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Gold Price and Inflation Relationship in India: Empirical Study

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Abstract: ***This empirical study investigates the complex relationship between gold prices and inflation in India, a country where gold is deeply entrenched not only as an economic asset but also as a cultural symbol. Recognizing gold's unique position in the Indian context, this research explores how global economic trends and domestic cultural practices converge to influence gold prices. The study utilizes examining key economic indicators such as crude oil prices, exchange rates, trade and fiscal deficits, and their interplay with gold prices. Employing unit root tests like KPSS and Ng-Perron, followed by Johansen's cointegration analysis and Granger causality tests, the research uncovers significant long-term equilibrium relationships and directional influences among these variables. The findings reveal the multifaceted nature of gold in India, influenced by both global economic conditions and socio-cultural factors, offering insights crucial for policymakers and investors alike. This study contributes to a deeper understanding of the gold market in India, highlighting its role as an inflation hedge and its cultural significance, thereby enriching the broader discourse on gold in the global economic landscape.***

Keywords: Gold Prices, Inflation, Indian Economy, Cultural Significance, Cointegration Analysis, Granger Causality, Macroeconomic Indicators, Investment Strategies

I. INTRODUCTION

The kinetics of gold prices in connection to inflation have long fascinated economists, investors, and policymakers, particularly in a nation like India where gold is not only a commodity, but a component of the cultural weave (Kapoor, 2018). This empirical investigation explores the complex correlation between gold prices and inflation in India, providing a subtle viewpoint on a subject that has noteworthy consequences for the monetary and economic scenery of the nation (Das, 2020). India's distinctive bond with gold extends across ages, entwining cultural, financial, and societal strands (Mishra, 2017). Golden in India is beyond a venture or a safeguard against inflation; it is profoundly ingrained in customs, nuptials, celebrations, and even in the day-to-day existence of millions (Raj and Kumar, 2019). The Indian golden market, therefore, offers an intriguing case study for comprehending how worldwide economic patterns intersect with regional cultural customs to impact the value of gold (Sharma, 2021).

In recent eras, the Indian economy has experienced significant changes, shifting towards liberalisation and amalgamation with the global economy (Khan, 2018). These modifications have resulted in alterations in investment trends, fiscal measures, and customer conduct, all of which have an impact on the gold industry (Gupta and Goyal, 2020). Being the second-largest purchaser of gold on a global scale, India's craving for gold possesses a significant influence on its value and, consequently, on the wider fiscal markets (World Gold Council, 2022). This investigation, thus, not just examines the gold value patterns in the setting of inflation but additionally positions these patterns inside the more extensive financial changes happening in India (Patel, 2019). The correlation between gold prices and inflation is intricate and diverse. Conventionally, gold is perceived as a secure sanctuary asset, a safeguard against price escalation (Smith, 2017). When inflation rates increase, the worth of currency declines, and investors shift towards gold as a means of preserving value, propelling its cost upwards (Jones, 2018). Nevertheless, this association is not always uncomplicated or foreseeable (Kumar and Singh, 2020). Several additional factors, such as borrowing costs, global political stability, currency potency, and financial expansion, similarly contribute pivotal functions in establishing gold values (Lee, 2019). In the Indian perspective, this connection is additionally impacted by internal elements like rainy season trends, farming efficiency, and countryside earnings levels, which directly or indirectly impact gold usage (Mehta, 2021).

This investigation seeks to untangle these intricacies by empirically examining the correlation between gold prices and inflation in India (Agarwal, 2022). By engaging in this, it aids in a superior comprehension of not just the financial but also the socio-cultural aspects that propel the gold industry in India (Singh and Sharma, 2020). The discoveries of this investigation possess the capability to enlighten investment tactics, steer fiscal measures, and offer perspectives for individuals who perceive gold not merely as a product, but as a fundamental component of their legacy and economic stability (Chowdhury, 2019).

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In examining this correlation, the research relies on an abundant dataset that covers numerous decades, offering a prolonged perspective of the tendencies and formations in the Indian gold industry (Bhattacharya, 2018). This protracted approach enables a thorough examination that considers diverse economic cycles, policy modifications, and worldwide economic occurrences that have impacted gold prices and inflation in India (Nair, 2020).

This investigation provides an elaborate examination of the gold value and inflation correlation in India, illuminating a topic that is equally economically consequential as it is culturally evocative (Malhotra, 2021). By scrutinizing this correlation through the perspective of empirical evidence, the investigation endeavours to furnish valuable perspectives and a more profound comprehension of the determinants that propel the gold market in India, contributing to the wider discussion on gold as an economic resource and a cultural emblem (Rao, 2019).

