# Major Research Project

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

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2K21/DMBA/38

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# CERTIFICATE

This is to certify that Mr. Arsh Dutt 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. Meha Joshi 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, Arsh Dutt Sharma, student of Delhi School of Management, Delhi Technological University, herby 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.

**Arsh Dutt Sharma**

**2K21/DMBA/038**

# ACKNOWLEDGEMENT

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

**Arsh Dutt Sharma**

**2K21/DMBA/038**

**MBA**

# EXECUTIVE SUMMARY

The objective of the research project is to find the relationship between gold prices and stock exchange indices (NIFTY and SENSEX). Secondary data is used for the preparation of this project.

The project has been divided into six parts, the first chapter deals with introduction of NIFTY, SENSEX and gold, the second chapter is about review of literature, while the third chapter notifies about research methodology being used i.e., descriptive research design. The fourth chapter cites with the various sources which were used for finding data for this research as well as the analysis techniques i.e., correlation and regression analysis used on the collective data and other findings through descriptive research. The fifth chapter states conclusion which can be drawn after conducting this extensive research.

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

That a positive correlation has been detected in the gold prices and market movements and gold 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 aim to have increased amount of money with the help of money he /she previously has. The entire process to generate new money with 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 in an efficient way for some expectation of returns in future.

An Investor has numerous options for investing either in assets, or in financial instruments like bonds, debenture, stock market, options, gold, ETF's 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 the high risk, higher returns.

Here, the focus is especially on gold and stock exchange index (i.e., NIFTY and SENSEX) this is because of the fact that gold has an irreplaceable value in the market due 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 secured 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.
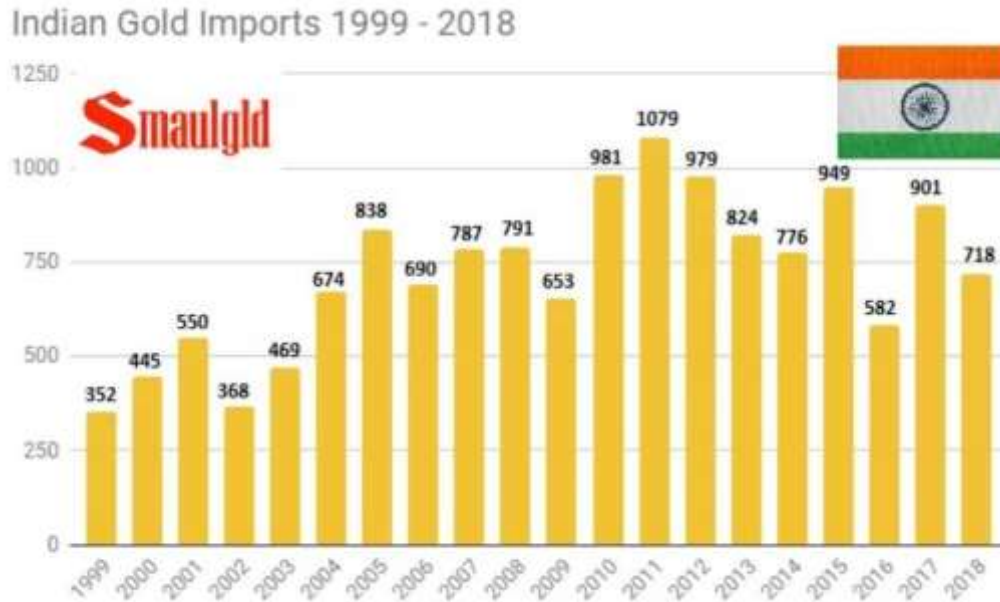
*Figure 1.1*



