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The Impact of Advanced Economy Monetary Policy on Gold Price Dynamics in India

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Abstract: Gold remains a dynamic investment tool in many economies and is considered a safe- haven during times of crises. The sheer size of the US economy and hence any monetary policy decisions have implications for the global economy and global assets. Since commodities are priced in the US dollar, transmission of shocks to asset prices is bound to happen as investors rebalance portfolio. Now, the direction of movement in gold prices depends on other factors as well. Against this backdrop, we examine the impact of US monetary policy on gold prices in India and try to examine how monetary policy announcements during the pandemic by the Fed has influenced domestic gold prices. Further, we investigate the determinants of domestic gold prices using an ARDL model and find that prices have moved closely with global economic policy uncertainty, thereby demonstrating its safe haven feature and have risen with domestic CPI inflation, thus proving to be an inflation hedge. Thus, the study is expected to upgrade the understanding on the behaviour of investors towards gold, and information processing under uncertainty. **JEL Classification:** G10, G15.

Keywords: Safe Haven, Cointegration, Us Monetary Policy, Gold Price.

I. INTRODUCTION

Gold remains an efficient tool for portfolio diversification in many economies in various forms such as coin, bullion, certificates (Worthington and Pahlavani, 2007, [17]) in the post Bretton Woods system. The global financial crisis of 2007-08 offered stakeholders with a robust incentive to search for 'safe haven' assets and between 2002 and 2012, gold prices rose many folds as the global economy, particularly the US, witnessed a slowdown as an aftershock from the crisis. Gold prices have crossed the $2000 US dollar during Covid pandemic, like the upsurge seen during different crises. Gold has long been an essential metal, both traditionally and economically, to India and most of Asia as well. Majority of the gold demand stems from jewellery. The biggest consumers of gold jewellery are India and China. Gold remained an integral part of social, economic and cultural milieu of Indian society, in the form of ornaments, gifts, or investment tool.

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It has always been associated with the Indian households' financial planning and remained an obvious choice of savings/investments. Investment into an asset like gold, silver, stocks, bonds, mutual funds, gold ETF, real estate, or a combination of these options is generally done to get monetary benefit or mitigate risks. Thus, investors from time to time assess and reassess their portfolios, guided by certain events and monetary policy decisions. Monetary policy is a key factor in determination of gold prices as central bank actions often indicate expectations about future inflation and economic activity. In any economy, the market for gold may be both supply and demand driven, either due to sufficient local production or due to large imports. Countries such as India, imports most of its gold to meet domestic demand. In the domestic market, gold price is a result of interaction of multiple factors such as global gold price, exchange rate, transaction costs etc; the global gold prices hinge a large part upon US monetary policy as gold is priced in US dollar. The growth of money supply and the central bank's policy stance impact inflation as well as the exchange rates. The US Fed's stance affects the dollar's strength and thus indirectly impacting the price of gold, which is negatively linked with the dollar. The sheer size and connectedness of the US with the rest of the world is a driver of global financial markets; thus, monetary policy announcements by the Fed have an important bearing on gold prices. Investors take a cue on the economic conditions and determine portfolio allocations to gold and other assets as was seen recently, gold price skyrocketed in March 2020 as Fed cut rates in an emergency meeting in response to the pandemic. Large importers of gold like India and China also witnessed a surge in domestic gold prices as global investors took refuge in gold as risk-off sentiment took hold globally. The role of currency valuation in pricing commodities has been long recognised and acknowledged by economists, particularly those of imported commodities, such as oil and gold, which also form a large share of import bill.

We examine the effect of US monetary policy on gold prices in India and try to examine how monetary policy announcements during the pandemic by the Fed has impacted gold prices globally and indirectly in India. Academicians have interest in closely observing the behaviour of gold prices in response to extensive liquidity support announcements by major central banks. Thus, the paper is expected to augment our understanding of gold price movements under extreme market conditions, as this pandemic period corresponds to, and in perusing the practicality of gold as hedging tool against inflation, exchange rate and volatility in equities.

The paper begins with a brief introduction, followed by review of literature, section III covers theoretical underpinning followed by stylised facts, section V discusses the data and methodology and finally the study concludes with results and discussion.

