

## **Analysis Of Relationship Between Performance Of Stock Market Index And Gold Price With Special Reference To Year 2016-17**

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### **Abstract**

Financial markets play a decisive role in the foundation of a stable and efficient financial system of any economy. There are numerous domestic and international factors which are seen to have a direct or indirect impact on the performance of stock markets. Many researchers have also identified the long-run and short-run relationships between stock price index and gold price in developed and developing nations. This research paper also explicates that the gold prices can influence the stock market to a great extent. The investment in the gold mainly becomes appealing and radiant, when investors have to otherwise bear diminishing stock market returns in times of upset stock market conditions. Gold was one of the first metals excavated by humans. Gold has traditionally been considered as an attractive investment in India and its excellent performance in recent years has substantially confirmed the wisdom of that tradition. When markets are volatile and investors panic they tend to move out the risky assets such as stock and invest into assets such as gold. Gold like virtually all commodities is traded on a dollar dominated basis. The domestic gold price in India is continuously increasing due to its heavy demand in the country. There are several reasons gold has high demand in India. The first reason is security; gold offers full security as long as it is retained by central banks. Secondly, gold is able to maintain its liquidity even at times of crisis situations like high global inflation or political turbulence.

**Keywords:** Commodities, stock markets, gold, correlation, dollar, credit risk

### **Review of Literature**

Wang (2010) investigated the effects of variations and long run & short run relationships in crude oil prices, gold price and exchange rates of various currencies on the stock market indices. Bhunia (2013) examined the relationship among crude price, gold price and financial variables. The period of the study was taken from 1991 to 2012. The study envisaged that there subsist a long term co integration and causality between the financial variables taken for the study of both NSE and BSE. Narang and Singh (2013) aimed at investigating the dynamic relationship between gold prices and stock market returns in India. In the study, an attempt has been made to investigate the existence of unidirectional or bidirectional relationship between gold price and Sensex for the period of 10 years (2002-2012). The results of the analysis show that there is no causality between the gold price and Sensex. Gayathri and Dhanabhakyaam (2014) made an attempt to test the co-integration and causality between Gold price and NSE-Nifty for a period of ten years including 2888 daily observations. The result of the study indicated that there is a long run co-integration relationship between the variables. Furthermore, the study showed a unidirectional causality relationship between Gold prices and NSE-Nifty index. Bhunia and Ganguly (2015) studied the influence of two commodity indicators, namely gold and crude oil, GDP growth rate and exchange rates on the stock market index in India. The period of the study was ranging from the year 1991 and to the year 2013. It was found that there is significant long-term co-integration and unwavering relationship between the respected variables. Further, it was concluded that the Indian stock market index is much dependable upon the prices of international crude oil, prices of gold, exchange rates and GDP growth rate. Rejeb and Arfaoui (2016) analysed the relationships between oil, gold, US dollar and stock prices from January 1995 to October 2015. It has been discussed that when business cycles reflects downfall, and the dollar and stock exchanges move downwards, then gold becomes more appealing and thus its value increases. In addition to this it has been found that gold prices are concerned by changes in oil prices, US dollars and changes in stock markets but somewhat also depends on the US oil gross imports and default premium.

### **BSE SENSEX**

The **S&P BSE SENSEX** (S&P Bombay Stock Exchange Sensitive Index), also called the **BSE 30** or simply the **SENSEX**, is a free-float market-weighted stock market index of 30 well-established and financially sound companies listed on Bombay Stock Exchange. The 30 component companies which are some of the largest and most actively traded stocks, are representative of various industrial sectors of the Indian economy. Published since 1 January

1986, the S&P BSE SENSEX is regarded as the pulse of the domestic stock markets in India. The base value of the S&P BSE SENSEX is taken as 100 on 1 April 1979 and its base year as 1978–79. On 25 July 2001 BSE launched **DOLLEX-30**, a dollar-linked version of S&P BSE SENSEX.

As of 25th September 2017, the full market capitalization of S&P BSE SENSEX was about • 54,637.0878 billion (US\$837 billion) (37% of GDP) while its free-float market capitalization was • 30,094.2286 billion (US\$461 billion). During 2008-12, Sensex 30 Index share of BSE market capitalization fell from 49% to 25% due to the rise of sectoral indices like BSE PSU, Banker, BSE-Teck, etc.

