IMPACT OF GOLD PRICES ON STOCK EXCHANGE: A CASE STUDY OF PAKISTAN

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ABSTRACT:

In the current global financial crisis and credit crunch, stock exchanges around the world in developing and developed countries are showing low level of trading activities. In developing country like Pakistan, various other major factors like devastating security circumstances, fragile economic situation and state of instable political position are also directly affecting the stock exchanges. Karachi Stock Exchange (KSE) as a major stock exchange of Pakistan is watching worst sell-off positions in these circumstances. Investors are showing less interest in the stock markets and investing in precious metals like gold due to increasing trend in gold prices. They have no fear in this kind of investment due to no future loss. Therefore, this behaviour is not only affecting stock exchanges of developed countries but also effecting stock exchanges of developing country like Pakistan. This paper is evaluating the impact of gold prices on KSE which is major stock exchange of Pakistan by using data of five years from 2006 to 2010. For this task, statistical techniques like Unit Root Test of Augmented Dickey Fuller (ADF), Unit Root Test of Phillip Perron, Johansen's Co Integration Test and Granger Causality Test (GCT) have been used.

INTRODUCTION:

In times of national crisis, bank failures, war, invasions and in case of negative real interest rates people consider gold as a solid asset and like to invest in such precious metal. According to Opdyke (2010), the international investors sought a safe haven in the precious metal like gold in the global recession in the history. For example in current unpredicted global financial situation USA, India and China are top three countries consuming major part of globally produced gold. According to Mpofu (2010), China, Australia, USA and South Africa respectively are big giants in the global gold production. Currently in Pakistan, political government is instable, economic indicators are lowering down and stock returns are diminishing due to stumpy activities in stock exchange. Therefore, investors in this great uncertainty are investing in gold bullion rather investing in stock market of Pakistan. In result demand of gold has been increased and Pakistan has become one of top ten consumers of gold. But production of gold in Pakistan is quite low and it has recently joined the group of gold producing countries due to Saindak Copper-Gold Project in Baluchistan (Daily Times, 2009). In 2002 KSE being a major stock market of Pakistan was declared as a best market in the world by the international magazine *Business Week* (Bloomberg Business Week, 2002) and according to Sheth (2008) also got leading status in global emerging market before 2007. But in the current situation gold has pulled the interest of investors because there is a little chance of getting better returns in the stock investments due to fragile economic and financial position in Pakistan.

This Paper examines the impact of gold prices on Karachi Stock Exchange (KSE) which is the main stock exchange of Pakistan. In Pakistan gold prices has crossed the limit of forty four thousand rupees (Rs. 44000) per Tola in December, 2010 due to international rising gold prices (Forex, 2011). This increasing trend is attracting potential investors and diverge current investors from stock investments. In this scenario it is necessary to scrutinize the stress of this factor on major stock exchange of Pakistan. For this task the statistical techniques Unit Root Test of Augmented Dickey Fuller (ADF), Phillip Perron, Johansen's Co Integration Test and Granger Causality Test have been used in this paper. This study is analysing the long term impact of gold prices on the Karachi stock market (KSE-100 index).

Hence this paper has been organized into six sections to understand this situation and trend. Section II provides a brief history of Karachi Stock Exchange (KSE). Section III presents an overview of empirical literature which interlinks gold prices and stock

exchange. Section IV describes data and methodology adopted in the study. Section V discusses the empirical results. Section VI concludes the results.

BRIEF HISTORY OF KARACHI STOCK EXCHANGE:

In 1947, after the independence from British rule in newly born country, Pakistan, Karachi Stock Exchange (KSE) was founded in Karachi in order to provide hub for trading activities in financial capital of Pakistan (Bloomberg Business Week, 2011). It got registration after few years of its establishment and became Karachi Stock Exchange Limited. In 1950s, there were only 5 listed companies and 90 members in this exchange. But after that it has experienced remarkable progress and reached at the level of 651 listed companies and 200 members in first decade of 21st century (Karachi Stock Exchange, 2011). KSE started its computerized operation in 1997 by using KATS (Karachi Automated Trading System). KSE attracted local and foreign investment when in 2002 it was declared as one of the best performing markets in the world by an international magazine *Business Week* (Bloomberg Business Week, 2002). Due to huge business in KSE during this period demand for Trading Workstations increased. Hence these workstations were significantly increased and crossed the level of 1000 KATS workstations (Naqvi, 2011). In addition already installed KATS workstations upgraded and internet trading facility was also provided on these stations.

