Phillip Perron test, Johansen and Jelseluis Co-integration test, *Variance* Decomposition test to find relationship between oil prices and Gold prices with KSE 100 Returns. This study concludes that Gold prices growth, Oil prices growth and KSE100 return have no significant relationship in the long run. Further research will be conducted on why Gold prices and oil prices have not significant relationship with KSE 100 returns. Further research will be also conducted on Gold prices and Oil prices relationship with other stock markets returns. Second chapter cover the literature review, third chapter covers the data and methodology, fourth chapter covers the results and their interpretation and the last chapter covers the conclusion and references.

2. Literature Review

Shahzadi And Chohan (2010) conduct study on impact of gold prices on stock exchange by using data from 2006 to 2010 (five years) of KSE (Karachi Stock Exchange) and gold market. This study uses Descriptive statistics, Unit Root Test of Augmented Dickey Fuller (ADF), Unit Root Test of Phillip Perron, Johansen's Co Integration Test and Granger Causality Test (GCT) to find the impact of gold prices on KSE (Karachi Stock Exchange). This study uses average gold prices and KSE-100 index as variables. Stock exchange indices (KSE) taken from Yahoo Finance and gold prices from online website (Forex, 2011). The results shown that there is a negative Correlation between the gold prices and Karachi stock exchange indices, co-integration test provided that there is not a long run relationship between the both variables, Granger Causality test cannot be applied because there is no co-integration between the two variables. So, It is concluded that gold is not the factor to effect the stock exchange, some other factors like security problems,

fragile economic conditions, and instable political environment are directly affecting the stock exchanges. Haroon et al. investigated on the south Asian Equity Market relationship. Four major markets Karachi Stock Exchange, Dhaka Stock Exchange, Bombay Stock Exchange, and Colombo Stock Exchange were taken to examine the relationship. Data is taken from the year 1999 to 2009 on monthly basis. This study uses Descriptive Statistics, Vector Auto Regression (VAR Technique), Unit Root Test, Johansen and Juselius Co-integration Test, Granger Causality Test and Error correction model is used to investigate the relationship among the South Asian Equity markets. Descriptive statistics results show that Karachi Stock Exchange and Dhaka Stock Exchange are found with high returns and high risk, while Bombay Stock Exchange is giving lower returns with high risk. Results of correlation analysis show that there exists no significant correlation between these markets. Correlation results were showing positive correlation but it is very low to establish any significant relationship among these markets.

Kaliyamoorthy and Parithi (2010) conducted a study on relationship between gold market and stock market. NSE monthly index data and monthly gold prices is taken as variable from June 2009 to June 2010. Chi square is applied to find relationship between gold prices and Stock market indices. The result shows that there is no relationship between gold prices and stock market indices. Stock market indices are increased and gold market is also increased, but stock market is not a reason for increase in the gold rates. Another study is made by Nguyen et al. (2010) conducted study on Co-movement of Stock Market and Gold Prices. To analyze the co-movement between markets data collected from seven countries including Japan, Singapore, UK, Indonesia, Malaysia, the Philippines, Thailand and US. This study used data of the indices from 1999 to 2010 to calculate the dependence of gold market and stock market. This study applied correlation, Archimedean copulas and linear convex combination tests to analysis the data. This research result shows that most of the stock market showed no dependence with the gold price while Indonesia, Japan and the Philippines market have left tail dependence. Malaysian stock market has right tail dependence on gold market.

Twite (2000) Studied on Gold Prices, Exchange Rates, Gold Stocks and the Gold Premium. The price of gold-mining stock increases 0.76% for each 1.00% change. The paper initially studies the 12 gold-mining firms in the period January 1985 to December 1998, on changes in the gold price. This research applied Descriptive statistics, computing Beta, correlation and Auto correlation to explore the relationship between the markets. There is no relationship found between gold premium, reserve ratio and gold prices. Toraman et al. (2011) conduct study on the factors affecting the prices of gold. This study takes oil prices, dollar index, Dow Jones Industrial Production Index, USA reel Interest Rates and USA inflation as variables. The study data consist of monthly data beginning from January 1992 to March 2010 of all indices. This study applied augmented dickey fuller test (ADF)

and Phiplip Peron (PP) test to find out unit root. The Correlation, ARCH (Autoregressive conditional heteroskedasticity) model and GARCH (Generalized Autoregressive Conditional Heteroskedasticity) models also applied to find out the relationship. By empirical finding highly negative correlation is found between gold prices and USA exchange rates. The results also indicate that there is a positive relationship between the oil prices and stock prices.

