



Journal Homepage: -www.journalijar.com
**INTERNATIONAL JOURNAL OF
ADVANCED RESEARCH (IJAR)**

Article DOI:10.21474/IJAR01/7706
 DOI URL: <http://dx.doi.org/10.21474/IJAR01/7706>



RESEARCH ARTICLE

THE EFFECT OF INTERNATIONAL CRUDE OIL PRICES AND GOLD PRICES ON THE INDIAN STOCK MARKET (S&P BSE SENSEX): AN EMPIRICAL STUDY (1986-2017).

Mr. Amee Gupta.

Student of Business Economics in Aryabhata College, Delhi University, A-116, A-Block, Sushant lok-1, Gurgaon, Haryana-122002.

Manuscript Info

Manuscript History

Received: 20 July 2018
 Final Accepted: 26 August 2018
 Published: September 2018

Keywords:-

Econometric, Global Financial
 Economy, Gold, International Crude
 Oil Price, Regression, SENSEX
 JEL Code: G0, G1.

Abstract

In today's globalized world a wide variety of factors influence the stock market which is considered to be the backbone of the financial economy. Crude Oil and Gold are considered to be important factors influencing the stock market. This research paper attempts to find the role and the effect of fluctuations of the International Crude Oil Price and Gold Price on the Indian stock market (S&P BSE SENSEX). This study is conducted by collecting monthly data from London Bullion Market, U.S. Energy Information Administration, Bombay Stock Exchange (BSE) and BP Statistical Review of World Energy. Analysis is drawn over the period of 1986-2017 and further comparative analysis is drawn over the period 1986-2001 and 2002-2017. The researcher empirically analysed the data using econometric and statistical tools like Correlation, Regression and Variance Analysis. This research is of vital importance in the area of stock market as it discusses in depth and provides comprehensive analysis of the impact of Crude Oil Price and Gold Price on S&P BSE SENSEX. The study concludes that there is a significant correlation between Crude oil Price, Gold Price and Stock indices in the long term that is, both crude oil price and gold price are positively related to the stock market for the period of 1986-2017. But contrasting results were observed during the periods of 1986-2001 and 2002-2017, where relationship of β_1 (International Crude Oil) changes from positive to negative and relationship of β_2 (Gold Price) changes from negative to positive from 1986-2001 to 2002-2017.

Copy Right, IJAR, 2018,. All rights reserved.

Introduction:-

Capital market in India has the potential of contributing to the economic growth of the country. In the last decade global equity markets have experienced explosive growth and so has the Indian stock exchanges, namely Bombay Stock Exchange. It has been widely argued that Capital markets in India have the potential of facilitating the economic growth of the country (Mishra, Mishra, Mishra, & Mishra, 2010) (Atje & Jovanovic, 1993). Thus, because of the immense significance of stock market to economic development, it is of vital importance to research and study some potential factors that could cause volatility in the stock market. It is widely accepted that a stock market of a country is a good determinant of its economic growth, hence it is of immense importance to identify macro-economic factors influencing it (Kaur, 2014). BSE SENSEX has been taken as the benchmark of the Indian stock

Corresponding Author:- Mr. Amee Gupta.

Address:- Student of Business Economics in Aryabhata College, Delhi University, A-116, A-Block, Sushant lok-1. Gurgaon. Haryana-122002.

market in this study. It was established in 1875 and was regarded as the first continent's first and is said to be the Fastest Stock Exchange in the world as it has speeds of up to 6 micro seconds. It is one of India's leading exchange groups. From its conception one hundred and forty-one years ago, it has encouraged the growth of the Indian financial sector and economy by providing it an efficient capital-raising platform. It was initially created as "The Native Share & Stock Brokers' Association" in 1875. Today BSE provides an efficient and transparent market for trading in equity, currencies, debt instruments, derivatives and mutual funds.", "BSE's popular equity index - the S&P BSE SENSEX - India's most widely tracked stock market benchmark index", has been taken for our analysis. "It is traded internationally on the EUREX as well as leading exchanges of the BRICS nations (Brazil, Russia, China and South Africa)" (BSE, Introduction, n.d.).

