Major Research Project

An Investigation into the Dynamic Relationship between Gold Prices and Stock Market Indices (NIFTY and SENSEX)

Submitted By:

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2K22/DMBA/05

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CERTIFICATE

This is to certify that Mr. Abhinav Sharma, has completed the project titled "An investigation into the dynamic relationship between gold prices and stock market indices (NIFTY and SENSEX)" under the guidance of Dr. Abhinav Chaudhary as a part of Master of Business Administration (MBA) curriculum of Delhi School of Management, New Delhi.This is an original piece of work and has not been submitted elsewhere.

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DECLARATION

I, Abhinav Sharma, student of Delhi School of Management, Delhi Technological University, hereby declare that the Major Project Report on

"An investigation into the dynamic relationship between gold prices and stock market indices (NIFTY and SENSEX)", submitted in partial fulfillment of the requirements for the award of the degree of Master of Business Administration (MBA) is the original work conducted by me. I also confirm that neither I nor any other person has submitted this project report to any other institution or university for any other degree or diploma. I further declare that the information collected from various sources has been duly acknowledged in this project.

Abhinav Sharma

2K22/DMBA/005

ACKNOWLEDGEMENT

Words often fail to express one's feelings towards others, still, I would like to express my sincere gratitude towards my guide **Dr. Abhinav Chaudhary** (Assistant Professor) for her able guidance, continuous support, and cooperation throughout my project, without whom the present work would not have been possible.

Abhinav Sharma

2K22/DMBA/005

MBA

EXECUTIVE SUMMARY

The study effort aims to determine the correlation between gold prices and stock exchange indices, specifically the NIFTY and SENSEX. This project is being prepared using secondary data.

The project is broken up into six chapters: the first one introduces NIFTY, SENSEX, and gold; the second chapter reviews the literature; the third chapter reports on the study methodology—descriptive research design—that is being employed. The fourth chapter includes citations to the different sources that provided the data for the study, along with analysis methods like regression and correlation that were applied to the whole data and further discoveries from descriptive research. The conclusion that can be reached after carrying out this in-depth research is stated in the fifth chapter.

The findings after doing the research can be drawn as follows:

A positive correlation has been detected in gold prices and market movements andgold being the independent factor affects both NIFTY and SENSEX with 34.2% and 38.1% respectively.

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1. INTRODUCTION

1.1 Background

Every individual aims to have an increased amount of money with the help of money he /she previously had. The entire process of generating new money with the help of already existing money is known as investment. Individuals can generate or create more money by investing their original sum in any asset or financial instrument. So, investment simply means a procedure in which people want to distribute their money efficiently forsome expectation of returns in the future.

An Investor has numerous options for investing either in assets or in financial instruments like bonds, debenture, stock market, options, gold, ETFs, etc. The decision to choose either of the options depends on the risk tendency of the investor which means with a low risk there are lower returns and with a high risk, higher returns.

Here, the focus is especially on gold and the stock exchange index (i.e., NIFTY and SENSEX)this is because gold has an irreplaceable value in the market due to the scarce nature of the yellow metal, the huge amount of value and attraction which people have towards it. It has always been viewed as a secure and sound investment, even in situations when the market is volatile, people generally start investing in gold. For the people in India, investing in gold commodities such as jewelry is always seen as a better option than the rest.

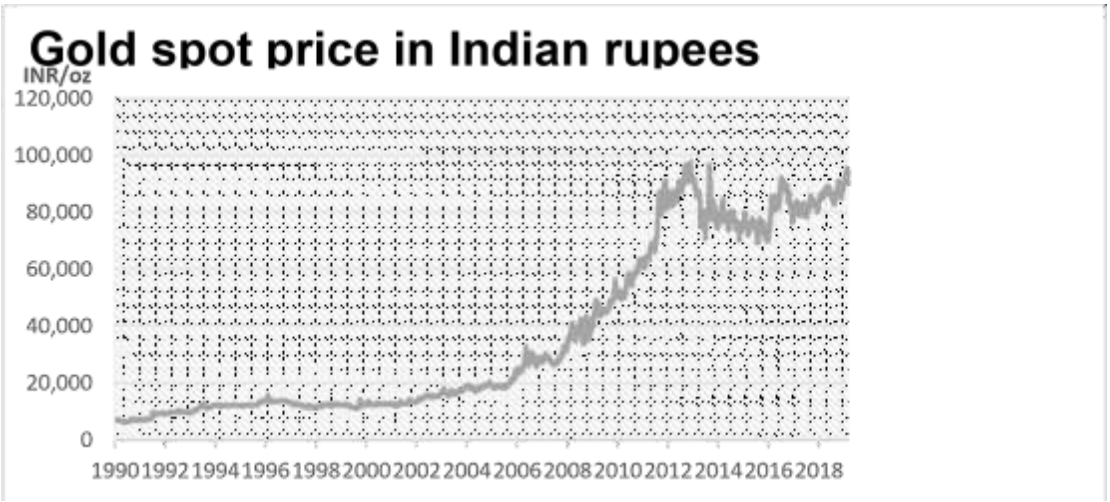


Figure 1.1

Source: World Gold Council

This (Figure 1) shows gold prices from 1990 to 2018. The graph shows how the returns from gold have always been on a significant rise even at the time of 2008-2010, the global economic crisis which affected the entire global economy and the stock markets but gold returns still managed to be stable.