The term **Sensex** was coined by Deepak Mohoni a stock market analyst. It is a portmanteau of the words **Sensitive** and **Index**. The initials S&P are derived from Standard & Poor's Financial Services LLC, an American financial services company which also rates and analyses stock market indices such as the U.S based S&P 500, the Canadian S&P/TSX, and the Australian S&P/ASX200.

### **Calculation**

The BSE has some reviews and modifies its composition to be sure it reflects current market conditions. The index is calculated based on a free float capitalization method, a variation of the market capitalization method. Instead of using a company's outstanding shares it uses its float, or shares that are readily available for trading. Free Floating capital implies total capitalization less Directors shareholding. As per free float capitalization methodology, the level of index at any point of time reflects the free float market value of 30 component stocks relative to a base period. The market capitalization of a company is determined by multiplying the price of its stock by the number of shares issued by corporate actions, replacement of scripts. The index has increased by over twenty five times from June 1990 to the present. Using information from April 1979 onwards, the long-run rate of return on the S&P BSE SENSEX works out to be 18.6% per annum.

### **Major Sensex Falls**

#### **January 2008**

In the third week of January 2008, the SENSEX experienced huge falls along with other markets around the world. On 21 January 2008, the SENSEX saw its highest ever loss of 1,408 points at the end of the session. The SENSEX recovered to close at 17,605.40 after it

tumbled to the day's low of 16,963.96, on high volatility as investors panicked following weak global cues amid fears of a recession in the US.

The next day, the BSE SENSEX index went into a free fall. The index hit the lower circuit breaker in barely a minute after the markets opened at 10 am. Trading was suspended for an hour. On reopening at 10.55 am IST, the market saw its biggest intra-day fall when it hit a low of 15,332, down 2,273 points. However, after reassurance from the Finance Minister of India, the market bounced back to close at 16,730 with a loss of 875 points.

Over the course of two days, the BSE SENSEX in India dropped from 19,013 on Monday morning to 16,730 by Tuesday evening or a two-day fall of 13.9%. Less than a month later, on 11 February 2008, the SENSEX lost 833.98 points, when Reliance Power fell below its IPO price in its debut trade after a high-profile public offer.

### **March 2008**

The free fall of the SENSEX accelerated in March 2008. The month started out with the Sensex losing 900.84 points on 3 March 2008, on concerns emanating from growing credit losses in the

US. This would be the first of four one-day falls of greater than 700 points during the month. On 13 March 2008, the SENSEX plummeted another 770.63 points on global economic jitters.

**14,810, 17 March 2008** - The SENSEX dropped by 951.03 points on the global credit crisis and distress, to fall below the 15,000 mark, closing at 14,810.

The month ended with the SENSEX shedding 726.85 points on 31 March 2008, after heavy selling in blue-chip stocks on global economic fears.

**13,802, 27 June 2008** - The SENSEX dropped by 600 points, to fall below the 14,000 mark, closing at 13,802.

**12,962, 1 July 2008** - The SENSEX falls below the 13,000 mark, closing at 12,962.

**11,802, 6 October 2008** - The SENSEX dropped by 724.62 points amid fears of the US recession and attempts by governments across the world to save their failing banks, to fall below the 12,000 mark, closing at 11,802.

**10,527, 10 October 2008** - The SENSEX dropped by 800.51 points amid weak industrial production data and concerns over impact of global economic crisis on IT and banking firms in India, to fall below the 11,000 mark, closing at 10,527.

**9,975, 17 October 2008** – The SENSEX crashes below the psychological 5-figure mark of 10,000 points, closing at 9,975.35, following extremely negative global financial indications in US and other countries. Just ten months earlier, in December 2007, SENSEX had closed above the 20,000 mark for the first time.

**8,701.07, 24 October 2008** - The SENSEX lost 10.96% of its value (1070.63 points) on the intra-day trade, closing at 8,701.07, for its first close below the 9,000 mark since 14 June 2006, after RBI lowered its GDP growth forecasts on global economic concerns.<sup>[11]</sup> The loss was the 2nd highest in terms of total points, and the 3rd highest percentage-wise, for a one-day period in the index's history.

**8,509.56, 27 October 2008** - The SENSEX hit an intra-day low of 7,697.39, before closing at 8,509.56, for its lowest close since 14 November 2005.

## **Early 2009**

The SENSEX dropped by 749.05 points on 7 January 2009, when the Satyam fraud came to light.

