

IMPACT OF MACROECONOMIC VARIABLES ON MARKET BEHAVIOUR OF PRECIOUS METALS (GOLD, SILVER AND PLATINUM)

by Vineet Kumar, Bhawna, Bhavesh Garg

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**IMPACT OF MACROECONOMIC VARIABLES ON MARKET
BEHAVIOUR OF PRECIOUS METALS (GOLD, SILVER AND
PLATINUM)**

A Dissertation Submitted in

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Submitted by:

BHAWNA (2K17/MBA/716)

BHAVESH GARG (2K17/MBA/713)

VINEET KUMAR (2K17/MBA/757)



University School of Management and Entrepreneurship
(Delhi Technological University)

CERTIFICATE

This is to certify that the dissertation entitled “**IMPACT OF MACROECONOMIC VARIABLES ON MARKET BEHAVIOUR OF PRECIOUS METALS (GOLD, SILVER and PLATINUM)**” is the project work carried out by **Bhawna, Bhavesh Garg, Vineet Kumar** at **University School of Management and Entrepreneurship** (Delhi Technological University) for partial fulfillment of **MBA**. This report has not been submitted to any other college/institute for the award of any Degree/Diploma.

Bhawna

Bhavesh Garg

Vineet Kumar

(MBA, USME)

Mr. Virender Kumar

(Assistant Professor)

Dr. Amit Mookherjee
(Head of Department)

EXECUTIVE SUMMARY

The paper tries to identify the impact of macroeconomic variables on the precious metals. Further this paper attempts to investigate the relative influence of the factors affecting the precious metals.

The macroeconomic variables used to conduct this study are: inflation rate, exchange rate, GDP, growth rate, real interest rate and interest rate. The precious metals used are: Gold, silver and platinum.

The second part of the study focuses on the examination of the price (average price of a year) and quantity of these precious metals traded.

Annual data ranging from 2009-2017 is considered. Primary hypothesis evaluates that whether these precious metals are dependent on the given macroeconomic variables or not. For establishing the relationship, regression analysis is used by using MS excel.

The result shows that macroeconomic variables do have some impact on price of gold, quantity of gold traded, price of silver, quantity of silver traded, price of platinum, quantity of platinum traded.

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We take this opportunity to express our profound gratitude and deep regards to **Mr. Virender Kumar (Assistant Professor, DTU)** for his exemplary guidance monitoring and constant encouragement throughout the course of the project. The help and study given by him from time to time shall carry us a long way in the journey of life in which we are about to embark.

BHAWNA

BHAVESH GARG

VINEET KUMAR

INTRODUCTION

Precious Metals

A **precious metal** is a rare, naturally occurring metallic chemical element of high economic value. Chemically, the precious metals are less reactive than most elements. They are usually ductile and have a high luster. Historically, precious metals were important as currency but are now regarded mainly as investment and industrial commodities. [Gold](#), [silver](#), [platinum](#), and [palladium](#) each have an ISO 4217 currency code.

A classification of metals that are considered to be rare and have a high economic value. The higher relative values of these metals are driven by various factors including their rarity, uses in industrial processes and use as an investment commodity.

The best-known precious metals are the [coinage metals](#), gold and silver. While both have industrial uses, they are better known for their uses in [art](#), [jewelry](#) and coinage. Other precious metals include the [platinum group](#) metals: ruthenium, rhodium, palladium, osmium, iridium, and [platinum](#), of which platinum is the most widely traded.

The demand for precious metals is driven not only by their practical use but also by their role as [investments](#) and a [store of value](#). Historically, precious metals have commanded much higher prices than common industrial metals.

Economic Use

[Gold](#) and [silver](#), and sometimes platinum, are often seen as [hedges](#) against both [inflation](#) and economic downturn. [Silver coins](#) have become popular with collectors due to their relative affordability, and, unlike most gold and platinum issues which are valued based upon the markets, silver issues are more often valued as collectables, far higher than their actual bullion value.

GOLD

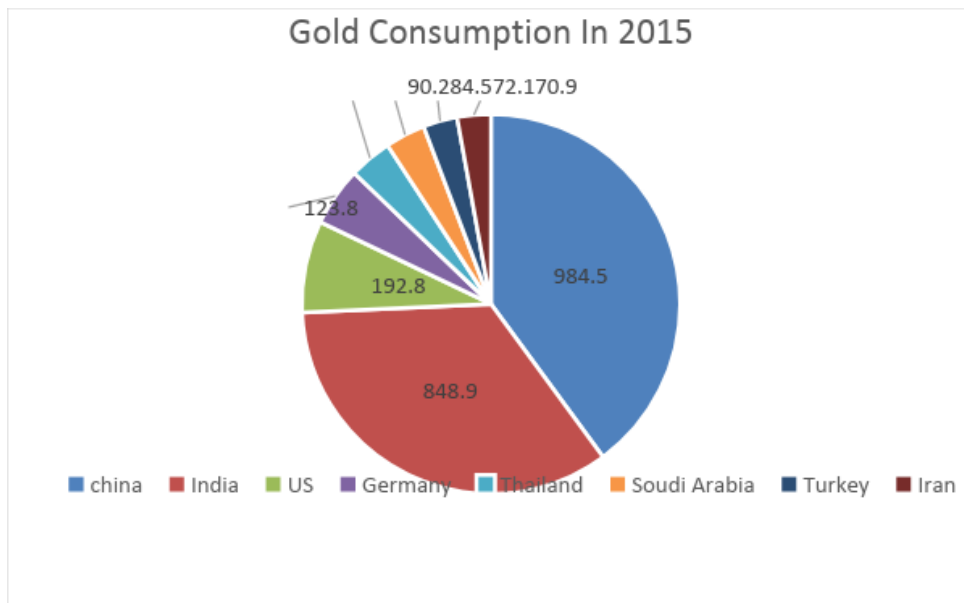
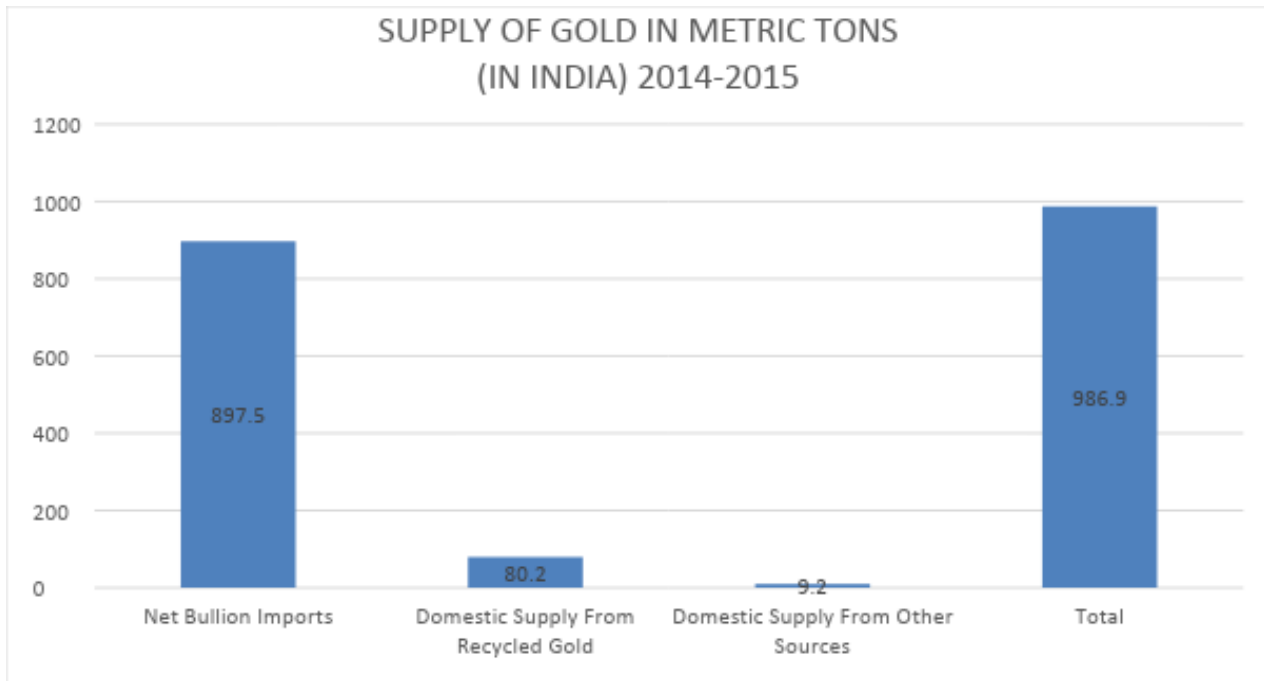


Gold is the oldest precious metal known to man and for thousands of years it has been valued as a global currency, a commodity, an investment and simply an object of beauty.