Crude oil plays an essential role in the economy of any country of the world. Being one of the most traded commodities in the world, any volatility in its price is met with direct impact on the financial system (Iyer, 2018). India as a country is highly dependent on crude oil and any upward movement of price hurts the fiscal deficit of the country. India's dependence and high fluctuations of crude oil prices urges us to research it further (Abdi, 2017). Immense research is being done on evaluating crude oil price-macroeconomic connections (Le & Chang, 2011; Chittedi, 2012; Hamilton, 1983). Indians have a special relationship with gold, many consider it important because of culture while some consider it better than cash, certainly studying such a commodity's influence is demanded (Kapoor, 2012) (P.F., 2013). At over US\$800bn, India's private stock of gold is a significant resource (World Gold Council, 2017). Gold is considered as a leading indicator of economic development and is also one of the most precious metals in the market that is also seen as an investment avenue. Gold is commonly referred to as 'safe haven' as the intrinsic value of gold is highly resistant to volatility and has acted as a good portfolio diversifier. In the financial system gold is often considered as an investment tool of choice in times of uncertainty or unusual volatility. So, due to this reason gold bullion can be preferred over the equities market. It is safe to assume that a relationship must exist between gold prices and the stock markets. This paper provides an in-depth analysis of the relationship of the Stock index with Gold Prices and International Crude Oil prices (WTI).

Objectives:-

After a thorough literature review the following objectives have been set for this study:

1. Estimation of the effect of fluctuations in International crude oil prices and gold prices on S&P BSE SENSEX index (1986-2017).
2. Identifying the long term relationship of International crude oil and gold prices on S&P BSE SENSEX index from 1986 -2017.
3. Comparison of long term and short relationships of International Crude Oil prices and gold prices on S&P BSE SENSEX. (1986-2001 and 2002-2017)

Literature Review

Review of Gold Prices on Stock Indices

Any investment made in gold is called an inflation hedge, store of value, means of exchange or a "safe haven" when the equities markets are uncertain, erratic and risky according to Baur & Lucey (2010). This study concluded in their study that price of gold and international Crude Oil price variability have a negative impact on stock markets in all emerging economies (India can be considered as an "emerging economy") in both short and long run. They further stated that equities markets in developing economies are more vulnerable to negative news and events that lead to an uncertain economic state. McCown & R. Zimmerman (2007) in their paper have stated that they detected gold as a Zero-beta asset, implying that any investment in gold would carry no market risk. It can then potentially be said that investments in gold are very safe and thus due to gold's inherent value and limited supply it is an ideal investment choice over stocks that carry a lot of market risk. Refuting the notion of gold as a better investment avenue, Najaf & Najaf (2016) concluded in their paper that there is no long run relationship between stock market of India and oil and gold markets. They further added that for getting the maximum return stock market is considered to be the best. Baur D. (2012) said that in spite of the significance of Gold for currency hedging and trading, volatility in gold prices cause negative consequences in financial markets, because of an upward movement in the gold price volatility could cause an unsafe investment condition, whereas comparatively lesser gold price volatility could cause a safe investment condition. Therefore, study on the effect of variabilities in the price of gold on the stock market must be conducted.

Empirical examination was done by Moore (1990) to establish a link between gold prices and the value of stock markets from 1970 to 1988. They saw an inverse relationship between gold prices and the stock market. It meant

that upward movement in gold prices would cause a downward movement in the stock markets. Patel(2012) also found that price of essential commodities like Gold is one of the major determinants of stock markets and even though their prices are determined at the international level they have significant impact on the domestic stock market. He further added that by local taxes and duties, policy makers could try and control the price of such commodities at an acceptable level.

Review of International Crude Oil Prices on Stock Indices

Ingallhalli, B.G., & Y.V.Reddy (2016) in their paper studied the casual relationship between oil, gold, forex and stock markets from 2005 to 2015 and concluded that out of the many factors that cause volatility in stock prices, oil is one of main one. Emerging countries that are witnessing fast growth in their economies have a high probability in increase of demand for oil that is they have a positive relationship. They elaborated by saying that as India is one of the fastest growing economy in the world and that the demand for oil consumption would increase drastically. Contrary to earlier assumptions of gold as “safe havens”, Ingallhalli and Reddy said that one must avoid investing in gold where there is high volatility in other financial markets as gold does not act as a safe haven.