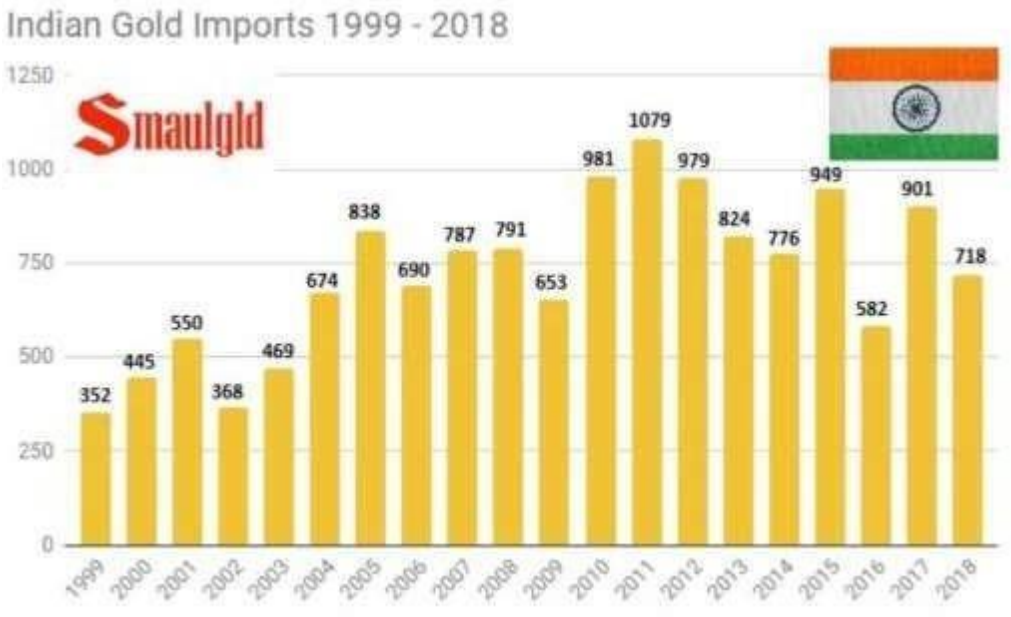


Figure 1.2

Source: Smaulgld

The above figure presents the facts of gold getting imported into the Indian economy.

According to the World Gold Council (WGC), there's an anticipated thirty-three percent surge in gold demand in India by 2020. The projected cumulative annual demand is set to surpass twelve hundred tons by 2020, valued at approximately Rs 2,50,000 crores at current levels. India stands as the world's largest buyer of gold, typically accounting for about a quarter of global gold purchases, which translates to around 700-750 tons annually. Following New Delhi's pledge of 67 tons of gold around 18 years ago to mitigate a balance of payments crisis, the Reserve Bank of India (RBI) has acquired three times that amount from the International Monetary Fund (IMF) to bolster its reserves. The IMF offered 200 metric tons of gold to the RBI, representing nearly half of the total sales volume of 403.3 metric tons approved by the Fund's Executive Board in September 2009. Traditionally, there was a belief that stock market returns and gold price returns exhibited a negative correlation; when stock markets declined, gold prices tended to rise.

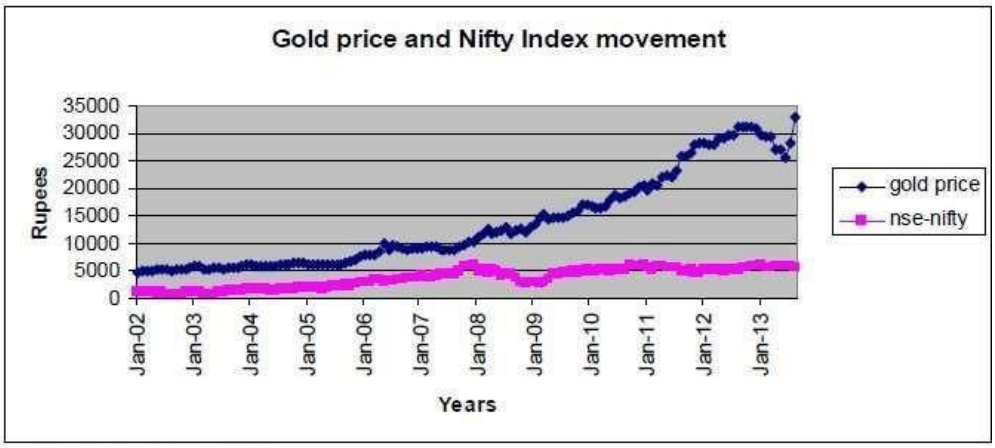
During the period from 1994 to 2002, it appeared that stock market returns and gold prices were inversely related. However, post-2002, both stock market returns and gold prices showed an upward trend simultaneously. This shift indicated the possibility of a positive correlation between the two.

The stock exchange is considered a market, better to call it a platform, where people come andmake an investment in shares of companies. There are two exchanges NSE and BSE in India whose indexes are NIFTY and SENSEX, respectively. Investing in the stock market always comes with risk but the higher the risk, the higher the return that it provides.

Figure 1.3

Source: Investing.com

The above figure depicts the returns from the year 1995 to 2019 of the NSE index. The trend above shows the performance of the market that is, its ups and downs. In 2008 when the market overall was experiencing a bearish stage, gold costs spiked as frenzy spread acrossworldwide markets. So far since March 2009 in India, there has been an emergence of recovery signs. The main purpose is to find out which is a better option for investment for the past five years by comparing returns from each other. The information utilized in such research would be descriptive.



Source: Handbook of statistics SEBI.

Figure 1.4

Between 2008 and 2010, a discrepancy between the price of gold and the Nifty Indices emerged. The inverse relationship between gold and stock demonstrated the yellow metal's ability to protect a portfolio just before a market collapse. This discrepancy became even further in 2011 as the stock continued to decline due to global unrest. Standard and Poor's (S&P), a rating organisation, reduced the U.S. credit rating.

This began a discussion: "Would we say we are coming back to the gold standard 40 years after U.S. President Richard Nixon finished the yellow metal-based rate of exchange? The ongoingincrement in the figure shows the gold value crossing Rs 30,000 imprint and drifting around Rs 32,000 during the mid-year 2013.

Industry Details

NIFTY

India Index Services and Products Ltd.(IISL) possesses and deals with the NIFTY. It is India's first specialized company that focused on an index as a core product. The NIFTY 50 is the lead file on the National Stock Exchange of India Ltd. (NSE). "The National Stock Exchange of India Limited (NSE) is the main stock trade of India, situated in Mumbai."

In 1992, the National Stock Exchange (NSE) was established as the country's first demutualized electronic trading platform. It pioneered a digital, fully automated screen-based trading system, providing convenient trading facilities to investors nationwide. With a total market capitalization exceeding US$2.27 trillion as of April 2018, NSE ranks as the world's eleventh-largest stock exchange. NIFTY 50, launched on April 1, 1996, stands as its flagship index, commonly known as NIFTY. Alongside the BSE Sensex, NIFTY serves as one of India's primary stock indices. It tracks the performance of a basket of blue-chip companies, representing the largest and most dynamic stocks in India.

It includes half of the approximately 1600 companies listed on the NSE, accounts for around 65% of its market value adjusted for float, and provides a true picture of the Indian financial system.

The NIFTY 50 provides venture managers with an introduction to the Indian market in a single, efficient portfolio and encompasses important sectors of the Indian economy. The huge blow ofthe market was in 2008 during the time of global crisis which affected NIFTY in a way that return from the market kept on declining at a steady rate. The current situation of themarket is smooth and is growing.

