The Quest for Insight on Qaurum- An Innovative Methodological Gold Valuation Framework for Investors- An Empirical Investigation

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Abstract

Bullion plays a predominant role in portfolio of the investor as a source of liquidity at times of pandemic risk. World Gold council has instigated a radical and innovative web-based investigative and explorative tool called "Qaurum" which is deliberated to contribute to a dynamic quantitative technique to evaluate and explore how bullion may react and respond under diverse macroeconomic and geopolitical conditions. The term Qaurum is coined as the summation of Q and Aurum (Q plus (+) Aurum) where "Q" stands for "Quantitative" and "Aurum" represents the Latin name for "Gold". In this paper, we discuss in detail about the factors that brings an urge to explore the insight on Qaurum, An innovative methodological gold valuation framework for the investors. This paper highlights about the importance of Qaurum, a web based analytical tool in evaluating the bullion performance in various macro-economic scenarios for investors. The primary data is collected through well framed and structured questionnaire to elicit *the perception of Bullion investors in India. Simple random sampling technique was adopted. Factor analysis by principal component method is found suitable to reduce variables pertaining to factors that brings an urge to explore the insight on Qaurum- An innovative methodological gold valuation framework. Five predominant factors are identified namely Knowledge factor, Risk management factor, Investors focus factor, Product Flexibility factors, Macroeconomic environment factor which brings an urge to explore the insight on Qaurum, An innovative methodological gold valuation framework for investors to evaluate bullion performance in macroeconomic pattern taking into consideration the risk and uncertainties associated with the financial markets. Qaurum is an effective knowledge acquisition tool which enhances the investor ability to acquire sound knowledge on the gold valuation framework. Qaurum enables to make the investors more beneficial by seeking sound knowledge on the working of bullion market in computation of Compounded annual growth rate for gold and determine the market equilibrium for gold. Finally, the researcher explains the new paradigm of gold valuation framework based on the demand and supply of bullion in India. Qaurum is an effective educational quantitative tool which adds to the knowledge of investors to assess the implied performance of bullion taking into consideration the macroeconomic drivers on the hypothetical basis, where macroeconomic environment is unpredictable in nature.*

Key words: Qaurum, Gold price, Risk, Macroeconomic environment, Equilibrium, Gold

1.1 Introduction

COVID 19 pandemic had severely impacted various global corporations shaking the stock markets, weakening the currency valuation, enhancing the huge import costs and bringing massive strike in the corporate profits, shattering the investor confidence in recent turbulent times. Several researchers had examined the role of gold as the safe haven assets at times of crisis Aye, G. C. Gupta, R Hammoudeh S., & Kim W J (2015). **(**Weilong Dingding Li Qi Li (2016), Dirk G Baur (2016), Chen, An-Sing, Lin, James Wuh (2014),Baur,D.G., and B.M. Lucey (2010), Natalie Dampster and Juan Carlos Artigas (2009),Dirk Baur and Thomas Mc Dermott (2009), Cai, J., Y.L. Cheng and M.Wong, (2001)).Gold acts as the best capital preserver and safe haven asset and delivers sound performance when other assets classes tend to languish in times of uncertainties Baur, D.G 2011, Dirk G Baur (2013) Dirk G Baur, Joscha Beckmann & Robert Czudaj (2016). In the current pandemic risk situation, there exist volatility in bullion price with the reduction in the economic growth. There is an impact in the bullion consumption demand in the form of jewellery. Risk level tend to rise with negativity in real rates of interest creating circumstances where gold investment demand remain as safe haven. Gold remain as high quality and highly liquid asset which is used to raise cash to offset losses made in the investment in other asset class. Bullion plays a predominant role in portfolio of the investor as a source of liquidity at times of pandemic risk. Gold serves as superior collateral and remain as safe haven in the long run. World Gold council has instigated a radical and innovative web-based investigative and explorative tool called "Qaurum" which is deliberated to contribute to a dynamic quantitative technique to evaluate and explore how bullion may react and respond under diverse macroeconomic and geopolitical conditions. The term Qaurum is coined as the summation of Q and Aurum (Q plus (+) Aurum) where "Q" stands for "Quantitative" and "Aurum" represents the Latin name for "Gold". This reveals that this innovative methodological framework is the quantitative approach of exploring and evaluating the bullion performance in the macro environmental circumstances and scenarios based on financial, economic and geopolitical happening across the globe. This analytical tool enables the investors to comprehend about the drivers of gold performance. It also highlights to the investors the connectivity between the demand and supply of bullion and external environment which impacts the gold performance. Qaurum acts as the great boon for the bullion investor to navigate and tackle the financial, economic and geo political challenges in the macroeconomic environment. In this paper, we discuss in detail about the factors that brings an urge to explore the insight on Qaurum, An innovative methodological gold valuation framework for the investors. This paper highlights about the importance of Qaurum, a web based analytical tool in evaluating the bullion performance in various macro-economic scenarios for investors.

1.2 Review of Literature

Weilong Dingding Li Qi Li (2016) analyses the explosive behavior of the bullion market on the quantitative basis between 1966 and 2013. The research undertaken strongly supports the evidence that gold is considered as the safe haven under huge risks and the gold price reacts to the political and economic calamities relatively faster than the other asset classes. **Dirk G Baur et.al (2016)** emphasizes that gold price forecasting is the most difficult task and the major constraint that the researcher undergoes in conducting the research is to select the relevant regressors at every point of time. Results pertaining to the study extend the support for the time variation of factors that drive the gold prices. **Chen, An-Sing, Lin, James Wuh (2014)** attempt to study the relationship between gold and stocks for the four severe bear markets since 1960s. The authors examine the role of gold as the hedge for investment in these bear market scenarios. Results of the study proves that gold served as the good instrument for hedging to bear the stock market risks for only two of the four severe bear market period analyzed. The researcher further concluded that the small cap stocks are exposed to huge risk and are considered as the most volatile investment even during the good time of boom period in the economy and gold is considered to offer effective risk hedging power for this segment of the stock market. **Dirk Baur and Thomas Mc Dermott (2009)** explore whether gold signifies as the safe haven with respect to stocks of major and developing countries investigating the correlations between gold returns and stock market returns in 13 countries over the past three decades. The researcher tends to use daily, weekly and monthly return data for the stock markets of the seven largest developed countries (G7), the largest emerging markets (BRIC), Australia and Switzerland and spot gold prices from the beginning of March 2009. Finally the researcher concluded that the gold is usually a hedge and safe haven for stocks in developed markets, but not in emerging markets. **Nelson Areal et.al (2013)** empirically analyze the dynamic behavior of conditional correlations between the US market financial proxies and gold using a multivariate dynamic conditional correlation model over different market regimes. The authors conclude that even in the context of a dynamic correlation analysis, gold is always a safe haven; negatively correlated with the stock market under adverse market conditions. Although the gold proxies exhibit low correlation with the stock market and therefore offer diversification benefits, they cannot be considered as theperfect substitutes of gold due to their lack of negative correlations with the market in times of havoc. **Pullen Tim, Benson Karen,Fatt, Robert (2014)** analyses about the diversifying, hedging and safe haven properties of gold bullion, gold stocks, gold mutual funds and gold exchange traded funds (ETFs). The authors consider that gold bullion and gold ETFs exhibit support for the safe haven property. **Cai, J., Y.L. Cheng and M.Wong, (2001)** studied the behavior of the gold futures market. The authors bring to the light that gold future prices were significantly affected by news about sales of gold reserves by central banks, political tensions in South Africa and key US macroeconomic indicators such as inflation, unemployment, interest rates and oil prices.

However, reactions of gold prices to news about economic fundamentals were relatively small compared to their effects on markets for Treasury Bonds and foreign exchange.

1.3 Statement of problem

Global market is drastically facing liquidity crunch sowing the seed for serious corporate bubble in recent times of COVID19 pandemic. Huge Corporate defaults sets fire to terrific credit risks in the market. Corporations are facing risky leveraged state of affairs. Illiquidity in the secondary market, narrowed investor base, huge costs of import, weakening of currency valuation, and lack of transparency in trades are great bottlenecks which hinders the growth of financial market. There exists a gloomy state of affairs in the financial market due to risk aversion. Gold is considered as safe haven asset even at times of risk and uncertainties. There is an urge to value the gold taking into consideration the macroeconomic environment circumstances enabling the investors to take the strategic and tactical decisions for investing in gold.

1.4 Objective of the study: To examine the factors that brings an urge to explore the insight on Qaurum, An innovative methodological gold valuation framework for the investors.