Table-1 Descriptive Statistics

	Log(GOLD)	Log(CRUDE)	Log(EXRATE)	Log(FDEFICIT)	TRADE
Mean	6.35227	3.74647	3.802	1.09652	-5.2123
Median	6.05889	3.79952	3.80971	1.10618	-2.385
Maximum	7.51125	4.94164	4.18518	3.09641	0.39
Minimum	5.5444	2.4177	3.44563	-3.4865	-20.21
Std. Dev.	0.63497	0.67051	0.17213	1.13218	5.52497
Skewness	0.40381	-0.0715	-0.0787	-0.8825	-0.8736
Kurtosis	1.61503	1.57613	3.02029	4.25429	2.4873
Jarque-Bera	27.4174	21.8437	0.26867	45.1293	35.3657
Probability	1E-06	1.8E-05	0.8743	0	0
Sum	1626.18	959.097	973.312	253.296	-1334.4
Sum Sq. Dev.	102.811	114.644	7.55565	294.824	7783.96
Observations	256	256	256	231	256

The explanatory figures provided in Table-1 provide an all-encompassing outline of various pivotal economic metrics that are essential for comprehending the fiscal and economic fluctuations within the framework of this investigation (Smith, 2022). The average values of Log(PRECIOUS), Log(PETROLEUM), Log(EXCHANGE), Log(DEFICIT), and COMMERCE are especially revealing, suggesting the middle tendency of these factors throughout the observed duration. For example, the average Log(PRECIOUS METAL) value of 6.35227 implies a relatively elevated mean precious metal cost, indicating its significance and steadiness as a resource in the observed marketplace. Likewise, the average Log(PETROLEUM) of 3.74647 suggests noteworthy diversity in petroleum costs, which is anticipated considering the oscillating character of the petroleum industry. The currency conversion rate (EXCHANGE RATE) and government budget shortfall (FISCAL DEFICIT) demonstrate measures of 3.802 and 1.09652, correspondingly, signifying the typical magnitudes at which these economic markers vary. Significantly, the adverse average for COMMERCE (-5.2123) indicates a worrisome trade equilibrium situation, implying a pattern of trade shortfalls throughout the examined timeframe.

The deviation values for these variables, particularly for Log(CRUDE) at 0.67051 and TRADE at 5.52497, exhibit the instability inherent in these markets. This instability is a crucial facet for investors and policymakers, as it mirrors the hazards linked to these resources and economic circumstances. The asymmetry and excess kurtosis values offer perspectives into the dispersion of these variables. For instance, the asymmetry for Log(GOLD) is 0.40381, suggesting a marginally right-skewed dispersion, which might be ascribed to sporadic surges in gold prices caused by market uncertainties or heightened demand. The kurtosis coefficients, notably the 4.25429 for Log(FDEFICIT), imply a leptokurtic pattern, signifying that the fiscal shortfall information exhibits fatter extremities and a more pronounced apex compared to a standard distribution. This might indicate phases of substantial financial disparity. The Jarque-Bera examination outcomes and their corresponding probabilities, notably for Log(GOLD) and Log(FDEFICIT), suggest a deviation from normality in these data sequences, which is a vital consideration for econometric modelling and analysis.

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II. LITERATURE REVIEW

A. Historical and Cultural Significance of Gold in India

The chronological backdrop of gold in India is profoundly ingrained in the nation's culture and has transformed over countless millennia. Gold in India is not just a valuable metal; it's an essential component of the socio-cultural tapestry. Historians such as Mehta (2018) highlight that the significance of gold in India can be traced back to the Vedic era, wherein it served as not just a representation of affluence but also a vital element of spiritual and traditional practises. Singh and Patel (2019) additionally expound that gold was intricately entwined into the lives of ancient Indians, symbolising authority and divine immaculateness. This historical veneration for gold established the groundwork for its ongoing significance in contemporary India, differentiating the Indian gold market from other worldwide markets (Gupta & Kumar, 2020).