Introduction

- Gold (Chemical Symbol-Au) is primarily a monetary asset and partly a commodity.
- Gold is the world's oldest international currency.
- Gold is an important element of global monetary reserves.
- With regard to the investment value, more than two-thirds of gold total accumulated holdings is with central banks' reserves, private players, and held in the form of jewellery.
- Less than one-third of gold's total accumulated holdings are used as “commodity” for jewellery in the western markets and industry.

This statistic shows the estimated supply of gold in India in 2015. During that year, the domestic supply from recycled gold totaled some 80 metric tons. Most of the global amount of gold was consumed by the jewelry industry.

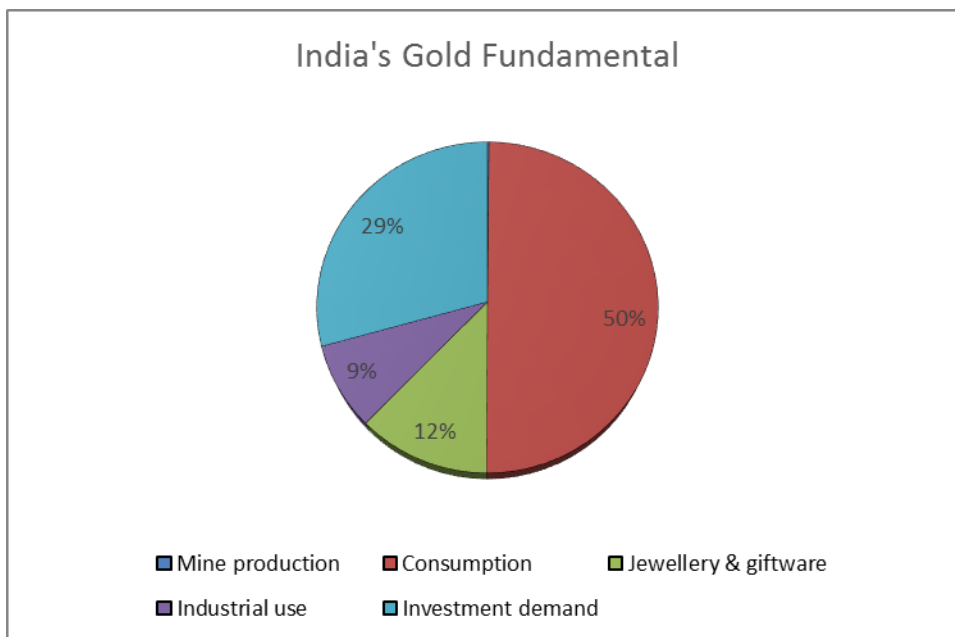


Global Scenario

- London is the world's biggest clearing house.
- Mumbai is under India's liberalized gold regime.
- New York is the home of gold futures trading.
- Zurich is a physical turntable.
- Istanbul, Dubai, Singapore, and Hong Kong are doorways to important consuming regions.
- Tokyo, where TOCOM sets the mood of Japan.

Indian Scenario

- India, world's largest market for gold jewellery and a key driver of the global gold demand.
- The domestic drivers of gold demand are largely independent of outside forces. Indian households hold the largest stock of gold in the world.
- Two thirds of the Indian demand for gold comes from the rural parts of the country.
- In 2017, gold's role as an inflation hedge bolstered its appeal in India. India imported around 850 metric tonnes (MT) of gold in 2017.



Factors Influencing the Market

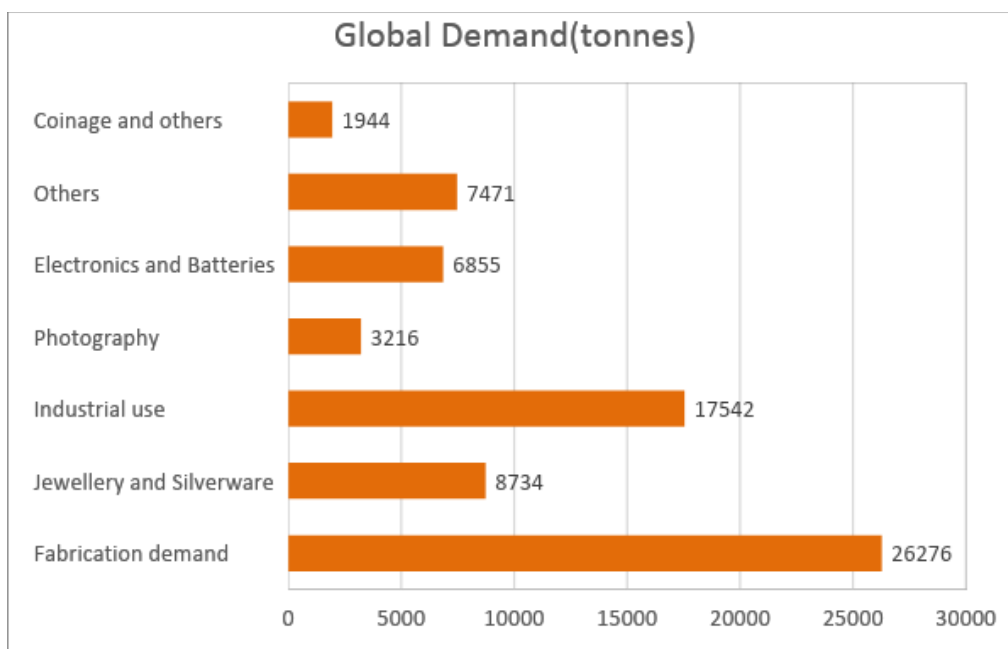
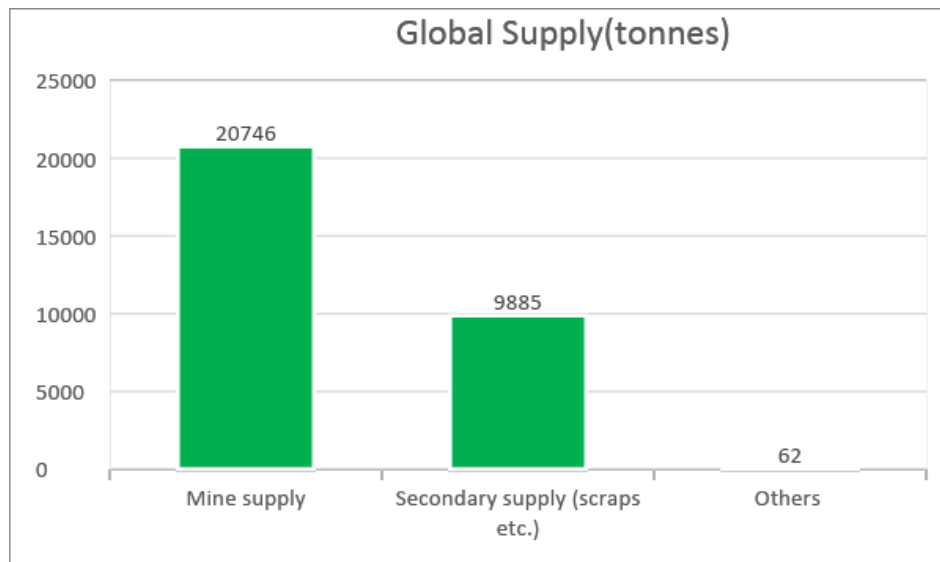
- Above ground supply of gold from central bank's sale, ¹ reclaimed scrap, and official gold loans.
- Hedging interest of producers/miners.
- World macroeconomic factors such as the US Dollar, interest rate and economic events.
- Commodity-specific events such as the construction of new production facilities or processes, unexpected mine or plant closures, or industry restructuring.
- In India, gold demand is also determined to a large extent by its price level and volatility.

SILVER



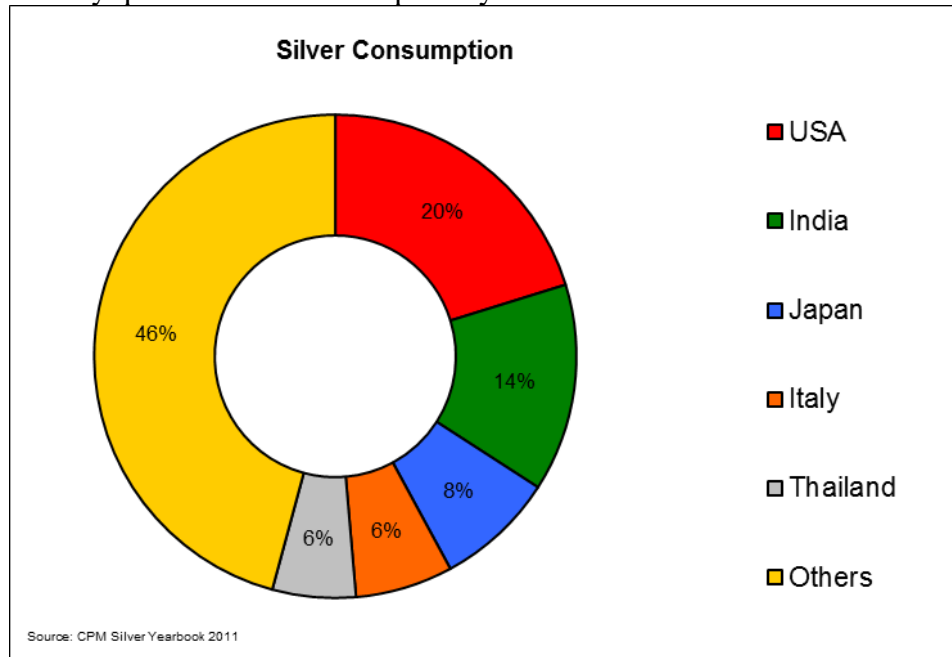
Introduction

- ¹ Silver (Chemical symbol-Ag) is a brilliant grey-white metal that is soft and malleable.
- Silver's unique properties include its strength, malleability, ductility, electrical and thermal conductivity, sensitivity, high reflectance of light, and reactivity.
- The main source of silver is lead ore, although it can also be found associated with copper, zinc and gold and produced as a by-product of base metal mining activities.
- Secondary silver sources include coin melt, scrap recovery, and dis-hoarding from countries where export is restricted. Secondary sources are price sensitive.