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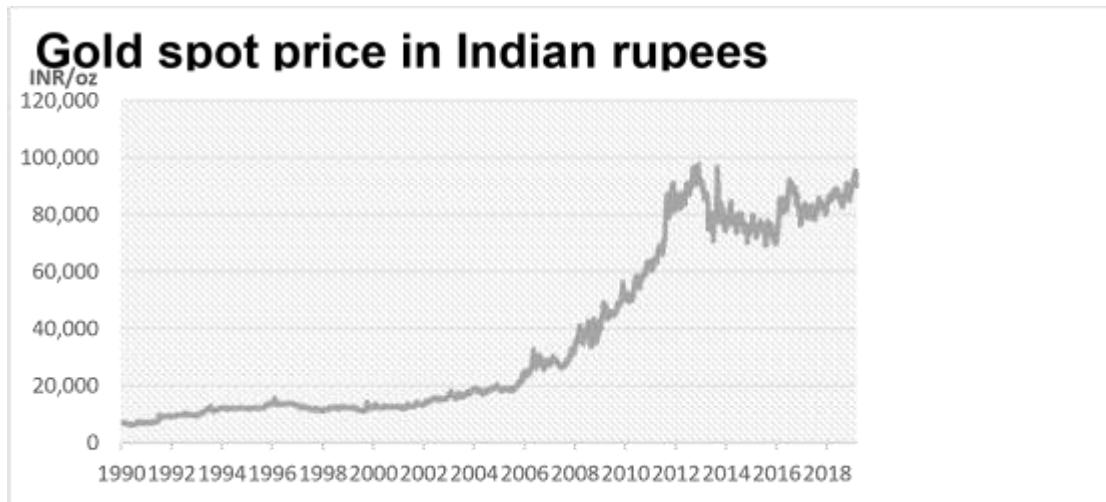
This (Figure 1) shows gold prices from 1990 to 2018. The graph shows how the returns from gold have always been on a significant rise even at the time of 2008-2010, the global economic crisis which affected the entire global economy and the stock markets but gold returns still managed to be stable.

*Figure 1.2*



Indian Gold Imports 1999 - 2018

*Source: Smaulgld*

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

"According to World Gold Council (WGC), demand of gold in India will increase by thirty-three per cent by 2020". "The accumulative annual demand are going to be in more than twelve hundred tons by 2020, esteemed at about Rs 2, 50, 000 crores at its present value level". India is the world's biggest purchaser of gold. "India normally buys about 25 percent of the world's gold, about 700-750 tons of gold every year". "Over 18 years after New Delhi pawned 67 tons of gold to hold over an equalization of installments emergency, the Reserve Bank of India has purchased thrice that measure of gold from the International Monetary Fund to expand its benefits". "The IMF had offered 200 metric huge amounts of gold to the RBI, saying that it spoke to practically 50% of the all-out deals volume of 403.3 metric tons that was endorsed by the Fund's Executive Board in September 2009". Traditionally, it was thought that "stock market returns and gold price returns were negatively correlated"; when the stock market fell, gold prices increased. This looked true

during 1994-2002 analysis, but after 2002, stock market returns and gold price were moving up together. This suggested that these two may be positively correlated.

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

*Figure 1.3*



*Source: Investing.com*

The above figure depicts the returns from year 1995 till 2019 of 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 across worldwide 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. Information utilized in such research would be descriptive in nature.

*Figure 1.4*



Source: Handbook of statistics SEBI.

The difference between the gold cost and Nifty Indices developed from 2008 to 2010. equity and gold were moving in inverse ways, showing the capacity of the yellow metal to secure one's portfolio at the hour of a plunge. This difference additionally enlarged in 2011 as stock kept on falling because of worldwide disturbance.. The U.S credit rating was downgraded by the rating agency Standard and Poor's (S&P). This began a discussion: "Would we say we are coming back to gold standard 40 years after U.S President Richard Nixon finished the yellow metal-based rate of exchange? The ongoing increment 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, NSE was set up as the first demutualized electronic trade in the nation. NSE was additionally the primary trade in the nation to give an advanced, completely robotized screen-based electronic exchanging framework which offered simple exchanging offices to its financial specialists spread over the length and breadth of the nation. National Stock Exchange has an all-out market capitalization of more than US$2.27 trillion, making it the world's eleventh biggest stock trade as of April 2018.. As stated above NIFTY 50 is its flagship index which was launched by NSE on April 1" 1996. NIFTY stands for National Stock Exchange Fifty. It is one of the two main stock indices used in India, the other being the BSE Sensex. The Index tracks the conduct of a portfolio of blue-chip organizations, the biggest and most fluid Indian securities.

It incorporates 50 of the roughly 1600 organizations recorded on the NSE, catches around 65% of its float adjusted market capitalization and is a genuine impression of the Indian financial exchange.