**8,160.40, 9 March 2009** - The SENSEX closed at 8,160.40, for its lowest close since 2 November 2005.

## **2015**

The index crossed the historical mark of 30,000 after repo rate cut announcement by RBI.

The index plummeted by over 1,624.51 points on 24 August 2015, the biggest one-day point plunge in the index's history.

## **NIFTY**

National Stock Exchange has a total market capitalization of more than US\$1.41 trillion, making it the world's 10th-largest stock exchange as of March 2017. NSE's flagship index, the NIFTY 50, the 50 stock index is used extensively by investors in India and around the world as a barometer of the Indian capital markets. Nifty 50 indexes were launched in 1996 by the NSE. However, only about 4% of the Indian economy / GDP is actually derived from the stock exchanges in India.

| Year | Milestones                                                                                                                                                                                        |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2000 | Launch of index futures based on the NIFTY 50 index (then known as S&P CNX NIFTY) for trading;<br>Listed index futures on NIFTY 50 on the Singapore Exchange;<br>Commenced internet trading       |
| 1998 | Commenced NSE certification for "Financial Markets certification program" (NCFM) in India.                                                                                                        |
| 1996 | Created and administered a settlement fund.<br>Launched NIFTY 50 Index, which remains our flagship index today.<br>Commenced trading and settlement in dematerialized securities on our exchange. |
| 1995 | Established an Investor Protection Fund Trust.                                                                                                                                                    |
| 1994 | Launched the equity and wholesale debt market segments.<br>Commenced electronic or screen-based trading.                                                                                          |
| 1993 | Recognised as a stock exchange                                                                                                                                                                    |

| Year | Milestones                                                                                                                                                               |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2010 | Launched NOW platform for mobile devices.<br>Launched trading in Currency Options                                                                                        |
| 2009 | Launched Mutual Fund Service System (MFSS).                                                                                                                              |
| 2008 | First in India to offer trading in Currency Futures.<br>Establishment of Securities Lending and Borrowing Scheme (SLBS).<br>Launched NOW platform for web-based trading. |
| 2005 | Launched NIFTY Bank index derivatives.                                                                                                                                   |
| 2002 | Launched ETFs listings.                                                                                                                                                  |
| 2001 | Launched index options based on the NIFTY 50 index (then known as S&P CNX NIFTY) for trading<br>Launched single stock futures and options on listed securities.          |

| Year | Milestones                                                                                                                                                                                      |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2016 | Launched NIFTY 50 index futures trading on TAIFEX<br>Launched platform for sovereign gold bond issuances<br>Launched electronic book-building platform for private placement of debt securities |
| 2015 | Entered into a memorandum of understanding to enhance the level of cooperation with the London Stock Exchange Group.<br>Renamed CNX NIFTY to NIFTY 50.                                          |

|      |                                                                                                                                                                                                                                |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2014 | Launched NMF-II platform for mutual funds<br>Launched NBF II segment for interest rate futures<br>Launched trading on India VIX index futures<br>Commenced trading on NIFTY 50 (then known as CNX NIFTY) on the Osaka Exchange |
| 2013 | Launched the New Debt Segment(NDS).                                                                                                                                                                                            |
| 2012 | Commenced trading in index futures and options contracts on the FTSE 100 index<br>Launched SME-specific EMERGE platform for the listing and trading of securities of SMEs.                                                     |
| 2011 | Commenced trading in index futures and options on global indices, namely the S&P 500 and Dow Jones Industrial Average.                                                                                                         |

### **Gold Prices in India**

If you are looking to buy gold in India, you will see prices quoted in the local currency. You may also see prices quoted in other key global currencies such as U.S. Dollars, euros, Great British Pounds or Japanese Yen. Gold is typically quoted by the ounce, gram or kilo.

India is one the world's largest consumers of gold, and the metal plays a special role in the country. The Indian wedding season is famous for fueling demand for gold jewelry, but the jewelry is not simply for aesthetic purposes. Rather, it is considered a reliable store of wealth and value and a symbol of prosperity. Many Indians do not have bank accounts, and inflation may run higher than benchmark interest rates and bond yields. Gold has long been considered an important asset, and the tradition of giving gold remains quite robust today.