1.5 Research methodology

The primary data to conduct the research is collected through well framed and structured questionnaire to elicit the perception of bullion investors who possess sound knowledge in finance to explore the insight on Qaurum, An innovative methodological gold valuation framework. Probability based Simple random sampling technique was employed by the researcher to cover a wide variety of bullion investors with different demographical profile. Since the population is definite, but fluctuating based on simple random criteria, the researcher intended to cover the prime respondents who are bullion investors who possess sound knowledge in finance which includes experts in banking and finance based industries, academicians who are specialized in the subject of finance, members from auditing profession. Being the academically validated methodology we seek opinion from the academicians who are expertise in finance. Bullion investors are those who had invested the funds in gold based investment related products. Factor analysis by principal component method is found suitable to reduce variables pertaining to factors that that brings an urge to explore the insight on Qaurum, An innovative methodological gold valuation framework for gold investors.

1.6 Unique features of Qaurum- An innovative methodological Gold valuation framework

There exist twin demand for Gold which includes both consumption demand in the form of jewellery and investment demand which is in the form of gold based financial products like Gold Exchange traded funds, sovereign bonds, bars and coins. The performance of Gold as an asset class is unpredictable and there is a lack of conventional methodology to value the gold. This acts as the barrier for making gold investment. In order to address this challenge, World gold council has introduced **Qaurum-** the radical methodology and investigative tool for understanding the working mechanism of drivers of gold performance. Qaurum works on the principle of gold valuation framework developed by experts of Oxford economics.

Qaurum is the web based quantitative tool to assess the gold performance and acts as an aid for the investors who seek knowledge on the reaction of gold towards macroeconomic environment. This enables the investors to further enhance their gold investment growth. Qaurum serves as the effectual forecasting model to enable the investors to predict the gold behavior and develop the effective forecast of bullion more quickly based on various in built macroeconomic scenarios from the on global economic model developed by the think tanks of Oxford economists which is Intuitive and instinctive for the users.

There are three major steps involved in the operation of web based quantitative analytical tool to evaluate gold performance designed by World Gold council which are explained below: The unique nature of gold is that it serves both as consumption good and asset class for investment. The performance of bullion is influenced by macroeconomic environment variables. The major macroeconomic drivers include economic expansion, opportunity cost, momentum, risk and uncertainty.

Step 1: The user can select the macroeconomic scenario which includes gradual recovery, financial crisis, slow recovery, Prolonged pandemic and second wave that is hypothetically developed by experts of Oxford Economics based on the investors concern. Even the user can customize the variables on own to evaluate the bullion price performance.

Step 2: The user can forecast the demand and supply of the bullion by activating the functionality by clicking on each of the relevant button with the assumption that there is no change in price and the impact of the key variables on the gold market can be viewed by the user.

Step 3: The implied returns for gold is calculated which ensures that annual demand and supply of bullion remain in equilibrium which is explained in the working of Gold valuation framework. The actual and implied gold returns are computed. The returns which is obtained from the gold refers to the percentage of change in average price of bullion from current year to the previous year is computed.

The compounded annual growth rate is calculated as given below:

$$\mathrm{CAGR}_{\mathrm{FX}} = \log\left(\frac{\text{Gold price}_{t+n,\mathrm{USD}} \times \left(\frac{\mathrm{FX}}{\mathrm{USD}}\right)_{t+n}}{\text{Goldprice}_{\mathrm{t,USD}} \times \left(\frac{\mathrm{FX}}{\mathrm{USD}}\right)_{\mathrm{t}}}\right)^{\frac{1}{n}}$$

Compounded Annual Growth Rate fx = [((bullion price)*m,USD* fx/USDt)/(bullion pricet+n,USD* fx/USDt+n)] (1/n) - 1

The major constituent for calculating implied returns takes into account various macroeconomic drivers namely economic expansion, risk and uncertainty, momentum and opportunity cost where the total return is exhibited. A detail description of bullion implied performance with 5 year CAGR and 30 year CAGR are exhibited based on the customized hypothetical scenarios which gives sound knowledge about the gold valuation methodological framework to the investors.

**** Screen captures from www.gold.org with regard to the above steps involved in the functioning of Qaurum – An Innovative Methodological gold valuation framework is exhibited in detail in the appendix*

The Qaurum reveals in depth explanation about the impact of bullion performance assessed based on the macroeconomic drivers to the investors pertaining to the implied return on gold. Gold price rises when the opportunity cost gets impacted with the reduction in the interest rate yield for long term US bonds which increases the identifiable investment demand in the form of bars and coins. Whenever, the debt increase to GDP of the country the risk and uncertainty expands which creates demand for identifiable investment for bullion in the form of Gold EFTs. Contraction of economic expansion will in turn give a drive for gold fabrication. Reduction in the risk and uncertainty and increase in the opportunity cost will negatively impact the gold performance as the yield of government bonds will continue to raise.

There are certain base case macro economic scenarios which was developed by Oxford economics based on the Global economic model on hypothetical basis which include Gradual recovery, delayed recovery, Rapid upturn, Global second wave and financial crisis (updated as of 27th November 2020). Several economic variables taken into consideration that include the Real GDP Growth (Year on year basis), Government bonds, Exchange rates and Inflation CPI (Year on Year basis). The user can customize the base case scenarios and can obtain the estimated value for the macroeconomic drivers for base scenarios. Based on the COVID 19 pandemic situation, the country's real GDP will augment when the vaccination and therapeutics for treatment of COVID 19 with adequate medical advancement happens. Due to the impact of oil prices and COVID 19 pandemic, inflation exhibits the gradual rise.

Qaurum depicts the model inputs which include the macroeconomic drivers such as economic expansion, opportunity cost, momentum and Risk and uncertainty. The economic expansion covers about the nominal GDP growth, national savings rate and industrial production growth from 2019 to 2024 for the world economy, emerging markets and US markets and advanced economies. Opportunity cost is the cost of the next best alternative which is foregone which includes nominal interest rates for US market in 10 years in the long run and negative interest rates in the short run. Risk and uncertainty is exhibited for Eurozone, US Government Debt to GDP, Consumer prices . The most crucial variables are taken into account such as money supply, Consumer prices and Government debt. Momentum highlights about the trend exhaustion for jewllery demand and investment demand and yield of government bond curve which includes both short term and long term. Financial crisis is absolutely a negative scenario to the economies at times of covid 19 pandemic with heavy loss on financial market and with amid fear of second wave of cornavirus, where economic slowdown happens reducing the employment, contracting the effective use of resources, reducing the global real GDP to zero with reduction in the output production and bring deflation where global equity prices tends to fall. Second wave of cornavirus triggers further economic contraction, market failure and huge global lockdown with a severe hit in real GDP growth and fall in global equity prices, the interest rates tend to fall where central banks will expand their purchase of government bonds based on shock size that the economy faces.

The second step involved in the operation of Qaurum is that demand and supply forecasts of the bullion need to be generated. Demand for gold can be categorized as consumption demand, Investment demand, industrial demand and Central bank Demand. The consumption demand for gold is in the form of jewellery buying. Investment demand for gold is classified as identifiable investment and implied investment of gold. The identifiable investment demand takes into account demand of bars and coins, Investments in gold based financial products such as Exchange traded fund. Implied investment demand for bullion happens through over the counter transactions. The implied investment for bullion in the form of over the counter products may increase in the times of economic and political calamities.

With the advancement in technology, the usage of gold in manufacturing electronic component is increased due to the unique properties of gold. Gold possess the terrific resistance to corrosion and superior thermal and electrical conductivity. The consumer demand for electronic goods enhances the industrial demand for gold. Central banks add gold to their reserves to meet the uncertain economic environment and for economic expansion which augments to demand for bullion. Gold acts an effective diversification asset for the central banks.

On the supply side of bullion, mining, hedging and recycling of gold is considered. Availability of gold is influenced by two predominant factors namely whether new gold can be obtained from the existing mines and the motive of the investors and consumers are taken into consideration whether to sell their existing gold holdings.

There are certain long term and medium term factors which determine the output production pertaining to new mine development cycles which are expensive with the augmenting marginal cost and reduction in the number of new discoveries of the mine for new output production limiting the expansion of the output. There exist mounting of the regulatory challenges pertaining to gold production which tends to rise the gold price and still higher prices are expected in the long term basis. The medium term capital intensive production of gold through mines that have the ability to make tactical shifts in the output production which in turn escalates the production cost and other expenses such as labour based cost and financial expenses reducing the demand for fabrication.

With regard to the producer hedging as the source of supply of bullion, where the yield curve of bullion remains consistent with the expansion and growth of economics which may enhance the miners profit margin and facilities the greater propensity to hedge the bullion by weakening the gold price through escalating the opportunity cost. Where the yield curve of bullion remains steeper is linked with gold price curve which is flatter in nature where the funding cost is incurred by the gold miners and gold loans remain more attractive as the major constituent of hedging.