The NIFTY 50 covers significant segments of the Indian economy and offers venture supervisors introduction to the Indian market in one effective portfolio. The huge blow of the 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 the market 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 sub-prime crisis, SENSEX saw a great fall and in year 2008 on 10th October loss of Rs 250.000 crores were occurred. This loss was mainly due in the withdrawal of foreign institutional investors (FII), but recovered from the crisis but was hit again in 2009 by the Satyam scandal but after that it recovered. In August 2018, SENSEX reached all time high of 38896.63.

GOLD

Gold is the most popular, accepted and approved as an investment in India. Traditionally people in India Invest in Gold in the form of Jeweler at the time of various occasions like marriages and keep this gold for a significant long period of time but at the same time investment in the stock market is very limited due to its risky nature and possibility of loss of value. Investors generally obtain gold as a way of diversifying risk, especially through the use of futures contracts and derivatives. The gold market is subject to extreme speculation and volatility as are other markets, to different valuable metals utilized for investment, gold has the best place of refuge and hedging properties over various nations.

The price of gold is guarded by the demand and supply, including the speculative demand. Unlike the other commodities, "saving and disposal have larger roles in influencing its price than its utilization".

The three main criteria that most conventional investors look for before making any investment are safety, liquidity and returns. The domestic gold price in India is constantly increasing due to its massive demand in the country. There are several different reasons why gold has high demand in India. Security being the first reason as gold offers full security because it is retained by central banks. There is no credit risk linked to gold. Also, gold maintains its liquidity at times of crisis like alarming global inflation or political disturbance. Gold is the most liquid of all assets but surely is superior to other commodities, Gold holdings do not fetch any return. But these zero returns are the price of the option provided by gold. Portfolio managers have to diversify to reduce risk. The third reason for holding gold is to build and maintain a diversified portfolio. In the long run, the price of gold has shown an extremely low and even a negative correlation with the US dollar and with US treasuries. Gold never gets affected by the policy decisions of an individual country and cannot be repudiated as can be the case for foreign securities

Gold reserves have been maintained by countries intended as a guarantee to redeem promises to pay depositors, note holders, or trading peers, during the eras of the gold standard, and also as store of value, or to help the value of the national currency. This relevance goes back to war times during the world wars.

Factors influencing gold price:

As the financial crisis took place in mid-2008, the dollar found some support as safe-haven buying into US Treasuries led to dollar buying. The irony is that the US reliance on QE in effect threatens to debase the dollar, further flattening the currency. Indeed, there is a fear that debt levels could get so high that the governments only hope of repaying the debt would be to allow inflation to reduce its currency's value.

When 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.

In India, the recent rise in the dollar rate has increased gold price, as 98 per cent of gold is imported from abroad. This has widened the Current Account Deficit of the country.

Asia and other rapidly developing economies face inflation, while developed economies are worried about deflation. With interest rates as minimum as they can be, governments are using QE to avoid deflation. As QE debases currency, we predict gold will remain in demand even during a period of deflation. One argument against strong gold price during periods of deflation is that deflation is likely to see more demand for US Treasuries, which in turn is likely to underpin the dollar, but as seen before, the dollar and gold both can rise in cycle.

"De-hedging also contributes to the rise in gold price. At the start of the bull market for gold, which roughly coincided with the start of de-hedging, the total hedge book stood at 3,107 tons (99.9Moz). At the end Q2'10, the hedge book stood at 195 tons (6.75 Moz). The level of de-hedging has, not surprisingly, slowed: in H1'10 the hedge book was cut by 40 tons. The de-hedging era is now coming to a close; therefore, one of the steady drivers of the bull market is petering out". At present, the demeanor towards hedging has not changed, and new hedges possibly appear to be put on when brokers/agents request it for new undertakings.

Central bank's official sales affect the gold price in a big way. For many years, central banks have been net sellers of gold, but that may change. As the first year of the third Central Bank Gold Agreement (CBGA-III), which allows for sales of 400 tons of gold per annum, comes to an end, it appears as though EU central banks will report sales of less than 3 tons; the IMF has sold 222 tons to central banks (India 200 tons, Mauritius 2 tons, Sri Lanka 10 tons and Bangladesh 10 tons) and 88.3 tons in the open market, so collectively official sales look to be 333 tons. Oil and gold prices have been found to be positively correlated for most of the bull run. However, since March 2010, oil prices have oscillated in a sideways trend, while gold prices have continued to rise. This weaker correlation suggests that oil prices are struggling as the outlook for economic growth has deteriorated, while gold remains strong in anticipation that there is still trouble ahead for the financial markets.