Global Scenario

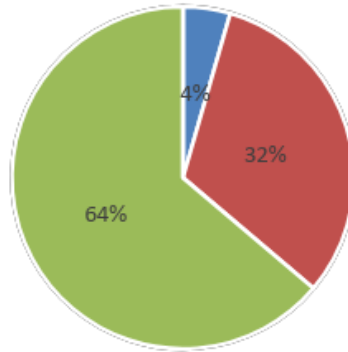
- Silver is predominantly traded on the London Bullion Market Association (LBMA) and COMEX in New York.
- LBMA, the global hub of over-the-counter (OTC) trading in silver, is the metal's main physical market. COMEX is a futures and options exchange, where most funds' activities are focused.
- Silver is invariably quoted in US Dollars per troy ounce.



Indian scenario

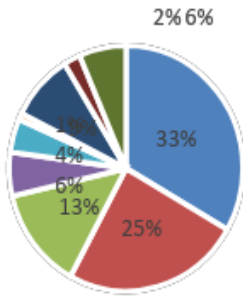
- The average annual demand for silver in India is about 2500 Metric tonnes (MT) per year. In 2011, the country's production was around 342.13 MT.
- Nearly 60% of India's silver demand comes from farmers and rural India, who store their savings in the form of silver bangles and coins.

Indian Supply



- Mine production
- Secondary supply (including scraps)
- Imports
- Government disposals & others

Indian Demand



- Fabrication demand
- Industrial use
- Electroplating
- Electrical/Electronics
- Brazing alloys
- others
- Jewellery and silverware
- Jewellery
- Silverware

Factors Influencing the Market

- Economic events such as India's industrial growth, the global financial crisis, recession and inflation affect metal prices.
- Commodity-specific events such as the construction of new production facilities or processes, unexpected mine or plant closures, or industry restructuring affect the market.
- Governments set trade policy (implementation or suspension of taxes, penalties, and quotas) that affect supply by regulating (restricting or encouraging) the material flow.
- Geopolitical events involving governments or economic paradigms and armed conflict can cause major changes.
- A faster growth in demand against supply often leads to a drop in stocks with the government and investors.
- Silver demand is underpinned by the demand from jewellery and silverware, industrial applications, and overall industrial growth.
- In India, the real industrial demand occupies a small share in the total industrial demand for silver. This is in sharp contrast to most developed economies.
- In India, silver demand is also determined to a large extent by its price level and volatility.

PLATINUM



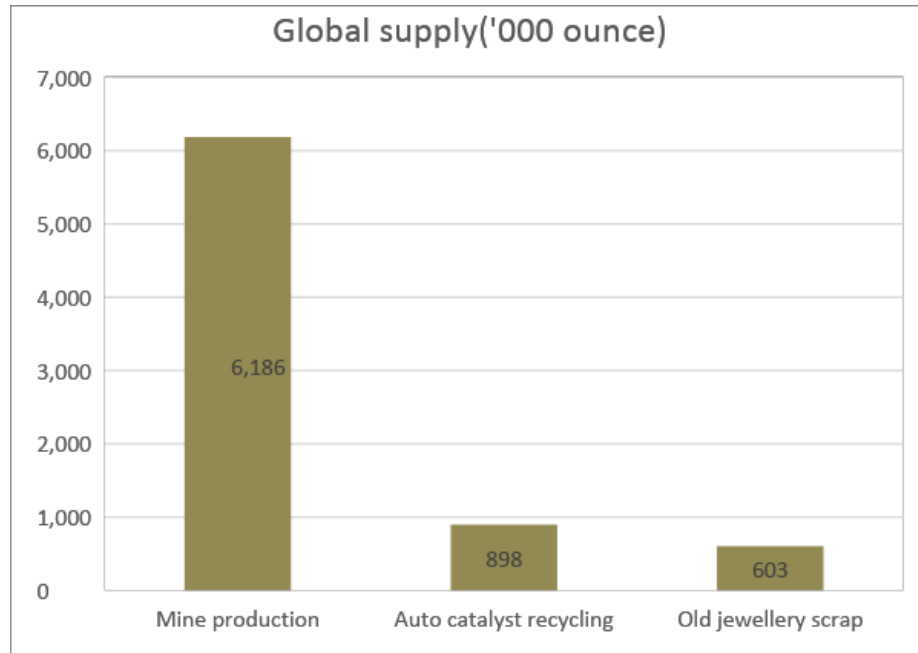
Platinum is the rarest of all precious metals. It has several unique chemical and physical properties that make it essential in a wide range of industrial and environmental applications. Platinum is also considered as one of the finest of all jewellery metals.

Major Characteristics

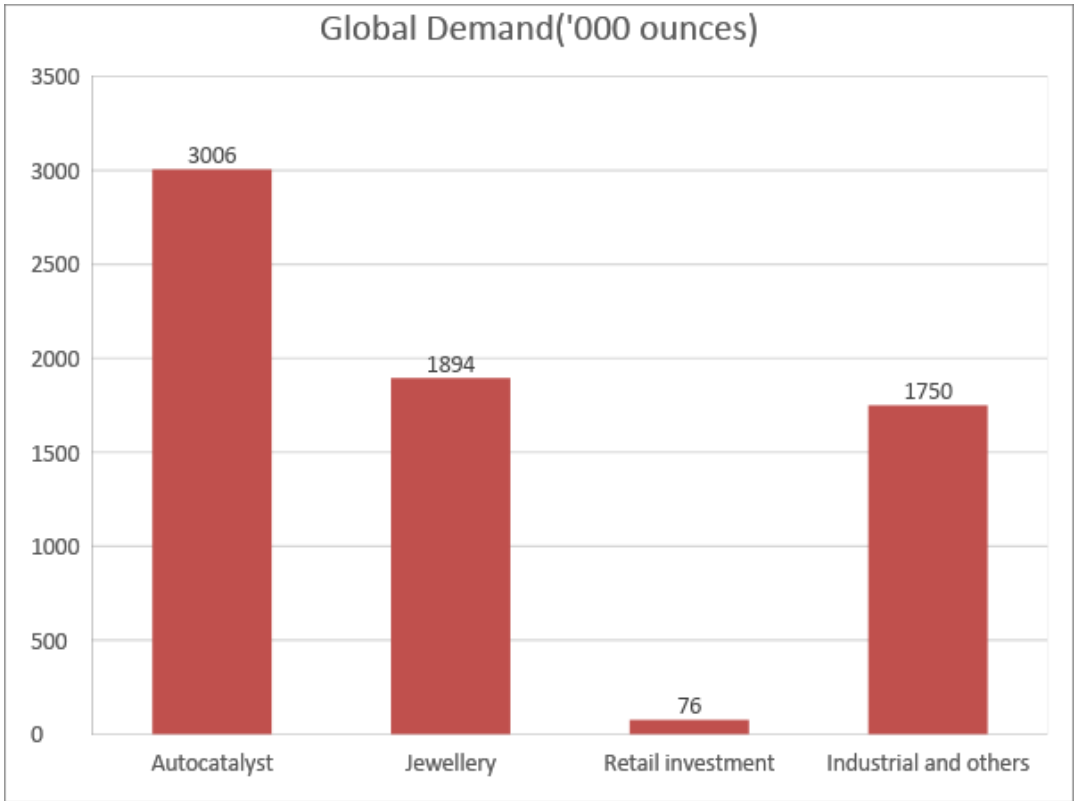
- Platinum as a pure metal is silvery-white in appearance, lustrous, ductile, and malleable. It is widely used in several industrial applications as it possesses high resistance to chemical attack, excellent high-temperature characteristics, and stable electrical properties.
- Platinum is corrosion resistant and is more precious than gold. Platinum's wear- and tarnish-resistance characteristics are well suited for making fine jewelry.
- Platinum is traded as a commodity with prices determined by market forces. It is also a widely sought after investment avenue in recent years. However, it is not widely treated as a monetary base like gold.