Research Gaps

1. Few studies have been done analysing the relationship of gold price and International Crude oil price on stocks individually but no study has been undertaken taking the variables together.
2. No comparative study has been done for studying the relationships of International Crude oil prices and Gold prices on the stock market of 16 years each from 1986-2001 and 2002-2017.
3. No long term study 1986-2017 (32 years) has been done to estimate long term relationships of International Crude oil prices and Gold prices on the stock market.

Methodology:-

Source of Variables

This study attempts toanalyse the relationship between International crude oil and gold prices with the S&P BSE SENSEXindex. In order to conduct the analysis, monthly data of three hundred eighty-four months from January 1986 to December 2017 is used. Various symbols, type of variable and source of the data collected and used in this study is cogentlydisplayed in Table 1. All calculations, data transformation and analysis is done via Microsoft Excel.

Table 1:-Source of Variables

Variable	Symbol	Type	Source
International Crude Oil Price (WTI)	Ico	Independent Variable	U.S. Energy Information Administration, Crude Oil Prices: West Texas Intermediate (WTI) - Cushing, Oklahoma [DCOILWTICO], 2018
Gold Price	Gp	Independent Variable	ICE Benchmark Administration Limited (IBA), Gold Fixing Price 3:00 P.M. (London time) in London Bullion Market, based in U.S. Dollars [GOLDPMGBD228NLBM]
BSE SENSEX	Bs	Dependent Variable	https://www.Bseindia.com/indices/IndexArchiveData.aspx

Model Creation

In order to conduct this study, the researcherformed a multiple linear regression model to check the impact of International crude oil and Gold Price on Stock market index.

The equation for our multiple linear regression model is asfollows:

$$\log(Bs)=\alpha+\beta_1\log(Ico)+\beta_2\log(Gp)+\varepsilon\text{-----}(1)$$

where, β_1 & β_2 are Regression Coefficients for International Crude Oil price and Gold price respectively, α is the intercept and ε is the Error term. In our study regression analysis was carried out after taking natural log of all the variables. R^2 (coefficient of multiple determination),a statistical measure that tells us how closely our data is fitted on the regression line. R^2 also tells us if our predictor variables (Ico and Bs) are good at estimating our dependent variable (Bs). Multiple R is the correlation coefficient tells us the strength of the linear relationship. For analysing the model, the researcher has calculated values of coefficients, Standard Error, t Stat and P-value for 3 time periods 1986-2017 (long run),1986-2001 and 2002-2017 (short run), represented in Table 2, table 3 and table 4

respectively. The researcher has also calculated regression statistics of Multiple R, R^2 , Adjusted R^2 , Standard Error and number of observations in tables. From theoretical knowledge β_1 & β_2 are elasticity. So, for each 1 % increase in Ico (international crude oil price), Bs (SENSEX) increases on an average by β_1 for a positive relation and decreases on an average by β_1 for a negative relation. Similarly, for each 1 % increase in Gp (Gold price), Bs (SENSEX) increases on an average by β_2 for a positive relation and decreases on an average by β_2 for a negative relation.

Findings

After running regression equation in three different time periods our findings are discussed three different cases for three time periods.

Empirical Findings in the year 1986-2017

In order to analyse the influence of International Crude oil prices and Gold prices on the stock market from January 1986 to December 2017 for a total of three hundred and forty eight months, the researcher saw that gold price and crude oil price has a positive relation with β_1 and β_2 as 1.094015 and 0.556352 respectively. Done on a 95 % confidence level after looking at the P-value, multiple R and adjusted R square value it can be said that both the estimated coefficients are statistically significant for this time period.

$$\text{equation (2) } \log(Bs) = \alpha + 1.094015 * \log(Ico) + 0.556352 * \log(Gp) + \varepsilon$$

For each 1 % increase in crude oil price (Ico), SENSEX (Bs) increases on an average by 1.094016. For each 1 % increase in gold price (Gp), SENSEX (Bs) increases on an average by 0.556352.