Until the beginning of the bull run in gold in 2001, jewelry accounted for the bulk of gold consumption, averaging 78% between 1993 and 2000. It then started to slip in the mid-2000s to an average of around 62% and since 2009; jewelry has composed less than 50% of the total demand. High gold prices have reduced demand, and in recent years economic hardship has pushed consumption down further. This has generally occurred across the world, with one significant exception: that of China. In 2009, global jewelry demand fell by 20% to around 1,760 tons and it is expected to fall 15% this year to 1.500 tons. China's demand reached a record level of 340 tons, a rise of 7.6%. India still remains the world's largest buyer of gold jewelry which enumerates to 476 tons in 2010, which has been the lowest since 1992. In the ten years leading up to 2009, annual demand in India has averaged 565 tons, but since 2005 demand has eased by an average of 6.6% per annum, as a result of the high price.

India has imported 1710 tons of gold in the last two fiscal years, showing increased demand for gold. Price of gold is also affected by demand for investment purposes. Exchange Traded Funds (ETFs) have become a highly popular investment vehicle and are used across the spectrum of the investment community from retail investors and pension funds to hedge funds and sovereign wealth funds.

1.2 <u>Problem Statement</u>

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 <u>Objectives of the study</u>

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 <u>Scope of the Study</u>

The scope of study of the project is confined towards 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 December 2019 to arrive at the conclusion of this research.

## 2. LITERATURE REVIEW

"Gold has been considered a safe 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 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 interest rates."

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 "comparison of risk reward associated with gold and NSE index (NIFTY) returns" states that the "returns from gold are much more and smooth than the return from NIFTY". This is found out by comparing data from the 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."

In 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 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 help of unit root test of ADF and the final measure used was Granger causality test in search of direction of causation among the chosen financial variables.

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 stationarity of time series and order of integration between the variables."

Mukesh Kumar Mukul, Vikrant Kumar and Sougata Ray (2012) analysed 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 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.

Dr. Rabi N Mishra and G. Jagan Mohan, 2012 in their working paper has noted in their analysis by conducting an exercise in vector auto- regression (VAR) (framework where FMSI, "Indian gold prices and Indian equity prices formed a vector of the variables) inferred that any sharp fall in the gold prices is unlikely to have destabilising effect on the Indian financial markets. Or maybe, any remedy in gold costs may relieve the financial stress, assuming any."

Multiple regression modelling was employed by Vuyyuri and Mani (2005) to "estimate gold price, lagged gold price, expected inflation, interest rate, import demand for gold, exchange rate, and stock market performance". The researchers came to the conclusion that "movement of the gold price is affected to a large extent by lagged prices of gold, as it is perceived to be an investment."

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 Indian market 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 "inter relationship 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 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 oil is 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

For the period 1971-2008, and saw that "financial exchange reacts contrarily to oil hocks in over the long haul", however this negative relationship crumbled after september1999. Their results support "the existence of structural breaks in this relationship".

Oberndorfer (2009) was keen on the period 2002-2007, utilizing both ARCH and GARCH models and found that "ascents in oil costs influence the European stock returns adversely".

Basher et al. (2012) used a SVAR on monthly data for the period 1988-2008, and found that "positive oil price shocks tend to depress stock prices on emerging markets and USD exchange rates in the short run". On balance, these studies affirm the proof that adjustments in oil cost affect stock prices.

*Gaur and Bansal (2010)* confirmed that, "in periods of crisis, rising gold rates are a result of falling stock market".

*Le & Chang (2012*) found an "emperical relationship between stock market prices and gold prices and concluded that stock market is a reason for climbing gold rates".

*Gilmore et al. (2009)* time series for the sampling period 1997-2008 found that "stock market index is linked directly to gold mining companies price index in the long run and that both variables drive each other in the short run".

There is lot of evidence that in unstable periods with economic uncertainty, as equity prices goes down gold price goes up and attention shifts on gold as a safe investment. Investigates whether "the Gulf Cooperation Council (GCC) equity markets are instructively productive with respect to 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 with respect to gold and oil price indexes".

