

Causal Relationship between Gold, Crude Oil & US Dollar Rates and S&P BSE 100 in India: An Experimental Study

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Abstract

In the present globalised business scenario, volatility in gold price, international crude oil price, and US Dollar exchange rate are likely to stimulate uncertainty in stock market conditions globally. The degree of uncertainty in stock market is high in the case of developing nations like India. Therefore, the study of causal relationship of gold, crude oil, and US Dollar rates with the stock market indices (S&P BSE 100) in India is more appropriate. The researchers have analysed these macroeconomic variables along with the S&P BSE 100 with the help of econometric tools viz. Augmented Dickey-Fuller Test for Unit-Root, Johansen Co-Integration Test, Pairwise Granger Causality Tests, Vector Auto Regression Modeling, Variance Decomposition test, and Impulse responses analysis. The econometric research software called EVIEWS 6 was used to apply all those tools successfully. The result shows that there is a high impression in the Indian stock market due to the volatility happens in the described macroeconomic factors.

Keywords: Macro Economic Variables, S&P BSE 100, Causal Relationship

1. Introduction

In the globalised era, financial markets had undergone continuous and significant changes. These changes have affected rising and developed economies, especially in terms of eliminating restrictions with regard to capital movements. Further, due to technological advances, individual and institutional investors are allowed to trade worldwide on a twenty-four hours basis in any market. The liberalised and technically advanced markets have become more integrated over time and it is particularly true in the case of financial markets. In many developing

countries like India, there has been marked change in the principles of the government towards integration of Indian economy with the world economy. When the markets experience an increase in their level of integration, shocks and events that happen in one market immediately affects the other interlinked financial markets and it has an impact upon the benefits that investors obtain from diversifying their portfolios internationally. If this is the case, and the markets are highly integrated, these benefits will be eradicated in the long-term and investors with long horizons may not benefit from their portfolios (Morales, 2009). There will also be a direct effect on the financial stability of the financial market since the negative and positive effects will spread among the co-integrated capital markets.

On the other hand, there is a common belief that the prices of commodities tend to move in unison since they are influenced by common macroeconomic factors like interest rate, exchange rate and inflation (Hammoudeh, Sari, & Ewing, 2008). Among other macroeconomic factors, oil and gold are the two strategic commodities which have received close attention recently due to the surge in their prices and the increase in their economic uses. In the world, the most commonly traded commodity is crude oil and its price is the most volatile in the commodity market. Gold is considered as the leader in the precious metal market and it is also an investment asset commonly known as a 'safe heaven' to avoid the increasing risk in the financial markets. Investors from both developing and developed markets, often switch between oil and gold or combine them to diversify their portfolios (Soytas, Sari, Hammoudeh, & Hacıhasanoglu, 2009).

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In 2009, oil prices had risen while the dollar continued to crash down but before oil's price surge, the dollar was strong. Many of the economists and researchers believe that the oil and dollar exchange prices are inversely correlated since oil is driving down the value of the dollar. Prior to 2007, oil and dollar were believed to be positively correlated, oil is bought and sold in US dollars, therefore as oil price goes up, so does the global demand for dollars.

The above features describing capital market, US Dollar exchange rate, oil, and gold justify the economic importance of investigating the relationship between these. Further, their special features make these not only influenced by ordinary forces of supply and demand but also by other forces. Hence, there is a need for expanding and shedding light for a better understanding of the true nature of relationships between the market around the world, and especially with regard to the inter-linkages among these market variables.

2. Review of Literature

Sharma and Mahendra (2010) made a study to evaluate the long-term relationship between BSE and Macro-economic variables (exchange rates, foreign exchange reserve, inflation rate, and gold price) for the period from January 2008 to January 2009 using multiple regression models. The study reveals that exchange rate and gold price influence the stock prices in India.

Le and Chang (2011) have made a study to investigate the relationships between the prices of two strategic commodities, that is, gold and oil in terms of index of US Dollar by using monthly data from January, 1986 to April, 2011 with the application of financial econometrics. Empirical results of the study showed that there is a long-run relationship existing between the prices of oil and gold and the oil price can be used to predict the gold price.