Recycling of gold is included in the supply of gold which is the function of gold price trend and the jeweler demand and recycling of bullion have inverse relationship with each other. Actually In country like India, recycling is not recorded. Generally, recycling of bullion is undertaken by fabricators and customers with wide range of diverse motives.

With the assumption that the annual demand and supply of bullion remains in the equilibrium (based on the Gold valuation framework principle) the implied returns for gold is computed.

1.7 Bullion market equilibrium Methodology

The Gold valuation framework enables the investors to investigate on how to utilize the market equilibrium in order to establish an appropriate framework for valuation of bullion. The common valuation framework applicable to value the stocks and bonds does not hold good to gold being the global asset class. Generally, without any form of return say dividend, interest or coupon, the discounted cash flow model fail to operate. Gold does not pay any return in the form of interest or dividend. Gold being the hard currency, there is no credit risk associated with gold. Gold is always termed as safe haven asset at times of uncertainties. In economics, the concept of market equilibrium is termed as the intersection of demand curve and supply curve. According to Gold Valuation framework developed by Oxford economics, the performance of Gold can be elaborated based on the market equilibrium.

In this web based quantitative tool Qaurum which is powered by gold valuation framework, the implied equilibrium price of the bullion can be estimated in three unique steps

1. **The drivers of demand for bullion and supply of the bullion need to be ascertained**
2. **The expected demand for bullion and supply of the bullion need to be determined**
3. **Implied equilibrium price need to be computed.**

Thus the investors can obtain the effective framework which estimates the gold performance

Step 1: Drivers of demand and supply of bullion need to be ascertained

In order to determine the implied equilibrium price , the degree of responsiveness of demand for bullion towards price of bullion and the degree of responsiveness of supply of gold towards its price need to be estimated and the price elasticity of demand and supply need to be connected with the relevant macroeconomic drivers. Here the demand for bullion is considered as the linear function towards price and relevant macro economic variables namely changes in GDP, inflation, exchange rate and interest rate fluctuations. Based on the Gold valuation framework formulated by oxford economics, the set of macroeconomic variables which affects the gold price is obtained from opportunity cost, risk and uncertainty, economic expansion and momentum.

Step 2: Determining the expected demand and supply of the bullion

Taking into consideration the relevant information on the macroeconomic variables like opportunity cost, risk and uncertainty, economic expansion, the expected demand and supply of the bullion is estimated with the assumption that there is no change in the price of the gold. Although the motive of the buyer and seller of the bullion tends to influence the gold price in the market, only the macro economic variables are considered which tends to bring market imbalance as the demand for bullion is greater than the supply of gold and vice versa. The impact of the price changes based on the buyer behavior and rationale behind the seller motive towards gold price is absolutely ignored.

Step 3: **Implied equilibrium price need to be computed**

In the final step, in order to bring the market to equilibrium, the required implied change in the price is computed. The bullion buyer and seller motive is impacted by the level of change in the price. In fact, the macro economic variables namely economic expansion, risk and uncertainty tend to bring the market imbalance where the demand will be higher than the supply of the bullion.

Market segmentation need to be undertaken to capture the response of diverse market participant. The motive of consumers and investors may be driven by the diverse factors which tend to differ pertaining to the motives of gold recycling undertaken by the gold miners.

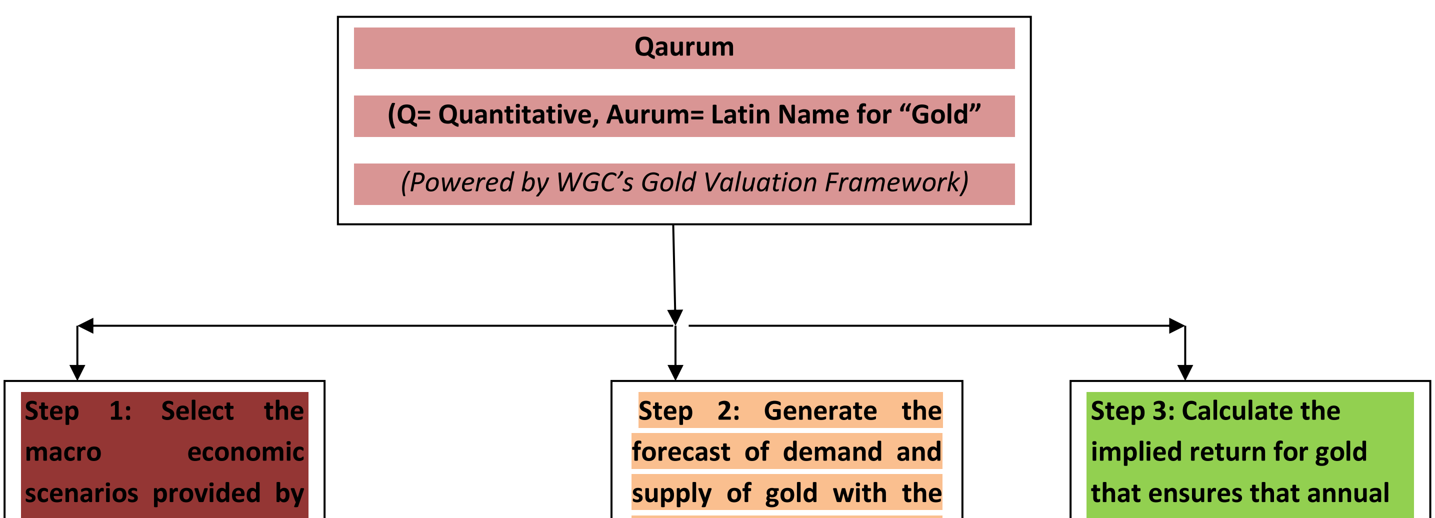
The performance of the gold is estimated to be the function of annual demand for bullion and supply of the bullion. The demand for bullion arises from Jewellery, technology, identifiable investment which includes the investment in Gold ETFs, gold bars and coins, Implied investment demand for bullion occurs through over the counter transactions. The supply of bullion arises through mine production, hedging made by the gold producers and recycling of gold.

Equilibrium = (Demand for Gold) X (Price) = (Supply of Gold)X (Price)

With the annual demand and supply of bullion in equilibrium, the implied returns on gold is computed which is the percentage of change in average gold price from current year to previous year. The Implied 5 year CAGR and 30 Year CAGR is computed which enables the investors to take effective portfolio allocation decision and to evaluate the gold performance.

Chart 1 given below depicts the bird's eye view of the functioning mechanism of Qaurum – A web based quantitative tool which enables the investor to recognize the foremost drivers of gold performance. There is an urge among the investors to explore the insight on Qaurum, An innovative methodological gold valuation framework. Although, Qaurum is not a gold price forecaster, but it reveals to the investors who seek sound financial knowledge in determining the gold performance based on macroeconomic drivers.

Chart – 1 : Steps involved in the operation of Qaurum- An innovative methodological gold valuation framework



2.1 Empirical analysis and discussion

2.1 Empirical analysis and discussions

In this section, the researcher attempts to present the empirical results obtained from statistical analysis such as Factor Analysis by principal component method. The questionnaire responses exhibited Cronbach-Alpha value of 0.765 for variables relating the factors that brings an urge to explore the insight on Qaurum, An innovative methodological gold valuation framework for the investors as depicted in Appendix (1). The computed alpha values are statistically significant to ensure a smooth normal distribution and to justify the sample statistics for the representation of population parameter.

2.2 Factor Analysis for determining the factors that brings an urge to explore the insight on Qaurum, An innovative methodological gold valuation framework for the investors

All the variables relating to the factors that brings an urge to explore the insight on Qaurum, An innovative methodological gold valuation framework for the investors are grouped using Principal Component Analysis with Varimax and Kaiser Normalization. The researcher tends to identify the factors that brings an urge to explore the insight on Qaurum, analytical quantitative tool. There are 18 variables quoted in the questionnaire therefore the data reduction is done through the application of factor analysis by principal component method and the following results are obtained.

From Table 2(Appendix) it is found that **KMO measure of sampling adequacy is 0.767, Bartlett's Test of Sphericity with approximate chi square value 1656.435, p = .000** are statistically significant at 5 percent level. Therefore, it can be concluded that the variables considered for factor analysis form the normal distribution less than 5% admissible error to represent the factors emerged. This implies that the sample size is adequate for data reduction process and creates a conductive situation to ascertain the latent factors that bring an urge to explore the insight on gold performance through Qaurum, web based analytical tool for investors.