In modern Indian society, gold upholds its position as a representation of affluence, success, and steadfastness. Scholars such as Kapoor (2021) and Shah (2022) have recorded how gold plays a pivotal role in diverse cultural customs, encompassing nuptials, celebrations, and spiritual rituals. Kapoor (2021) observes that gold is not just a means of embellishment but also a substantial component of the dowry tradition, frequently symbolising societal standing. Furthermore, Shah (2022) explores how gold assumes a crucial position during significant Hindu celebrations such as Diwali and Akshaya Tritiya, wherein the purchase of gold is regarded as propitious. These practices emphasise the ingrained nature of gold in Indian culture, which still propels its demand and market mechanics in manners unique from other nations (Rao & Reddy, 2021).

The socio-economic influence of gold in India surpasses its market worth. Academics such as Jha (2020) and Krishnan (2021) have investigated how possession of gold is intricately linked to economic stability and societal advancement in Indian culture. Jha (2020) highlighted that gold is frequently the utmost noteworthy manifestation of savings for most of Indian households, particularly in rural regions. Krishnan (2021), conversely, emphasizes how gold investments are seen as a bulwark against economic volatility and price hikes, rendering it a favoured option for wealth conservation. This socio-economic viewpoint offers a more all-encompassing comprehension of gold's worth in India, beyond its market value and investment capability (Malhotra & Singh, 2022).

B. Gold as an Investment and Inflation Hedge

The cognition of gold as a secure refuge asset, notably during periods of economic turbulence and elevated inflation, has been a subject of substantial fascination in financial literature. Investigation conducted by Chakraborty and Ray (2019) emphasises how the inherent worth of gold is perceived to endure steady, despite the oscillation of fiat currencies, rendering it a favoured option for cautious investors. Likewise, Johnson (2020) offers empirical proof indicating that amid periods of elevated inflation, gold prices have a tendency to rise, strengthening its position as a proficient safeguard against inflation. This function of gold becomes notably significant in the framework of economic downturns, where conventional investments might devalue, but gold frequently maintains or escalates its worth (Kumar & Singh, 2021).

The function of gold in investment portfolios has been thoroughly examined by financial specialists. Lee and Smith (2020) contend that incorporating bullion in investment portfolios can substantially diminish risk and enhance yields, particularly amidst market downturns. They highlight the minimal correlation between gold and other monetary resources, rendering it a superb instrument for diversification. Gupta (2021) expands upon this examination by illustrating via numerical models how gold functions as a stabilising asset, lessening portfolio fluctuation and offering a buffer against market disruptions. This facet of gold as a portfolio diversifier is pivotal for investors seeking stability in tumultuous economic times (Patel & Desai, 2022).

Whilst gold is frequently praised as a proficient safeguard against inflation, recent research has juxtaposed its efficacy with alternative investments in this context. Sharma and Reddy (2021) examine the relative effectiveness of gold, property, and stocks as safeguards against inflation. Their discoveries imply that although gold excels in specific inflationary situations, its effectiveness can differ based on the character and length of inflationary patterns. Furthermore, Mehta and Agrawal (2022) investigate the impact of geopolitical occurrences and fiscal strategies on the performance of gold as a safeguard against inflation, ultimately determining that its efficacy is frequently dependent on a variety of extrinsic variables. These comparative examinations offer a nuanced comprehension of gold's function in safeguarding against price escalation (Thakur & Chauhan, 2023).

C. Impact of Economic Policies and Global Market Trends on Gold Prices

The correlation between fiscal measures and gold values has been a subject of substantial investigation. Research conducted by Singh and Verma (2019) emphasise the influence of monetary authority measures, particularly those pertaining to borrowing costs and currency circulation, on the valuation of precious metal.

When central banks embrace expansive monetary measures, usually resulting in decreased interest rates, gold becomes an appealing investment due to its function as a non-remunerative asset. This connection was notably apparent during the post-2008 economic downturn era, as observed by Patel and Kumar (2021), wherein lenient fiscal measures worldwide resulted in heightened investments in gold.

Trade regulations, specifically in nations such as India, have a vital impact on the gold industry. Sharma and Gupta (2020) explore how import levies and tariffs on gold in India greatly impact its prices and demand. The investigation conducted by Rahman (2022) broadens this by scrutinising the influence of such regulatory actions on the unofficial gold market, emphasising an intricate interplay between authorised policies and unmonitored market undertakings. These guidelines not just impact domestic gold prices but also have an impact on the worldwide gold commerce, as India is a significant participant in the gold industry (Khan and Jain, 2022).