The India Government Mint has four operations in the country and was given responsibility for producing the nation's coinage through the Coinage Act of 1906. In addition to minting circulation coinage for the Reserve Bank of India, the mint also produces coin blanks, commemorative coins and medallions. The Mumbai operation has a gold refining capability of 999.9 percent, and some of its locations also have assaying facilities.

In and around India, gold bars in both 22 carat and 24 carat purities may be widely exchanged, with popular sizes being 1 tola, 5 tola and 10 tola. The tola is a unit of measure originally from South Asia, and one Indian tola is approximately 11.66 grams.

Gold bars represent one of the best overall values when it comes to gold bullion. Unlike gold bullion coins, bars carry no face value and are not considered good, legal tender. They may also be produced at a lower per-ounce cost by refiners when compared to coins. Smaller gold bars like 1 gram or 10 gram bars will typically carry much higher premiums than larger gold

bars. This is due to the fact that production costs are relatively similar regardless of the bar's weight when the metal content is not factored in.

### **Research Methodology**

#### **Objectives of the study:**

##### **Main objective:**

The main objective of the study is to investigate the influence of Gold prices on Indian stock market represented by BSE-SENSEX and NSE-NIFTY.

To understand and investigate the factors establishing relationship between stock market indices movement and the fluctuation of Gold prices and the factors affecting it, as well as to find out the correlation between fluctuations of stock market indices and the Gold prices to judge the impact of indices movement on the Gold prices with special reference to the year 2016-17.

##### **Specific objectives:**

- 1-To study the factors causing fluctuations in stock market indices and Gold prices.
- 2- To understand the major macroeconomic factors & their possible role in establishing a relationship between stock indices and Gold prices fluctuations.
- 3-To establish the statistical correlation between the stock market indices movement and the Gold prices fluctuations, to bring out the possible relation between the stock market indices movements and price fluctuation.

##### **Scope of the study:**

The study covers the Gold prices to establish a relation between the movement in the Gold prices & stock market indices of Bombay Stock Exchange and National Stock Exchange.

##### **Data collection and methodology:**

The study is basically based on secondary data, taken from Bombay stock exchange, National stock exchange and Gold price. Raw data is taken for the period between 01/04/2016 to 31/03/2017 for one year, through the available data, it is tried to establish the relationship between the movement of stock indices and Gold prices, to bring out the correlation between the two series of data Sensex and Nifty movements and Gold prices in Karl Pearson

coefficient correlation is been used along with the scattered diagram to strengthen the outcome of the analysis.

**Karl Pearson' Correlation coefficient:**

Statistical correlation Karl Pearson's is been used to measure the relationship between the stock market indices movement and the movement of Gold prices.

Its numerical value ranges from +1.0 to -1.0. It gives us an indication of the strength of relationship,  $r > 0$  indicates positive relationship,  $r < 0$  indicates negative relationship while  $r = 0$  indicates no relationship (or that the variables are independent and not related). Here  $r = +1.0$  describes a perfect positive correlation and  $r = -1.0$  describes a perfect negative correlation.

Karl Pearson's coefficient of correlation:

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

**Factors causing fluctuations in stock market indices and Gold prices**

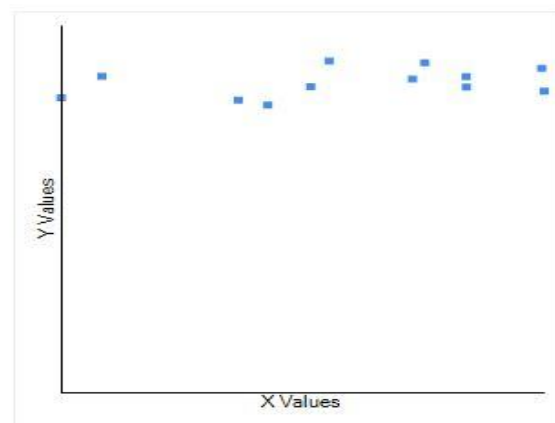
Various factors causing fluctuations in stock market indices and Gold prices, identified by the authors on the basis of extensive review of literature are:

1. Global prices.
2. Taxation policies of state and central government.
3. Investment strategies of Foreign Institutional Investors (FIIs) and Domestic Institutional Investors (DIIs).
4. Global economic sentiments.
5. Interest rate regime of the country.