It is found in Table 3 (Appendix) that the eighteen variables exhibit the variances from 0.558 to 0.862. This implies that the **range of variations defined "between" 55 percent to 86 percent,** which is statistically significant to go ahead for the meaningful data reduction process. This is adequate for factor segmentation from the variables. It is also ascertained that the **five factors individually possess the variances of 35.589 percent, 42.689 percent, 28.429 percent, 18.612 percent 16.422 percent** respectively. This leads to variable loading of each factor brings the need for the investor to assess Qaurum , being the gateway to determine the gold performance. This leads to factor segmentation through grouping of variables.

Five predominant factors are identified by conducting factor analysis by principal component method seeking the opinion from the respondents about the insight on Qaurum- An innovative methodological gold valuation framework. The predominant factors are Knowledge factor, Risk management factor, Investors focus factor, Product Flexibility factors, Macroeconomic environment factor which brings an urge to explore the insight on Qaurum, An innovative methodological gold valuation framework for investors to evaluate bullion performance in macroeconomic pattern taking into consideration the risk and uncertainties associated with the financial markets.

The rotated component matrix in the factor analysis grouped the variables as follows. The factor I named as **Product flexibility factor** consists of four variables (Table 4 (Appendix) having the towering variance of **35.589%** which represents that Qaurum is the user friendly quantitative tool to evaluate bullion performance and it is clear cut to understand based on the explanation provided in the quantitative tool. Qaurum is straightforward to navigate based on dynamic uncertain economic scenario and it is very easy for the users to customize the values. This factor is titled as Product flexibility factor which makes this web based quantitative tool user friendly for the investors.

The factor II is considered as **Knowledge factor** which consists of five variables (Table 5 (Appendix) having the high variance of **42.689 %** which represents several variables such as the Qaurum provides sufficient information to the bullion investors with regard to the usage and disclosures as this tool does not considers the individual investment goal and financial motive to invest. This is absolutely educational tool to learn the gold performance taking into consideration the macroeconomic drivers. Investors can gain sound knowledge on the computation of implied return on gold and bullion market equilibrium methodology. Investors can obtain good knowledge about the macroeconomic drivers which impact the gold performance.

The factor III is entitled as **Macroeconomic environment based factor** consists of three variables having the high variance of **28.429 %** which represents several variables (Table 6 (Appendix) such as the macroeconomic condition being unpredictable which impact the gold performance to greater extent where Qaurum enables to hypothetically customize the macro economic variables to forecast the demand and supply of bullion and to compute the implied returns on gold. At times of economic growth, the consumption demand for bullion, technology and long term savings augment bringing long term return.

The factor IV which is known as **Risk and Uncertainty factor** consists of three variables (Table 7 (Appendix) having the high variance of **18.612 %** which represents a group of variables such as the bullion being considered as the hard currency as there is no credit risk associated with it. The identifiable demand for bullion in the form of Gold EFTs and bars and coins tend to get increased in the long run which maximize the household wealth and also give response to perceived systemic risk. Qaurum elaborates about the base scenario like second wave, financial crisis, prolonged pandemic to assess the risk and uncertainty while evaluating the gold performance.

The factor V which is known as **Investor Focus factor** consists of three variables (Table 8 (Appendix) having the high variance of **16.422 %** which represents a group of variables such as the web based analytical quantitative tool Qaurum reveals about the implied five year and 30 year CAGR for gold to the investors for making portfolio decision. Qaurum is not gold price forecaster and enables the investors to take effective strategic and tactical decision on bullion. Economic expansion, risk and uncertainty are strategic in nature which facilities huge long term returns, diversification and hedging. Opportunity cost and momentums are the macroeconomic drivers which are tactical in nature. The price of other assets, bonds and equities, currency fluctuations impact the investor’s attitude towards bullion which brings relative attractiveness to the investor.

Results reveal that Qaurum acts as the best aid to undertake the strategic and tactical decision for the investors. Qaurum tends to be reliable, flexible to use and user friendly analytical tool which can be employed by the investors to navigate the gold performance in the dynamic macro economic environment. Although, Qaurum does not play the role as the gold price forecaster, it acts as the game changer to the investors to estimate the implied gold returns and pave the best way for effective portfolio management for the investors at times of risk and uncertainties. Qaurum is an innovative 360 degree level of methodological quantitative approach which in turn takes into consideration several significant parameters pertaining to bullion such as mine supply of gold, consumption of bullion, recycling of gold, Implied investment, Identifiable investment and central bank demand for gold to undertake the demand and supply forecasts for bullion which facilities the investors to make effective portfolio allocation decision in bullion.

3.1 New Paradigm of Gold valuation framework for Indian Bullion markets (based on demand and supply of Gold in India)

In India, there are various factors which determine the local gold prices which include Exchange rate towards US dollars, Seasonal factors, Restrictions made on Import by the government and Taxation rules. This research brings out new paradigm to redesign the Gold valuation framework which enables to further upgrade Qaurum focusing on Indian gold market which benefits the Indian bullion investors. The Qaurum can be designed additionally and specifically for the Indian scenario taking into consideration the demand and supply of bullion in India. As the macro economic scenario (Gradual recovery, Delayed recovery, Rapid upturn financial crisis and Global second wave) developed by oxford economics can be applicable to any kind of economies in general. The third step which deals with the computation of implied return on gold remains the same. The second step with regard to forecasting of demand and supply of gold can include those sources which is more specific to Indian gold market in order to make the Qaurum to gain in depth knowledge among the bullion investors in evaluating the gold performance in Indian scenario.

The demand for gold arises from the banks, Bullion traders, Jewellers, Industries, Exporters (duty free) for manufacturing refined bars, Medallions, Jewellery and retail investors. The supply of gold is categorized as domestic gold and imported gold. The Domestic gold supply is obtained through Gold monetization scheme of the Government of India, Sovereign Gold Bonds, mine production, Scrap supply and Collateral for Gold Metal Loan. The Import supply of bullion is through accredited banks, Accredited agencies and refiners which is in the form of bullion, scrap, dore .

The Indian demand for bullion includes Jewellery demand, Investment demand is categorized as Identifiable Investment demand for bullion which includes demand in the form of Bars and coins, Exchange trade funds, Investment demand through sovereign bonds, Central bank demand, Implied Investment demand in the form of Commodity exchange activity and Industrial demand. The supply trend of gold in India includes Gold Imports, Scrap supply and Gold monetization scheme. While forecasting the demand and supply of bullion, these demand and supply variables specific to Indian Bullion market can be included in the Qaurum model to make it more specific to Indian gold markets.

Jewellery demand: Jewellery demand is the consumption demand for gold. At times of wedding season the demand for gold jewellery raises, which in turn augments the gold prices. The demand for gold jewellery in india is affected by social factor, cultural factor and economic factor to possess gold as an asset class among the households. In the pandemic effect, there is a decline in the demand for jewellery due to domestic economic slowdown and decline in the income earning capability of individuals. As the income of the households grows the gold consumption demand increases bringing a positive impact in country's GDP.

Investment demand: The investment demand for gold is classified as Identifiable investment and Implied Investment The identifiable demand for gold which includes demand for bars and coins, Investment through Exchange Traded Funds, Sovereign Gold Bonds. Digital gold platform has been increasingly used by the customers to beat the obstacle due to soaring gold prices. Investment demand through ETFs has appeared as the desired choice of investment destination for investors where ETFs investments have augmented in recent times of COVID 19 pandemic. Implied investment demand arises through over the counter exchange activity.

Investment through Gold Exchange Traded Funds: Gold Exchange Traded Fund has created a great transformation in the Indian bullion markets in the recent times. The gold backed financial products which are listed in stock exchange which are bought and sold in the form of shares. This source of gold investment attracts the investors due to removal of separate storage costs, standardized quality, liquidity, security, assured returns, lower management fee and more transparency and greater operational efficiency.

Investment through Sovereign Gold Bonds (SGB): The Sovereign Gold Bonds was introduced by Government of India on 30th October 2015. Sovereign gold bonds are issued by the Reserve bank of India on behalf of the Government of India in terms of gold on the payment of stipulated rupees. During the time of maturity, the redemption value is linked with the gold price and not with the fixed sum. Suppose say if an investor invest in 25 grams of Sovereign Gold Bond for Rs. 4500 per gram rate say for 3 years then after the stipulated tenure of the bond, the investor is entitled to receive the yearly interest income for a fixed rate of interest at certain percentage rate added with the maturity of the bond value which is determined based on the prevailing price of gold during that period. The utmost advantage of Sovereign gold bonds is that investors gain greater the appreciated price of bullion where the returns is higher than the Actual yield of bullion. This gold investment product can also be used as collateral for bank, NBFC loan and Loan from financial institutions. This is the best way to invest for the long term investors who wish to accumulate gold. Currently there are around ten series of Gold bonds which were open for subscription in the year 2019-20. With the soaring of gold demand, the first and second tranche of gold bonds issued in FY 2021 noticed a total takeoff crossing four tones of bullion.