Simakova analyze the Relationship between Oil and Gold Prices for the period 1970 to 2010. Consumer Price Index (CPI), Rate of U.S. three-month Treasury bills (TB3MS), Index of industrial production Gold mining index (GMI), and capacity utilization (IND) are used as variables. The data sample is taken from 2000 to 2010 (131 observations) and 2000 to 2007 (96 observations) to determine the relationship and how other factors influences the stock exchange prices. Granger causality test, Descriptive statistics and Quantitative analysis, Vector Error Correction model are used to find relationship between the gold and oil prices. Quantitative analyses show Co-movement between oil and gold prices. Correlation analyses show co-movement in oil price and interest rates and opposite movement in gold price and interest rates. Co integration test also present long-term relationship between all variables. Bhunia and Das (2012) made a study on the association between gold prices and stock market returns. This study is based on data gathered from different data sources are ministry of finance, NSE database and Bloomberg database (India). This study used Eviews 6.0 program for arranging the data and conducting econometric analyses to use Johansen's (1995) Co-integration Test, Augmented Dickey-Fuller (ADF) Unit Root (1981) Test and Granger (1969) Causality Test. This research used all these tests for the purpose to find association between the variables. This study concluded that the existence co-movement of stock prices and gold prices during the period financial crisis and thereafter. There exist co-integrations in four countries (Japan, Germany, Taiwan, and China) indicates that there exist long-term stable relationships among these variables. While there is no co-integration relationship among these variables and the U.S. stock market.

Mishra et al. (2010) made a study on the volatility of gold price and stock market in India. This study uses data monthly from the database of reserve bank of India. This research analyzes the data from 1970 to 2009 annual price movement of gold in Indian market and stock market, BSE 100 index period January 1991 to December 2009. This study used Augmented Dickey-Fuller unit root, Granger Causality test and Co-integration test. This study tells that there exist long run equilibrium relation between gold market prices and stock market in India. Smith (2001) conduct research is on the relationship between stock exchange prices and gold price using daily, weekly and monthly data from 1991 to 2001. Four gold prices and six stock exchange indices were included in the study. This study takes gold data from three London gold market Prices and US market. For this research

data was taken from six stock exchanges which included Hong Kong stock exchange, Japan, Australia, Germany, France and US stock exchange. A small relationship was observed in the period between gold price and stock exchange price index.

Gilmore at al. (2009) Investigated on the dynamic relationship between stock exchanges indices of gold mining companies, gold prices and co-movements of stock market prices. This research used weekly data of Wednesday from the period of June 5, 1996, to January 31, 2007. This study collected the data from three stock market price indices (LCAP, MCAP and SCAP). The number of total observations is 557 that have been analyzed. This study applied Unit Root Tests, Vector Error-Correction (VEC), and Co-integration technique to examine the relationship among the variables. This research concluded that each stock market index that there is long-run relationship between gold mining company stock prices. Miyazaki et al. (2012) Researched on the dynamic interdependence among gold market and other financial markets including the stock, foreign exchange markets, and bond, by using asymmetric dynamic conditional correlation (A-DCC) model. This study uses descriptive statistics, univariate volatility models, GARCH models, EGARCH model, standard deviation and dynamic conditional correlation model to find the dynamic conditional correlation with conditional asymmetry. The data is taken from London Bullion Market Association (LBMA) from January 4, 2000, to July 29, 2011. S&P500 index and US dollar & Euro exchange rate is taken from the Federal Reserve Bank of St. Louis homepage. World Government Bond Index in US (WGBIUS) is taken as a rate of return on bonds. The results identified that complimentary asymmetry in the dynamic conditional correlation is only between gold and the US dollar & Euro and a structural break is appeared in the dynamic conditional correlation for the pair of gold and S & P500 index after bankrupts of Lehman Brothers.

3. Methodology

Data Collection

This study use secondary data from different websites, journals, books, also from different news papers and reports. This study is used the monthly stock values of KSE100 return (Pakistan) and monthly average gold prices (measured in grams) and oil prices for the period of 2000 to 2010.