Hosseini, Ahmad, and Lai (2011) examined the relationships between stock market indices and four macroeconomics variables, namely crude oil price, money supply, industrial production, and inflation rate in China and India using yearly data between January 1999 and January 2009. The study points out that there are both long and short run linkages between macroeconomic variable and stock market index in each of these two countries.

Dasgupta (2012) has made a study to examine the long-run and short-run relationships between BSE SENSEX

and four key macroeconomic variables (wholesale price index, index of industrial production, exchange rate and call money rate) of Indian economy by using monthly data from April, 2007 to March, 2012 with the application of financial econometrics. Empirical results of the study showed that there are no short-run causal relationships between SENSEX and four macro-economic variables but confirmed long-run relationships between BSE SENSEX with index of industrial production and call money rate.

Samanta and Zadeh (2012) examined the co-movements of selected macro-variables (gold price, stock price, real exchange rate, and crude oil price) based on 21 years data using econometric models for the periods from January 1989 to September 2009. The study exposes that there is a co-integration relationship between the variables.

Kaliyamoorthy and Parithi (2012) have made a study to examine the relationship between gold price and stock market for the period from June 2009 to June 2010. They prove that there is no relationship with the stock market and gold price and stock market is not a ground for rising gold price.

In a study, Basci and Karaca (2013) examined the relationship between ISE 100 Index and a set of four macroeconomic variables using Vector Autoregressive (VAR) model. Variables they used in their model are Exchange, Gold, Import, Export, and ISE 100 Index. ISE 100 Index is a dependent variable and the others are independent variables. In the study they used 190 observations for the sample period from January, 1996 to October, 2011. All variables have seasonal movements. After seasonal adjustments, all series have had stationary in their first difference. After determining optimal lag order, it was given one standard deviation shock for each series and their response. And in variance decomposition carried out subsequently, it has been determined that especially as of the second default of exchange, it was explained 31% by share indices.

Luthra and Mahajan (2014) studied impact of macro-factors on BSE Bankex. The Bombay Stock Exchange launches the BSE Bankex index in the year 2003 and this index consists of major public and private sector banks listed in BSE. Further, they selected four macroeconomic factors namely Inflation rate, Exchange rate, GDP, and Gold price. They studied the intensity of relationship between these macro factors and BSE Bankex using 10 years monthly average index. The researchers used

SPSS for develop a multiple regression model and which showed the regression co-efficient between the share prices and various factors affecting the same. Regression results indicate that Exchange rate, Inflation, GDP growth rate affect banking index positively whereas Gold prices have negative impact on BSE Bankex but none of them have significant impact on Bankex.

In a study Bhunia and Pakira (2014) have investigated the affiliation between three financial variables of gold price, exchange rates and Sensex between 1991 and 2013. For the study, they used econometrics models namely unit root test, granger causality test, and Johansen co integration test. They found that Johansen cointegration test result indicates that there exists a long-term relationship among the selected variables. The Granger causality test result shows that there must be either bidirectional or no causality among the variables.

Sood, Bapna, Totala, and Saluja (2014) examined the effects on gold returns by the important and highly traded financial assets - Gold ETFs, Gold Futures, BSE SENSEX, and S&P CNX NIFTY. The research also explores the correlation and their impact on each other individually and collectively with respect to volatility clustering by using GARCH (1, 1) Model. The study shows that while inefficiency is present in the gold, Gold ETFs, Gold Futures, BSE SENSEX returns and S&P CNX NIFTY returns together affect the volatility of gold returns for the period 2011-2013.

Banumathy and Azhagaiah (2014) examined in a study that there exists a causal link between BSE Sensex and gold price. Time series data (monthly) of BSE Sensex and gold price for the period from January 2004 to December 2013 are used. To provide evidence on the existence of causal relationship between the variables, the Granger Causality test employed. Johansen cointegration results show that there is a cointegration between the two variables chosen which leads to prove the existence of causal relationship between them. The study found that there is a existence of a causal relationship, which is running from Sensex to gold however there is no such relationship existing from gold to Sensex, and therefore the study concludes that there is a unidirectional relationship between stock price and gold price

Timwar and Gupta (2015) examined the causal relationship between gold prices and stock market returns in India. The researchers have used nine years' monthly

average BSE index and gold price data for this purpose and they used ADF unit root test and granger causality test. For the purpose of analysis, linear deterministic trend and lags interval in first differences have used. The study found that the time series are not stationary at levels and selected time series are stationary at first difference. Granger Causality test indicates that no causal relationship exist between gold price and BSE sense.