The study by *Zang et al. (2010)* dissects "the co-incorporation relationship and causality among gold and crude oil costs" The investigation finds that "there are steady patterns between the crude oil price and gold price with critical positive relationship during the inspecting time frame". The examination also suggests that "equilibrium between the two markets and the crude oil price alter linearly Granger causes the unpredictability of gold price". With respect to the common effective price between the two markets, the contribution of the crude oil price seems larger than that of the gold price.

Laughlin (1997) recommends that "whether commodities fall according to gold or gold rises corresponding to commodities, in either case the estimation of gold has risen".

The investigation by Ashraf (2005) looks at five cases in which the five occurrences are noted in which a base gold-oil ratio agreed with falling {or negative) yield spreads, an increasing fed fund rates, a falling dollar and in the end falling growth"

*Pravit (2009)* incorporated "Multiple Regression and Auto Regressive Integrated Moving Average (ARIMA) to predict gold prices". The examination result proposes that "ARIMA (1, 1, 1) is the most accurate model to be utilized for predicting gold prices for the time being". The study recommended that "the Australian dollar, Japanese Yen, US dollar, EU Ponds. Oil costs and gold future prices have impact on the difference in Thai gold prices".

The study by *Larryet al. (1997)* backs the theory of market efficiency for the world gold market during the 1991-2004 periods. The real fluctuations in the euro and the yen against the U.S. dollar effectively affect the cost of gold in every single other currency Further the investigation proposes that "the significant gold producers of the world (Australia, South Africa, and Russia) seem to have no critical impact over the world price of gold".

*Ismail et al(2009)* reflects the fact that "few variables like USD/Euro exchange rate , Inflation rate , Money supply (M1), NYSE Index, S&P Poor Index and US dollar index have an effect on gold prices".

The paper by Max (2004) presents a money related hypothesis of nominal oil and gold prices. It tests the model with a VAR framework with from the earlier unsure basic breaks. Results with US information show that "nominal oil and gold prices is Granger brought about by fiscal variables. Additionally money Granger causes inflation which thus Granger causes output growth rate changes".

*Reddy (2002)* found that, "besides the relative price of gold, India's gold demand is significantly influenced by real income and a set of variables pertaining to monetary, fiscal and financial sector policies, for example, loan cost, exchange rate, individual personal expense, government spending to ease financial and social vulnerability, and riches (asset price)". These discoveries have basic ramifications for development policy, monetary intermediation and gold market in the Indian setting.

Bhattacharya and Mukherjee (2002) analyzed the "nature of casual relationship between stock prices and macroeconomic aggregates in India" by using the Granger Causality Test for the period of 1992-93 to 2000-2001. Their results showed that "there is no causal relationship between stock price and macroeconomic variables like interest rates, national income and money supply, but that there is a two-way causation among stock price and inflation rate".

*Mishra (2004)* examined the "relationship between stock market and foreign exchange markets using the Granger Causality Test and the Vector Auto Regression technique". He used monthly data for stock return, exchange rate, interest and demand for money for the period 1992 to 2002. The study found that "there is a unidirectional causality between the exchange rate and interest rates and also between the exchange rate return and demand for money". The study also suggested that "there is no Granger causality between exchange rates and stock return".

*Dr. Prashanta Athma and Ms Suchitrak* brought up in their article that "Gold ETF is a developing choice of the various investment options which are available to the investor". The low volatility of gold prices as compared to the equity market, weakening of Indian Rupee against the US Dollar and growing uncertainty about the global economy resulted in the emergence of the Gold ETF as a strong asset class. setting aside of a little bit of investment in Gold ETF would broaden the portfolio risk. Incorporation of any Gold ETF in the portfolio of assets would broaden the risk Gold ETFs likewise offer the advantage of lower incidence of tax. Despite the benefits of holding Gold ETFs, the investment in it is low because of the low understanding among the investors and the wistful connection of the investors towards holding gold in the physical structure.

*Devdutt Pattanaik (2013)* - "Sacred Gold"- This research work was published by the World Gold Council mainly focuses on the "mythological and cultural significance of gold in India". Logically, gold is a tangible investment, unlike shares and bonds; a portable investment, unlike property and a beautiful ornament, one that can be worn daily on the body as jewelry.

*Narang and Singh (2013)* investigated the "relationship between gold prices and stock market returns in India". The study attempted to investigate the existence of unidirectional relationship between gold price and Sensex for the period of 10 years (2002-2012). The result of the analysis "there is no causality between the gold price and Sensex".