SENSEX

The SENSEX is a free float market-weighted market index of BSE (Bombay Stock Exchange). This index is calculated based on 30 well-established and financially sound companies, unlike NIFTY which has 50 companies in its components. As the oldest index which was launched in India on 1 January 1986; the S&P BSE SENSEX is considered as the pulse of the domestic stock markets in India. This scientifically designed index inculcates globally accepted construction as well as review methodologies. The base value of 100 was set on 1 April 1979 from the data based on financial years from 1978-79. Due to the US subprime crisis, SENSEX saw a great fall and in the year 2008 on 10th October loss of Rs 250.000 crores occurred. This loss was mainly due to the withdrawal of foreign institutional investors (FII), but recovered from the crisis but was hit again in 2009by the Satyam scandal but after that, it recovered. In August 2018, SENSEX reached an all-time high of 38896.63.

GOLD

In India, gold is the most widely used, endorsed, and approved form of investment. In India, individuals typically invest in jewellery for special occasions like marriages and hold onto it for a very long time. In contrast, stock market investments are extremely rare because of the stock market's high level of risk and potential for value loss. Typically, investors buy gold to diversify their risk, particularly when using futures and swaps. Like other commodities, the gold market is prone to intense speculation and volatility. Among

the valuable metals used for investment, gold offers the best place of refuge and hedging properties across different countries.

The dynamics of supply and demand, especially speculative demand, protect the price of gold. "Saving and disposal have larger roles in influencing its price than its utilisation," in contrast to the other commodities.

Prior to making any kind of investment, the majority of conventional investors consider three key factors: returns, liquidity, and safety. Due to the high demand for gold in India, the price of the metal is continually rising. India has a high demand for gold for a number of reasons. First and foremost, because gold is held by central banks, it provides complete security. Gold is not associated with any credit risk. Additionally, during times of crisis like as global inflation or political unrest, gold keeps its liquidity. Although gold is the most liquid asset class, it is unquestionably superior to other commodity classes. Gold investments yield no profit. But the cost of the alternative that gold offers is these zero returns. Over an extended period, the link between the price of gold and US treasuries and the US dollar has been incredibly weak, if not negative. Gold is not susceptible to the policy decisions of a single nation, unlike foreign assets, and it cannot be renounced.

Throughout the gold standard era, countries kept gold reserves as a store of value or to support the value of the national currency, as well as a guarantee to honour pledges to pay depositors, note holders, or trading peers. This significance dates back to the global war era.

Factors influencing gold price:

The dollar received some support during the mid-2008 financial crisis as purchases of US Treasuries by safe-haven investors helped to boost the currency. Ironically, the US's dependence on quantitative easing actually poses a threat to the dollar's value, further depreciating it. In fact, there is concern that debt levels may rise to the point that the government's only viable option for repaying the debt would be to let inflation depreciate its currency.

When a country experiences inflationary conditions, the currency weakens as a result of

devaluation against other currencies. When more than two currencies devalue together, their exchange rates do not register much change, but the buying power of these currencies is always condensed. This is one reason why we expect the gold price to continue to rise.

Since 98 percent of India's gold is imported from overseas, the recent increase in the dollar rate has raised the price of the precious metal. The nation's current account deficit has increased as a result.

While industrialized economies worry about deflation, Asia and other quickly expanding economies fear inflation. Governments are employing quantitative easing (QE) to prevent deflation by keeping interest rates as low as possible. We believe that even in a deflationary situation, demand for gold will persist as quantitative easing debases currencies. One argument against high gold prices during deflationary times is that deflation will probably lead to increased demand for US Treasuries, which will support the currency. However, as history has shown, both the USD and gold can climb during a cycle.

De-hedging is also a contributing factor to the upward trend in the price of gold. As the bull market for gold commenced, which roughly aligned with the onset of de-hedging, the total amount of hedged gold stood at 3,107 tons (99.9Moz). By the end of Q2'10, this figure had decreased to 195 tons (6.75 Moz). Understandably, the pace of de-hedging has slowed, with a reduction of 40 tons in H1'10. The era of de-hedging is approaching its conclusion; consequently, one of the consistent catalysts for the bull market is diminishing. Currently, the attitude towards hedging remains unchanged, and new hedges seem to be established upon request by brokers/agents for new ventures.

Official sales by central banks have a significant impact on the price of gold. Central banks have been net sellers of gold for a long time, but this could soon change. It seems that EU central banks will report sales of less than 3 tonnes as the first year of the third Central Bank Gold Agreement (CBGA-III), which permits sales of 400 tonnes of gold annually, draws to a close. The IMF has sold 222 tonnes to central banks (India 200 tonnes, Mauritius 2 tonnes, Sri Lanka 10 tonnes, and Bangladesh 10 tonnes) and 88.3 tonnes on

the open market, so collectively official sales look to be 333 tonnes.. The prices of gold and oil have been favourably connected for the most of the bull run. But gold prices have been rising steadily since March 2010, while oil prices have been fluctuating sideways. This reduced association indicates that while gold is still robust in expectation of more problems for the financial markets, oil prices are likely suffering since the forecast for economic growth has been worse. But gold prices have been rising steadily since March 2010, while oil prices have been fluctuating sideways. This reduced association indicates that while gold is still robust in expectation of more problems for the financial markets, oil prices are likely suffering since the forecast for economic growth has been worse.

Jewellery used the majority of gold until the start of the 2001 gold rush, with an average of 78% between 1993 and 2000. After that, it began to decline in the middle of the 2000s, averaging roughly 62%, and since 2009, jewellery has made up less than 50% of the demand overall. The demand for gold has declined due to high pricing, and the recent economic downturn has further decreased consumption. This has typically happened all around the world, with China being the one notable exception. The demand for jewellery plummeted 20% globally in 2009 to about 1,760 tonnes, and this year it is predicted to fall 15% to 1.500 tonnes. China's demand increased by 7.6% to a record 340 tonnes.

India continues to be the world's biggest consumer of gold jewellery, with 476 tonnes sold in 2010—the fewest since 1992. India's annual demand in the ten years prior to 2009 was an average of 565 tonnes; but, due to high prices, since 2005, demand has decreased by an average of 6.6% annually. In the last two fiscal years, India has imported 1710 tonnes of gold, indicating a rise in the country's appetite for the metal. The desire for gold as an investment has an impact on its price as well. Exchange-traded funds, or ETFs, have gained immense popularity as an investment tool and are utilised by a wide range of investors, including hedge funds, sovereign wealth funds, retail investors, and pension funds.