Industrial demand: Gold is widely used for various industrial and decorative purposes for gold coating and gold plating. Gold is used as the catalyst in fuel cells, chemical processing, bio medical applications and in nanotechnology. The stupendous properties of gold as the superior conductor soars the demand for gold in Industries. The Government of India's Atmanirbhar bharat and Make in India initiative will still enriches bullion's industrial demand.

Central bank demand: Gold is considered as the reserve asset of the central bank. The major rationale behind the central banks holding of gold is to bear the economic and political uncertainty, In recent times, The central bank had purchased gold worth 40.5 tonnes adding to the total gold holdings of RBI amounted to 653 tonnes in the FY 2019-20. In March 2020, the share of bullion in foreign exchange reserves augmented to 6.40%.

Supply of Gold in India

The supply of gold in India is categorized as domestic gold and imported gold where domestic gold supply includes Mine supply, Collateral for Gold Metal Loan, Scrap Supply and Gold Monetization scheme. Imported gold supply is in the form of Dore, Scrap supply, Bullion, LGD. The major participants involved in the supply of gold are accredited banks refiners and nominated agencies

Gold mine production in India urges to grow which requires support from Central and State government in order to bring remarkable sustainable development in the Indian economy. Effective Public, private, Partnership (PPP) model is required to reengineer the mining sector by providing huge infrastructure and revitalize the sector for future mining projects.

Gold Imports: India being the largest importer of gold impacts the country's current account deficit. Gold imports made by Banks, nominated agencies, fine gold refined from dore, Import of bullion by exporter is included in the Gross Imports where the import for re-exporting purpose is deducted to obtain net imports. The net imports is the import of gold for the domestic consumption.

Recycled gold and scrap supply: Recycled gold is the significant dynamics in the bullion markets. Scrap is the bullion which is sourced from antique fabricated product that have been improved and refined to bars. The prevailing economic scenarios and the behavior of bullion price influence the supply of scrap. At times of economic crisis, scrap supply raises. The rationale behind Recycling of gold from the customers and fabricators differs. There exist a paradigm shift among the customers to utilize scrap gold as collateral for loan with rising bullion price.

Gold Monetization scheme: In order to put the gold to the productive use by mobilizing the idle gold held by households and institutions and to curtail the current account deficits of the country by reducing the gold imports, Gold Monetization scheme was initiated in the year 2015 by Government of India. There are twin schemes in gold monetization scheme which are linked together namely revamped Gold Metal loan scheme and Revamped Gold deposit scheme. This scheme stipulates the minimum deposit of 30 grams of bullion in the form of bars and coins and jewellery excluding gems and precious stones in jewellery. The duration of the scheme ranges from one to three years for short term and Five to 15 years for long term with no maximum limit for gold deposit. Gold monetization scheme offers security for bullion and gives intrest for the gold deposit. On the redemption of the scheme, depositor can take either in the form of cash or gold. Gold monetization scheme offers various tax benefits and provides secured storage for gold. Around 20547 Kgs of gold have been mobilized through this scheme in January 2020. The Indian gold coin scheme is also initiative of Gold monetization scheme and Make in India. Out of domestic gold obtained from Gold monetization scheme this gold coins are manufactured in India. These standard coins which are manufactured in different denominations can in turn replace the imported coins. More than 770 Kgs of Gold coins have been sold in January 2020.

Chart 2 - Demand for Gold in Indian Markets

DEMAND FOR GOLD

Major participants:

Banks, Jewellers, Bullion Traders, medallions, Retail investors, exporters (Duty free for manufacturing refined bars)

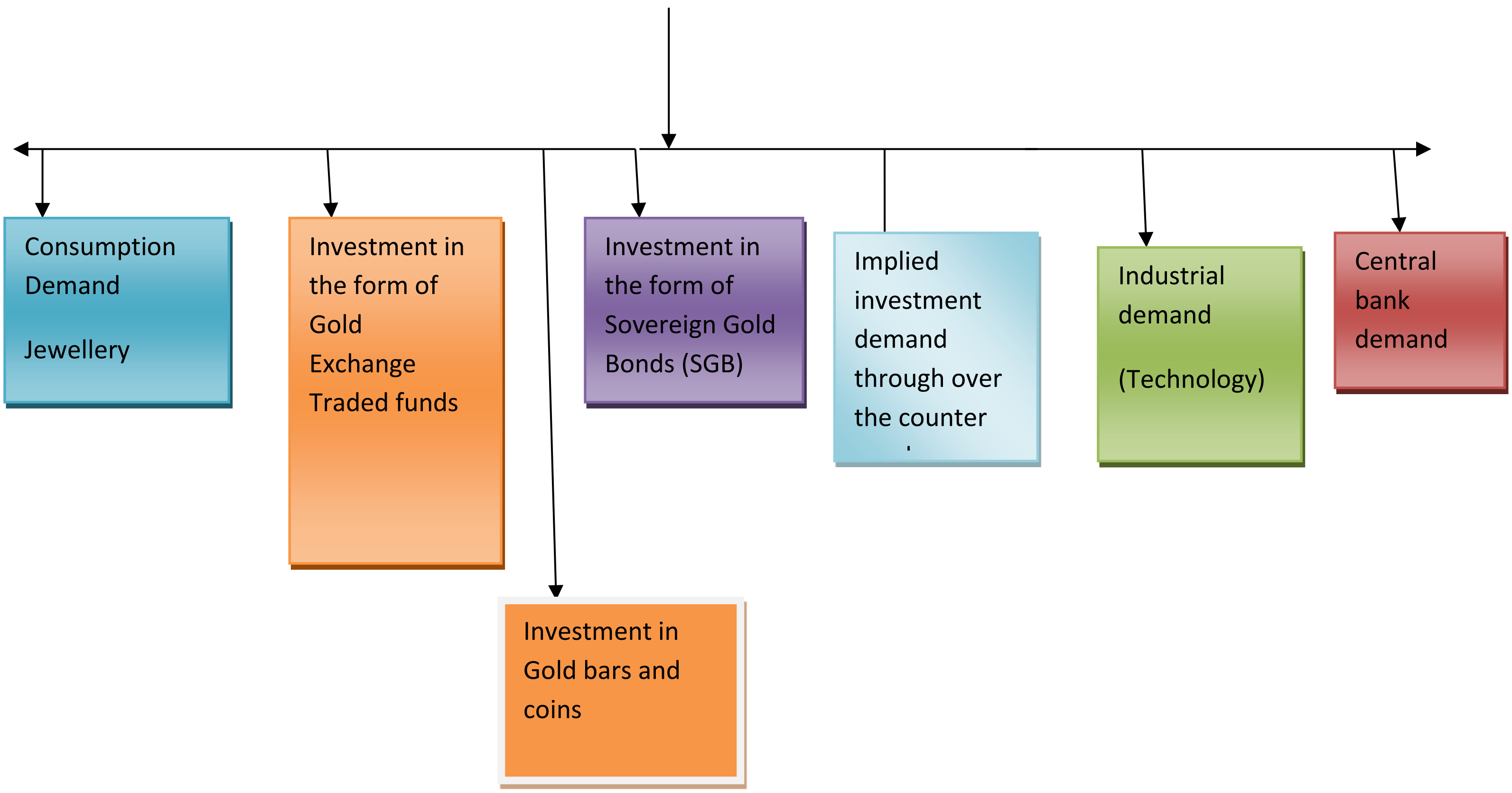
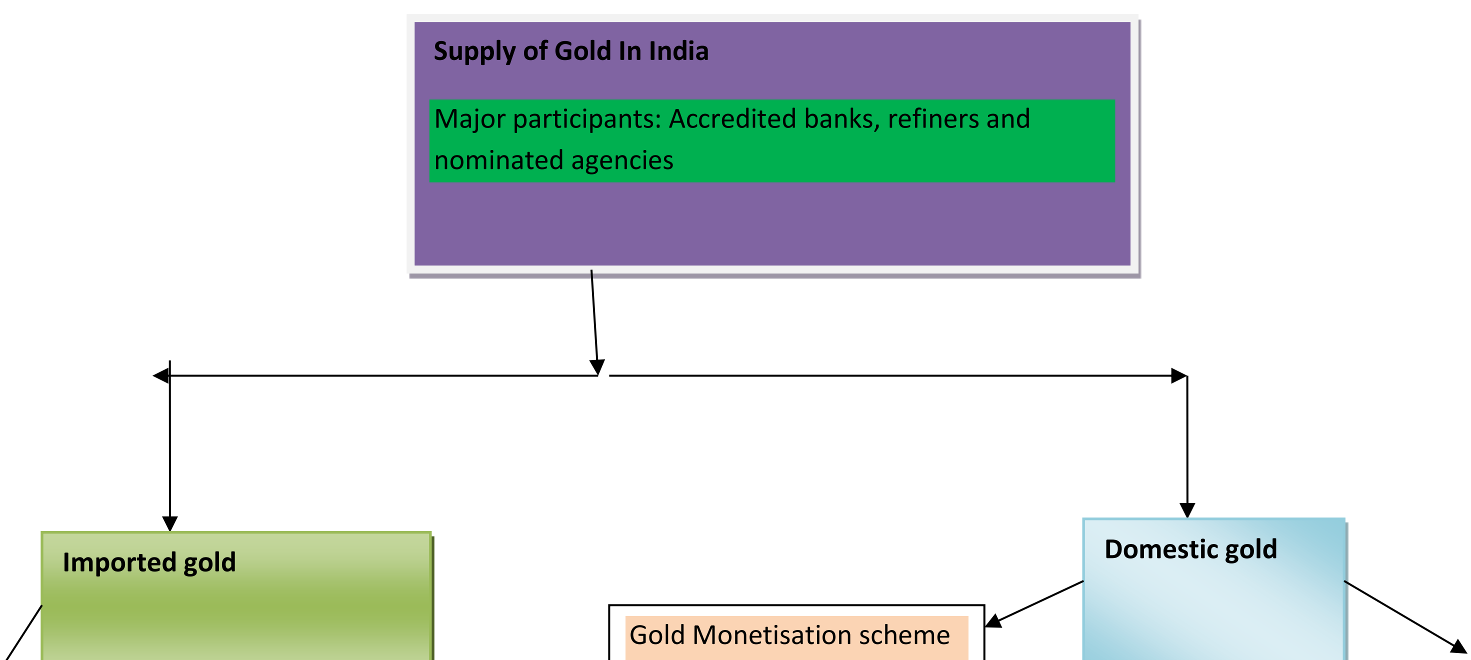