In the last decade of 20th century Karachi Stock Exchange introduced KSE 50 Index but it could represent the stock market performance due to continuous growth. Hence a capital weighted KSE 100 Index was introduced in order to absorb contentious investment and to show clear stock market performance. Karachi Stock Exchange also introduced KSE All Share Index in 1995 and KSE 30 Index in 2006. Currently, it has the status of oldest exchange in Pakistan and successfully trading in these three world famous indices. Up to 2010, KSE has volume of US$ 12 billion and market Capitalisation US$ 32.5 billion (Karachi Stock Exchange, 2011).

LITERATURE REVIEW:

According to a study by Levin and Wright (2006), gold is considered as a store of value (without escalation) whereas stocks are regarded as return on value (escalation from probable real price increase plus dividends). This view gained attractiveness in 19th century due to stable political climate with strong property rights and little turmoil in USA. But according to Pritchard (2010) recent global recession has contradicted this view and once again investors

are converging on gold investments. Trend in stock investment has sharply declined and many stock markets in the world have been crashed. Therefore, in addition to various other factors demand of gold has appreciated the value of gold price. In 2005 before the global recession, the price of gold was around at the level US$415 per ounce which crossed the limit of US$1000 per ounce in March 2008 while currently it has reached at the record height of US$1421 per ounce in November 2010 (Forex, 2011).

Levin and Wright (2006) also presented the short-run and long-run determinants of price of gold on the basis of a theoretical framework of simple economics of ‘‘Supply and Demand’’. According to this modal, total supply of gold is a function of the price of gold and short run fluctuations in the gold price are caused by political instability, financial turmoil and changes in exchange rates and real interest rates. In this study three main findings relating to long-run detriments of price of gold shows that there is a long-term relationship between the price of gold and US price level; US price level and the price of gold move together in a statistically significant long-run relationship; and finally in the wake of shock causes deviation from this relationship. This study also demonstrates that there is positive relationship between gold prices and changes in US inflation, nevertheless negative relationship was found between changes in the gold price and changes in the US dollar trade-weighted exchange rate and the gold lease rate.

Many economic variables including gold prices have effect on the stock markets. Ratanapakorn & Sharma (2007) examined the long-term and short-term relationships among the U.S. stock price index (using the S & P 500) and macroeconomic variables by using first quarter 1975 to fourth quarter 1999. Results extracted from this study indicate that the stock price index and long-term interest rate are negatively correlated, but money supply, industrial production index, inflation rate, exchange rate, and short-term interest rate are positively correlated. Kolluri (1981) in a study pointed out that an association does exist between the gold price and inflation rate, which can be utilized for hedging and other activities. On the contrary, the conclusions of Mahdavi and Zhou (1997), Blose and Shieh (1995), Chan and Faff (1998) found that gold is no longer an inflation protective asset.

Moore (1990) derived the result on the basis of empirical results from 1970 to 1988 that gold price and the stock/bond markets had a negative correlation, it means when gold prices are rising, the stock/bond markets are declining. Büyükşalvarcı (2010) confirmed this finding by

analyzing the effects of seven macroeconomic variables (consumer price index, money market interest rate, gold price, industrial production index, oil price, foreign exchange rate and money supply) on the Turkish Stock Exchange Market and found that gold is an alternative investment tools for Turkish investors. So as the gold price rises, Turkish investors tend to invest less in stocks, causing stock prices to fall. Therefore, there is a negative relationship between gold price and stock returns. Another study from South Asia Sharma & Mahendru (2010) examined the impact of Macro-Economic variables on stock prices in India and used the macroeconomic variables like change in exchange rate, foreign exchange reserves, inflation rates and gold prices. This study covers the period of January 2008 to January 2009 and results revels that exchange rate and gold prices highly affect the stock prices.

Wang, Wang and Huang (2010) used the oil prices, gold price, and exchange rates of dollar in contrast with currencies and stock markets of Germany, Japan, Taiwan, China and USA. This study derives results from empirical results that there exists co-integration and long-term stable relationship among these variables in the mentioned countries except USA. Nevertheless, there is no co-integration and long-term stable relationship among these variables in USA.