This study applied Descriptive statistics to find out the mean, median, standard deviation and skewness of data. Augmented Dickey Fuller Test and Phillip Perron test is applied to find out the unit root. Johansen and Jelseluis Co-integration test is applied to find out the long run relationship between the variables. Granger Causality used to find out the Lead and Lag relationship. Further varience

decomposition and impulse response function is applied to explore the co-movements between KSE100, Gold Prices and Oil prices.

Return on index is calculated as

RT = ln (PT/PT-1)

Where:

RT = Return on month `t`

PT = Index closing prices on month `t`

PT-1 = Index closing prices on month `t-1`

Ln = Natural log.

While Growth in Gold Prices calculated as

GRG = ln (GT/GT-1)

Where:

GT = Return on month `t`

G = Index closing prices on month `t`

GT-1 = Index closing prices on month `t-1`

Ln = Natural log.

While Growth in Oil Prices calculated as

GRO = ln (OT/OT-1)

Where:

OT = Return on month `t`

O = Index closing prices on month `t`

OT-1 = Index closing prices on month `t-1`

Ln = Natural log.

In this research we use and analyze the monthly data of stock exchange market prices and gold prices and Oil prices.

Hypotheses:

H1: There is No Long run relationship exists between gold prices and stock market returns.

Ho: There is Long run relationship exists between gold prices and stock market returns.

H2: There is No Long run relationship exists between oil prices and stock market returns.

Ho: There is Long run relationship exists between Oil prices and stock market returns.

Results

Table 1. Descriptive Statistics

	GOLD	INDEX	OIL
Mean	0.012025	0.014502	0.009181
Median	0.008601	0.017723	0.0217
Maximum	0.102168	0.241106	0.256847
Minimum	-0.124798	-0.448796	-0.403033
Std. Dev.	0.038715	0.089981	0.103374
Skewness	-0.266156	-1.114058	-1.042827
Kurtosis	3.925805	7.719395	5.181337
Jarque-Bera	6.272589	149.8045	50.09499
Probability	0.043443	0	0
Sum	1.587354	1.914199	1.211946
Sum Sq. Dev.	0.196354	1.060648	1.399897

Table 1 represents the descriptive statistics of variables. The table shows the Mean, Median, Maximum, Minimum, Standard deviation and Skewness. The results show that KSE100 has the high return of 0.014502. Gold has growth value of 0.012025 and Oil growth value of 0.00918. KSE100 returns has the standard deviation value of 0.089981, while gold has Standard Deviation of 0.038715 and the Oil standard deviation value is 0.103374.

Table 2. Correlation Matrix

	GOLD	INDEX	OIL
GOLD	1		
INDEX	-0.038619	1	
OIL	0.190822	0.207851	1

Table 2 shows the correlation results for the Gold, KSE and Oil markets that there exists no significant relationship between these markets. KSE100 has a negative correlation with the Gold market. The oil growth has weak positive correlation with the KSE100. However these results provide information to the investors who want to get the benefit of diversification. Correlation is not an authentic measure to

find the co-integration, because it discusses only the relaionship and not the lead lag relationship. So, Co-integration and Granger causality are used to solve the problem.

Table 3. Unit Root Test

	ADF Level	**ADF First Difference**	**Philip perron test**	**PP First Difference**
Gold	1.00425	-10.9787	1.069803	-10.9744
KSE	-0.88868	-10.3078	-0.90602	-10.31061
OIL	-1.38549	-8.89619	-1.4519	-8.89619
Critical Values				
1% level	-3.48082	-3.48122	-3.48082	-3.48122
5% level	-2.88358	-2.88375	-2.88358	-2.88375
10% level	-2.5786	-2.57869	-2.5786	-2.57869

Unit root test is applied to check the stationary of the data. Augmented Dickey Fuller and Phillip Peron test were applied for this purpose. In the table 3 at level the data is not stationary because the calculated values are less than the critical values. The data become stationary at the first difference because the Calculated Values are greater than the critical values. Phillip Peron test applied for the confirmation of stationary of data.