### **Data Analysis & Interpretation**

Karl Pearson coefficient of correlation revealed 0.369 is strong positive correlation, and there is inverse relation between the BSE stock market indices movement and Gold prices movement. To strengthen the outcome of the correlation, data is also plotted on scattered diagram, which also reveals no correlation between the two variables.

| X Values | Y Values |
|----------|----------|
| 24883.59 | 28168    |
| 25229.70 | 30202    |
| 27009.67 | 29210    |
| 27166.87 | 31640    |
| 27981.71 | 31480    |
| 28978.02 | 30945    |
| 28334.55 | 30180    |
| 27876.61 | 29950    |
| 26392.76 | 27914    |
| 26643.24 | 27464    |
| 28335.16 | 29193    |
| 28999.56 | 28795    |



Y axis- Gold prices

| X - M <sub>x</sub> | Y - M <sub>y</sub> | (X - M <sub>x</sub> ) <sup>2</sup> | (Y - M <sub>y</sub> ) <sup>2</sup> | (X - M <sub>x</sub> )(Y - M <sub>y</sub> ) |
|--------------------|--------------------|------------------------------------|------------------------------------|--------------------------------------------|
| -2435.697          | -1427.083          | 5932618.252                        | 2036566.840                        | 3475942.118                                |
| -2089.587          | 606.917            | 4366372.438                        | 368347.840                         | -1268204.974                               |
| -309.617           | -385.083           | 95862.480                          | 148289.174                         | 119228.218                                 |
| -152.417           | 2044.917           | 23230.840                          | 4181684.174                        | -311679.382                                |
| 662.423            | 1884.917           | 438804.673                         | 3552910.840                        | 1248612.781                                |
| 1658.733           | 1349.917           | 2751396.271                        | 1822275.007                        | 2239151.772                                |
| 1015.263           | 584.917            | 1030759.636                        | 342127.507                         | 593844.445                                 |
| 557.323            | 354.917            | 310609.298                         | 125965.840                         | 197803.340                                 |
| -926.527           | -1681.083          | 858451.664                         | 2826041.174                        | 1557568.537                                |
| -676.047           | -2131.083          | 457039.096                         | 4541516.174                        | 1440711.784                                |
| 1015.873           | -402.083           | 1031998.629                        | 161671.007                         | -408465.736                                |
| 1680.273           | -800.083           | 2823318.475                        | 640133.340                         | -1344358.689                               |
| Mx: 27319.287      | My: 29595.083      | Sum:<br>20120461.751               | Sum:<br>20747528.917               | Sum: 7540154.213                           |

X axis- Sensex movements

#### Result Details & Calculation

##### X Values

$\Sigma = 327831.44$   
Mean = 27319.287  
 $\Sigma(X - M_x)^2 = SS_x = 20120461.751$

##### Y Values

$\Sigma = 355141$   
Mean = 29595.083  
 $\Sigma(Y - M_y)^2 = SS_y = 20747528.917$

##### X and Y Combined

$N = 12$   
 $\Sigma(X - M_x)(Y - M_y) = 7540154.213$

##### R Calculation

$r = \Sigma((X - M_x)(Y - M_y)) / \sqrt{(SS_x)(SS_y)}$

$r = 7540154.213 / \sqrt{(20120461.751)(20747528.917)} = 0.369$

##### Meta Numerics (cross-check)

$r = 0.369$

#### Key

X: X Values

Y: Y Values

$M_x$ : Mean of X Values

$M_y$ : Mean of Y Values

$X - M_x$  &  $Y - M_y$ : Deviation scores

$(X - M_x)^2$  &  $(Y - M_y)^2$ : Deviation Squared

$(X - M_x)(Y - M_y)$ : Product of Deviation Scores

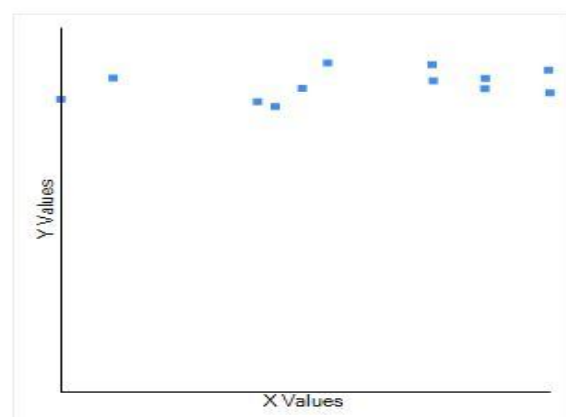
The value of R is 0.369. Although technically a positive correlation, the relationship between your variables is weak (nb. the nearer the value is to zero, the weaker the relationship).