Table 2:-Regression from 1986 -2017 , Calculations done by researcher

Source: BSE, London Bullion Association and U.S. Energy Information Administration

Regression Statistics				
Multiple R	0.828137			
R Square	0.68581			
Adjusted R Square	0.684161			
Standard Error	0.68742			
Observations	384			
	Coefficients	Standard Error	t Stat	P-value
Intercept	1.158215	0.428002	2.706094	0.007114
Gold price (log)	0.556352	0.104361	5.331024	1.68E-07
Crude oil (log)	1.094015	0.094179	11.61629	6.54E-27

Empirical Findings in the year 1986-2001

In order to analyse the influence of International Crude oil prices and Gold prices on the stock market from January 1986 to December 2001 for a total of one hundred and ninety eight months, from table 3 it can be seen that gold price has an inverse relationship and crude oil price has a positive relation with β_1 and β_2 as 0.385056679 and - 3.236834813 respectively.

$$\text{equation (3) } \log(Bs) = \alpha + 0.385056679 * \log(Ico) - 3.236834813 * \log(Gp) + \varepsilon$$

Done on a 95 % confidence level the P-value of Gold price tells us that the inverse relation is statistically significant whereas the P-value of Crude oil tells us that its positive relation is statistically insignificant and should not be accepted. Another point to note from table 3 is the low Multiple R and adjusted R square values which tells us that our estimates for this time period are not significant. It can be said that such behaviour could be a relation due to low growth period and under developed infrastructure. Even the exchange BSE switched to electronic trading system in 1995. This calls for further scope of work in the relation of crude oil prices, gold and stock exchange index for this particular time period via other various techniques and sources.

Table 3:-Regression from 1986 -2001 , Calculations done by researcher

Regression Statistics	
Multiple R	0.657693212

R Square	0.432560361
Adjusted R Square	0.426555709
Standard Error	0.616745573
Observations	192

	Coefficients	Standard Error	t Stat	P-value
Intercept	25.40378245	2.004587	12.67283	4.87E-27
Gold price (log)	-3.236834813	0.297784	-10.8698	1.09E-21
Crude oil (log)	0.385056679	0.205576	1.873063	0.062604

Source: BSE, London Bullion Association and U.S. Energy Information Administration

Empirical Findings in the year 2002-2017

In order to analyse influence of International Crude oil prices and Gold prices on the stock market from January 2002 to December 2017 for a total of one hundred and ninety eight months, from table 4 it can be seen that gold price has a positive relationship and crude oil has a weak inverse relationship with β_1 and β_2 as -0.0594529 and 1.1649426 respectively. Done on a 95% confidence level the P-value of Gold price tells us that the positive relation is statistically significant.

equation 4. $\log(Bs) = \alpha - 0.0594529 * \log(Ico) - 1.1649426 * \log(Gp) + \epsilon$

The high Multiple R value of .89938967 and adjusted R square value of 0.80687958 tells us that in this time period contrastingly to case 2, β_2 coefficient is a robust estimator. From table 4, even in this time period it can be seen that crude oil has a P-value that tells us that the estimators are statistically insignificant. This calls for further scope of work in the relation of crude oil prices to stock exchange index for this particular time period.

Table 4:-Regression from 2001 -2017, Calculations done by researcher

Regression Statistics	
Multiple R	0.89938967
R Square	0.80890178
Adjusted R Square	0.80687958
Standard Error	0.30091093
Observations	192

Source: BSE, London Bullion Association and U.S. Energy Information Administration

	Coefficients	Standard Error	t Stat	P-value
Intercept	1.89014067	0.272592	6.933959	6.3E-11
Gold price (log)	1.1649426	0.055071	21.15361	1.02E-51
Crude oil(log)	-0.0594529	0.069168	-0.85954	0.391132

Graphical Representation of the Relationship between International Crude oil prices and Gold prices on the stock market

Chart 1 and 2 represent movement of International crude oil price vs SENSEX and movement of Gold price vs SENSEX respectively for cogently understanding the relationship.