II. LITERATURE REVIEW

People primarily hold gold for two reasons, one for consumption which includes jewellery and other adornments and second for investment purposes where it is used to hedge against inflation, uncertain exchange rate and volatility in equities (Zhu et al., 2018, [18]). The COVID-19 pandemic has once again attracted the attention of both investors and academicians towards gold. Investors look at it as major investment and risk diversification tool as other investment substitutes have very low or volatile return due to expansionary monetary measures, to cope with uncertain events. The pioneering contribution by Frankel (1984, [5]) had sown seeds for future study of monetary conditions and interest rates and how it can serve as possible drivers of commodity prices. Most of the empirical studies have concentrated on US interest rate as a gauge of monetary policy stance to estimate the relationship between monetary policy and commodity prices (Frankel and Rose, 2010 [6]). However, interest rates often may not fully reflect shocks to monetary policy; further their response to monetary policy could also be endogenic; largely reflecting economic developments in general. To get rid of this endogeneity researchers are now focusing on major policy announcements, such as quantitative easing (QE) by central banks and its implications for commodity prices. A historical analysis by World Gold Council (WGC) in March 2019 [16] observed that when the Fed loosened its policy stance from tightening to neutral, gold did not react promptly. Prices eventually reacted positively as the pause cycle extended or on easing of monetary policy by the Fed. Similarly, an event study done by (Zhu et al., 2018, [18]) for major central banks found substantial impact of Fed QE announcements on gold; however, this impact was weaker for the European Central Bank. In case of the UK and Bank of Japan gold price didn't respond at all to the QE news announcements. ECB in its working paper series has also highlighted the bearing of monetary policy on commodities.
Sherman (1983, [13]) in his study concluded unexpected inflation and gold price movement has positive relationship; whereas Moore (1990, [11]) found the significant positive relationship between gold price movement and inflation; and that of gold price movements can be predicted by a leading indicator of inflation. Adrangi et al. (2003, [1]) as against to the conclusion of Sherman (1983, [13]) determined gold prices have a positive relationship with expected inflation. Levin & Wright (2006, [10]) evaluated the long relationship between the price of gold and the average price level in the US for the period between 1975-2006 and found that the determinants of gold prices in the short run were variations in US inflation, US trade-weighted exchange rates, fluctuation in inflation and credit risk. Sharma (2018, [15]), through empirical investigation during 1991-2018 found that the exchange rate, personal disposable income, Bombay Stock Exchange (BSE) Sensex and oil prices have independent, positive and significant effect on Indian gold prices, whereas the discrete impact of inflation and interest rates on gold prices were found to be negative and insignificant. Girish et al. (2015, [8]) and Patel (2013, [12]) have done a similar study across different time periods and revealed that US Dollar exchange rate and inflation are essential determinants of gold prices in the long run. The academic interrelation between gold, inflation and interest rates was promoted by Fortune (1987, [4]); Batten et al. (2015, [3]) show that there is substantial time variation in the connection between gold and the CPI. The relationship was weak during the 1980s and 1990s but began strengthening in 2002. The association was found to be guided by interest rates: declining rates increase the significance of inflation. It could echo a change in opportunity cost from forgone interest payments to decline in purchasing power as interest rates fell in the US. However, some studies, Silva (2014, [14]), Lawrence (2003, [9]), find no significant relationship between gold price and interest rates, as well as other macroeconomic variables such as inflation.

III. THEORETICAL UNDERPINNINGS

Among the numerous precious metals, gold and silver have played a vital role in the history of monetary policy. Gold is expected to be a hedge against inflation; increase in the consumer price level usually prompts investors to substitute liquid resources with gold. The US is used as a reference impacting gold price is used as it possesses an overriding influence globally. Monetary policy of the US is bound to impact liquidity and asset prices as well. For emerging markets any change in US monetary policy has implications on risk appetite and thus we consider monetary policy announcements by the Fed as one of the key factors impacting gold prices in this study. Gold prices can effectually feel the pulse of inflation in the times to come as commodity prices are normally considered capable of integrating and assimilating new information quicker than consumer prices. Investors usually purchase gold during episodes of high inflation. There are multiple channels through which monetary policy impacts gold prices and, especially through interest rates and prices of competing assets. First, the impact of monetary policy on gold is expected to be more pronounced as we transition between cycles when policymakers hint at tightening or expanding based on economic indicators as uncertainty prevails over when the hiking or loosening may begin. Second, reallocation between asset classes and third, allocations to gold due to movements in the US dollar. While US interest rates impact gold prices, QE has been found to impact gold prices as well. There are a very few studies on it, as during the global financial crisis, central banks across the developed world entered uncharted territory and balance sheet tinkering continues as we recover from the pandemic. A meagre news or talk of a QE creates ripples in the gold market. The Fed has remained one of the main triggers, a slight hint towards the policy of QE, the prices of gold have moved. Taper talk is bound to impact gold as it reduces excess money. Gold has risen during times of crisis as was witnessed during pandemic. The movement in gold prices and fiat currency has been overstated by the quantitative easing policies used by many central banks.