Global Demand and Supply Scenario

- The supply of platinum is met by mine production, auto catalyst refining and jewellery refining with their respective contribution estimated to be 6.15 million ounces, 1 million ounce and 0.9 million ounce in 2008.
- The annual production of platinum has averaged around 6.2 million ounces (193 tonnes) in the previous three years from 2006 with more than 90% of the production coming from South Africa (76%) and Russia. The other producers are United States of America, Canada and Zimbabwe.
- The production of platinum is highly dependent on South Africa's production with 2009 output from South Africa, Russia, USA and Zimbabwe estimated to be 4.7 million ounces, 0.74, 0.25 and 0.33 million ounces respectively.
- The platinum mining industry is very capital intensive and it is reported that approximately 10 tonnes of raw ore has to be mined to produce just one pure ounce of platinum.
- Unlike other precious metals like gold and silver, there are no large above-ground platinum stockpiles to protect against significant supply disruptions. Some estimates predict that existing above ground reserves would last only for a year, if platinum mining was suddenly stopped.



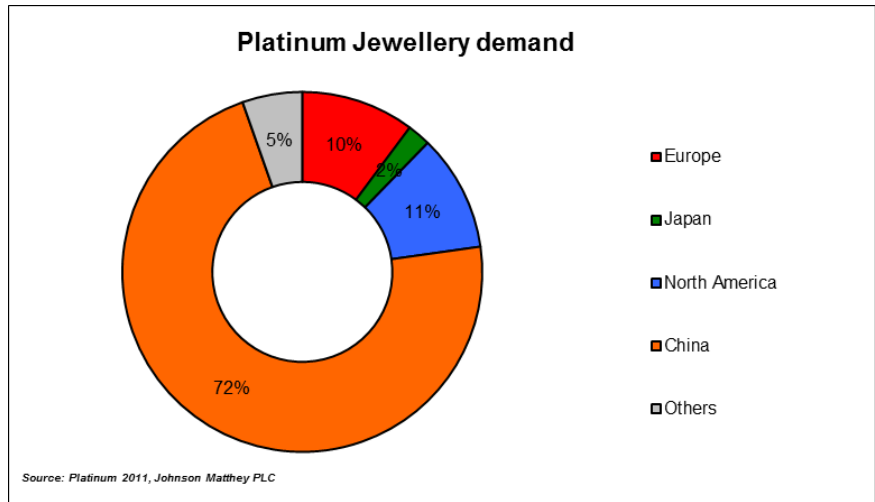
- The demand for platinum mainly comes from auto catalyst, jewellery, other industrial application and investment. The other industries uses platinum are electronics, glass and petroleum industry.
- The total global demand for this rare metal is reported to be around 7.79 million ounces in 2008, with consumption by auto catalyst (used in automobiles), jewellery, investment and other industrial applications estimated to be around 3.8, 1.6, 0.45 and 1.9 million ounces respectively.
- North America, Europe, China and Japan are the most important economies accounting for majority of the global platinum consumption



World Gold Markets

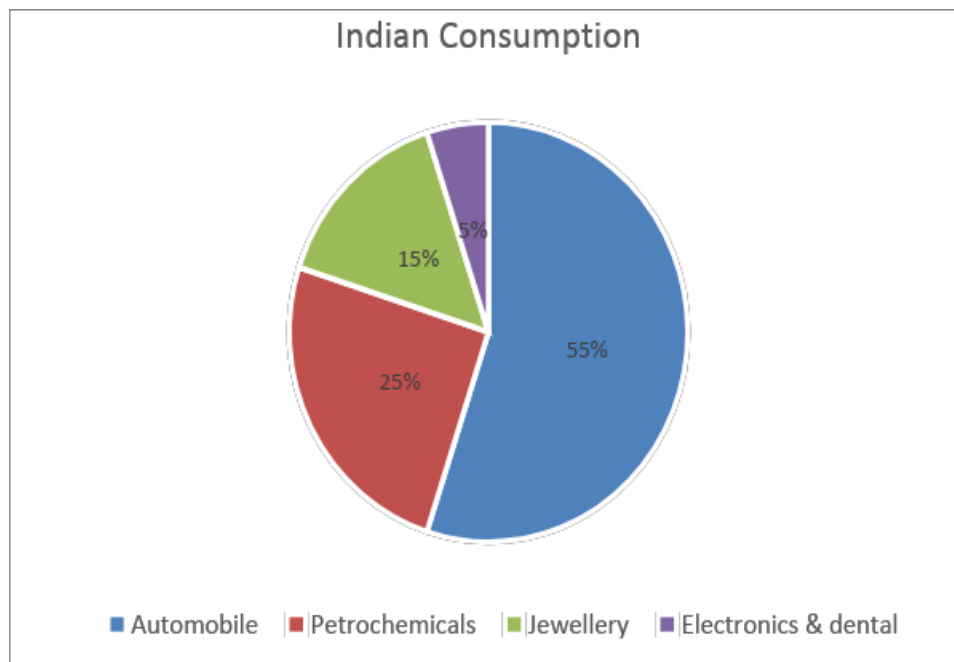
The London Platinum and Palladium Market (LPPM), which provides the industry benchmark price 'London fix'

Derivative exchanges at New York – CME (COMEX), TOCOM (Japan), MCX (Mumbai)



Indian Scenario

- India's appetite for platinum has been steadily increasing in recent years on account of the country's economic progress leading to rising industrial demand and increasing preference for platinum jewellery in urban areas.
- India's consumption of platinum in 2008-09 is estimated to be around 932 kgs, which is expected to rise to around 1200 kgs in 2009-10.
- The approximate consumption by various sectors in India is estimated to be automobile (55%), petrochemicals (25%), jewellery (15%) and electronics & dental (5%).



Factors Influencing the Markets

- Indian platinum prices are highly correlated with international prices. However, the fluctuations in the INR-US Dollar impact domestic platinum prices and have to be closely followed.
- The global prices are driven by a host of factors with macro-economic factors like strength of the global economy, currency movements, interest rates, rising importance of emerging markets being major influencing factors.
- Economic situation in major consuming countries like USA, Europe, Japan and China influence consumption on account to its high demand from industrial sectors, especially automobiles.
- Platinum production is highly skewed with just four mines and two countries producing almost 90% of the total annual production. Prices are influenced profoundly by production disruptions, policies taken in producing countries. The influence of this factor is enhanced by the absence of any significant global stocks of platinum in the world, unlike that of gold and silver. Additionally, platinum mining is a very capital intensive industry, which discourages entry of new players.
- Any change in global stocks, of which a major portion is present in Russia do influence prices.
- The price movement in other precious metals, especially gold is a major influencing factor.

MACROECONOMIC VARIABLES

Macroeconomic variables indicate prosperity of any economy and they decide the destiny of investments. The macroeconomic variables influence price determination process in any economy. The uncertainty of macroeconomic variables affects stock and commodity market significantly causing volatility in the prices. In contemporary scenario, increase in oil demand depicts increased imports, and stronger inflation which, in turn, requires gold conservation.

Since precious metals (gold, silver and platinum) are an important saving and investment instrument in India, it is expected that these metals may be looked upon as alternative assets for those holding idle money and for speculative purposes.

In past two decades, prices of these metals have been rising and bursting out the technical's. It is not surprising that the prices move in synch because they are probably influenced by common macroeconomic fundamentals like, GDP, Growth Rate, Exchange Rate, Interest Rate, Inflation, and Forex Reserves.

As these metals are one of prime financial assets which can be used as hedge against inflation, the close relationship between macroeconomic variables and its impact on these precious metals are to be observed and analysed.

GROSS DOMESTIC PRODUCT (GDP)

Gross domestic product (GDP) is the market value of all officially recognized final goods and services produced within a country in a year, or other given period of time. GDP can be determined in three ways which are: the expenditure approach, output approach, and the income approach.

- (1) Expenditure basis: how much money was spent?
- (2) Output basis: how many goods and services were sold, and
- (3) Income basis: how much income (profit) was earned.

In India, for all these years we have been getting GDP Product-wise (output basis). GDP is usually calculated on an annual basis. It includes all of private and public consumption, government outlays, investments and exports less imports that occur within a defined territory.

$$\text{GDP} = \text{C} + \text{G} + \text{I} + \text{NX}$$

where:

"C" is equal to all private consumption, or consumer spending, in a nation's economy

"G" is the sum of government spending

"I" is the sum of all the country's businesses spending on capital

"NX" is the nation's total net exports, calculated as total exports minus total imports. (NX = Exports - Imports)

In India, GDP is calculated by the Central Statistics Office.