3. Statement of the Problem

As world economy is not steady due to various businesses, political, social and more importantly globalised economic environments, Indian economy also faces the same problem, which in recent times has resulted in decline in the GDP growth and increasing inflation rate. In many developing countries like India, there has been a marked change in the principles of the government towards integration of Indian economy with the world economy. Volatility in gold price, international crude oil price, and US Dollar exchange rate are likely to stimulate uncertainty in stock market condition. In this regard, the study of relationship between Indian stock market indices and gold, oil and exchange rates shall help the investors in making adjustments in the organisation and management of their portfolios with a view to achieve optimum levels of return. Such a study at macro level shall help the policy makers to evolve macro level policies to redress the various problems encountered by the Indian stock market and investors. Hence the study titled "Casual relationship between Gold, Crude Oil & US Dollar Rates and S&P BSE 100 in India: An Experimental Study" has been undertaken in order to address the above discussed problems in India.

4. Methodology

This study investigates the relationship between the selected indexes in the long run as well short run. The researcher has also studied the linkages between the stock index and other important economic variables. In line with this objective, the researcher has used both quantitative and qualitative methodology. For the qualitative analysis, the researcher has used the empirical evidences from literature review regarding the macroeconomic factors affecting the stock market. The preliminary variables identified for the basic model are variables that have been derived from the previous studies and theories. Theories and previous studies suggest the macroeconomic variables

such as exchange rates, oil price, and gold price influence each other. The exchange rate considered was the RBI reference rate of daily nominal spot rate i.e., rupee per US dollar price as available for each foreign exchange market day under the study period. For oil prices, OPEC countries prices are taken into consideration. The gold price taken for consideration is the monthly average price obtained from the World Gold Council. S&P BSE 100 Index is considered as the benchmark index since this index is comprehensive and the data are available for analyses and is used to measure the market price movements of Indian securities. The main objective of this study is to perform an in-depth research that leads to the outcome of adding relevant empirical evidence to the analysis of relevance of macroeconomic factors for the Indian Stock Market. Therefore, the initial hypothesis of this research postulates a lack of integration between financial markets and selected macroeconomic variable in emerging economies.

This research approach differs in a number of aspects from previous studies in the existing literature. First, the data used for the study covers a longer period and further up to recent years (1990 to 2015) than existing studies in the area. Second, the research focuses on studying the inter relationship and inter dependence between equity, dollar, gold, and oil markets in a combined manner which is a clear distinctive feature of this research work. Third, the relationship between these economic variables will be analysed with a particular emphasis on the emerging market i.e. India.

Since the present study relay on the economic variables that required secondary data. Hence, the present data have been collected from various sources like, websites, journals, books and the thesis. Monthly average closing value has been taken for representing the series of S&P BSE 100 index and the same has been collected from the BSE website. The monthly average gold price as well as the monthly average of US Dollar exchange rate against Indian rupees has been collected from Reserve Bank of India (RBI) website. The monthly average Brent oil price has been collected from the U.S. Energy Information Administration website.

To satisfy the objectives of the study, various time series econometrics models were used. The econometric analysis has been carried out with the help of the computer software called EVIEWS 6. The tools used for

the analysis are Augmented Dickey-Fuller Test for Unit-Root, Johansen Co-Integration Test, Pairwise Granger Causality Tests, Vector Auto Regression Modeling, Variance Decomposition test, and Impulse responses analysis.