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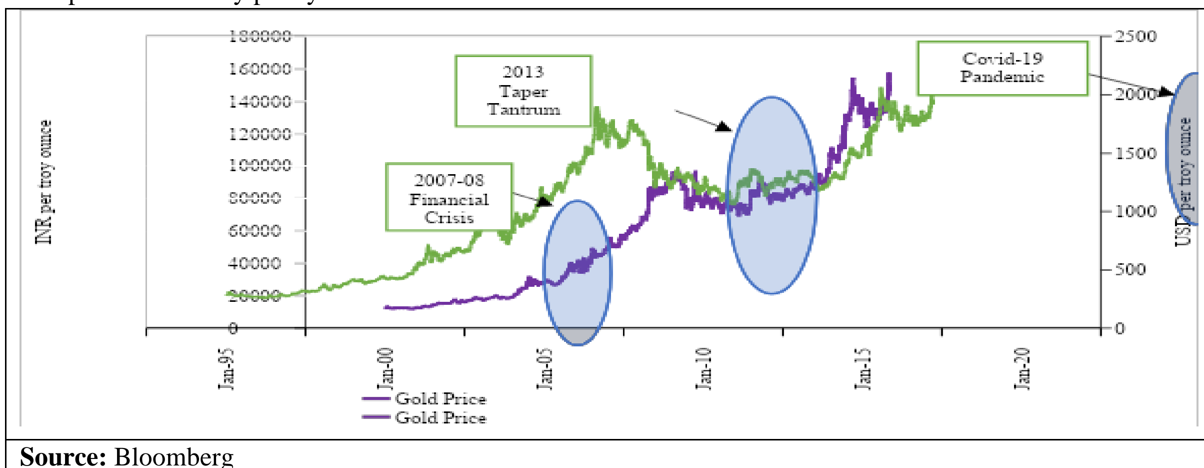
The manipulation of the money supply in the system impacts gold price in the system and given the allure of the yellow metal, various stakeholders are impacted in different ways and degrees. Bernanke [2], however, held adverse views on predicting gold prices, but Jiang and Wang (2017, [7]) show that an unanticipated rise in the Fed funds rate led to a decline in spot return of gold. A lot of volatility in asset prices can also depend on the expected versus unexpected monetary policy announcements especially by the large central banks like the Fed and the ECB; a living testimony to importance of communication is the taper tantrum in May 2013 which further emphasised the importance of central bank communication by the systemically important ones as many emerging market economies (EMEs) witnessed sharp gyrations in asset prices being price takers with domestic monetary policy playing a very small role in influencing commodity prices. Evolution of central bank communication needs a mention at this juncture as unexpected announcements by policy makers cause an upheaval in markets with emerging markets at the receiving end. The unexpected part of monetary policy announcement has come down over the years as transparency has increased over years, however, asset prices do react to policy announcements which is the subject of the study. The surprise element to a certain extent remains.