Table 4.1. Multivariate Co-integration Analysis

	Eigenvalue	**Trace Statistic**	**Critical Value**	**Prob.****	**Remarks**
Gold	0.164894	27.18099	29.79707	0.0973	
KSE	0.028071	3.755464	15.49471	0.9223	No co-integration
OIL	0.000415	0.053977	3.841466	0.8163	

To find out the Long run relation then among the variable we applied co-integration test. Results have shown in the multivariate co-integration table 4.1 shows that there exists no co-integration, because the Eigen values and Trace Statistics are less than the critical values. Gold, KSE100 and Oil has less Eigen and trace statistics than the critical values.

Table 4.2. Bivariate Co-integration Analysis

	Eigenvalue	**Trace Statistic**	**Critical Value**	**Prob.****	**Remarks**
KSE	0.028455	3.754244	15.49471	0.9223	No co-integration
Gold	1.11E-05	0.00144	3.841466	0.9682	
KSE	0.135197	20.17772	15.49471	0.0091	No co-

OIL	0.009911	1.294794	3.841466	0.2552	integration

Table 4.2 represents the bivariate co-integration results. The result shows that there is no significant co-integration between Gold prices and stock market return because critical values are greater than Trace statistics. KSE100 and oil have also no co-integration because the trace statistics are less than the critical values. However Co-integration test does not tells the lead lag so Granger causality test is applied for desired results.

Table 5. Pairwise Granger Causality Tests

Null Hypothesis:	**Observations**	**F-Statistic**	**Probability**
Δ KSE100 does not Granger Cause Δ GOLD Δ GOLD does not Granger Cause Δ KSE100	131	0.55513 1.40129	0.4576 1.4013
Δ OIL does not Granger Cause Δ Gold Δ GOLD does not Granger Cause Δ Oil	131	0.00613 3.08045	0.9377 0.0816
Δ OIL does not Granger Cause Δ INDEX Δ INDEX does not Granger Cause Δ OIL	131	1.68383	0.1967 0.2686

Granger Causality test is used to check the lead lag relationship, table 5 shows the related results. KSE100 has no Granger cause with Gold growth. Oil has no Granger cause with Gold growth and Oil has also no Granger cause with KSE100.

Table 6.1. Variance Decomposition of GOLD

Period	**S.E.**	**GOLD**	**INDEX**	**OIL**
1	0.0392	100	0	0
2	0.039304	99.57049	0.424216	0.005293
3	0.039306	99.56299	0.429654	0.007354
4	0.039306	99.56252	0.429929	0.00755
5	0.039306	99.56249	0.429948	0.007564
6	0.039306	99.56249	0.42995	0.007565
7	0.039306	99.56249	0.42995	0.007565
8	0.039306	99.56249	0.42995	0.007565
9	0.039306	99.56249	0.42995	0.007565
10	0.039306	99.56249	0.42995	0.007565

The variance decomposition result shows that the variance occurs in the gold prices due its in fluctuation but negligible changes occur in gold prices due to KSE100 prices and oil prices.

Table 6.2. Variance Decomposition of KSE INDEX

Period	S.E.	GOLD	INDEX	OIL
1	0.090078	0.236861	99.76314	0
2	0.091281	1.185276	97.98617	0.828553
3	0.091374	1.264104	97.85621	0.879684
4	0.09138	1.269744	97.84703	0.883231
5	0.091381	1.270148	97.84637	0.883484
6	0.091381	1.270177	97.84632	0.883503
7	0.091381	1.27018	97.84632	0.883504
8	0.091381	1.27018	97.84632	0.883504
9	0.091381	1.27018	97.84632	0.883504
10	0.091381	1.27018	97.84632	0.883504

The results in the above given table 6.2 shows that change in KSE index 99.76314% is due to its own market fluctuations and 0.236861% change is due to Gold market, and the remaining Oil market have no impact on the KSE100 return.

Table 6.3. Variance Decomposition of OIL

Period	S.E.	GOLD	INDEX	OIL
1	0.100164	3.426002	3.126474	93.44752
2	0.104643	6.670646	4.825922	88.50343
3	0.104971	6.880735	5.008941	88.11032
4	0.104995	6.895482	5.022445	88.08207
5	0.104997	6.896538	5.023414	88.08005
6	0.104997	6.896614	5.023483	88.0799
7	0.104997	6.896619	5.023488	88.07989
8	0.104997	6.89662	5.023489	88.07989
9	0.104997	6.89662	5.023489	88.07989
10	0.104997	6.89662	5.023489	88.07989

In the above table results represents that 93.44752% change in the Oil market is due to its own market fluctuations and 3.126474% change is due to KSE100 return and 3.426002% change is affected by Gold market fluctuations.