*Bhunia and Ganguly (2015)* studied the "impact of 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)* analyzed the "relationships between oil, gold, US dollar and stock prices" from January 1995 to October 2015. It has been discussed that "when business cycles reflect 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 American oil gross imports and default premium".

*Ghosh and others (2002),* using monthly gold price data and co-integration regression techniques, confirmed that "gold can be regarded as a long-term inflation hedge".

Smith (2002) found that "the short–run relationship between gold prices and the stock value lists indices is every now and again little and negative in European markets and Japan; likewise, gold costs and stock price indices are not co-integrated. There is no long run relationship".

*Vuyyuri et al (2003)* found that "returns on investment in gold have proved to be a perfect hedge against inflation, as the beta coefficient was positive and greater than one and the results were significant at 1% for pre-liberalization and at 5% for post-liberalization".

*Aggarwal and Soenen (1988)* investigated returns from 1973-1982. Regressing the gold return against the market return, they found that "the coefficient of market return is positive but small".

Von (1989) used technical and fundamental analysis to examine "determinants of stock price movement" and found "gold price to have been consistently negative for stock averages in Europe and Japan but not on the U.S stock market".

Blose (1996) studied the "Gold and Government fund, which invested in both government debt securities and gold investments". Gold tends to move in the same direction as inflation, while bonds tend to move inversely to inflation. Subsequently, the inflation risk of the gold is supported to some degree in the reserve."

*Mahdavi and Zhou (1997)* found that "for the United States, momentary developments in the price of gold are excessively unstable and market explicit to figure generally progressive and little changes in the general value level in a satisfactory way". They also

quote Einhorn (1994) to reinforce their finding that "the role of gold as a hedge against inflation seems to have diminished over time relative to financial futures".

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

Feldstein (1983) shows that "a rise in expected inflation will increase the relative price of gold". Chua et al. (1982) inspected "whether gold has been a successful fence against expansion for investors in six industrial nations" over the period 1975-1980. "Gold is viewed as a hedge against inflation if changes in the profits on gold investment methodically counterbalance changes in the general value level of a specific nation. The outcome demonstrates that gold has been a viable support against just U.S inflation, and just more than one-and half year holding periods. At the point when the real inflation rate was decomposed into expected and startling segments, it was again discovered that just U.S investor could fence against inflation utilizing gold. chosen large scale factors (gold value, stock value, real exchange rate and the crude oil cost) in view of 21 years information utilizing econometric models for the periods from January 1989 to September 2009". The study uncovered that "there is a cointegration connection between the factors".

*S. Kaliyamoorthy and Parithi (2012)* have made a study "to investigate the association between gold cost and securities exchange" for the period from June 2009 to June 2010.They demonstrate that "there is no relationship with the stock market and gold price and stock market isn't a ground for rising gold cost".

*V.Prabhakaran, (2014)* studied "dynamic interactions of macroeconomic variables and stock market movements in India". The study revealed that "oil price and exchange rate is having a significant impact on the stock market". The study concluded that "exchange rate is having an adverse impact on stock market and gold is having a positive impact on stock market".

*Mohanamani, Sivgnanasithi (2014)*, investigates "the impact of macroeconomic variables on the behavior of Indian Stock market such as BSE Sensex, Call Money rate, Exchange rate between Indian Rupees and US $, Foreign Institutional Investment, Industrial

productivity, money supply and wholesale price index" over the period 2006:04 to 2013:07. The analysis reveals that "Indian stock market is positively a wholesale price index, money supply and industrial productivity". "The exchange rate and inflow of outside institutional investment are seen as irrelevant to Indian Stock market". In the Granger Causality sense, "wholesale price index and industrial productivity influence the stock market to a great extent".

*Kannan and Dall (2003 (Dall, 2003)* in their examination "broke down the different variables of demand for gold in India" and presumed that the demand for gold has an opposite relationship with its price and is emphatically identified with income. They further deduced in their investigation that "money related riches instigated by medium term drifts in value costs positively affects gold and that genuine yield on government bonds have an inverse relationship with gold demand".

*Wang M, (2010)* utilized day by day information and time series strategies to explore the effects of "fluctuations and long and momentary connections in crude oil value, gold cost, and trade various currencies on the stock price indices".