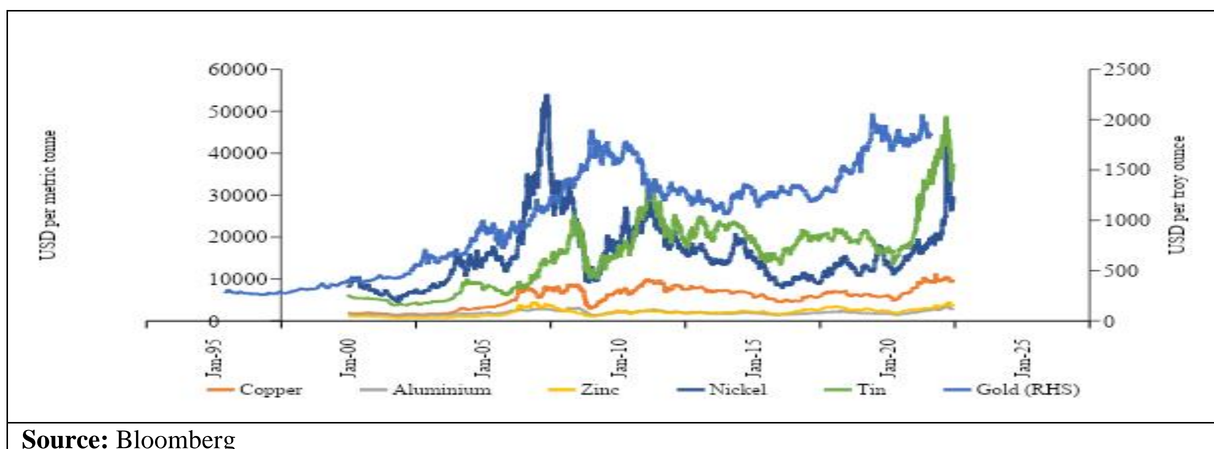
IV. STYLISED FACTS

The pandemic saw a surge in gold prices with prices moving up from 1589.44 US dollar (March 2020) per ounce to 1927 US dollar per troy ounce (March 2022). During this two-year period, it reached at its all-time peak of 2063 US dollar per troy ounce in August 2020 (Fig.1). Fed had to step-in to provide liquidity and policy support to both consumers and producers to keep credit flowing and to limit the economic damage from the pandemic. All these announcements on quantitative easing by different central banks along with sharp contraction and protracted uncertainty led people to hold more liquid deposits and search for some safe investment alternative such as gold. Thus, gold epitomized its true character of a safe haven.



Source: Bloomberg

Fig.1. Gold Spot Price



Source: Bloomberg

Fig.2. Spot Metal Prices

Similarly, in 2007-09, during global financial crisis gold prices touched 1000 US dollar mark for the first time in history as people's demand for gold and gold related assets rose due to a loss of credibility of banks and financial markets. It went on till 2013 "taper tantrum" episode, when Fed announced to taper its asset purchase programme, and reached up to 1897.46 US dollar in August 2011. While prices of most of the metals dropped during 2007-09, gold followed a unique path and rose about six per cent in the peak of crisis (Fig.2). In recent times, no other commodity and metals have picked up like gold as pandemic has raged all over the world, (Fig. 2 and 3), except crude oil due to the Russia-Ukraine conflict.