5. Results and Discussions

Table 1 presents the summary of descriptive statistics for the sample financial & commodities variable price returns during the study period. Volatility is high in the case of gold price and stock price. Skewness was negative in the case of Dollar exchange rate and the kurtosis is more than 3 for US Dollar price and Gold price but for BSE 100 and oil price it was close to 3. Further, the probability value of all the variables is 0 except US Dollar, signifying that the distribution is leptokurtic. In case of US Dollar also, probability value is 0.067 signifying that the distribution is leptokurtic at ten percent level.

It is clear from Table 2 that calculated value of the test statistic 't' is less than its critical value (3.452) in all the selected indexes and all the probability value also greater than 0.05, the null hypothesis is accepted, which means for the series BSE 100, Exchange rate of dollar and oil price, unit root exists and they are non-stationary at its levels. Even though at this level all the data has unit root, the unit root tests reject the same null hypothesis i.e. in the first differenced form of the series. At their first difference the calculated |t| is more than the critical value 3.452 and all the probability value also less than 0.05 (Table 3). Hence, the null hypothesis is rejected, which indicates that in the first differenced form, all the series are stationary. Therefore, each time series data is integrated in order one, or I (1).

The results of pair-wise Granger causality between selected time series are contained in Table 4. It has been found that causality between US Dollar exchange rate and BSE 100 is at 10 percent significance level. There exists unidirectional causality between BSE 100 and gold price, BSE 100 and oil price, gold price and US Dollar exchange rate, oil price and US Dollar exchange rate and oil price and gold price. From the Granger causality analysis it is concluded that there is short run and interchangeable lead-lag relationship between the variables

From Table 5, it is inferred that the trace statistics and Max-Eigen value are lesser than the critical value (none), which has not established a long-run co-integration

relationship in the model, since the p value is not significant at 5% level. Therefore, as per trace statistics, H0: “there is no co-integration between the variables” is accepted at 5% level of significance, which implies that there is no co-integration equation (since p value is more than 0.05) between the selected time series viz., BSE 100, US Dollar exchange rate, oil and gold price. Since the selected time series are not co integrated, the study does not prove for the presence of long-run relationship between them and hence H0: “there is no co-integration relationship between time series” is accepted.

By applying VAR model, it has been observed that the integration of the time series with others can be established if the table value is more than 1.96. Table 6 shows that BSE-100 index at the lag of 1 had influence on the returns of BSE 100 and oil price index since value 1.87 is very closer to the table value. However, with a lag of 2, it had no influence on the returns of each of the indexes under the study. The index of US Dollar exchange rate at the lag of 1 and 2 had influence on the returns of US Dollar Exchange rate indexes. At the lag of 1, gold price index only, gold price indexes has influenced and others not influenced while at lag order 2, none of the indexes has influenced under the study. The oil price index at the lag order 1, oil price index and gold price index has influenced while at lag order 2, only oil prices index has influenced. The estimated integration of variables is given in equation form as given below.

Equation 1: $BSE_100 = 0.982034453957 * BSE_100(-1) + 0.00340614078772 * BSE_100(-2) - 10.461820861 * DOLLAR(-1) + 14.1940888407 * DOLLAR(-2) + 0.028881816779 * GOLD_PRICE(-1) - 0.0210635826603 * GOLD_PRICE(-2) + 0.0614300246421 * OILPRICE(-1) - 1.54697832593 * OILPRICE(-2) - 97.0981855647.$

Equation 2: $DOLLAR = -0.000342235774477 * BSE_100(-1) + 0.00025985800017 * BSE_100(-2) + 1.20492303477 * DOLLAR(-1) - 0.218857998276 * DOLLAR(-2) - 7.64335362239e-05 * GOLD_PRICE(-1) + 8.50349304638e-05 * GOLD_PRICE(-2) - 0.00199279319082 * OILPRICE(-1) + 0.00898613098691 * OILPRICE(-2) + 0.526349705558.$

Equation 3: $GOLD_PRICE = -0.149845093375 * BSE_100(-1) + 0.178854665399 * BSE_100(-2) + 16.880050776 * DOLLAR(-1) - 18.8809496319 * DOLLAR(-2) + 1.03418072005 * GOLD_PRICE(-1) - 0.0450457473122 * GOLD_PRICE(-2) + 12.8184385994$