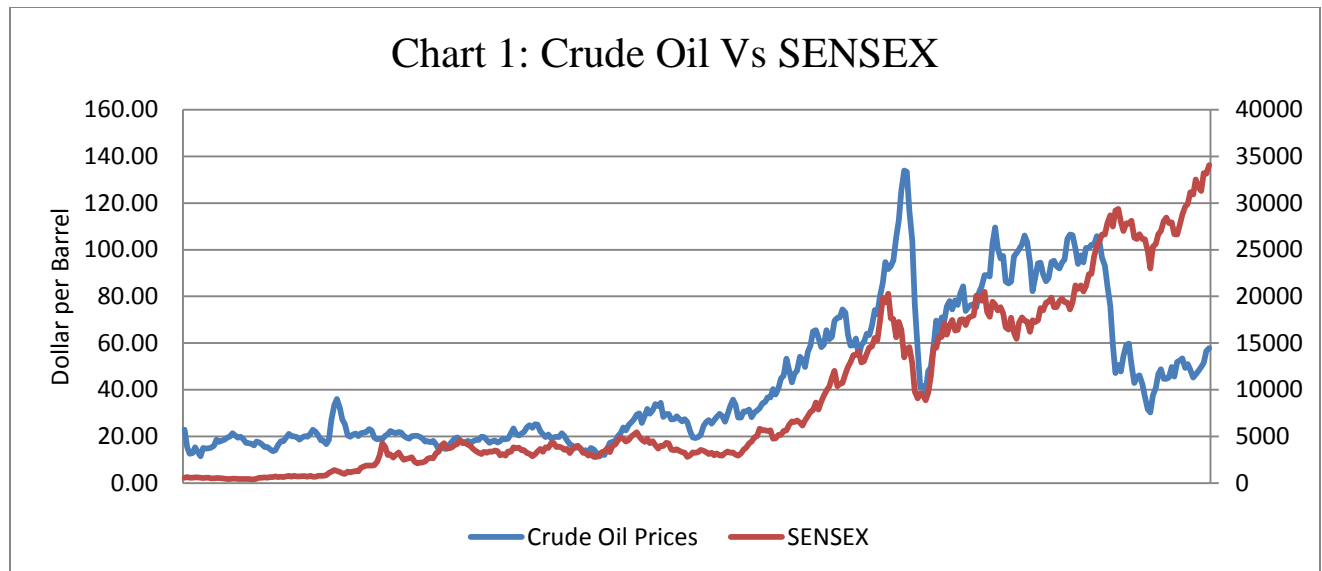


Chart 1:-SENSEX Vs International Crude Oil price from 1986-2017

Source: BSE official and U.S. Energy Information Administration

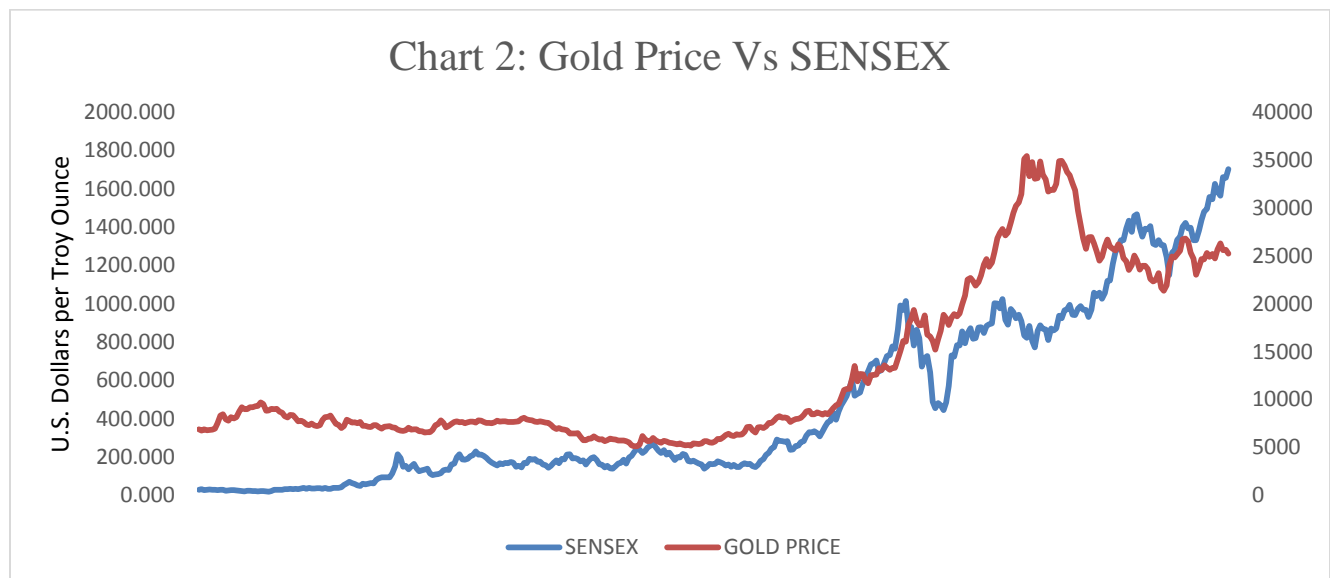


Chart 1:-SENSEX Vs Gold price from 1986-2017

Source: BSE Official and London Bullion Association.

Conclusion:-

International crude oil and gold prices have a significant impact on India's economy and stock markets. The main aim of the study was to analyse the relationship of crude oil and gold price on SENSEX and the paper has investigated that there does exist a long run relationship between crude oil price, gold price and stock market index (SENSEX). In the long run the researcher sees that crude oil has a much bigger impact on the SENSEX than gold prices. While in the short run gold does have a strong inverse relationship in the second time period, it takes a completely drastic turn in time period three as it shifts to a positive relation. Such behaviour could be contributed due to viewing of equities market as a better investment avenue and increased awareness about better opportunities in the stock market. Earlier gold was viewed as a "safe haven" to park one's capital till the time volatilities in the stock market existed but post 2002 a period of growth and investor awareness started with the rise of technology could have fuelled an opinion change about gold as an investment avenue when compared to the stock

market. In a comparatively shorter time period it can also be seen that a relationship between crude oil and stock index doesn't exist with a statistical significance.