Graham (2001) examined how there is short-term interaction and long-term equilibrium between the gold price and stock prices. According to this study there is no obvious relationship in the long run, but in the short run, the gold price is affected by the stock price.

DATA DESCRIPTION AND METHODOLOGY:

This study is based on the monthly closing values of KSE-100 index (Pakistan) and monthly average gold prices (used in grams) in Pakistan for the period 1 Dec,2005 to Dec 31,2010 and closing values of KSE-100 index has been taken from Yahoo Finance and values of gold prices has been taken from online site (Forex, 2011). The compounding rate of returns are calculated by using that formula,

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

Where, $\mathbf{R_t}$ = Return on day‘t’

$\mathbf{P_t}$ = Index closing value on day‘t’

$\mathbf{P_{t-1}}$ = Index closing value on day t-1

ln = Natural Log

In order to test the relationship among these variables, several methods are available. In this study the emphasis is given to test the relationship between the stock market of Pakistan with that of historical gold prices in Pakistan, by using (i) Descriptive Statistics; (ii) Correlation Matrix; (iii) Co Integration tests and (iv) Ganger causality test.

Co Integration analysis requires that time series should be integrated of the same order. Unit Root test has been used to check the stationary of time series. Augmented Dickey-Fuller Test (ADF) and Phillips-Perron test have been employed for this purpose.

The Augmented Dickey Fuller test is used to test the presence of single unit root test. ADF technique presumes that variance is constant and error terms are statistically independent. Constant variance is rather a stringent notion so an alternative test i.e. Phillip Perron test is applied to ensure the stationary of the time series.

Co Integration test is analyzed by applying the Johansen-Juselius (1990). This test is used to evaluate the long term relationship between variables. The purpose of Johansen-Juselius (JJ) test is to have likelihood ratio for the determination of Co Integrated vectors. In order to run the JJ test a lag length is determined from Vector Auto Regression (VAR) test. A lag length is selected on the basis of Schwarz information criteria; the maximum negative value of Schwarz is taken. If Johansen Juselius test confirms the long term relationship among the variable, then there must be Granger Causality exist between pair variables. Granger causality test was proposed by C.J granger in 1969.This test analyzes the lag lead relationship in the sample. The acceptance of hypothesis is at the 0.05 level of significance, with having F-test. This gives the leading relationship between two variables.

EMPIRICAL RESULTS:

Descriptive statistics for Karachi Stock Exchange (KSE-100) and average Gold prices are given in the **Table 1**. This includes the description of mean, standard deviation, kurtosis, skewness and variance etc. A careful study shows that average Gold prices have Mean value of 21092.21 and Karachi Stock Exchange has a Mean value of 10585.21 and average Gold prices has a standard deviation of 8412.146 and Karachi Stock Exchange of 2309.466.

Table – 1: Descriptive statistics

	Gold Prices	Karachi Stock Exchange (KSE-100)
Mean	21092.21	10585.21
Median	19918.41	10505.09
Maximum	39122.32	15125.89
Minimum	10798.39	5377.42
Std. Dev.	8412.146	2309.466
Skewness	0.518222	-0.024289
Kurtosis	2.066526	2.809855
Variance	70764204.35	5333632.231
Jarque-Bera	4.863973	0.096287
Probability	0.087862	0.952997
Observations	60	60

Table 2 shows the results of correlation matrix and it indicates that Karachi Stock Exchange (KSE-100) is negatively correlated with average Gold prices but not perfectly negative correlated because this negative relation is not much strong as the value lies as -0.343021 for correlation with Average Gold Prices but there exists an opposite movement direction among average Gold prices and Karachi Stock Exchange.

Table –2: Correlation Matrix

	Gold Prices	Karachi Stock Exchange (KSE-100)
Karachi Stock Exchange	-0.343021	1
Gold Prices	1	-0.343021

Correlation analysis is not a strong technique because it does not discuss the cause and effect relationship. In order to know a clear picture of the relationship we perform Co Integration analysis that tests the co-movement of KSE-100 and average Gold prices.

In order to run the Co Integration analysis the series should be stationary. So, in the first step, the stationarity of the series has been tested. Table 3.1 reveals that time series are not

stationary at levels. However, Table shows that the KSE-100 and average Gold price series are stationary at 1st Difference [1(1)]. **Augmented Dickey Fuller Unit Root Analysis** test reveals that errors have constant variance and are statistically independent.