1.2 Problem Statement

For investors and financial professionals, the dynamic link between gold prices and the NIFTY and SENSEX stock market indexes has attracted attention. The economy and people's investment choices are significantly impacted by the volatility in the pricing of these assets. There is still a paucity of knowledge on the nature of the connection between gold prices and stock market indexes in India, despite substantial study. Determining the dynamic relationship between gold prices and the NIFTY and SENSEX stock market indexes can help shed light on how these assets behave and how they affect the economy.

1.3 Objectives of the study

The objective of this study is to analyze the dynamic relationship between gold prices and stock market indices (NIFTY and SENSEX) in India using advanced econometric techniques. The study aims to achieve the following specific objectives:

1.) To determine the direction and magnitude of the causality between gold prices and stock market indices (NIFTY and SENSEX) in India.

2.) To provide insights into the investment behavior of investors in India during different economic scenarios.

3.) To provide insights into the behavior of Indian investors and their investment decisions regarding gold and stock market indices

4.) To evaluate the effect of news and events such as geopolitical tensions, and natural disasters on the relationship between gold prices and stock market indices (NIFTY and SENSEX).

1.4 Scope of the Study

The scope of study of the project is confined to uncovering the relationship between gold prices and the stock market indices (i.e., NIFTY and SENSEX) due to the huge number of studies performed in this section. The tools used for discovering the relationship between gold and market indices are correlation and regression analysis. The data used is from 1 Jan 2010 to 31 December2019 to arrive after this research.

2. LITERATURE REVIEW

"Gold has been considered a haven asset for centuries due to its intrinsic value and limited supply. On the other hand, the stock market indices are considered as leading indicators of the overall economic performance of a country. The relationship between gold prices and stock market indices has been an interesting topic for research as it helps in understanding the investment behavior of investors during different economic scenarios."

"Several studies have been conducted to explore the relationship between gold prices and stock market indices. A study by Baur and McDermott (2010) analyzed the dynamic relationship between gold prices and stock market indices for six developed countries including the US, UK, Japan, Canada, Australia, and Switzerland. The study found that there is a significant negative relationship between gold prices and stock market indices during periods of high uncertainty and financial crisis."

Another study by Demir et al. (2012) examined "the relationship between gold prices and stock market indices in Turkey using monthly data from 2000 to 2010. The study found that there is a significant negative relationship between gold prices and stock market indices, indicating that investors tend to shift their investment from the stock market to gold during periods of economic uncertainty and financial crisis."

Similarly, a study by Shahzad et al. (2014) analyzed "the dynamic relationship between gold prices and stock market indices in India using daily data from 2001 to 2012. The study found that there is a significant negative relationship between gold prices and stock market indices during periods of high economic uncertainty and financial crisis."

However, some studies have also found a positive relationship between gold prices and stock market indices. For instance, a study by Blose and Shieh (1995) examined "the relationship between gold prices and stock market indices in the US using weekly data from 1980 to 1992. The study found that there is a significant positive relationship between gold prices and stock market indices during periods of inflation and rising interestrates."

In conclusion, the dynamic relationship between gold prices and stock market indices is complex and varies depending on the economic scenario. While some studies suggest a negative relationship, others suggest a positive relationship. Therefore, further research is required to understand the relationship between gold prices and stock market indices in different economic scenarios using advanced econometric techniques.

Another study by Goh and Ewing (2013) analyzed "the relationship between gold prices and stock market indices in Asia-Pacific countries including Australia, China, Hong Kong, India, Japan, Singapore, South Korea, and Taiwan. The study found that the relationship between gold prices and stock market indices varies across the countries, and the factors affecting this relationship also differ."

A study by Abduh and Omar (2016) examined "the relationship between gold prices and stock market indices in Malaysia using monthly data from 2000 to 2014. The study found that there is a significant positive relationship between gold prices and stock market indices, indicating that investors tend to diversify their portfolio by investing in both gold and stock market during periods of economic uncertainty and financial crisis."

Furthermore, a study by Arouri et al. (2014) analyzed "the dynamic relationship between gold prices, oil prices, and stock market indices for four emerging markets including Brazil, Russia, India, and China (BRIC). The study found that there is a significant positive relationship between gold prices and stock market indices during periods of economic uncertainty and financial crisis, while the relationship between oil prices and stock market indices is negative."

Overall, the literature suggests that the relationship between gold prices and stock market indices is not constant and varies depending on several factors such as economic uncertainty, financial crisis, inflation, and interest rates. Therefore, it is essential to consider these factors while analyzing the relationship between gold prices and stock market indices. The use of advanced econometric techniques such as time-varying parameter models, multivariate GARCH models, and wavelet analysis can provide further insights into the dynamic relationship between gold prices and stock market indices.

A report by Barinder Singh & J.B Nadda (2013) on the "comparison of risk-reward associatedwith gold and NSE index (NIFTY) returns" states that the "returns from gold are much more and smoother than the return from NIFTY". This is found out by comparing data fromthe past eight years (2005-2013) where they employed statistical measures like standard deviation to check volatility on their returns and CAGR to inform about the compounded annual growth of the two investment options. In their research, it was discovered that "returns from NIFTY were unstable, kept on changing very frequently and they even dropped twice but returns from gold were stable which involved less risk". So, they concluded that "investing in gold is much safer and more stable than in the stock market."

The paper, presented by Dr. Amalendu Bhunia (2013) on "cointegration and casual relationship among crude price, domestic gold price, and financial variables" provides that the selected variables are closely interlinked. This answer came out by using some econometric tools like the Johansen co-integration test to find long-term co-integration between gold price, crude oil price, and stock price indices of BSE and NSE and exchange rates, this test was possible with the help of unit root test of ADF and the final measure usedwas Granger causality test in search of direction of causation among the chosen financialvariables.

S.P. Narang and Raman Preet Singh (2012), investigated the "existence of any unidirectional or bidirectional relationship between the gold prices and the BSE index i.e. Sensex" for a period of 10 years (2002-2012), the result came out to be no causality between gold prices and Sensex. The tools used to justify their search were Karl Pearson's Correlation model, Johansen's co-integration test was also applied to check whether a long-run equilibrium relation exists between the variables or not, and lastly, Granger causality test and ADF unit root test to examine the stationarity of time series and order of integration between the variables".

Mukesh Kumar Mukul, Vikrant Kumar, and Sougata Ray (2012) analyzed the "gold Exchange Traded Fund (ETF) risk and reward against diversified equity fund and market portfolio". They based their study on data from January 2010 to August 2011 with specific measuring tools. They pointed out that "gold prices have usually shown an upward trend since pre and post-LPG expect year 1997-98". Analysis proved that "gold investment gave better returns and has a negative correlation with equity investments and is used for hedging as well". Investment in a gold ETF or gold mutual fund is an ideal instrument for investment.