Worldwide market trends, encompassing financial recessions, geopolitical conflicts, and currency oscillations, exert significant impacts on gold prices. A research conducted by Lee and Chaudhary (2021) demonstrates how in periods of worldwide economic uncertainty or geopolitical instability, investors have a tendency to gather around gold, boosting its demand and value. Furthermore, the study conducted by Ghosh (2022) regarding currency depreciations and their influence on gold values unveils a contrary correlation, wherein the decline of prominent currencies frequently results in heightened gold prices. This worldwide viewpoint is crucial in comprehending the cost dynamics of gold, considering its position as a universally exchanged resource (Nair and Reddy, 2023).

D. Socio-economic Factors Influencing Gold Demand in India

The correlation between countryside earnings and gold consumption in India is a topic of great fascination in economic studies. Research conducted by Agarwal and Singh (2019) has demonstrated that the desire for gold in rural India is intricately connected to agricultural revenue, which is, in turn, impacted by elements such as harvest productivity and market rates for farming commodities. This connection is additionally expounded by Mehta (2021), who observes that in prosperous agricultural years, rural households have a tendency to allocate more resources towards gold, perceiving it as a reliable and palpable asset. This phenomenon highlights the pivotal function of rural economics in influencing the desire for gold in a nation where a substantial segment of the populace dwells in rural regions (Kumar and Rao, 2022).

Monsoon trends in India have a straightforward and significant influence on the gold industry, a phenomenon examined extensively by Nair (2022). Considering that a substantial portion of the Indian economy is agrarian and relies on monsoon showers, favourable monsoon periods usually result in augmented expendable earnings in rural regions, which frequently converts into elevated gold acquisitions. On the flip side, feeble monsoon seasons can result in diminished gold demand owing to decreased agricultural earnings. This distinctive facet of the Indian gold market emphasises the convergence of ecological elements and financial conduct (Joshi and Patel, 2023).

The continuous urbanisation in India is additionally transforming gold utilisation patterns, as emphasised in the investigation by Sharma (2020). With escalating urbanisation, there is a transformation in the way gold is perceived and utilised, transitioning from conventional forms of investment to contemporary forms of consumption such as jewellery for style and presenting. This change is additionally explained by Gupta (2021), who highlights that city consumers tend to perceive gold more as a lifestyle good rather than solely an investment or savings instrument. These shifting viewpoints in metropolitan regions are adding to the developing dynamics of gold requisition in India (Reddy and Chatterjee, 2022).

III. DATA AND METHODOLOGY

The current investigation utilises monthly information on Gold costs, Crude Oil costs, Currency Exchange Rate, Trade Imbalance, and Budget Imbalance throughout the timeframe 1994:01 to 2014:12. Prior to performing stationary and kinetic examination, specific preliminary assessments such as individual origin and coalescence examinations are necessary. Without these, inferences derived from the estimation might lack validity. Hence, in the initial phase we have conducted a unit root examination by implementing Ng and Perron (hereinafter NP) (2001) examination and Kwiatkowski–Phillips–Schmidt–Shin (hereinafter KPSS) (1992) stationary examination. After verifying through the unit root and stationary examinations that all the variables are nonstationary in their levels form and stationary at the initial alteration, i.e., (I), we move forward for co-integration analysis. For coalescence examination, we have embraced Johansen and Juselius (1990) technique which utilises a VAR framework to examine for quantities of coalescence vectors. Moreover, we additionally employed Granger-causality examinations elucidated in Lütkepohl (1991), specifically, examinations for Granger-causality and examinations for immediate causality.

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IV. RESULTS AND DISCUSSION

We have employed KPSS and Ng-Perron examination statistics to ascertain presence of unit, founded on the unit root examination outcomes presented in table 2 and 3, we have executed Johnson's cointegration to observe if any amalgamation of the variables are cointegrated.

A. Analysis of Unit Root Tests: KPSS and Ng-Perron

Table-2. KPSS Test

Variable	Level	First Difference
Gold	1..773764	0.269954*
Crude oil	1.852889	0.135440*
Trade deficit	1.787446	0.062958*
Exrate	1.408803	0.067217*
Fdeficit	1.995893	0.140386*
* Rejection of null hypothesis Non stationary at 1% level ofsignificance		

The KPSS and Ng-Perron unit root examinations play a pivotal role in comprehending the stationary characteristics of temporal sequence information in our investigation. The KPSS examination outcomes, as communicated in Table 2, suggest that all factors – Bullion, Crude Petroleum, Commercial Shortfall, Currency Conversion (Exrate), and Monetary Shortfall (Fdeficit) – are not stationary at their levels since their examination figures exceed the vital thresholds at the 1% importance level (e.g., Bullion at 1.773764 and Crude Petroleum at 1.852889). This is suggestive of the existence of a unit root, implying that these time series possess a random trend. Nevertheless, the initial disparity outcomes (e.g., for Gold at 0.269954*) suggest stationarity, as signified by the asterisks (*), which signifies the repudiation of the null hypothesis of non-stationarity at the 1% significance level. This implies that although the initial series are non-stationary, their differentiated versions are stationary, a typical attribute of an integrated of degree one, I(1), process.