EXCHANGE RATE

3

An exchange rate (also known as a foreign-exchange rate, forex rate, FX rate) between two currencies is the rate at which one currency will be exchanged for another. It is also regarded as the value of one country's currency in terms of another currency.

Exchange rates are determined in the [foreign exchange market](#), which is open to a wide range of different types of buyers and sellers.

A currency pair is the quotation of the relative value of a currency unit against the unit of another currency in the foreign exchange market.

	in INR
 Australia	50.73
 Switzerland	68.74
 EU	74.8
 United Kingdom	95.33
 Hong Kong	8.605
 Japan	0.5967
 United States	66.719200

The quotation USD/INR 66.72 means that 1 Dollar is able to buy 66.72 Indian Rupee. In other words, this is the price of a unit of Dollar in Indian Rupee. Here, Dollar is called the "Fixed currency", while Indian Rupee is called the "Variable currency".

INFLATION RATE

4

The rate at which the general level of prices for goods and services is rising, and, subsequently, purchasing power is falling.

Inflation is a persistent increase in the general price level of goods and services in an economy over a period of time. When the general price level rises, each unit of currency buys fewer goods and services. Consequently, inflation reflects a reduction in the purchasing power per unit of money – a loss of real value in the medium of exchange and unit of account within the economy.

Inflation or inflation rate is calculated as the percentage rate of change of a certain price index. The price indices widely used for this are Consumer Price Index (CPI) and Wholesale Price Index (WPI).

A consumer price index (CPI) measures changes in the price level of a market basket of consumer goods and services purchased by households.

The Wholesale Price Index or WPI is "the price of a representative basket of wholesale goods".

Inflation's effects on an economy are various and can be simultaneously positive and negative.

Inflation rate can be calculated as follows:

$$\text{Inflation rate} = (\text{CPI of end of year} - \text{CPI of beginning of year}) / \text{CPI of beginning of year} \times 100$$

INTEREST RATE (REPO RATE)

Repo rate is the rate at which RBI lends to commercial banks generally against government securities. Reduction in Repo rate helps the commercial banks to get money at a cheaper rate and increase in Repo rate discourages the commercial banks to get money as the rate increases and becomes expensive.

The increase in the Repo rate will increase the cost of borrowing and lending of the banks which will discourage the public to borrow money and will encourage them to deposit. As the rates are high the availability of credit and demand decreases resulting to decrease in inflation. The repo rate in India is similar to the discount rate in the US.

This increase in Repo Rate and Reverse Repo Rate is a symbol of tightening of the policy. As of march 2016, the repo rate is 6.75 % and reverse repo rate is 5.75%.

GROWTH RATE

Growth Rate is the rate at which a nation's Gross Domestic product (GDP) changes/grows from one year to another. The GDP growth rate measures how fast the economy is growing.

The GDP growth rate is driven by retail expenditures, government spending, exports and inventory levels. Rises in imports will negatively affect economic growth. The GDP growth rate is the most important indicator of economic health. If it is growing, so will business, jobs and personal income. If it's slowing down, then businesses will hold off investing in new purchases and hiring new employees, waiting to see if the economy will improve.

In practice, it is a measure of the rate of change that a nation's gross domestic product goes through from one year to another. Gross national product can also be used if a nation's economy is heavily dependent on foreign earnings.

$$\text{Economic Growth} = \frac{\text{GDP}_2 - \text{GDP}_1}{\text{GDP}_1}$$

REAL INTEREST RATE

Real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator. In other words, interest rate that has been adjusted to remove the effects of inflation to reflect the real cost of funds to the borrower, and the real yield to the lender. The real interest rate of an investment is calculated as the amount by which the nominal interest rate is higher than the inflation rate.

Real Interest Rate = Nominal Interest Rate - Inflation (Expected or Actual)

It is the growth rate of purchasing power derived from an investment. By adjusting the nominal interest rate to compensate for inflation, you are keeping the purchasing power of a given level of capital constant over time.

For example, if you are earning 4% interest per year on the savings in your bank account, and inflation is currently 3% per year, then the **real interest rate** you are receiving is 1% (4% - 3% = 1%). The real value of your savings will only increase by 1% per year, when purchasing power is taken into consideration

RATIONALE OF STUDY

- The project studies the macroeconomic variables that influence the trend of these precious metals in Indian commodity market.
- This project helps the portfolio managers and investors to understand what impact macroeconomic variables have on precious metals in the Indian market.
- Speculators who use these precious metals as a saving and investment tool can earn more profits by determining the demand and supply that can be predicted by the change that happens in macroeconomic variables.
- To determine how much quantity of these metals are traded in India since last ten years.
- Indian Government makes its policies and plans by considering these precious metals as a leading prime factor.
- To give an outlook on the potential growth of precious metals trading in India.

LITERATURE REVIEW

Some of the relevant literature papers related to my analysis are following:

**1. International Journal of Research in Commerce, IT & Management. 2012, Vol. 2 Issue 6
MACRO ECONOMIC FACTORS INFLUENCING THE COMMODITY MARKET WITH
SPECIAL REFERENCE TO GOLD AND SILVER
DR. G. PANDURANGAN, R. MAGENDIRAN, L. S. SRIDHAR & R. RAJKOKILA**

In this paper, they have made an attempt to predict precious metals market, how it is influenced by the macro economic factors. In order to perform analysis they extract the necessary information from the secondary source.

This study attempt is a descriptive research one. The data for the study consist of 3 months futures prices and spot prices: Gold - 10th January, 2007 to 31st March, 2009 comprising 581 observations and Silver – 14th July, 2008 to 24th March, 2010 comprising 229 observations.

6

All the times series are obtained from NCDEX (National Commodities and Derivatives Exchange) database. Most of the investors prefer to invest in Bullion market not only because it is a safe investment but also it hedges against inflation and political uncertainties and it is easy to liquidate.

The macro economic factors data were obtained from Reserve Bank of India (RBI) official bulletin and official website. Series of data, the regression which was used as a tool to estimate in measuring the influence of various sets of macroeconomic factors that affect the price of gold and silver market. There is one standard model followed by other models, checking for robustness of the results. The table captures the regression estimates for inflation rate, United States (US) dollar exchange, and crude oil price, and Interest rate.

This study first examines this relationship on the basis of price or return and focuses on the model setting for commodity market. This will implicate to make better understanding commodity market in long term aspect.

They found that the **interest rate** is important factors to **determine the prices** of both gold and silver.

2. The Macroeconomic Determinants of Volatility in Precious Metals Markets

Jonathan A. Batten, Cetin Ciner and Brian IM. Lucey

This paper investigate key macroeconomic factors that impact the price returns of precious metals markets. The markets investigated were gold, silver and platinum whereas the macroeconomic factors accommodated business cycle, monetary environment and financial market sentiment factors.

This study also offers several additional contributions. First, although there is significant prior work on the macroeconomic determinants of volatility in equity markets, little evidence exists from other non-financial markets. If similar factors are important in all or at least other asset markets, it could be argued that they should figure in arbitrage based asset pricing models.

Second, focus on precious metals permits us to analyze the nature of the arbitrage and price relationship between the gold and silver markets, which have also been discussed in prior work. For instance, it is frequently argued, especially by practitioners, that since gold behaves like surrogate money it provides a hedge against inflation and hence, should be considered among the choices for investment by both households and institutions.

Since silver has significant industrial uses, as mentioned by Erb and Harvey (2006) among several others, its use for these purposes may not be so clear cut. Thus, this empirical study will also provide useful evidence on the substitutability of gold and silver, as suggested by their historical use as coinage, or whether they occupy separate markets with different uses and functions.

The key findings present limited evidence that the same macroeconomic factors jointly influence the volatility processes of the precious metal price series, although there is some evidence of volatility feedback between the precious metals. This finding lends weight to views that individual commodities are too distinct to be considered a single asset class or represented by a single index; a finding of considerable importance for portfolio managers and investors.

3. Pacific Business Review International Volume 5 Issue 1
Dynamics of Macroeconomic Variables Affecting Price Innovation in Gold: A Relationship Analysis

DR. IRA BAPNA, PROF. VISHAL SOOD, DR. NAVINDRA KUMAR TOTALA,
PROF. HARMENDER SINGH SALUJA

The present paper makes a modest attempt to explore the causal relationship between gold prices and macroeconomic variables in the Indian economy. The uncertainty of macroeconomic variables affects stock and commodity market significantly causing volatility in the prices. In contemporary scenario, increase in oil demand depicts increased imports, and stronger inflation which, in turn, requires gold conservation. Volatilities and changes in macroeconomic variables are likely to have an impact on gold prices and vice-versa.

It is not surprising that the gold prices move in synch because they are probably influenced by common macroeconomic fundamentals like, GDP, Growth Rate, Exchange Rate, Interest Rate, Inflation, Sensex, Index and Forex Reserves.

As gold is one of prime financial assets which can be used as hedge against inflation, the close relationship between macroeconomic variables and gold prices are to be observed and analysed.