Chart 3- Supply of Gold in India



****Demand and Supply forecasts in Indian bullion markets**

Demand for Gold In India = Consumption demand (Jewellery buying) + Investment demand (Identifiable investment + Implied Investment) + Industrial demand (Technology) + Central Bank Demand (where Identifiable investment = Investment in Sovereign Gold bonds + Investment in bars and coins + Investment in Gold EFTs) and Implied investment = over the counter activity))

Supply of Gold In India = Domestic gold (Gold monetization scheme+ Scrap supply and recycling + Collateral for Gold Metal Loan+ Mine supply) + Imported Gold (LGD + Bullion+ Scrap + Dore)

Chart 2 in the above reveal about the demand for gold in India and Chart 3 highlights about the gold supply in Indian bullion markets.

Demand for Gold in India

Jewellery demand (a)	**Investment in Sovereign Gold Bonds (b)**	**Investment in Gold Exchange Traded Funds (C)**	**Investment in Gold bars and Coins (d)**	**Implied Investment (E)**	**Industrial demand (f)**	**Central bank demand (g)**	**Total demand for gold (a+b+c+d+e+f+g)**

Supply of Gold in India

Gold Monetization scheme (GMS) (a)	**Scrap (b)**	**Recycling**(C)	**Mine Supply** (d)	**Collateral for Gold Metal Loan** (E)	**Domestic gold** (a+b+c+d+e= F)	Total Supply of Gold in India (F +G) **(Domestic Gold +Imported Gold)**
LGD (a)	**Bullion (b)**	**Scrap** (C)	**Dore** (d)	**-**	**Imported Gold** (a+b+c+d = G)	

The demand and supply of bullion based on the Indian gold markets without any change in prices can be included to upgrade the Qaurum based on Indian Gold markets which gives in depth knowledge to the Indian bullion investors. Based on the demand and supply of bullion in India, Qaurum can provide a precise and reliable framework that enables the investor to analyze in depth the effects of different assumptions based on macro economic scenarios formulated by think tanks of Oxford economists on the Indian gold market.

Qaurum For Indian Gold Markets

Step 1: Macroeconomic scenario framed by Oxford Economic experts can be selected or customized by the user

Step 2: **Forecast of Demand and supply of bullion based on Indian Gold Markets with the assumption of no change in price is generated based on Gold valuation framework powered by WGC (Macroeconomic drivers are economic expansion, Momentum, Risk and uncertainty and opportunity cost)

Step 3: Computation of implied returns on gold where the annual demand and supply of gold in India remains in equilibrium

3.2 Conclusion: Based Indian bullion markets, Qaurum can be upgraded to provide more information to the Indian investor to undertake portfolio decisions. Qaurum is an effective educational quantitative tool which adds to the knowledge of investors to assess the implied performance of bullion taking into consideration the macroeconomic drivers on the hypothetical basis, where macroeconomic environment is unpredictable in nature. This tool does not consider the investment objectives and the personal needs of the investors. It is not considered as an advisory tool to seek advice on the purchase and sale of bullion and gold related products. Qaurum is an effective knowledge acquisition tool which enhances the investor ability to acquire sound knowledge on the gold valuation framework. Information symmetry is the great challenge of the bullion investors.

Qaurum enables to make the investors more beneficial seeking sound knowledge on the working of bullion market in computation of Compounded annual growth rate for gold and determine the market equilibrium for gold. Qaurum elaborates in detail about the steps involved in using the quantitative tool which provides in depth knowledge to the invest and to estimated the implied gold performance based on macroeconomic drivers on hypothetical basis. Macroeconomic environment is uncertain and unpredictable so the assumption can be easily customized by the users. This Qaurum also describes about base scenario and gold valuation framework to determine the market equilibrium for gold prices. Adequate information is available to the investors that Qaurum is academically validated quantitative methodology which does not guarantee for reliability and accuracy of the information, estimations and functioning mechanism of the quantitative tool that it does not reflects the actual results of gold investments and does not provide any guarantee for the future results of gold performance. Qaurum is the user friendly hypothetical scenarios based learning tool for the investors to understand the gold performance as gold being both commodity and monetary asset.

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www.gold.org – Qaurum-Powered by World Gold Council Gold Valuation Framework (2020)

Appendix

Qaurum- An Innovative Methodological Gold Valuation Framework for Investors

Screen captures from www.gold.org

Step 1: The user should select the macroeconomic scenario which includes gradual recovery, financial crisis, slow recovery, rapid upturn, Prolonged pandemic and second wave that is hypothetically developed by experts of Oxford Economics based on the investors concern. Even the user can customize the variables on own to evaluate the bullion price performance.

Gradual Recovery | Delayed Recovery | Financial Crisis | Rapid Upturn | Global Second Wave | Reset

The global economy expands by 4.9% in 2021 as vaccine rollouts allow for a rapid relaxation of restrictions

Global inflation remains subdued and monetary policy remains accommodative in all regions

The US dollar experiences prolonged weakness and equity markets muster only anaemic gains to 2024

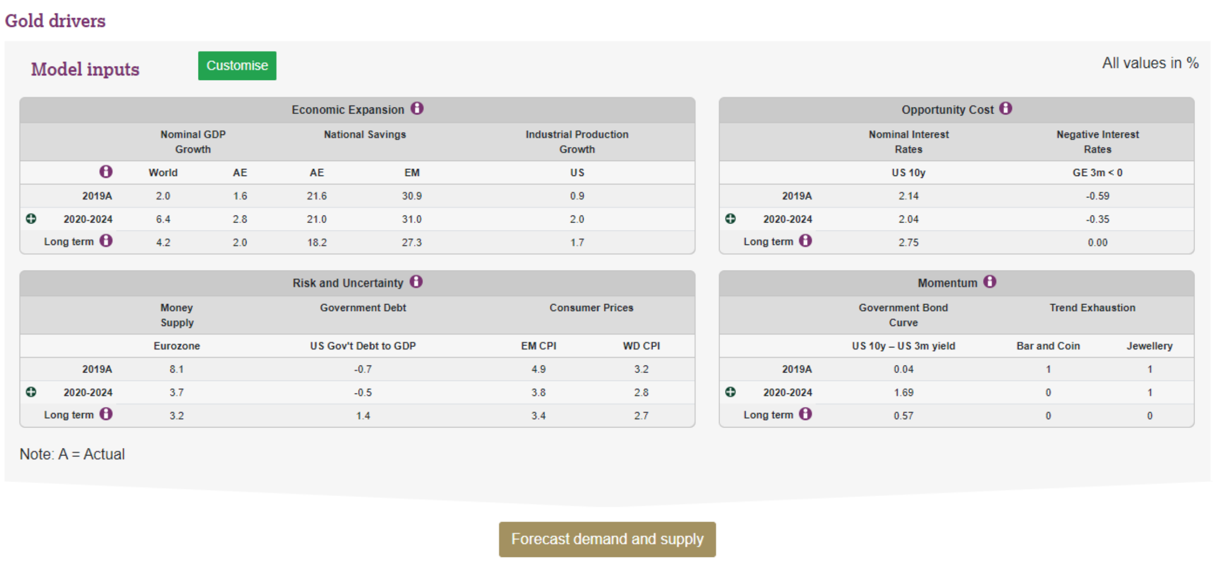
This corresponds to the "base case" scenario from Oxford Economics based on their Global Economic Model updated as of 27 November 2020. All the contents herein are hypothetical, see important information and disclosures.