In their 2012 working paper, Dr. Rabi N Mishra and G. Jagan Mohan conducted an analysis using vector auto-regression (VAR) to explore the relationship between FMSI, Indian gold prices, and Indian equity prices. They concluded that a significant decline in gold prices is improbable to cause instability in the Indian financial markets. Conversely, they suggested that a correction in gold costs might alleviate financial pressures, if any.

Vuyyuri and Mani (2005) utilized multiple regression modeling to assess various factors influencing gold price fluctuations, including lagged gold prices, anticipated inflation, interest rates, gold import demand, exchange rates, and stock market performance. Their findings suggested that the gold price movement is significantly influenced by past gold prices, reflecting its perceived role as an investment vehicle.

Dr. Shaminder kaur and Deepinder kaur (2017) found out that "there is a positive correlation between the gold prices and SENSEX from 2007 to 2016, even during the US economic crisis". Gold has a significant influence on BSE SENSEX. During a volatile market situation investor move from risky assets to assets like gold, this takes place becomes investment in gold becomes radiant at that point of time.

C.V Shobha (2017) states that "gold is such a unique asset which is highly liquid but scarce, acts as a diversification tool and serves as a hedge during inflation. Gold in the Indianmarket has surpassed the equity market and real estate in the past 10 years". Found out that "the daily volatility in gold prices is less as compared to bond and stock yield. The daily volatility of bonds is even more even being a risk-free asset."*Dr. S. Nirmala*

and Deepthy. K states that “India accounts for 30% of the global market of gold and is the largest consumer of oil after the USA, China, and Japan”. They studied “interrelationship between gold and crude oil with NIFTY and SENSEX” from 1 January 2010 to 30 May 2015 and came to conclusion that “low positive correlation between gold, SENSEX, and NIFTY, in short run both move in the same direction as gold but in long run, increase in gold price cause decrease in NIFTY and SENSEX as investor shift and correlation of crude oilis negative with NIFTY and SENSEX”.

The literature incorporates different investigations that affirm “the interdependency between oil prices and stock prices”. For example, Basher and Sador Sky (2006) detailed solid proof that “oil price risk affects stock profits for developing markets”. Mill operator and Ratti (2009) utilized a VECM.

Between 1971 and 2008, it was observed that the financial market responded unfavorably to oil shocks over an extended period. However, this adverse correlation ceased after September 1999. Their findings validate the presence of structural shifts in this association.

Oberndorfer (2009) showed a particular interest in the period from 2002 to 2007, employing both ARCH and GARCH models. The study revealed that increases in oil prices had a detrimental effect on European stock returns.

Basher et al. (2012) employed a Structural Vector Autoregression (SVAR) model with monthly data spanning from 1988 to 2008. They observed that in the short term, upbeat oil price fluctuations typically lead to declines in both stock prices in emerging markets and USD exchange rates. Overall, their findings contribute to the body of evidence supporting the notion that changes in oil prices exert an influence on stock prices.

Gaur and Bansal (2010) established that during times of crisis, the escalation in gold prices correlates with the decline in the stock market. Similarly, Le & Chang (2012) identified an empirical link between stock market fluctuations and gold price increases, underscoring the influence of the stock market on the upward trajectory of gold rates.

Gilmore and colleagues (2009) conducted a time series analysis spanning from 1997 to 2008, revealing a direct relationship between the stock market index and the price index

of gold mining companies over the long term. Additionally, they observed that in the short term, fluctuations in one variable influence the other, indicating a reciprocal relationship.

There is a lot of evidence that in unstable periods with economic uncertainty, as equity prices go down gold prices goes up, and attention shifts to gold as a safe investment. Investigates whether "the Gulf Cooperation Council (GCC) equity markets are instructively productive concerning oil and gold value stuns" during the period 2006– 2008 utilizing day-by-day dollar-based stock market indexes dataset. The examination additionally inspects "the effect of the effect of oil and gold prices on the financial performance of the six separate GCC financial markets". The investigation finds that "GCC equity markets are educationally effective concerning gold and oil price indexes".

Zang et al. (2010) examine the interconnectedness and causal links between gold and crude oil prices. They discover a consistent correlation between the two, indicating a significant positive relationship over the observed period. Additionally, the study proposes that changes in crude oil prices linearly influence gold price volatility, suggesting a mutual influence between the markets. Moreover, it suggests that crude oil prices have a greater impact on the combined effective price of both markets compared to gold prices.

Laughlin (1997) suggests that regardless of whether commodities decline relative to gold or gold ascends in relation to commodities, the valuation of gold increases in either scenario.

Ashraf (2005) examines five instances where a fundamental gold-oil ratio correlated with declining yield spreads, rising fed fund rates, a depreciating dollar, and ultimately, economic contraction.

Pravit (2009) integrated both Multiple Regression and Auto-Regressive Integrated Moving Average (ARIMA) techniques to forecast gold prices. The findings indicate that the ARIMA (1, 1, 1) model yields the highest accuracy for current gold price prediction. The study suggests that fluctuations in Thai gold prices are influenced by various factors including the Australian dollar, Japanese Yen, US dollar, EU Ponds, oil prices, and gold futures.

Larry et al. (1997) support the concept of market efficiency within the global gold market spanning from 1991 to 2004. Fluctuations in the euro and yen against the U.S. dollar notably influence the price of gold across various currencies. Moreover, the study

suggests that major gold-producing countries such as Australia, South Africa, and Russia exert minimal influence on the global price of gold.

Ismail et al. (2009) indicate that several factors, including the USD/Euro exchange rate, inflation rate, money supply (M1), NYSE Index, S&P Poor Index, and US dollar index, impact gold prices.

Max's (2004) paper introduces a hypothesis linking money to nominal oil and gold prices. The study employs a VAR framework to examine this hypothesis, addressing uncertainties stemming from previous basic breaks. Findings based on US data suggest that fiscal variables Granger-cause nominal oil and gold prices. Furthermore, the study reveals a causal relationship where money Granger-causes inflation, subsequently leading to changes in output growth rates.

Reddy (2002) discovered that in addition to the relative price of gold, various factors such as real income and a range of variables concerning monetary, fiscal, and financial sector policies significantly influence India's demand for gold. These findings hold important implications for policy-making in terms of economic growth, financial intermediation, and the dynamics of the gold market within the Indian context.