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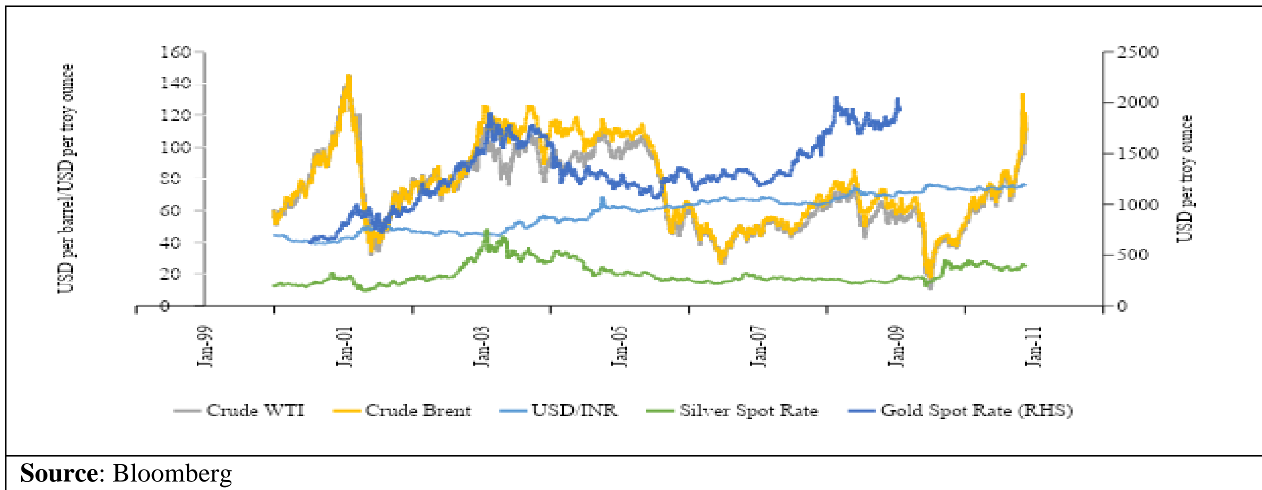
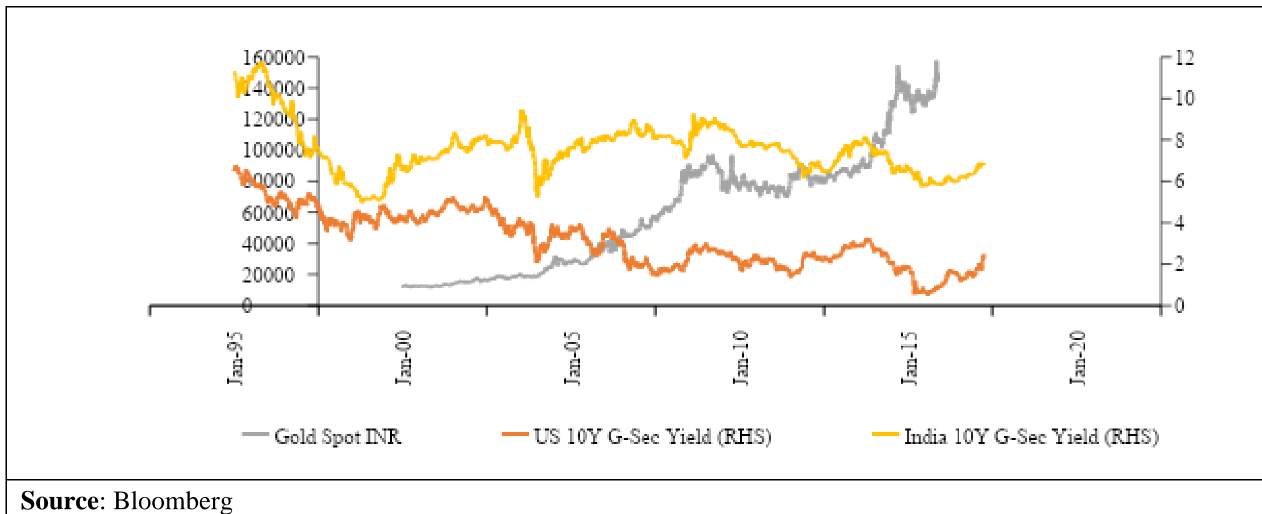