The study primarily revolved around two major questions first, do macroeconomic variables impact on gold prices? Answer to this question is that, exchange rate, fiscal deficit, forex reserve inflation rate are independently affecting gold prices at large but, growth rate, GDP, BSE Sensex and NSE Index are having a very low impact on gold prices independently and collectively all these variables determines gold prices.

Secondly, does there exists any interactive cause and effect relationship between macroeconomic variables and gold prices? Answer to this question is that, gold does not cause and effect exchange rate, BSE Sensex, NSE Index, forex reserves and fiscal deficit but gold does affect interest rate and inflation and vice versa. There exists a bidirectional relationship with growth rate and GDP in terms of gold pricing.

4. IMF Working Paper

Research Department

The Effects of Economic News on Commodity Prices: Is Gold Just Another Commodity?

Prepared by Shaun K. Roache and Marco Rossi

The paper uses an event study methodology to investigate which and how macroeconomic announcements affect commodity prices.

Results show that gold is unique among commodities, with prices reacting to specific scheduled announcements in the United States and the Euro area (such as indicators of activity or interest rate decisions) in a manner consistent with gold's traditional role as a safe-haven and store of value.

Other commodity prices, where such news is significant, exhibit pro-cyclical sensitivities and these have risen somewhat as commodities have become increasingly financialized.

These results are important for those trading in the commodity markets on a frequent basis and long-term market participants that take their decisions based on information on price fundamentals, which are reflected in the release of macroeconomic announcements.

Gold's high sensitivity to real interest rates and its unique role as a safe-haven and store of value typically leads to a counter-cyclical reaction to surprise news, in contrast to their commodities. It also shows a particularly high sensitivity to negative surprises that might lead financial investors to become more risk averse.

Gold price are more sensitive to bad news and when uncertainty is high. Change in gold price also affects other precious metal prices such as silver and platinum.

OBJECTIVE OF STUDY

- The primary objective of this project is to determine whether macroeconomic variables have any impact on precious metals such as gold, silver and platinum or not.
- To determine how many kilograms of these metals are traded in India in past ten years.
- To determine how much value of these metals are traded in India in past ten years.
- To determine and analyze the impact of these macroeconomic variables on the prices of these metals.
- To determine and analyze the impact of these macroeconomic variables on the change in the quantity of order that has been traded.
- To determine and analyze the impact of these macroeconomic variables on the change in the value of these metals traded.

HYPOTHESIS

1. H0 : Macroeconomic variables have an impact on gold price
H1 : Macroeconomic variables do not have an impact on gold price

2. H0 : Macroeconomic variables have an impact on quantity of gold traded
H1 : Macroeconomic variables do not have an impact on quantity of gold traded

3. H0 : Macroeconomic variables have an impact on silver price
H1 : Macroeconomic variables do not have an impact on silver price

4. H0 : Macroeconomic variables have an impact on quantity of silver traded
H1 : Macroeconomic variables do not have an impact on quantity of silver traded

5. H0 : Macroeconomic variables have an impact on platinum price
H1 : Macroeconomic variables do not have an impact on platinum price

6. H0 : Macroeconomic variables have an impact on quantity of platinum traded
H1 : Macroeconomic variables do not have an impact on quantity of platinum traded

7. H0 : Macroeconomic variables have an impact precious metals
H1 : Macroeconomic variables do not have an impact on precious metals

DATA SOURCE

Data for macroeconomic variables is collected from various sources like

<http://indiabudget.nic.in>, www.rbi.org.in, <http://dbie.rbi.org.in>, <http://planningcommission.gov.in> and <http://www.mospi.nic.in>.

Data for precious metals is collected from <http://www.mcxindia.com> , <http://www.indiainfoline.com> , and <http://www.kitco.com>.

RESEARCH METHODOLOGY

8

Multiple regression analysis is carried out to check multiple macroeconomic variables effect on changes in precious metals. Multiple regression also allows you to determine the overall fit (variance explained) of the model and the relative contribution of each of the predictors to the total variance explained. For example, you might want to know how much of the variation in **precious metals** can be explained by **macroeconomic variables** "as a whole", but also the "relative contribution" of each independent variable in explaining the variance.

Regression model focuses on the relationship between a dependent and one or more independent variables. It can establish that a set of independent variables explain a dependent variable at a significant (through a significance test of R square).

For the study,

1. **Gold price** has been taken as **dependent variable** (DV), and macroeconomic variables like GDP, exchange rate (USD/INR), inflation rate (CPI), interest rate (repo rate) , growth rate, and real interest rate have been taken as **independent variables** (IV).

The **independent variables** remain the **same** in each case but the dependent variable changes. So, the **dependent variable** will change due to following:

2. **Quantity of gold traded** has been taken as dependent variable (DV),
3. **Value of gold traded** has been taken as dependent variable (DV),
4. **Silver price** has been taken as dependent variable (DV),
5. **Quantity of silver traded** has been taken as dependent variable (DV),
6. **Value of silver traded** has been taken as dependent variable (DV),
7. **Platinum price** has been taken as dependent variable (DV),
8. **Quantity of platinum traded** has been taken as dependent variable (DV),
9. **Value of platinum traded** has been taken as dependent variable (DV)

Multiple regression equation used to compute the relationship is given below:

$$Y = \alpha + \beta_1 \text{GDP} + \beta_2 \text{ExR} + \beta_3 \text{IR} + \beta_4 \text{IntR} + \beta_5 \text{GR} + \beta_6 \text{IntR}$$

Where,

Y = Dependent variable

α = Constant

β_1 = slope of GDP

β_2 = slope of Exchange rate

β_3 = slope of Inflation rate

β_4 = slope of interest rate

β_5 = slope of Growth rate

β_6 = slope of real interest rate

GDP = Gross domestic product

ExR = Exchange rate

IR = Inflation rate

IntR = Interest rate

GR = Growth rate

RIntR = Real interest rate

The “ β ” values are the values for the regression equation for predicting the dependent variable from the independent variable.

In this case, here are 6 predictor variables (independent variables), hence, 7 regression weights are estimated, one for each of the 6 predictor variables and one for the constant (α) term.

.

The following part studies the observations carried out by using regression analysis.

OBSERVATIONS

This section describes the data analysis and results of the study.

1) Gold Price is taken as the dependent variable.

Regression analysis

<i>Regression Statistics</i>	
Multiple R	0.976823009
R Square	0.95418319
Adjusted R Square	0.86254957
Standard Error	3456.840039
Observations	10

R square (also called the **coefficient of determination**) gives information about the goodness of fit of a model. In regression, it indicates how well the regression line approximates the real data points.

It measures the proportion of the variation in the dependent variable (gold price) that was explained by the variations in the independent variables.

Here, R square tells us that **95.41%** of the variation in gold prices was explained by macroeconomic variables.

Adjusted R square is a modification of R square that adjusts for the number of explanatory terms in a model. Unlike R square, the adjusted R square increases only if the new term improves the model more

than would be expected by chance. The adjusted R square will be always be less than or equal to R square. In this case, it is **86.25%**.

The **Standard error of the estimate** is the error expected between the predicted and actual dependent variable. Here, the expected the error for gold price prediction is off by ₹3456.84.

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	6	746597850.9	124432975	10.41302516	0.040585369
Residual	3	35849229.17	11949743.1		
Total	9	782447080.1			

The F-ratio in the ANOVA table tests whether the overall regression model is a good fit for the data. The above table shows that the independent variables statistically significantly predict the dependent variable at 5% of significance, $F(6, 3) = 10.4130 < 14.735$ (i.e., the regression model is a good fit of the data).

This implies that **macroeconomic variables do have some kind of impact on gold price**. Therefore, the null hypothesis is **accepted**.

Regression equation:

$$Y = -10923.76535 + 0.002548359GDP + 477.3281613InfR - 11.81532992ExR - 288.3394449RIntR - 57.09009579GR + 1218.865294IntR$$

GDP has a β coefficient of 0.002548.

This means that a 1 % change in GDP will lead to a 0.002548 % change (increase) in predicted gold price, with other independent variables being held constant.

Similarly,

A 1 % change in inflation rate will lead to a 477.328 % change (increase) in predicted gold price.

A 1 % change in exchange rate will lead to a 11.8153 % change (decrease) in predicted gold price.

A 1 % change in real interest rate will lead to a 288.33944 % change (decrease) predicted gold price.

A 1 % change in growth rate will lead to a 57.090095 % change (decrease) in predicted gold price.

A 1 % in interest rate will lead to a 1218.86529 % change (increase) in predicted gold price.

2) Quantity of gold traded is taken as the dependent variable.

Regression analysis

<i>Regression Statistics</i>	
Multiple R	0.91491666
R Square	0.837072495
Adjusted R Square	0.511217486
Standard Error	2623952.156
Observations	10

R square (also called the **coefficient of determination**) gives information about the goodness of fit of a model. In regression, it indicates how well the regression line approximates the real data points.