In their 2002 study, Bhattacharya and Mukherjee (2002) investigated the relationship between stock prices and macroeconomic indicators in India, employing the Granger Causality Test over the span of 1992-93 to 2000-2001. Their findings indicated that while there was no evident causal link between stock prices and macroeconomic factors such as interest rates, national income, and money supply, there existed a mutual causation between stock prices and the inflation rate.

Mishra (2004) explored the correlation between the stock market and foreign exchange markets by employing the Granger Causality Test alongside the Vector Auto Regression technique. Utilizing monthly data spanning from 1992 to 2002, Mishra examined stock returns, exchange rates, interest rates, and demand for money. The findings revealed a one-way causal relationship between exchange rates and interest rates, as well as between exchange rate returns and demand for money. Additionally, the study indicated an absence of Granger causality between exchange rates and stock returns.

Dr. Prashanta Athma and Ms. Suchitrak's article highlights the emergence of Gold ETFs as a burgeoning option amidst various investment choices available to investors. Factors such as the depreciation of the Indian Rupee against the US Dollar, gold's comparatively stable price behavior compared to equities, and the growing uncertainty in the global economy have propelled the rise of Gold ETFs as a resilient asset class. While incorporating a Gold ETF into a portfolio may introduce some level of risk, it also offers the advantage of mitigating tax burdens. Despite these advantages, the adoption of Gold ETFs remains limited due to investors' limited understanding and sentimental attachment to physical gold holdings.

"Sacred Gold" by Devdutt Pattanaik (2013) - The World Gold Council issued this study, which primarily examines the "mythological and cultural significance of gold in India." It makes sense that gold is an actual investment, as opposed to stocks and bonds; it's a transportable asset, as opposed to real estate; and it's a lovely piece of jewellery that can be worn on the body every day.

Narang and Singh (2013) explored the "correlation between gold prices and stock market returns in India." Their research aimed to examine whether there was a one-way connection between gold prices and the Sensex over a decade-long span (2002-2012). The findings indicate that "there is no discernible causality between gold prices and the Sensex."

Bhunia and Ganguly (2015) explored the influence of gold and crude oil prices, GDP growth rate, and exchange rates on the stock market index in India. Spanning from 1991 to 2013, the research revealed a notable long-term co-integration and a consistent correlation among these variables. The findings underscored the substantial reliance of the Indian stock market index on international crude oil and gold prices, exchange rates, and GDP growth rate.

Rejeb and Arfaoui (2016) examined the "interconnections among oil, gold, the US dollar, and stock prices" spanning from January 1995 to October 2015. They observed that during economic downturns, when the dollar and stock markets decline, gold tends to become more attractive, leading to an increase in its value. Furthermore, their research revealed that fluctuations in gold prices are influenced by changes in oil prices, movements in the US dollar, shifts in stock markets, and to some extent, by American oil gross imports and default premiums.

Ghosh and colleagues (2002) utilized monthly data on gold prices along with co-integration regression methods. They concluded that gold holds the potential to serve as a reliable hedge against long-term inflation.

In European markets and Japan, Smith (2002) discovered that the short-term correlation between gold prices and stock value indices is occasionally weak and negative. Additionally, there is no co-integration observed between gold prices and stock price indices, indicating the absence of a long-term relationship.

Vuyyuri et al. (2003) discovered that investments in gold offer an excellent safeguard against inflation. They observed that the beta coefficient, being positive and greater than one, indicated significant results at 1% prior to liberalization and 5% following liberalization.

Aggarwal and Soenen (1988) examined returns spanning 1973 to 1982. Their analysis, which involved regressing gold return on market return, revealed that while the coefficient of market return was positive, it was of modest magnitude.

Von (1989) employed both technical and fundamental analyses to explore the "factors influencing stock price fluctuations." Their investigation uncovered a consistent negative correlation between gold prices and stock averages in Europe and Japan, contrasting with the absence of such a relationship in the U.S. stock market.

Blose (1996) examined the performance of the "Gold and Government Fund," which invested in both government debt securities and gold assets. Gold typically moves in tandem with inflation, whereas bonds tend to move inversely. Consequently, the inflation risk associated with gold is partially mitigated within the reserve. Ben Mahdavi and Zhou (1997) discovered that short-term fluctuations in gold prices are excessively

volatile and market-specific, providing limited insight into overall changes in the general price level. They reference Einhorn (1994) to strengthen their argument that gold's role as an inflation hedge has diminished over time compared to financial futures.

Abken (1980) looks at the "connection between the 1-month treasury bills and gold prices".

Feldstein (1983) demonstrates that an increase in anticipated inflation will raise the relative price of gold. Chua et al. (1982) investigated whether gold served as an effective hedge against inflation for investors in six industrialized nations during the period from 1975 to 1980. Gold is considered an inflation hedge if fluctuations in gold investment returns systematically offset changes in the general price level of a particular nation. The findings indicate that gold has been an effective hedge against inflation only for U.S. investors and specifically over holding periods exceeding one-and-a-half years. When dissecting the real inflation rate into expected and unexpected components, it was once again observed that only U.S. investors could utilize gold as an inflation hedge. Selected macroeconomic variables (such as gold price, stock price, real exchange rate, and crude oil price) were examined using econometric models spanning 21 years of data from January 1989 to September 2009. The study revealed a cointegration relationship among these factors.

S. Kaliyamoorthy and Parithi (2012) conducted a study aiming to explore the correlation between gold prices and the stock market during the timeframe spanning from June 2009 to June 2010. Their findings indicate that there is no discernible relationship between the stock market and gold prices, suggesting that fluctuations in the stock market do not serve as a catalyst for changes in gold prices.

V. Prabhakaran (2014) examined the dynamic interactions between macroeconomic variables and stock market movements in India. The findings unveiled that both oil prices and exchange rates exert a notable influence on the stock market. The study concluded that the exchange rate adversely affects the stock market, whereas gold exerts a positive impact on stock market performance.

Mohanamani and Sivgnanasithi (2014) conducted an investigation into the influence of macroeconomic variables on the behavior of the Indian stock market, including parameters such as the BSE Sensex, Call Money rate, exchange rate between the Indian Rupee and the US Dollar, Foreign Institutional Investment, industrial productivity, money supply, and wholesale price index, spanning from April 2006 to July 2013. The

analysis highlights that the Indian stock market exhibits a positive correlation with the wholesale price index, money supply, and industrial productivity. Conversely, the exchange rate and foreign institutional investment inflow are deemed insignificant factors affecting the Indian stock market. Furthermore, in terms of Granger Causality, the wholesale price index and industrial productivity significantly influence the stock market.