Table – 3.1: Unit Root Analysis (Augmented Dickey fuller)

	Augmented Dickey Fuller (LEVEL)	**Augmented Dickey Fuller (1st Difference)**
Gold prices	0.969508	-9.195997
Karachi stock exchange	-1.495143	-6.811781
critical values		
1%	-3.544063	-3.546099
5%	-2.91086	-2.91173
10%	-2.59309	-2.593551

An alternative test of **Unit Root Tests i.e. Phillip Perron** test is used to check the stationarity of the data. This test allows the error variance to be heterogeneously distributed and less dependent. **Table 3.2** proves the results of previous test (table-3.1) that all series are stationary at **1st Difference [1(1)]**. So, Co Integration test can be applied on these variables.

Table –3.2: Unit Root Analysis (Phillip-Perron)

	Phillips-Perron (LEVEL)	**Phillips-Perron (1st Difference)**
Gold prices	-1.495022	-9.316951
Karachi stock exchange	-1.614288	-6.86179
critical values		
1%	-3.544063	-3.546099
5%	-2.91086	-2.91173
10%	-2.59309	-2.593551

Johansen Co Integration Test (Trace Statistics and Max Eigen) is used for analyzing the co integrating vectors between Karachi Stock Exchange and average Gold price time series. It shows a long term relationship among dependent variable (KSE-100) and independent

variable (Average Gold price). Results of this analysis (Trace Statistics) are given in the **table 4**.1. This assures long term relationship does not exist among the variables.

Table –4.1: Bivariate Co Integration Analysis Trace Statistics (lag 2)

	HYPOTHESIS	**Eigen value**	**Trace statistic**	**0.05 Critical Value**	**Prob.****	**Remarks**
KSE 100 - Gold Prices	r = 0	0.086459	5.24476	14.2646	0.7107	**No Co-integration**
	r ≤ 1	0.033319	1.96543	3.841466	0.1609	
Trace test indicates no co integration at the 0.05 level						
* denotes rejection of the hypothesis at the 0.05 level						

Max-Eigen value statistics test is used to confirm the results of co integration Trace statistics analysis. It also ensures 2 co integrating equations have no level of significance. Results are given in the **table 4.2**.

Table –4.2: Bivariate Co Integration Analysis Max-Eigen Value Statistics (lag 2)

	HYPOTHESIS	**Eigen value**	**Max-Eigen statistics**	**0.05 Critical Value**	**Prob.****	**Remarks**
KSE 100 - Gold Prices	r = 0	0.088303	5.26951	14.2646	0.7075	**No Co-integration**
	r ≤ 1	0.033516	1.94315	3.841466	0.1633	
Max-Eigen value test indicates no Co Integration at the 0.05 level						
* denotes rejection of the hypothesis at the 0.05 level						

If Co Integration exists between the variables then there must exist a paired **Granger-Causality** between the variables. **Table 4.2** shows that long term relationship does not exist among the variables. So, **Granger- Causality test** cannot apply on these variables because it cannot determine the direction of causality in the right way.

CONCLUSION:

In conclusion we can say that there is a negative relationship between monthly average gold prices and KSE 100 index. But there is no perfectly negative relationship. These results depict long term relationship. In this study we applied Unit Root Augmented Dickey Fuller Test for the Stationary time series trend. When we applied Correlation test, it proved that the average gold price had a negative relationship with the KSE. In another test, we applied Co-

Integration Test on the basis of monthly data to analyze the long term relationship between average gold prices and KSE 100 index. But from this test it was proved that there was no existence of long term relationship between these two variables. In this model, we used maximum negative value of Schwarz information criterion which gives Lag length 2 for analyzing the effects along the period of time. Final test, Granger causality test cannot apply on these variables because Co Integration does not exist between the gold prices and KSE-100 index.

Other researchers can study these two variables (i.e. average gold prices and KSE) in short term relationship and impact of other macro variables on KSE. More studies can also be conducted by using the average Gold prices in ounce rather in grams and effect of average gold prices on Stock Exchanges of other South Asian counties like India, Bangladesh, Nepal, Bhutan, Maldives and Sri Lanka.

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