$* OILPRICE(-1) - 9.98192765419 * OILPRICE(-2) + 55.2001721472.$

Equation 4: $OIL_PRICE = 0.0019299103744 * BSE_100(-1) - 0.00147181129018 * BSE_100(-2) - 0.521535421842 * DOLLAR(-1) + 0.492642350114 * DOLLAR(-2) + 0.000793233489474 * GOLD_PRICE(-1) - 0.000713051438544 * GOLD_PRICE(-2) + 1.33865179855 * OILPRICE(-1) - 0.390974172609 * OILPRICE(-2) + 1.67992338486.$

To check the percentage change in the variable, if a shock is introduced in the residual series the Variance Decomposition Analysis was done. In the analysis one standard deviation shock is assumed in residual series.

From Table 7 it can be concluded that when there is one standard deviation change in residual BSE 100 equation, in short term i.e. three months, 99.73% of change happens in BSE, 0.013% change in dollar, 0.247% in gold price, and 0.009% in oil price (total being 100). Likewise with one standard deviation change in residual BSE 100, in long run i.e. twelve months, 95.74% of change happens in BSE 100, 1.238% change in dollar, 1.030% in gold price, and 1.989% in oil price (total being 100). Further it is clear from the table that, the level of influence of long run shock in BSE 100, is increasing dollar exchange rate and oil prices as comparing with short run shock in BSE 100.

To know the variable responds to one standard deviation shock in residual series the impulse response analysis is used and the result shows that the BSE series increases over the 12 months period and becomes highest positive in the long run. Where dollar prices increase from negative value to positive value in long run, gold price is starting at neutral value and has increased to highest positive value in fifth month and after that the value has become decreasing in trend. Oil price is increasing in trend, though negative throughout the period.

6. Conclusion and Managerial Implications

This study aims at investigating the relationship among the S&P BSE 100, US Dollar exchange rate, crude oil price, and gold price in India. The major conclusion of the study is that the selected time series exhibits non-stationary and therefore provide indication of long-term co-integration relationship. In short, selected time series variables are closely interlinked. US Dollar exchange

rate and oil price are essential unpredictable variables that operate as channel during which the stock prices are associated. The Granger causality test reveals that the US Dollar exchange rate, gold, and oil price instability has an influence on each other. However, BSE 100 does not cause other series. Further, it is clear from the result that the level of influence of long run shock in S&P BSE 100 is increasing dollar exchange rate and oil prices as comparing with short run shock in BSE 100. Hence this study has the following managerial implications as suggestions in general:

- Investors are advised to take informed decisions by considering the global economic and political environments for mitigating investment risks in their investment portfolio.
- Stakeholders and policy makers keep informing the investors about market information and other profitable investment avenues by hedging their portfolios so that shocks in an index will not affect their portfolio.
- Legitimate risks return strategies help in controlling unpredictability, which needs to be guaranteed by the policy makers. In its absence, the informed and institutional financial specialists will move in the opposite direction of the capital markets. Regardless of the fact that they partake, they may fall back on unscrupulous methods for benefit making open doors prompting higher instability.
- Numerous speculators maintain a strategic distance from securities exchanges because of data asymmetry. The controllers and approach producers need to make strides for proficiently scattering data about the market. The premise of benefit valuation must be entirely bound to the financial basics, so that speculators can't make strange additions.
- With everything taken into account, keeping in view the nature and ramifications of unpredictability, it is fitting to consistently concentrate on available data to distinguish the components that have suggestions for its real market makers, the detail arrangements that will help to settle and to hold these variables under control.
- It is likewise fitting that macroeconomic approaches in regards to these variable sought to, at all times, take perception of the conceivable impacts that such strategies will have an impact on stock value changes and the capital markets by and large. Such an all-

encompassing way to deal with approach plan will help guarantee and security in the capital business sector and accordingly diminish the likelihood of crashes in share prices, which may prompt disequilibrium in the capital business.

The above discussed managerial implications have the immense use for the policy makers to make appropriate decision for mitigating the problems faced by the investors while their investments by unpredictable shocks in the economy.