It measures the proportion of the variation in the dependent variable (quantity of gold traded) that was explained by the variations in the independent variables.

Here, R square tells us that **83.71%** of the variation in quantity of gold traded was explained by macroeconomic variables.

Adjusted R square is a modification of R square that adjusts for the number of explanatory terms in a model. Unlike R square, the adjusted R square increases only if the new term improves the model more

than would be expected by chance. The adjusted R square will be always be less than or equal to R square. In this case, it is **51.15%**.

The **Standard error of the estimate** is the error expected between the predicted and actual dependent variable. Here, the expected the error for quantity of gold traded prediction is off by 2623952.156 gms.

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	6	1.06121E+14	1.76869E+13	2.56884955	0.234740062
Residual	3	2.06554E+13	6.88512E+12		
Total	9	1.26776E+14			

The F-ratio in the ANOVA table tests whether the overall regression model is a good fit for the data. The above table shows that the independent variables are not statistically significantly predict the dependent variable at 5% of significance, $F(6, 3) = 2.5688 < 14.735$ (i.e., the regression model is good fit of the data).

This implies that **macroeconomic variables do have some kind of impact on quantity of gold traded**. Therefore, the null hypothesis is **accepted**.

Regression equation:

$$Y = 16496692.14 - 0.195360728GDP + 1218904.02InfR - 284857.2629ExR - 24939.76803RIntR - 760060.8242GR + 607682.5088IntR$$

GDP has a β coefficient of -0.1953

This means that a 1 % change in GDP will lead to a 0.1953 % change in predicted quantity of gold traded, with other independent variables being held constant.

Similarly,

A 1 % change in exchange rate leads to a 284857.2629 % change in predicted quantity of gold traded.

A 1 % change in inflation rate leads to a 1218904.02 % change in predicted quantity of gold traded.

A 1 % change in interest rate (repo) leads to a 607682.5088 % change in predicted quantity of gold traded.

A 1 % change in growth rate leads to a 760060.8242 % change in predicted quantity of gold traded.

A 1 % change in real interest rate leads to a 24939.76803 % change standard deviation increase in predicted quantity of gold traded.

3) Silver Price is taken as the dependent variable.

Regression analysis

<i>Regression Statistics</i>	
Multiple R	0.922266048
R Square	0.850574662
Adjusted R Square	0.551723987
Standard Error	11314.75223
Observations	10

R square (also called the **coefficient of determination**) gives information about the goodness of fit of a model. In regression, it indicates how well the regression line approximates the real data points.

It measures the proportion of the variation in the dependent variable (silver price) that was explained by the variations in the independent variables.

Here, R square tells us that **85.05%** of the variation in silver prices was explained by macroeconomic variables.

Adjusted R square is a modification of R square that adjusts for the number of explanatory terms in a model. Unlike R square, the adjusted R square increases only if the new term improves the model more than would be expected by chance. The adjusted R square will be always be less than or equal to R square. In this case, it is **55.17%**.

The **Standard error of the estimate** is the error expected between the predicted and actual dependent variable. Here, the expected the error for silver price prediction is off by ₹11314.75.

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	6	2186248613	364374768. 9	2.8461527 2	0.209810812
Residual	3	384070854.2	128023618. 1		
Total	9	2570319468			

The F-ratio in the ANOVA table tests whether the overall regression model is a good fit for the data. The above table shows that the independent variables statistically significantly predict the dependent variable at 5% of significance, $F(6, 3) = 2.846 < 14.735$ (i.e., the regression model is a good fit of the data).

This implies that **macroeconomic variables do have some kind of impact on silver price**. Therefore, the null hypothesis is **accepted**.

Regression equation:

$$Y = 35979.21101 + 0.005752883GDP - 110.2914416InfR - 949.9280471ExR - 1080.511057RIntR - 1637.414188GR + 2536.452746IntR$$

GDP has a β coefficient of 0.005752883.

This means that a 1% change in GDP leads to a 0.00575283 % change in predicted silver price, with other independent variables being held constant.

Similarly,

A 1% change in exchange rate leads to a 949.92804% change in predicted silver price.

A 1% change in inflation rate leads to a 110.291441 % change in predicted silver price.

A 1% change in interest rate (repo) leads to a 2536.4527 % change in predicted silver price.

A 1% change in growth rate leads to a 1637.4141 % change in predicted silver price.

A 1% change in real interest rate leads to a 1080.51105 % change in predicted silver price.

4) Quantity of silver traded is taken as the dependent variable.

Regression analysis

<i>Regression Statistics</i>	
Multiple R	0.849562101
R Square	0.721755764
Adjusted R Square	0.165267291
Standard Error	156850.5062
Observations	10

R square (also called the **coefficient of determination**) gives information about the goodness of fit of a model. In regression, it indicates how well the regression line approximates the real data points.

It measures the proportion of the variation in the dependent variable (quantity of silver traded) that was explained by the variations in the independent variables.

Here, R square tells us that **72.17%** of the variation in quantity of silver traded was explained by macroeconomic variables.

Adjusted R square is a modification of R square that adjusts for the number of explanatory terms in a model. Unlike R square, the adjusted R square increases only if the new term improves the model more than would be expected by chance. The adjusted R square will be always be less than or equal to R square. In this case, it is 16.52%.

The **Standard error of the estimate** is the error expected between the predicted and actual dependent variable. Here, the expected the error for quantity of silver traded prediction is off by 156850.5062 kgs.

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	6	1.91451E+11	3190846685	1.29698241	0.449027239
Residual	3	73806243920	2460208130	6	
Total	9	2.65257E+11	7		

The F-ratio in the ANOVA table tests whether the overall regression model is a good fit for the data. The above table shows that the independent variables statistically significantly predict the dependent

variable at 5% of significance, $F(6, 3) = 1.2969 < 14.735$ (i.e., the regression model is good fit of the data).

This implies that **macroeconomic variables do have some kind of impact on quantity of silver traded**. Therefore, the null hypothesis is **accepted**.

Regression equation:

$$Y = 1975673.555 + 0.075566244GDP - 2886.12149InfR - 33308.18972ExR - 27857.50963RIntR + 31412.01479GR - 21353.49273IntR$$

GDP has a β coefficient of 0.07556624.

This means that a 1% change in GDP leads to a 0.07556624 % change in predicted quantity of silver traded, with other independent variables being held constant.

Similarly,

A 1% change in exchange rate leads to a 33308.1897 % change in predicted quantity of silver traded.

A 1% change in inflation rate leads to a 2886.1214 % change in predicted quantity of silver traded.

A 1% change in interest rate (repo) leads to a 21353.4927 % change in predicted quantity of silver traded.

A 1% change in growth rate leads to a 31412.0147 % change in predicted quantity of silver traded.

A 1% change in real interest rate leads to a 2857.5096 % change in predicted quantity of silver traded.

5) Platinum price is taken as the dependent variable.

Regression analysis

Multiple R	0.99298188
R Square	0.986013014
Adjusted R Square	0.944052058
Standard Error	1171.925187
Observations	9

R square (also called the **coefficient of determination**) gives information about the goodness of fit of a model. In regression, it indicates how well the regression line approximates the real data points.

It measures the proportion of the variation in the dependent variable (platinum price) that was explained by the variations in the independent variables.

Here, R square tells us that **98.60%** of the variation in platinum prices was explained by macroeconomic variables.

Adjusted R square is a modification of R square that adjusts for the number of explanatory terms in a model. Unlike R square, the adjusted R square increases only if the new term improves the model more than would be expected by chance. The adjusted R square will be always be less than or equal to R square. In this case, it is 94.40%.

The **Standard error of the estimate** is the error expected between the predicted and actual dependent variable. Here, the expected the error for platinum price prediction is off by ₹1171.9251.

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	6	193636976.4	32272829.3 9	23.4983444 7	0.041376786
Residual	2	2746817.286	1373408.64 3		
Total	8	196383793.6			

The F-ratio in the ANOVA table tests whether the overall regression model is a good fit for the data. The above table shows that the independent variables statistically significantly predict the dependent variable at 5% of significance, $F(6, 2) = 23.4983 < 39.331$ (i.e., the regression model is a good fit of the data).

This implies that **macroeconomic variables do have some kind of impact on platinum price**. Therefore, the null hypothesis is **accepted**.

Regression equation:

$$Y = 7521.389027 + 0.001366931GDP + 731.2186973InfR - 285.723087ExR - 420.6945491RIntR + 226.6346438GR + 1867.856917IntR$$

GDP has a β coefficient of 0.001366.

This means that a 1 % change in GDP leads to a 0.00136693 % change in predicted platinum price, with other independent variables being held constant.

Similarly,

A 1 % change in exchange rate leads to a 285.72308 % change in predicted platinum price.

A 1 % change in inflation rate leads to a 731.21869 % change in predicted platinum price.

A 1 % change in interest rate (repo) leads to a 1867.8569 % change in predicted platinum price.