Kannan and Dall (2003) analyzed various factors influencing the demand for gold in India and concluded that the demand for gold exhibits an inverse correlation with its price and is strongly linked to income levels. Additionally, they inferred from their research that financial wealth driven by medium-term trends in asset prices positively impacts gold demand, while the real yield on government bonds shows a negative relationship with gold demand.

Wang M. (2010) employed daily data and time series methodologies to investigate the impacts of "fluctuations and long-term as well as short-term relationships among crude oil prices, gold prices, and exchange rates on stock price indices."

In his research on the causal relationship among crude oil prices, gold prices, and financial variables from 1991 to 2012, Bhunia (2013) suggested the presence of a long-term cointegration relationship between selected crude oil prices, domestic gold prices, and financial variables from both the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE).

3. Methodology

The plan of research used is "conclusive research structure" as the objective of the project, "to think about the association among prices and stock exchange indices (NIFTY moreover, SENSEX)", clearly prompts an end which can be used in the decision-making process by using quantitative information assortment and information investigation techniques.

Under conclusive research design, “descriptive research design” is applicable in this project. This can be known as the problem under this study as well as the solution of the study is well-defined.

Data collected for the research is secondary because to discover the objective ofthe study it was necessary to make use of data that was secondary i.e., been recently published in journals, magazines, papers, books, online entryways, and different sources.

The software which were used during my research that helped to collect organize and analyze the data:

• Microsoft’s excel

• SPSS

• Microsoft’s word

Microsoft excel was to manage the data related to the prices of gold and market indicesas its interface is easy to use and the data can be easily exported to other software for further analysis. SPSS helped analyze the data collected in excel, the data was imported from Microsoft Excel and then correlation and regression analysis was done on the data for the research. Microsoft’s word was used to finally compile all the information, analysis, and make a research report.

The ordinary Least Square Model will be developed for both indices to find the relationship between Gold Price and the respective indices. The model so formed will be:

Sensex = B0 + B1(Gold Price) + μ

Nifty = B0 + B1(Gold Price) + μ

From these regression equations, we will get to know the relationship between indices andgold price.

For the last two objectives, different news articles and blogs were studied and the findings are reported here.

4. Analysis

DATA COLLECTION-

The data is gathered from secondary sources for research which were taken from many journals, articles, reports, online portals, and other sources.

Reports and online data were taken from below-mentioned sources:

- Research gate
- Commonwealth Journal of Commerce & Management Research
- Investing.com
- World gold council
- Abhinav International Monthly Refereed Journal of Research in Management & Technology
- Journal of Exclusive Management Science
- Ceep-Bit Working Paper Series
- International Journal of Research – GRANTHAALAYAH
- International Journal of Business Management & Research (IJBMR)
- Transnational Corporations Review
- Universal Journal of Marketing and Business Research
- Journal of Contemporary Issues in Business Research
- Moneycontrol.com

- Journal of Econometrics
- Journal of Futures Markets
- American Journal of Theoretical and Applied Business
- Journal of Business Finance and Accounting
- Review of Financial Economics

DATA ANALYSIS AND INTERPRETATION-

Hypothesis

H_0 : There is no significant relationship between Gold and Market Indices(i.e., NIFTY and SENSEX

H_1 : There is a significant relationship between Gold and Market Indices(i.e., NIFTY andSENSEX

The data taken from 1 Jan 2010 to 31 December 2019 shows the following results:

Correlation Analysis

Correlation- A statistical tool that measures the degree of two securities move about each other. It always has a value between -1.0 and +1.0.

Correlations

Correlations

		Sensex	Nifty	Gold
Sensex	Pearson Correlation	1	.999**	.639**
	Sig. (2-tailed)		.000	.000
	N	120	120	120
Nifty	Pearson Correlation	.999**	1	.634**
	Sig. (2-tailed)	.000		.000
	N	120	120	120
Gold	Pearson Correlation	.639**	.634**	1
	Sig. (2-tailed)	.000	.000	
	N	120	120	120

**. Correlation is significant at the 0.01 level (2-tailed).

Correlation between gold and stock exchange index (i.e., NIFTY and SENSEX).

INTERPRETATION:

As shown above the correlation coefficient of gold and SENSEX is + 0.639 and of gold and NIFTY is +0.634, which states that a moderate (positive) linear relationship between the two variables in both cases.

A positive relationship means that both move in the same direction i.e., when one variable increases the other increases, or when one variable decreases the other variable also decreases.

The correlation coefficient of NIFTY and SENSEX is + 0.999, which signifies a very strong linear relationship between the two variables.

The relationship can further be studied through regression analysis.

Regression Analysis

A statistical measure called regression seeks to ascertain the degree of correlation between a single dependent variable (represented by Y) and a number of other variable that are subject to change (referred to as independent variables, represented by X).

Regression analysis between gold and NIFTY

Variables Entered/Removed

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Gold[b]	.	Enter

Dependent Variable: NIFTY

All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.634[a]	.402	.397	1746.46640

a. Predictors: (Constant), GOLD P

Interpretation: Value of R = .634 and R square = 0.402. The percentage of the dependent variable's variance that can be accounted for by the variables that are thought to be independent is shown by the R square value.

Thus, in our research, Gold price can explain 40.2% ofthe variance in the NIFTY and 59.8% variance in NIFTY is due to other factors.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	242047169.8	1	242047169.8	79.356	.000[b]
	Residual	359917098.0	118	3050144.898		
	Total	601964267.7	119			

a. Dependent Variable: NIFTY

b. Predictors: (Constant), GOLD P

Interpretation: We got the significant value (p) = 0.000 Since, p value is less than 0.05, thus the relationship is significant.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-810.479	979.678		-.827	.410
	Gold	.309	.035	.634	8.908	.000

a. Dependent Variable: NIFTY

The regression equation thus becomes:

NIFTY = -810.479 + .309 GOLD

Regression analysis between gold and SENSEX

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	GOLD P[b]	.	Enter

a. Dependent Variable: SENSEX

b. All requested variables entered.

Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.639[a]	.409	.404	5717.50094

a. Predictors: (Constant), GOLD P

Interpretation: We got the value of R = .639 and R square = 0.409 The value of R square tells us what percent of the variance in the dependent variable has been explained by the considered independent variables. Thus, in our research, Gold price can explain 40.9% of the variance in the SENSEX and 59.1% variance in SENSEX is due to other factors.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2668695041	1	2668695041	81.637	.000[b]
	Residual	3857398409	118	32689817.02		
	Total	6526093450	119			

a. Dependent Variable: SENSEX

b. Predictors: (Constant), GOLD P

Interpretation: We got the significant value (p) = 0.000 Since, p value is less than 0.05, thus the relationship is significant.