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Annexure

Table 1: Descriptive Analysis

	BSE_100	DOLLAR	GOLD_PRICE	OILPRICE
Mean	2804.215	42.04407	10277.01	47.94413
Median	1513.46	43.9519	5293.6	28.645
Maximum	8994.46	63.8937	31672.83	133.9
Minimum	361.36	17.295	3284.8	9.8
Std. Dev.	2258.261	10.09708	8755.51	35.41168
Skewness	0.753037	-0.323525	1.32593	0.823104
Kurtosis	2.26895	3.118707	3.228627	2.222032
Jarque-Bera	35.0337	5.409559	88.55793	41.44046
Probability	0	0.066885	0	0
Sum	841264.4	12613.22	3083104	14383.24
Sum Sq. Dev.	1.52E+09	30483.34	2.29E+10	374942.2
Observations	300	300	300	300

Source: Data Analysis Eviews Out put

Table 2: Unit Root Test results at Level with Constant

Period 1990-2015	Variable	No. of Observation	ADF Test Statistic	Critical Value@ 5%	P Value
Level	BSE-100	299	0.393	-3.452	0.9824
Level	Exchange rate of Dollar	299	-1.470	-3.452	0.5474
Level	Gold Price	299	1.161	-3.452	0.9979
Level	Oil Price	299	-1.859	-3.452	0.3513

Source: Data Analysis

Table 3: Unit Root Test results at first differenced form series with Constant

Period 1990-2010	Variable	No. of Observation	ADF Test Statistic	Critical Value@ 5%	P Value
First Difference	BSE-100	298	-16.814	-3.452	0.0
First Difference	Exchange rate of Dollar	298	-12.906	-3.452	0.0
First Difference	Gold Price	298	-15.771	-3.452	0.0
First Difference	Oil Price	298	-11.372	-3.452	0.0

Source: Data Analysis

Table 4: Pair-wise Granger Causality Tests

Sample : 1991-2015

Lags : 2

Null Hypothesis	F Stat	P-Value	Hypothesis Accept/Reject	Causality
DOLLAR does not Granger Cause BSE_100	2.90621	0.0563**	Reject	Bi-Directional
BSE_100 does not Granger Cause DOLLAR	2.56593	0.0786**	Reject	
GOLD_PRICE does not Granger Cause BSE_100	1.94965	0.1442	Accept	No causality
BSE_100 does not Granger Cause GOLD_PRICE	3.4341	0.0336*	Reject	Unidirectional
OILPRICE does not Granger Cause BSE_100	0.06319	0.9388	Accept	No causality
BSE_100 does not Granger Cause OILPRICE	5.13352	0.0064*	Reject	Unidirectional
GOLD_PRICE does not Granger Cause DOLLAR	2.94532	0.0541**	Reject	Unidirectional
DOLLAR does not Granger Cause GOLD_PRICE	0.11772	0.889	Accept	No causality
OILPRICE does not Granger Cause DOLLAR	4.00455	0.0192*	Reject	Unidirectional
DOLLAR does not Granger Cause OILPRICE	2.1609	0.1171	Accept	No causality
OILPRICE does not Granger Cause GOLD_PRICE	5.09209	0.0067*	Reject	Unidirectional
GOLD_PRICE does not Granger Cause OILPRICE	1.80848	0.1657	Accept	No causality

Source: Computed Data

*(**) Indicates significant causal relationship at 5 (10) significance level.

Table 5: Johansen's Co-Integration Test

Unrestricted Co-Integration		Trace Rank Test			Max-Eigen Value test		
Hypothesised No. of CE (s)	Eigen Value	Trace	Critical value @ 5%	Prob**	Max Eigen Value	Critical Value @ 5%	Prob**
None	0.05128	37.077	47.856	0.344	15.687	27.584	0.692
At most 1	0.03631	21.390	29.797	0.334	11.023	21.132	0.645
At most 2	0.02762	10.368	15.495	0.254	8.347	14.264	0.345
At most 3	0.00676	2.0203	3.841	0.155	2.020	3.841	0.155

Source: Data Analysis Eviews Out put

Table 6: Estimations of the ‘Unrestricted Series Autoregressive Vector’