A 1 % change in growth rate leads to a 226.6346 % change in predicted platinum price.

A 1 % change in Real interest rate leads to a 420.6945 % change in predicted platinum price.

6) **Quantity of platinum traded** is taken as the dependent variable.

Regression analysis

<i>Regression Statistics</i>	
Multiple R	0.899466448
R Square	0.809039891
Adjusted R Square	0.236159563
Standard Error	1034.107257
Observations	9

R square (also called the **coefficient of determination**) gives information about the goodness of fit of a model. In regression, it indicates how well the regression line approximates the real data points.

It measures the proportion of the variation in the dependent variable (quantity of platinum traded) that was explained by the variations in the independent variables.

Here, R square tells us that **80.90%** of the variation in quantity of platinum traded was explained by macroeconomic variables.

Adjusted R square is a modification of R square that adjusts for the number of explanatory terms in a model. Unlike R square, the adjusted R square increases only if the new term improves the model more than would be expected by chance. The adjusted R square will be always be less than or equal to R square. In this case, it is 23.61%.

The **Standard error of the estimate** is the error expected between the predicted and actual dependent variable. Here, the expected the error for quantity of platinum traded prediction is off by 1034.1073kgs.

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	6	9061257.002	1510209.5 1069377.81	1.4122319 3	0.47044654 4
Residual	2	2138755.637	8		
Total	8	11200012.64			

The F-ratio in the ANOVA table tests whether the overall regression model is a good fit for the data. The above table shows that the independent variables are **not** statistically significantly predict the dependent variable at 5% of significance, $F(6,2) = 1.4122 < 39.331$ (i.e., the regression model is good fit of the data).

This implies that **macroeconomic variables do have some impact on the quantity of platinum traded**. Therefore, the null hypothesis is **accepted**.

Regression equation:

$$Y = -685.2242925 - 0.000617773GDP + 475.0197056InfR + 93.07836294ExR + 261.1555723RIntR - 255.6609622GR - 258.0422321IntR$$

Exchange rate has a β coefficient of 93.0783.

This means that a 1% change in exchange rate leads to a 93.0783 % change in predicted quantity of silver traded, with other independent variables being held constant.

Similarly,

A 1% change in inflation rate leads to a 475.01970 % change in predicted quantity of platinum traded.

A 1% change in interest rate (repo) leads to a 258.0422 % change in predicted quantity of platinum traded.

A 1% change in growth rate leads to a 255.66096 % change in predicted quantity of platinum traded.

A 1% change in GDP leads to a 0.0006177 % change in predicted quantity of platinum traded.

A 1% change in Real interest rate leads to a 261.1557 % change in predicted quantity of platinum traded.

LIMITATION

Smuggling of precious metals

Precious metals have significant value and have been considered as the standard for currency worldwide. These metals have high economic value and are used extensively in industry. This has also become the focus of organized criminal groups in producing countries such as South Africa, Africa, Russia, USA, South America and China. Smugglers keep the smuggled gold with them which decreases the quantity of gold in the market which in turn results in the increase in price of the metal.

Multicollinearity

In multicollinearity (also collinearity) is a phenomenon in which two or more independent variables in a multiple regression model are highly correlated, meaning that one can be linearly predicted from the others with a substantial degree of accuracy. It is the desirable situation where the correlations among the independent variables are strong. Multicollinearity increases the standard errors of the coefficients. Increased standard errors in turn mean that coefficients for some independent variables may be found not to be significantly different from 0.

CONCLUSION

Conclusions with regard to hypothesis are:

- 1) Accept** the null hypothesis that macroeconomic variables do have some impact on gold price.

- 2) Accept** the null hypothesis that macroeconomic variables do have some impact on quantity of gold traded.

- 3) Accept** the null hypothesis that macroeconomic variables do have some impact on silver price.

- 4) Accept** the null hypothesis that macroeconomic variables do have some impact on quantity of silver traded.

- 5) Accept** the null hypothesis that macroeconomic variables do have some impact on platinum price.

- 6) Accept** the null hypothesis that macroeconomic variables do have some impact on quantity of platinum traded.

Change in gold price also affects other precious metal prices such as silver and platinum. (Effects of economic news on commodity prices)

So, the macroeconomic variables have some kind of impact on precious metals

BIBLIOGRAPHY

<http://indiabudget.nic.in>

<http://planningcommission.gov.in>

<http://www.mospi.nic.in>

<http://www.rbi.org.in/home.aspx>

<http://dbie.rbi.org.in/DBIE/dbie.rbi?site=home>

<http://dbie.rbi.org.in/DBIE/dbie.rbi?site=statistics>

<http://www.mcxindia.com/>

<http://www.mcxindia.com/SitePages/ContractSpecification.aspx?ProductCode=GOLD>

<http://www.mcxindia.com/sitepages/HistoricalDataForVolume.aspx>

<http://www.statista.com/statistics/417926/estimates-of-indian-gold-supplies/>

<http://www.statista.com/statistics/299638/gold-consumer-demand-by-top-consuming-country/>

<http://www.silverminesltd.com.au/silver/demand-supply.aspx>

<http://www.inflation.eu/inflation-rates/india/historic-inflation/cpi-inflation-india.aspx>

<http://www.x-rates.com/average/?from=USD&to=INR&amount=1&year=2015>

<http://data.worldbank.org/indicator/FR.INR.RINR>

<http://www.allbankingsolutions.com/Banking-Tutor/Chronology-Repo-Rate-India.shtml>

<http://portal.indiainfo.com/datamonitor/Others/Commodity-Research/The-Silver-per-1Kg-Price-History-Year-wise.aspx>

<http://statisticstimes.com/economy/gdp-growth-of-india.php>

http://planningcommission.gov.in/data/datatable/data_2312/DatabookDec2014%202.pdf

<http://www.cso.gov.bw/>

<http://portal.indiainfoline.com/datamonitor/Others/Commodity-Research/Gold-Performance/The-Gold-10gms-Price-History-year-wise.aspx>

<http://portal.indiainfoline.com/datamonitor/Others/Commodity-Research/The-Silver-per-1Kg-Price-History-Year-wise.aspx>

“Pacific Business Review International”, “Volume 5 Issue 1” Dynamics of Macroeconomic Variables Affecting Price

MACRO ECONOMIC FACTORS INFLUENCING THE COMMODITY MARKET WITH SPECIAL REFERENCE TO GOLD AND SILVER – “DR. G. PANDURANGAN, R. MAGENDIRAN, L. S. SRIDHAR & R. RAJKOKILA Innovation in Gold: A Relationship Analysis”

The Macroeconomic Determinants of Volatility in Precious Metals Markets – “Jonathan A. Batten, Cetin Ciner and Brian M. Lucey”

Dynamics of Macroeconomic Variables Affecting Price Innovation in Gold: A Relationship Analysis – “DR. IRA BAPNA, PROF. VISHAL SOOD, DR. NAVINDRA KUMAR TOTALA, PROF. HARMENDER SINGH SALUJA”

ANNEXURE

Data Range: 2009-2017 (Annually)

MACROECONOMIC VARIABLES

Year	GDP (in crores)	INFLATION RATE (cpi)	EXCHANGE RATE	REAL INTEREST RATE	GROWTH RATE	INTEREST (REPO) RATE
2009	3693369	4.25	44.27	6.2	9.3	6.25
2010	4294706	5.79	45.29	4.5	9.2	6.87
2011	4987090	6.39	40.26	6.9	10.2	7.62
2012	5630063	8.32	45.99	4.3	3.9	7.92
2013	6477827	10.83	47.42	5.8	8.5	5.08
2014	7784115	12.11	45.58	-0.6	9.8	5.62
2015	9009722	8.87	47.92	3.5	6.9	7.53
2016	10113281	9.3	54.41	2.8	5.1	8

2017	11355073	10.92	60.50	3.8	6.9	7.58
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GOLD

YEAR	GOLD PRICE/10 grms	QUANTITY(In 000's) (grms)
2009	7000	2600407
2010	8400	9957351
2011	10800	7604891
2012	12500	14024217
2013	14500	12144967
2014	18500	12052225
2015	26400	12655760
2016	29000	10287609
2017	31799	8944603

SILVER

YEAR	SILVER PRICES/kgs	QUANTITY (kgs)
2009	10675	175342.95
2010	17405	284956.32
2011	19520	275498.19
2012	23625	329180.28
2013	22165	346665.03
2014	27255	493215.99
2015	54790	733036.32
2016	57426	518535.87
2017	49318	352644.66

PLATINUM

YEAR	PLATINUM PRICES/kgs	QUANTITY(In 000's) (kgs)
2009	14236.03	-
2010	17849.85	-
2011	20782.43	7.75
2012	22312.48	1879.5
2013	19527.52	3227.75
2014	26901.46	55.25
2015	27695.52	52.5
2016	26323.17	5.25
2017	28322.09	108.75

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