From table 5 it can clearly be seen that during the long term period of 1986-2017 both international crude oil and gold prices are positively related with β_1 & β_2 being 0.556352 and 1.094015 respectively. During the same period Multiple R value of 0.828137 and adjusted R^2 value of 0.684161 confirms that there exists a relationship in the long term. During the period of 1986-2001 β_1 & β_2 of crude oil and gold price is 0.385056679 and -3.236834813 respectively with low adjusted R^2 and Multiple values of 0.426555709 and 0.657693212. We can say that the relationship during this period is not as strong as during the period of 2002-2017 where Adjusted R^2 and Multiple R take high values of 0.80687958 and .0899938967 that is, β_1 & β_2 during 2002-2017 time period have a much stronger relationship between Crude oil and gold on stocks markets. Contrastingly relationship of β_1 changes from positive to negative and relationship of β_2 changes from negative to positive from 1986-2001 to 2002-2017. Such behaviour outlines the need of future scope of work on the relationship of crude oil and gold on stock markets during the two different time periods.

Table 5 :-Comparison of Empirical Findings

Time Period	1986-2017	1986-2001	2002-2017
Adjusted R^2	0.684161	0.426555709	0.80687958
Multiple R	0.828137	0.657693212	0.89938967
Gold (β_2)	0.556352	-3.236834813	1.1649426
Crude Oil (β_1)	1.094015	0.385056679	-0.0594529

Source: Calculations done by researcher from table 2, table3 and table 4

This paper has attempted to explain and analyse the relationships of International Crude Oil prices and Gold prices to the stock market exchange (SENSEX) This study has done a long term analysis from 1986-2017 and established a positive relationship. This study has also done a comparative econometric analysis from 1986-2001 and 2002-2017. Thus this paper has opened further arenas of research about the factors playing an important role behind the changing relationship of crude oil prices and gold prices on the stock market.