	<i>BSE_100</i>	<i>DOLLAR</i>	<i>GOLD_PRICE</i>	<i>OILPRICE</i>
BSE_100(-1)	0.982034	-0.000342	-0.149845	0.00193
	-0.062	-0.00018	-0.11471	-0.00103
	[15.8387]	[-1.88234]	[-1.30629]	[1.87416]
BSE_100(-2)	0.003406	0.00026	0.178855	-0.00147
	-0.0632	-0.00019	-0.11693	-0.00105
	[0.05389]	[1.40211]	[1.52957]	[-1.40216]
DOLLAR(-1)	-10.46182	1.204923	16.88005	-0.52154
	-21.3768	-0.06268	-39.5494	-0.35503
	[-0.48940]	[19.2219]	[0.42681]	[-1.46899]
DOLLAR(-2)	14.19409	-0.218858	-18.88095	0.492642
	-21.2584	-0.06234	-39.3304	-0.35306
	[0.66769]	[-3.51084]	[-0.48006]	[1.39533]
GOLD_PRICE(-1)	0.028882	-7.64E-05	1.034181	0.000793
	-0.03264	-9.60E-05	-0.0604	-0.00054
	[0.88474]	[-0.79846]	[17.1233]	[1.46308]
GOLD_PRICE(-2)	-0.021064	8.50E-05	-0.045046	-0.00071
	-0.03245	-9.50E-05	-0.06003	-0.00054
	[-0.64917]	[0.89372]	[-0.75038]	[-1.32319]
OILPRICE(-1)	0.06143	-0.001993	12.81844	1.338652
	-3.31005	-0.00971	-6.12398	-0.05497
	[0.01856]	[-0.20531]	[2.09316]	[24.3505]
OILPRICE(-2)	-1.546978	0.008986	-9.981928	-0.39097
	-3.42429	-0.01004	-6.33532	-0.05687
	[-0.45177]	[0.89491]	[-1.57560]	[-6.87470]
C	-97.09819	0.52635	55.20017	1.679923
	-77.7196	-0.2279	-143.79	-1.29079
	[-1.24934]	[2.30952]	[0.38389]	[1.30147]
R-squared	0.987276	0.994341	0.997113	0.985762
Adj. R-squared	0.986924	0.994185	0.997033	0.985368
Sum sq. resids	19249908	165.5281	65890963	5309.781
S.E. equation	258.0866	0.75681	477.4897	4.286367
F-statistic	2803.004	6347.762	12478.58	2501.17
Log likelihood	-2073.156	-335.2387	-2256.5	-851.995
Akaike AIC	13.9742	2.310327	15.2047	5.778492
Schwarz SC	14.08586	2.421984	15.31636	5.890149
Mean dependent	2820.557	42.21008	10323.01	48.15574
S.D. dependent	2256.964	9.924218	8766.801	35.43575
Determinant resid covariance (dof adj.)		1.31E+11		
Determinant resid covariance		1.16E+11		
Log likelihood		-5487.43		
Akaike information criterion		37.07		
Schwarz criterion		37.51663		

Source: Data processed by means of Eviews 6.0

Table 7: Variance Decomposition of BSE 100

<i>Period</i>	<i>S.E.</i>	<i>BSE_100</i>	<i>DOLLAR</i>	<i>GOLD_PRICE</i>	<i>OILPRICE</i>
1	258.087	100.000	0.000	0.000	0.000
2	362.445	99.847	0.017	0.136	0.000
3	439.990	99.732	0.013	0.247	0.009
4	502.887	99.585	0.016	0.340	0.059
5	556.090	99.363	0.047	0.424	0.167
6	602.297	99.048	0.113	0.504	0.335
7	643.170	98.645	0.217	0.583	0.555
8	679.807	98.165	0.358	0.663	0.814
9	712.974	97.621	0.534	0.747	1.099
10	743.225	97.027	0.741	0.835	1.397
11	770.979	96.398	0.977	0.929	1.696
12	796.562	95.743	1.238	1.030	1.989

Source: Data Analysis Eviews Output