Source: Bloomberg

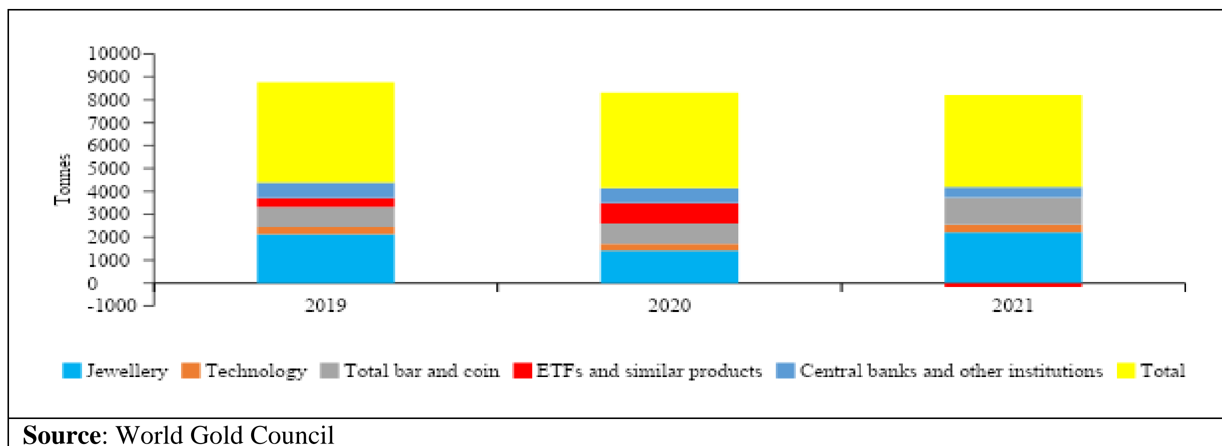
Fig. 3. Asset Prices



Source: Bloomberg

Fig.4. Asset Prices

Both gold and government bonds are deemed to be safe-haven; there exists a positive correlation between gold and bond prices, however, what actually matters for gold prices, are the real interest rates, (rising inflation impact gold and bonds in different ways) (Fig. 4). While gold has risen in times of turmoil, the present crisis was different as many economies went into lockdowns, like India, which happens to be one of the largest consumers of gold and thus the price rise was also arrested as global demand had plummeted during 2020 (Fig.5).



Source: World Gold Council

Fig.5. Global Gold Demand

Stock market and gold prices behave differently as we compare their response to some economy-wide shocks such as 2007-08 financial crisis and Covid-19 pandemic. As we look at the overall relation between gold and stock prices to be positive, during some crisis period or in abnormal market conditions the two may move in opposite directions as well (Fig.6).

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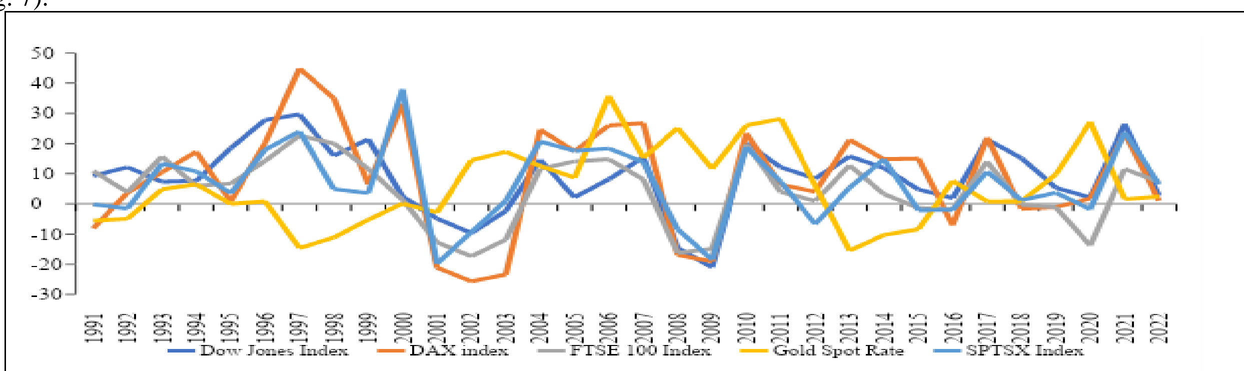
Fig. 6. Equities and Gold

We have analysed the excess return of gold and stock indices of some advanced economies to understand, how gold reacts during any market turmoil. During times of crisis, they have moved in opposite direction, reflecting search for safe haven (Fig. 7).