References:-

1. Abdi, B. (2017, 11 16). India's oil import bill seen rising 29 per cent to \$85-90 billion current fiscal. Retrieved from energy.economictimes.indiatimes: <https://energy.economictimes.indiatimes.com/news/oil-and-gas/-indias-oil-import-bill-seen-rising-29-per-cent-to-85-90-billion-current-fiscal/61666821>
2. Atje, R., & Jovanovic, B. (1993). Stock markets and development. 632-640. Retrieved from <https://EconPapers.repec.org/RePEc:eee:ecrev:v:37:y:1993:i:2-3:p:632-640>
3. Baur, D. (2012). Asymmetric Volatility in the Gold Market. Journal of Alternative Investments, 26-38.
4. Baur, D. G., & Lucey, B. M. (2010). Is Gold a Hedge or a Safe Haven? An Analysis of Stocks, Bonds and Gold. Financial Review, 217-229. Retrieved from <http://dx.doi.org/10.1111/j.1540-6288.2010.00244.x>
5. BSE. (n.d.). Index Archive Data. Retrieved from BSE India: <https://www.bseindia.com/indices/IndexArchiveData.aspx>
6. BSE. (n.d.). Introduction. Retrieved 03 02, 2018, from BSE India: <https://www.bseindia.com/static/about/introduction.aspx?expandable=0>
7. Chittedi, K. R. (2012). Do Oil Prices Matters for Indian Stock Markets? An Empirical Analysis. Journal of Applied Economics and Business Research, 2-10.
8. Hamilton, J. D. (1983). Oil and the Macroeconomy since World War II. Chicago Journals, 228-248. Retrieved from <http://www.jstor.org/stable/1832055?origin=JSTOR-pdf>
9. ICE Benchmark Administration Limited (IBA), Gold Fixing Price 3:00 P.M. (London time) in London Bullion Market, based in U.S. Dollars [GOLDPMGBD228NLBM]. (n.d.). Federal Reserve Bank of St. Louis. Retrieved march 1, 2018, from FRED: <https://fred.stlouisfed.org/series/GOLDPMGBD228NLBM>
10. Ingallhalli, V., B.G., P., & Y.V.Reddy. (2016). A Study on Dynamic Relationship Between Oil, Gold, Forex and Stock markets in Indian context. Paradigm, 83-91. Retrieved from <http://journals.sagepub.com/doi/pdf/10.1177/0971890716637706>
11. Kapoor, P. (2012, April 24). why Indians love gold. Retrieved from Moneycontrol: <https://www.moneycontrol.com/news/business/personal-finance/-1830717.html>

12. kaur, G. (2014). EVOLUTION OF STOCK MARKETS AND ROLE OF STOCK EXCHANGE . 3. Retrieved from <http://www.iracst.org/ijcbm/papers/vol3no42014/5vol3no4.pdf>
13. Le, T.-H., & Chang, Y. (2011). The impact of oil price fluctuations on stock markets in developed and emerging economies. Munich Personal RePEc Archive.
14. McCown, J. R., & R.Zimmerman, J. (2007). Is gold a zero-beta asset? Analysis of the investment potential of precious metals.
15. Mishra, P. K., Mishra, U. S., Mishra, B. R., & Mishra, P. (2010). Capital Market Efficiency and Economic Growth: The Case of India. European Journal of Economics, Finance and Administrative Sciences.
16. Moore, G. (1990). Gold prices and a leading index of inflation. Challenge, 1990, . 52-56.
17. Najaf, R., & Najaf, K. (2016). Impact of Oil and Gold Prices on the Stock Exchnage of Bombay : An Evidence from India . Journal of Accounting & Marketing. Retrieved from <https://www.omicsonline.org/open-access/impact-of-oil-and-gold-prices-on-the-stock-exchange-of-bombay-anevidence-from-india-2168-9601-1000193.pdf>
18. P.F. (2013, November 20). why do indians love gold. Retrieved from The Economist: <https://www.economist.com/blogs/economist-explains/2013/11/economist-explains-11>
19. Patel, S. (2012). The effect of Macroeconomic Determinants on the Performance of the Indian Stock Market. NMIMS Management Review.
20. U.S. Energy Information Administration, Crude Oil Prices: West Texas Intermediate (WTI) - Cushing, Oklahoma [DCOILWTICO]. (2018, march 1). Retrieved from <https://fred.stlouisfed.org/series/DCOILWTICO>
21. World Gold Council. (2017). India's gold market: evolution and innovation. Retrieved from https://www.gold.org/download/file/5377/india_gold_market_innovation_and_evolution.pdf