Coefficients[a]

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-2803.325	3207.224		-.874	.384
	Gold	1.027	.114	.639	9.035	.000

a. Dependent Variable: SENSEX

SENSEX= -2803 + 1.027*GOLD

Since In both the cases P-Value is less than 0.05 we reject the null hypothesis and accept the alternate hypothesis which means **there is significant relationship between Gold Prices and Market Indices (i.e., NIFTY and SENSEX) .**

Behavioral Factors

Stock Market

1. Overconfidence and optimism – Investors are generally overcome with overconfidence after dealing in the stock market for some time. They feel that past experience enablesthem to predict the stock market better. They have an overly optimistic view of the share market movements and also they feel more confident to invest in stocks when the share prices are increasing rather than decreasing. This is a risk-seeking behavior that may not be very beneficial to investors in the long term.

2. Recency effect – The investors feel confident to trade in stocks that have been in the news recently due to positive financial performance or any other positive news coverage. It assures them of making the right choice for investment. This also includes the analyst recommendations which may be used to determine the trading decisions of investors.

3. Loss aversion – It is closely related to the prospect theory proposed by Kahneman and Tversky (1979). It means that losses sting more than the equal proportion of gains. Investors prefer to sell the gainers before they sell the losers just to avoid losses. They also act based on a belief that the stock market is predictable and that it follows a pattern. Investors prefer to invest only in well-established companies to avoid any losses.

4. High return expectations – As generally perceived, share market investments are considered to provide high returns. The investors do seem to forget the risk behind high-return assets. They think that shares give the best return among all asset classes. They invest in shares to benefit from the high returns in the share market.

5. Herd behavior – Investors generally follow the investment strategy followed by their successful peers. This also helps them minimize the sting of their losses when they discuss the loss with their peers and hear that they also had a loss. Herd behavior is harmfulfor investors because it may encourage an investor to choose investments that may not be suitable for him if it’s just imitating other investors.

Gold

1. haven – Investors believe that gold is better than other assets due to its havenquality. The demand for gold has risen higher each year despite some dips occasionally. The gold price has also shown a similar trend. Investors turn towards gold to protect their assets from market volatility.

2. Less volatility – Overall price increases in gold for many decades have increased the trust of people in gold investments. They perceive gold as less risky than any other asset class. Also, the movable quality of the asset makes it more attractive.

3. Social customs – Most investors prefer to buy gold to fulfill social customs. This is a very common reason for the seasonal demand for gold and gold jewelry.

4. Gold optimism – Investors believe that gold is forever and it will never lose its value. Jewelry is preferred by investors due to its easy availability and multiple uses.

Investors have been confident and optimistic for both gold and stock investments. However, the perception of lower risk for gold has made it more attractive than stock investments.

Effects of news and events on the relationship between Gold and Stock Market

Since ancient times, gold has been regarded as the safest investment option. The yellow metal's price is set by even minor fluctuations in the world market. Economic crises, war, and natural calamities can all have a significant impact on the gold rate.

Understanding the relationship between supply and demand is among the most crucial concepts. The price of a commodity will increase when market demand is strong and supply is limited. The price of a thing will decrease if there is little demand for it but there is an ample supply.

One asset regarded as a shelter is gold. This indicates that, despite market volatility, gold investments are the kind whose value is projected to increase over time. These circumstances could be brought about by a conflict or an economic downturn. Investors choose safe-haven assets like gold during economic downturns in order to lessen their exposure to riskier assets like debt or stocks.
Naturally, the price of gold rises in tandem with the demand for this safe haven asset.

As a result, the movement of gold prices and the stock market is nearly inversely proportionate to each other in situations like these where a news or event is about to cause investors' investment decisions to shift. Accordingly, there is a rise in demand for a comparatively safer asset like gold during a downturn in the stock market. This ultimately drives up the price of gold on the international market. Similar to this, when the stock market outperforms, investors pour money into it since the strong rise in the stock market depresses gold price

FINDINGS AND SUGGESTIONS

From all the analysis done above, it becomes crystal clear that there is a positive moderate relationship between gold prices and the stock market index (i.e., NIFTY and SENSEX) andthe regression analysis depicts that gold being the independent variable can change the values of market index (dependent variable).

These findings lead to the conclusion that there is a positive relationship, both move in the same direction i.e., when one variable increases the other increases, or, one variable decreases the other variable also decreases, between the market index and gold price movement.

Suggestions – It is clear that gold is an indispensable investment option in an investor's portfolio because it does not get affected by the volatility of the market indices. As the market becomes volatile, there is a sudden shift in the investor attitude, they start investing in gold because it is a risk-free asset. So, every investor should add gold to their portfolio to prevent them from the losses of market fluctuations because a diversified portfolio helps in the prevention of risk.

Investors need to evaluate their goals and financial plans before following fellow investors' or analysts' recommendations. Investing in any asset comes with risk which needs to be kept in mind while investing. Gold is preferred by investors mainly due to its cultural preferences. Stock investments are still less preferred by many investors which needs to be given proper attention by the regulatory authorities. The government and the stock market agencies need to be more efficient and convenient to attract more investors.

5. CONCLUSION

The study started with an emphasis on finding the relationship between the gold prices and the stock market index (NIFTY and SENSEX). The data used to discover this relationship dated from 1 Jan 2010 to 31 December 2019 and the tools used to help in the analysis were correlation and regression analysis.

Correlation resulted in a positive moderate relationship between the gold prices and the stock market index (NIFTY and SENSEX), which discovered that there is a moderate rate of relation between both.

Regression analysis stated that the degree of change in NIFTY and SENSEX, the dependent variable, is due to the change in gold prices which is the independent variable. The information that gold is an independent variable came from an extensive review of literaturefrom past presentations.

The two linear regressions gave us the following findings based on the given data: - For NIFTY, for every Rupee the Gold price moves, and the NIFTY moves .309 points in the same direction. This means that if the gold price was to increase by 1000 points, it wouldresult in an upward movement in NIFTY by 309 points.

For SENSEX, for every Rupee the Gold price moves, and the SENSEX moves 1.027 in the samedirection. This means that if the gold price were to increase by 1000 points, it would resultin an upward movement in SENSEX by 1027 points. Various asset classifications exist for investment objectives. But gold has endured all climates and continues to be the go-to choice for investors. especially in periods of economic unrest, recession, or even conflict. The truth is that yellow metal is easy to grasp, even in the most dubious of circumstances. Because of this, investors looking to diversify their portfolios find it to be a favourite.

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