*Bhunia, (2013)* in his study on "causal relationship among crude price, gold price and financial variables" during the period from 1991 to 2012 envisaged that "there exist a long term cointegration relationship between the selected crude oil price, domestic gold price and financial variables of both BSE and 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 in nature because to discover the objective of the 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.

Software which were used by during my research which helped to collect organize and analyze the data are:

• Microsoft's excel

• SPSS

• Microsoft's word

Microsoft's excel was to manage the data related to the prices of gold and market indices as its interface is easy to use and the data can be easily exported to other software for further analysis. SPSS was helpful in analyzing the data collected in the excel, the data was imported from Microsoft's 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.

Ordinary Least Square Model will be developed for both the 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 and gold 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 significant relationship between Gold and Market Indices(i.e., NIFTY and SENSEX

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

**Correlation Analysis**

Correlation is a statistical tool that measures the degree to which two securities move in relation to 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 there is a moderate (positive) linear relationship between the two variables in both the cases.

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

Regression is a statistical measurement that aims to determine the strength of the relationship among one dependent variable (denoted by Y) and a series of other changing variables (known as independent variables, denoted 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 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: We got the value of R = .634 and R square = 0.402. 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 40.2% of the 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<sup>a</sup>**

| Model | Variables Entered | Variables Removed | Method |
|---|---|---|---|
| 1 | GOLD P<sup>b</sup> | . | 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<sup>a</sup> | .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 | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 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**

<u>**Stock Market**</u>

1. Overconfidence and optimism – Investors are generally overcome with overconfidence after dealing in the stock market for some time. They feel that the past experience enables them to predict the stock market better. They have 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 which 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 a right choice for investment. This also includes the analyst recommendations which may be used to determine the trading decisions of investor.

3. Loss aversion – It is closely related to 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 losers just to avoid the losses. They also act based on a belief that 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 share market.

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

**<u>Gold</u>**

1. Safe haven – Investors believe that gold is better than other assets due to its safe haven quality. The demand for gold has risen higher each year despite some dips occasionally. The gold price has also shown the similar trend. Investors turn towards gold to protect their assets from the 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 of gold and gold jewelry.

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

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

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

Gold has been considered the safest investment avenue since the millenniums. Even a small disturbance in the global market sets the prices of the yellow metal rolling. From natural disasters to war, and even economic crisis, the gold rate is highly sensitive to such stimuli.

One of the most important aspects to understand is how demand and supply works. When there is a high demand in the market and the supply is low, the price of that commodity will go up. When the demand for the product is low but its supply is abundant, its price will decline.

Gold is considered a safe haven asset. This means that gold investment is a type of investment that is expected to grow in terms of its value over time, even amid market turbulence. These situations may be a result of an economic crisis or war. In the event of an economic downturn, investors opt for safe haven assets like gold to reduce their exposure to volatile assets such as equities or debt.

Naturally, when the demand for this safe haven asset (gold) goes up, its prices also shoot up.

Therefore, in such cases where a news or even is about to bring a change in the investment decision of the investors, the movement of gold prices and the stock market is almost inversely proportional to each other. This means that when the stock market is on a downward spiral, the demand for a relatively safer asset like gold goes up. This in-turn pushes the price of gold in the global market. Similarly, when the stock market outshines, investors siphon money into the market since gold prices take a beating due to robust growth in the stock market.

FINDINGS AND SUGGESTIONS

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

These findings lead to a 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 in their portfolio to prevent them from the losses of market fluctuations because a diversified portfolio helps in prevention of risk.

Investors need to evaluate their goals and financial plan before following fellow investors or analyst 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 in order to attract more investors.

# 5. CONCLUSION

The study started with an emphasis to find the relationship between the gold prices and 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 among the gold prices and 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, 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 extensive review of literature from the past presentations.

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

For SENSEX, every Rupee the Gold price moves, the SENSEX moves 1.027 in the same direction. This means that if the gold price was to increase by 1000 points, it would result in an upward movement in SENSEX by 1027 points.

There are different asset classes for investment purposes. However, gold has weathered all seasons and remains the preferred option for investors. Particularly, during times of economic turmoil, recession, and even war. The fact that even in the most uncertain of times, one can catch hold of yellow metal easily. This makes it a favorite for investors who want to diversify their portfolios.

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