The value of  $R^2$ , the coefficient of determination, is 0.1362.

#### Y axis- Gold prices

Karl Pearson coefficient of correlation revealed 0.3587 is strong positive correlation, and there is inverse relation between the NSE stock market indices movement and Gold prices movement. To strengthen the outcome of the correlation, data is also plotted on scattered diagram, which also reveals no correlation between the two variables.

| X Values | Y Values |
|----------|----------|
| 7603.20  | 28168    |
| 7747.00  | 30202    |
| 8266.45  | 29210    |
| 8335.95  | 31640    |
| 8622.90  | 31480    |
| 8943.00  | 30945    |
| 8769.15  | 30180    |
| 8626.25  | 29950    |
| 8143.15  | 27914    |
| 8192.25  | 27464    |
| 8768.30  | 29193    |
| 8946.90  | 28795    |



#### X axis-Nifty movements

| $X - M_x$       | $Y - M_y$        | $(X - M_x)^2$    | $(Y - M_y)^2$     | $(X - M_x)(Y - M_y)$ |
|-----------------|------------------|------------------|-------------------|----------------------|
| -810.508        | -1427.083        | 656923.758       | 2036566.840       | 1156662.934          |
| -666.708        | 606.917          | 444500.002       | 368347.840        | -404636.399          |
| -147.258        | -385.083         | 21685.017        | 148289.174        | 56706.730            |
| -77.758         | 2044.917         | 6046.358         | 4181684.174       | -159009.312          |
| 209.192         | 1884.917         | 43761.153        | 3552910.840       | 394308.859           |
| 529.292         | 1349.917         | 280149.668       | 1822275.007       | 714499.642           |
| 355.442         | 584.917          | 126338.778       | 342127.507        | 207903.755           |
| 212.542         | 354.917          | 45173.960        | 125965.840        | 75434.580            |
| -270.558        | -1681.083        | 73201.812        | 2826041.174       | 454831.105           |
| -221.458        | -2131.083        | 49043.793        | 4541516.174       | 471946.163           |
| 354.592         | -402.083         | 125735.250       | 161671.007        | -142575.399          |
| 533.192         | -800.083         | 284293.353       | 640133.340        | -426597.766          |
| $M_x: 8413.708$ | $M_y: 29595.083$ | Sum: 2156852.904 | Sum: 20747528.917 | Sum: 2399474.892     |

The value of R is 0.3587. Although technically a positive correlation, the relationship between your variables is weak (*nb.* the nearer the value is to zero, the weaker the relationship).

The value of  $R^2$ , the coefficient of determination, is 0.1287.

#### Result Details & Calculation

##### X Values

$\Sigma = 100964.5$   
Mean = 8413.708  
 $\Sigma(X - M_x)^2 = SS_x = 2156852.904$

##### Y Values

$\Sigma = 355141$   
Mean = 29595.083  
 $\Sigma(Y - M_y)^2 = SS_y = 20747528.917$

##### X and Y Combined

$N = 12$   
 $\Sigma(X - M_x)(Y - M_y) = 2399474.892$

##### R Calculation

$r = \Sigma((X - M_x)(Y - M_y)) / \sqrt{((SS_x)(SS_y))}$

$r = 2399474.892 / \sqrt{((2156852.904)(20747528.917))} = 0.3587$

##### Meta Numerics (cross-check)

$r = 0.3587$

#### Key

X: X Values

Y: Y Values

$M_x$ : Mean of X Values

$M_y$ : Mean of Y Values

$X - M_x$  &  $Y - M_y$ : Deviation scores

$(X - M_x)^2$  &  $(Y - M_y)^2$ : Deviation Squared

$(X - M_x)(Y - M_y)$ : Product of Deviation Scores

## Findings and Conclusions:

1. On the basis of the hypothesis testing it was found that there is no significant relationship between the movement of market indices and retail oil prices.

2.  $H_0$  is rejected and  $H_1$  holds good that there is no significant relationship between movement of market indices and retail oil prices.
3. Thus, random walk theory in context of share price movement still holds good.
4. Statistical testing shows a strong negative correlation between retail petrol prices and market indices (-0.00245).

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