4. Conclusion

In this study we take KSE100 return, Gold prices and Oil prices. This study investigates that there is any long run relationship between KSE100 return, Gold prices and oil prices. The result reveals that KSE100 has the high return. Gold and Oil market have low growth. ADF and PP test are used for the stationary of the data and found that the data is integrated at the same level. The results of Multi

variate and and Bivariate co-integration test reveals that there is no co-movement between KSE100 return, Gold growth and Oil growth. The result of Granger Causality test show that KSE100 return has no Granger cause with Gold growth while Gold has Granger cause with Oil growth; Oil has no granger cause with KSE100. The result of Impulse response shows that KSE100 is not influenced by Gold and Oil prices fluctuation, and neither Gold nor Oil markets are influenced by KSE100 return. This study supports the Shehzadi and Chohan (2010) that there is no long run relationship between gold prices and stock market returns. This study suggest that at Stock Market returns are not Influenced by Gold and Oil prices, Further Investors make an investment simultaneously in Gold Market, Oil Marker and Equity Market for the purpose of diversify the investment portfolio.

4. References

Bhunia, D. A. & Das, M. A. (2012). Association between Gold Prices and Stock Market Returns: Empirical Evidence from Nse. *Journal of Exclusive Management Science, Vol 1, Issue 2*, pp. 1-7.

Gilmore, C. G., McManus, G. G., Sharma, R. & Tezel, A. (2009). The Dynamics of Gold Prices, Gold Mining Stock Prices and Stock Market Prices Comovements. *Research in Applied Economics, Vol. 1, No. 1*, pp. 1-19.

Haroon, H., Yasir, H. R., Azeem, S. S. & Ahmed, F. (n.d.). International Portfolio Diversification in developing Equity Markets of South Asia. *Studies in Business and Economics*, pp. 80-100.

Kaliyamoorthy, D. S. & Parithi, M. S. (2012). Relationship of Gold Market and Stock Market: An Analysis. *International Journal of Business and Management Tomorrow, Vol. 2, No. 6, June*, pp. 1-6.

Mansoor, M., Hassan, A. & Hussain, R. H. (2012). Long Run Relationship between South Asian Equity Markets and Equity Markets of Developed World. I*nternational Journal of Management and Strategy, Vol., No.3, Issue 5*, pp. 1-23.

Mishra, P. K., Das, J. R. & Mishra, S. K. (2010). Gold Price Volatility and Stock Market Returns in India. *American Journal of Scientific Research, Issue 9*, pp. 47-55.

Miyazaki, T., Toyoshima, Y. & Hamori, S. (2012). Exploring the Dynamic Interdependence between Gold and Other Financial Markets. *Economics Bulletin, Volume 32, Issue 1*, pp. 37-50.

Shahzadi, H. & Chohan, M. N. (2010). *Impact of Gold Prices on Stock Exchange*, pp. 1-12.

Smith, G. (2001). *The Price of Gold and Stock Price Indices for the United States, November*, pp. 1-36.

Toraman, C., Başarır, Ç. & Bayramoğlu, M. F. (2011). Determination of Factors Affecting the Price of Gold: A Study of MGARCH Model. *Business and Economics Research Journal, Volume 2, No. 4*, pp. 37-50.

Twite, G. (2002). Gold Prices, Exchange Rates, Gold Stocks and the Gold Premium. *Australian Journal of Management, Vol. 27, No. 2*, pp. 123-140.

Nguyen, C., Komorníková, M., Komorník, J. & Bhatti, I. (n.d.). *New Evidence on Asymmetric Co-movement between Gold Prices and Stock Markets with Mixed-copula Analysis*, pp. 1-25.

Šimáková, J. (n.d.). *Analysis of the Relationship between Oil and Gold Prices*, pp. 651-662.

Online Sources:
London Fix Historical gold. (2012, April 4). Retrieved from KITCO: http://www.dailytimes.com.pk/default.asp?page=2011%5C11%5C15%5Cstory_15-11-2011_pg5_1.

Appendix

Impulse response