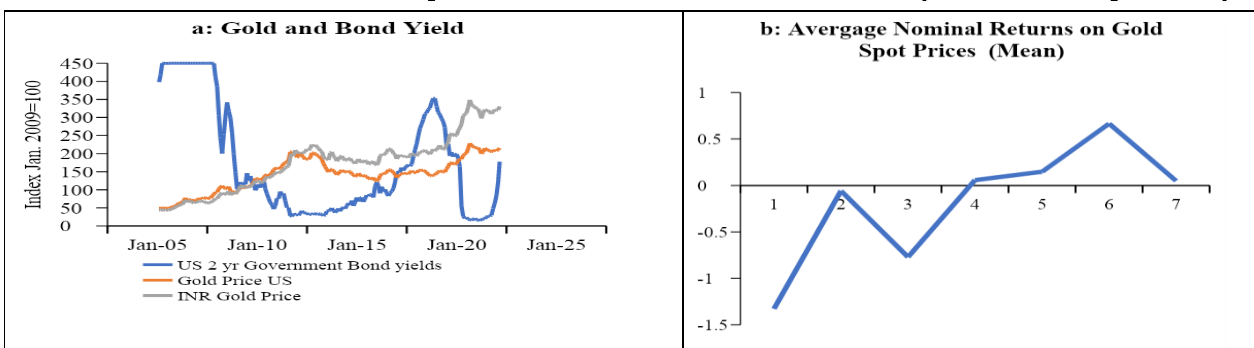


Source: Bloomberg

Fig. 7. Returns Gold v/s Equities

V. METHODOLOGY & RESULTS

We will consider the monetary policy announcements by the US Fed during Covid and its impact on Indian gold prices as the Fed reduced both interest rates and expanded its balance sheet to counter the effect of Covid induced slowdown. Gold witnessed a meteoric rise in 2020 and later the rally lost steam in 2021 as economic conditions improved and thus the return on gold prices merits a study as asset prices were greatly influenced during this period (Fig. 8a). During the time of Covid, between January 2020 to March 2022, US monetary policy announcements (Fig. 8b) did not have much impact on gold returns in India when we consider the mean return around the three-day event window of monetary policy announcements by the US Fed, when significant changes were made either to the fed funds rate or the balance sheet. This could be the case as for India and rest of the world, gold demand had fallen in 2020, despite abundant global liquidity.



Source: Bloomberg and authors calculations

Fig. 8. Gold Prices (Spot) and US Monetary Policy

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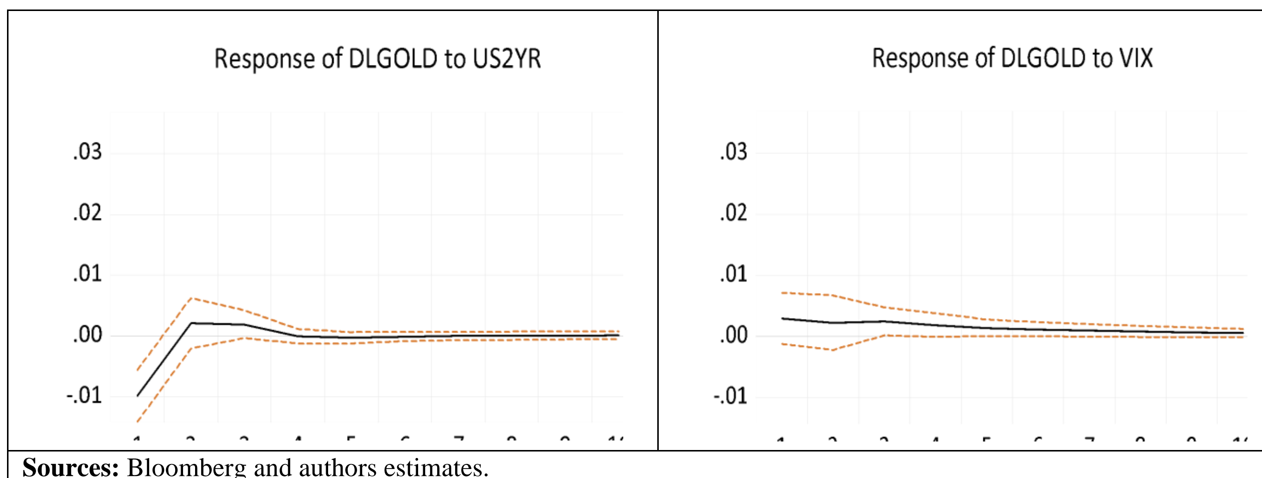

Sources: Bloomberg and authors estimates.

Fig. 9. Response of Indian gold prices to US 2Y Bond Yield and VIX

The yield on 2yr US treasury bills (US 2YR) is most sensitive to monetary policy announcements in the US and it is found to predict the future value of Indian gold prices (GOLD) for the period between January 2000 till February 2022. A VAR model was estimated of following form using data monthly data on US 2yr treasury bond yield, CBOE VIX (volatility index) and Indian gold prices with all the series being stationary as per standard Unit Root test:

Yt=C+AiYt-i+t

where Yt represents a vector of endogenous variables comprising US 2yr treasury bond yield, VIX and Indian gold prices. Also, crisis dummy of August 2008 and Brent crude prices are considered as exogenous variables for data spanning from January 2000 until February 2022, and we find a negative relationship between 2-year US treasury bond yield and Indian gold prices (Fig. 9). Many investors believe rising interest rates make fixed-income investments more profitable, and thus funds would be redirected to bonds and money market funds from gold. Consequently, when the Fed raises the benchmark rate, gold witnesses a selloff, but other factors—like the supply and demand undercurrents for commodities—could possibly have a larger effect on gold prices in the long run. Against this backdrop, an empirical analysis on the drivers of domestic gold prices was done using the ARDL framework for the period between January 2005 to September 2021, with domestic consumer prices index (CPI), real effective exchange rate (REER) of the Indian rupee and global price of gold as independent variables of order I (1), which have been seasonally adjusted using X13 method. All the variables are found to be significant drivers of gold prices in India in the long run. Underlining this stable long-run relationship, the error correction term was also found to be -0.13 and significant at 1 per cent. The long run relationship was tested by the bounds test, reported in Table 2. The F-statistics and absolute value of t-statistics were greater than the respective I (1) bound values at all levels of significance corroborating the existence of cointegration. CUSUM test suggests the stability of the model within 5 per cent confidence band. According to the short-run estimates (Table1), domestic CPI has a negative association with domestic gold price return which can be attributed to monetary policy tightening, investors' preference for holding cash balances and macro-uncertainty in the face of higher inflation. Similarly, India being a large importer of gold, an appreciation in effective exchange rate of the INR, which makes import of gold cheaper, leads to lower returns on domestic gold in the short run. A rise in domestic equity markets (NSE 500) is also associated with a fall in gold returns. Gold prices move usually in tandem with global economic policy uncertainty, underscoring its safe haven feature (Table 1).

Table 1 : Determinants of Gold Prices in India

Long-run Estimates(Dep. Variable: Log(GoldInd)				Short-run Estimates (Dep. Variable: ΔLog(GoldInd)		
	Coeff.	Std. Error			Coeff.	Std. Error.
Log(CPIInd)	1.11***	0.077		Error Correction Term	-0.13***	0.026
LogREERInd	-1.32***	0.224		ΔLog(Goldt-1Ind)	0.038***	0.024
Log(GoldGlobal)	0.73***	0.031		i=03ΔLog(CPIt-iInd)	-0.15***	0.026
				ΔLog(REERtInd)	-0.75***	0.054
				ΔLogGoldtGlobal	0.80***	0.224
				LogEPUtGlobal#	0.01***	0.002
				LogEquitytInd#	-0.01***	0.003

Notes: 1. The above estimates have been derived using an autoregressive distributed lag (ARDL) cointegration framework.
2. Data sample: Monthly data from Jan. 2005 to Sept. 2021.
3. All the variables are seasonally-adjusted using X-13 ARIMA method.
4. Diagnostic tests for serial correlation and heteroskedasticity suggest no residual autocorrelation and homoskedastic residuals.
5. *** denotes significance at 1 per cent, ** denotes significance at 5 per cent and * denotes significance at 10 per cent.
#. EPU^{Global} $Equity^{Ind}$ are exogenous variables in the ARDL framework, so not taken in Long-run Estimates.
Sources: Reserve Bank of India and Authors' own calculations.

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Table 2: F and T bounds test

		Null: No relationships at levels		
F-Bounds Test				
Test Statistic	**Value**	**Significance**	**I (0)**	**I (1)**
F-statistic	5.975222	10%	2.72	3.77
k	3	5%	3.23	4.35
		2.50%	3.69	4.89
		1%	4.29	5.61
t-Bounds Test				
Test Statistic	**Value**	**Significance**	**I (0)**	**I (1)**
t-statistic	-4.34897	10%	-2.57	-3.46
		5%	-2.86	-3.78
		2.50%	-3.13	-4.05
		1%	-3.43	-4.37

VI. CONCLUSION

A foremost feature of any safe-haven asset is that they respond to uncertainty and results from this study also showed that gold prices have reacted positively to global uncertainty underscoring their safe haven attribute. Panic during crises have pushed investors towards gold. Linear Granger causality and VAR tests indicate that lagged monetary policy announcements affect gold prices in the domestic market. However, gold is a unique asset, accumulated for sentimental and investment purpose and many factors play a dominant role in explaining movement in gold prices against the backdrop of rising and falling uncertainty. Returns on gold prices did not show much movement around FOMC announcements as much of the liquidity in the market was expected as investors were rebalancing portfolios in lockdown and demand for gold also plummeted during 2020.

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