In this hypothetical scenario...

- Global GDP expands by 4.9% in real terms (9.3% nominal) during 2021 with positive vaccine news opening the door to a more rapid relaxation of restrictions. Growth remains positive until 2024 but slows to 3% – about half a percentage point below the long-run average (1980-2019)
- The pace of recovery varies around the world with US economic output closer to its pre-COVID (2019) level than that of the Eurozone or Japan. Emerging markets rebound strongly in 2021 – with real GDP growth in China of 7.8% supported by household consumption gathering pace. Growth remains positive until 2024 but slows in all regions to below long-run levels (1980-2019)
- Oil prices remain relatively subdued, reaching US$53/bbl by the end of 2021. Global inflation remains below the 3% level seen prior to the pandemic helped by slowing inflation rates across emerging economies. Inflation in advanced economies is also low, but picks up gradually each year, reaching 1.8% in 2024 – close to central bank inflation targets
- With little price pressure, monetary policy remains accommodative in all regions. Both the Federal Reserve (Fed) and the European Central Bank (ECB) postpose increasing rates until mid-2024. The Peoples Bank of China (PBoC) only marginally increases its policy rate in 2023 from 3 to 3.1%
- Rises in global government bond yields are gradual and limited. The US 10-year yield reaches 2% by 2024, in line with inflation. German 10-year yields do not turn positive until 2023 – reaching 50bps in 2024 – while 3-month yields remain negative until the end of 2024
- US dollar weakness against major currencies persists through 2024, depreciating by 5%, on average, against major currencies over the period
- Stock markets muster only anaemic gains – stretched by valuations and relatively weak GDP growth.

Source www.gold.org

The performance of bullion is influenced by macroeconomic environment variables. The major macroeconomic drivers include economic expansion, opportunity cost, momentum, risk and uncertainty.



Gold drivers

Model inputs

Customise

All values in %

Economic Expansion					
	Nominal GDP Growth		National Savings		Industrial Production Growth
	World	AE	AE	EM	US
2019A	2.0	1.6	21.6	30.9	0.9
2020-2024	6.4	2.8	21.0	31.0	2.0
Long term	4.2	2.0	18.2	27.3	1.7

Opportunity Cost		
	Nominal Interest Rates	Negative Interest Rates
	US 10y	GE 3m < 0
2019A	2.14	-0.59
2020-2024	2.04	-0.35
Long term	2.75	0.00

Risk and Uncertainty				
	Money Supply	Government Debt	Consumer Prices	
	Eurozone	US Gov't Debt to GDP	EM CPI	WD CPI
2019A	8.1	-0.7	4.9	3.2
2020-2024	3.7	-0.5	3.8	2.8
Long term	3.2	1.4	3.4	2.7

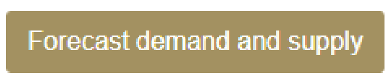
Momentum			
	Government Bond Curve	Trend Exhaustion	
	US 10y – US 3m yield	Bar and Coin	Jewellery
2019A	0.04	1	1
2020-2024	1.69	0	1
Long term	0.57	0	0

Note: A = Actual

Forecast demand and supply

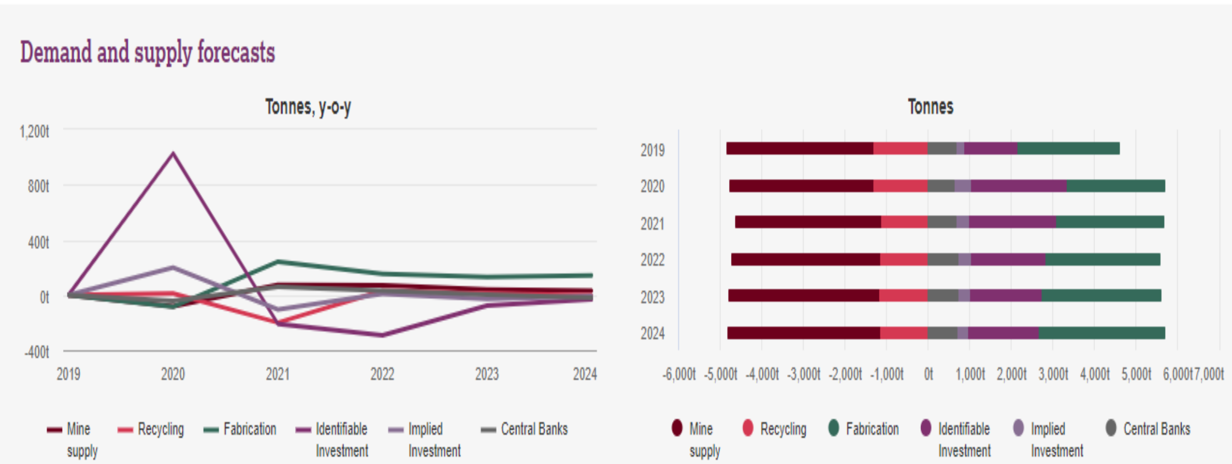
Source www.gold.org

Step 2: The user can forecast the demand and supply of the bullion by activating the functionality by clicking on each of the relevant button with the assumption that there is no change in price and the impact of the key variables on the gold market can be viewed by the user.



Source www.gold.org

Click on the forecast demand and supply to get the detailed forecast of demand and supply of bullion from various sources.



	Mine supply	Recycling	Supply Total	Imbalance	Demand Total	Fabrication	Identifiable Investment	Implied Investment	Central Banks
2019A	3,530	1,296	4,826	224	4,603	2,463	1,273	199	668
2020-2024	3,662	1,149	4,811	-885	5,696	3,045	1,688	262	700
Long term	4,142	1,182	5,324	5,670	10,993	7,063	3,058	223	650

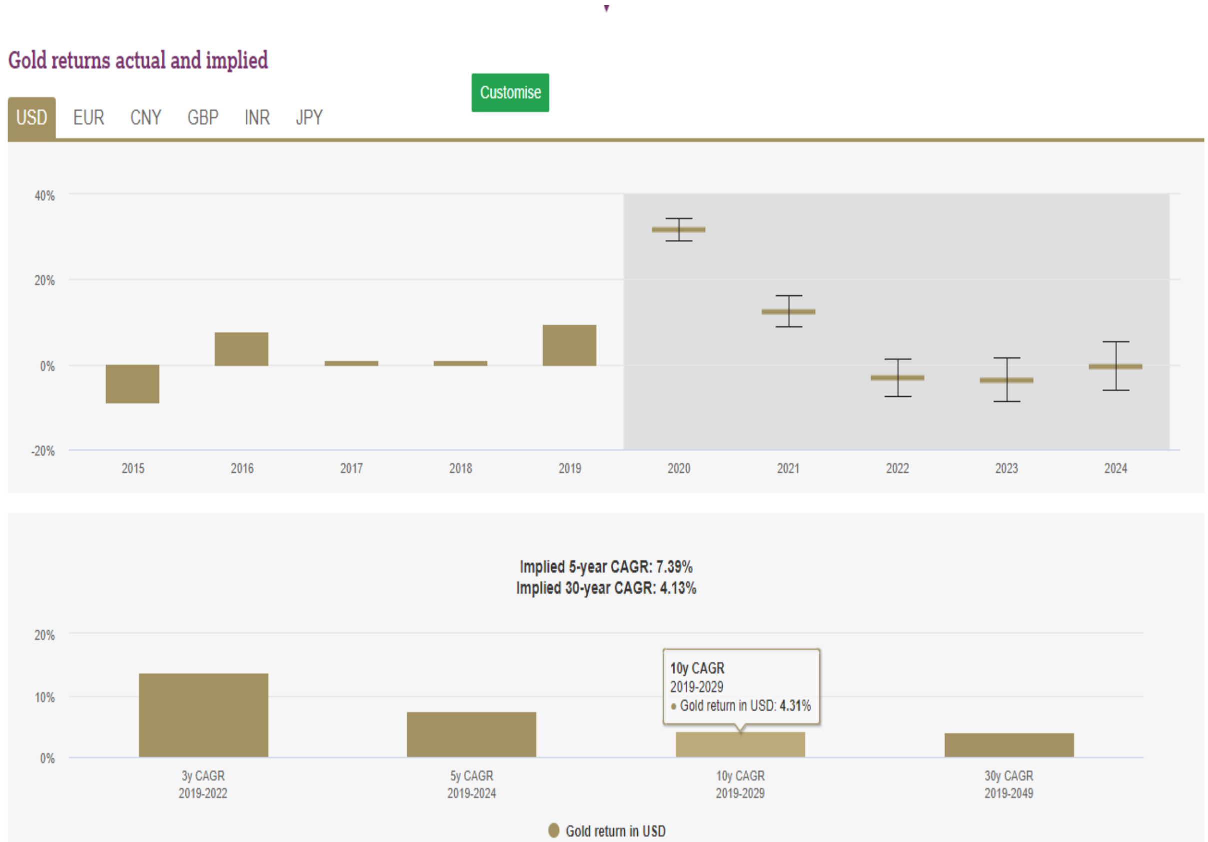
Source www.gold.org

Step 3: The implied returns for gold is calculated which ensures that annual demand and supply of bullion remain in equilibrium which is explained in the working of Gold valuation framework. The actual and implied gold returns are computed. The returns which is obtained from the gold refers to the percentage of change in average price of bullion from current year to the previous year is computed.

Calculate implied return

Source www.gold.org

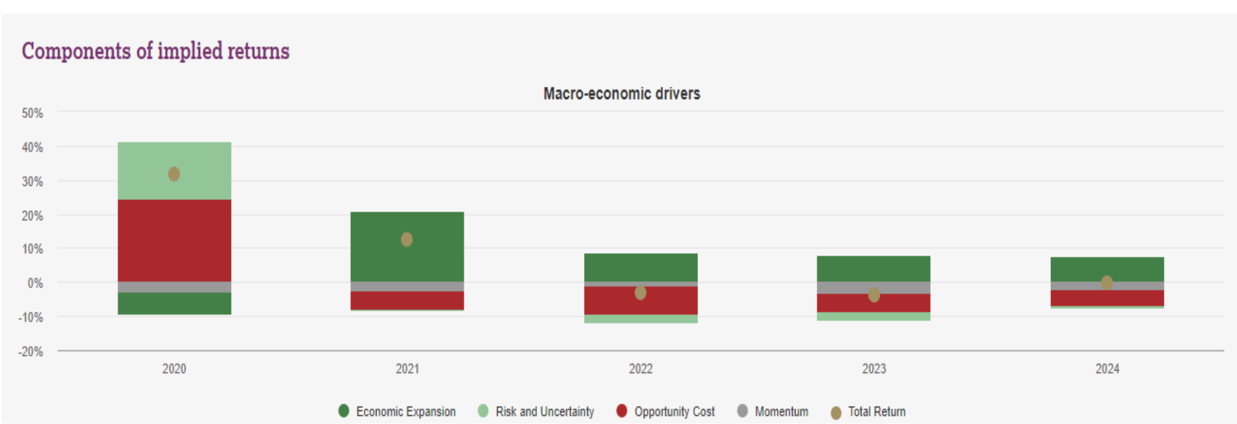
Click on the "Calculate implied return" to get the actual and implied gold returns which includes implied 5 year CAGR and 30 year CAGR on gold



Source www.gold.org

Note: returns represent % changes in the average price of gold from one year to the next.

$$\mathrm{CAGR}_{\mathrm{FX}} = \log\left(\frac{\text{Gold price}_{t+n,\mathrm{USD}} \times \left(\frac{\mathrm{FX}}{\mathrm{USD}}\right)_{t+n}}{\text{Goldprice}_{t,\mathrm{USD}} \times \left(\frac{\mathrm{FX}}{\mathrm{USD}}\right)_{t}}\right)^{\frac{1}{n}}$$



Source www.gold.org

Table 1
Reliability Statistics for factors that brings an urge to explore the insight on Qaurum, An innovative methodological gold valuation framework for the investors related variables

Factors that brings an urge for to explore the insight on Qaurum, An innovative methodological gold valuation framework	Cronbach's Alpha	No. of variables
Need to explore the insight on Qaurum, web based analytical tool variables	0.765	18

Source: Computed Data

Table 2
KMO and Bartlett's Test for factors that brings an urge to explore the insight on Qaurum, An innovative methodological gold valuation framework for the investors related variables

Kaiser-Meyer-Olkin Measure of Sampling Adqueacy		**0.767**
Bartlett's Test of Sphericity	Approx Chi square	**1656.435**
	Sig	.000

Source: Computed Data

Table 3
Communalities for factors that brings an urge to explore the insight on Qaurum, An innovative methodological gold valuation framework for the investors

Sl.No	**Factors** that brings an urge **to explore the insight on Qaurum, An innovative methodological gold valuation framework for the investors**	**Initial**	**Extraction**
1.	Qaurum is the user friendly quantitative tool to evaluate bullion performance	1.000	.762
2.	Qaurum is clear cut to understand based on the explanation provided in the quantitative tool	1.000	.637

3.	Qaurum is straight forward to navigate based on uncertain economic scenarios	1.000	.754
4.	It is very easy to customize the values in Qaurum	1.000	.779
5.	Qaurum provides sufficient information with regard to the usage and disclosures to the investors	1.000	.824
6.	Investors can obtain ample knowledge in understanding the bullion market equilibrium methodology by using Qaurum	1.000	.771
7.	Investors can acquire sound acquaintance about the macro economic drivers which impact the gold performance	1.000	.720
8.	Investors can able to understand the computation of implied return on gold	1.000	.877
9.	Qaurum is absolutely an educational tool for the investors seeking financial knowledge in determining the gold performance based on macroeconomic drivers	1.000	.720
10.	Macroeconomic condition is unpredictable in nature	1.000	.697
11	Qaurum enables to hypothetically customize the macro economic variables	1.000	.852
12.	Qaurum takes into account the macro economic drivers to compute the implied returns	1.000	.816
13.	Qaurum highlights about the base case scenarios which enables the investors to assess the risk and uncertainty	1.000	.802
14.	There is no credit risk associated with bullion, being the hard currency	1.000	.670
15.	The identifiable demand for bullion in the long run has enhanced the household wealth and given response to perceived systemic risk	1.000	.634
16.	Qaurum reveals the implied 5 year and 30year CAGR for gold to the investors for making portfolio decision	1.000	.652
17	Qaurum enables the investors to take effective strategic and tactical decisions	1.000	.552
18.	Qaurum is not gold price forecaster	1.000	.628

Extraction Method: Principal Component Analysis.
Source: Computed data

Table 4
Factor I – Product flexibility factor

Variables	Factor Loading
Qaurum is the user friendly quantitative tool to evaluate bullion performance	**.762**
Qaurum is clear cut to understand based on the explanation provided in the quantitative tool	**.637**
Qaurum is straightforward to navigate based on uncertain economic scenarios	**.754**
It is very easy to customize the values in Qaurum	**.779**

Source: Computed Data

Table 5
Factor II Knowledge factor

Variables	Factor Loading
Qaurum provides sufficient information with regard to the usage and disclosures to the investors	**.824**
Investors can obtain ample knowledge in under the bullion market equilibrium methodology by using Qaurum	**.771**
Investors can acquire sound knowledge about the macroeconomic drivers which impact the gold performance	**.720**
Investors can able to understand the computation of implied return on gold	**.877**
Qaurum is absolutely an educational tool for the investors seeking financial knowledge in determining the gold performance based on macroeconomic drivers	**.720**

Table 6
Factor III –Macro Economic Environment based factor

Variables	Factor Loading
Macroeconomic condition is unpredictable in nature	**.654**
Qaurum enables to hypothetically customize the macro economic variables	**.752**

Qaurum takes into account the macro economic drivers to compute the implied returns	**.516**

Source: Computed Data

Table 7
Factor IV – Risk and Uncertainty factor

Variables	**Factor Loading**
Qaurum highlights about the base case scenarios which enables the investors to assess the risk and uncertainty	.602
There is no credit risk associated with bullion, being the hard currency	.670
The identifiable demand for bullion in the long run has enhanced the household wealth and given response to perceived systemic risk	.534

Source: Computed Data

Table 8

Factor V

Investor focus factor

Variables	**Factor Loading**
Qaurum reveals the implied 5 year and 30 year CAGR for gold to the investors for making portfolio decision	.652
Qaurum enables the investors to take effective strategic and tactical decisions	.552

Qaurum is not gold price forecaster	.628

Source: Computed Data