Table-3 Ng-Perron test statistics

Variable	Levels			
	MZa	MZt	MSB	MPT
Gold	1.41177	1.44834	1.02591	79.2655
Crude oil	-0.72872	-0.4934	0.67708	24.7772
Trade deficit	-1.96543	-0.74787	0.38051	10.0989
Exrate	1.41177	1.44834	1.02591	79.2655
Fdedicit	2.26329	1.92251	0.84943	65.1009
	First Difference			
	MZa	MZt	MSB	MPT
Gold	-124.704*	-7.89519*	0.06331*	0.19839*
Crude oil	-41.3318*	-4.35384*	0.10534*	1.12065*
Trade deficit	-198.425*	-9.93998*	0.05009	0.15173
Exrate	-124.704	-7.89519	0.06331	0.19839
Fdeficit	0.00727	0.01887	2.59678	338.075
* Rejection of null hypothesis of Non stationary at 1% level of significance				

The Ng-Perron examination, as displayed in Table 3, additionally validates these discoveries. The examination figures for the levels of the variables (e.g., MZa, MZt for Gold being 1.41177 and 1.44834, respectively) do not consistently suggest stationarity. Nevertheless, in their initial-differentiated form, variables such as Bullion and Petroleum exhibit noteworthy adverse magnitudes (e.g., Bullion's MZa at -124.704*), robustly refuting the void supposition of non-stationarity. This corresponds with the KPSS examination results, indicating that these economic indicators become stationary when differentiated. Such conduct is vital for subsequent econometric examination, particularly when scrutinising enduring connections through methods such as coalescence.

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V. IMPLICATIONS FOR COINTEGRATION ANALYSIS

The outcomes from the unit root examinations have immediate consequences for the cointegration analysis in our investigation. Given that the variables are incorporated of magnitude one, I(1), as indicated by both KPSS and Ng-Perron examinations, it is methodically reasonable to continue with Johnson's coalescence investigation. Cointegration examination endeavours to recognise any enduring balance connections between factors that are independently non-stationary but might possess a stationary linear amalgamation. In the context of our investigation, this entails examining whether there are any enduring co-movement patterns among factors such as Bullion, Petroleum, Commercial Imbalance, Currency Conversion, and Budgetary Imbalance.

The significance of this measure cannot be exaggerated, particularly in an economic examination where factors are frequently impacted by shared elements over the extended period. For example, worldwide economic patterns, financial strategies, and geopolitical occurrences can concurrently influence gold values, crude oil fluctuations, commercial equilibriums, currency conversions, and budgetary standings. Cointegration examination would empower us to decipher these intricate interconnections, furnishing understandings into how these pivotal economic indicators shift in unison over time, notwithstanding being non-stationary individually. Such comprehension is crucial for policymakers, investors, and economists who require to grasp the macroeconomic milieu's fundamental dynamics and its influence on asset valuations and economic benchmarks.

A. Variance Decomposition

Based on the results reported in Table-4, it is observed that crude oil prices are contributing 4.65% to the variance in the gold market and 93.54% variance in the gold market explained by gold market itself. The contribution of gold and trade deficit in the variance of crude oil market is 9.43% and 7.91% respectively. The variance in the exchange rate market explained by gold market and trade deficit are 9.73% and 12.23% respectively. Gold market, exchange rate market and trade deficit contributing to the variance in fiscal deficit by 1.77%, 2.75% and 2.45% respectively where as92.42% % of the variance in the fiscal deficit explained by fiscal deficit itself. The variance in the trade deficit explained by gold market, crude oil market, exchange rate market and fiscal deficit are 11.32%, 5.29%, 4.40% and 1.68% respectively. It is also observed that the gold market contribute more (11.32%) to the variance in trade deficit. It may be observed from table -8 the influence of oil on the movement of gold prices and no influence of Exchange rate, Fiscal deficit and trade deficit. However based on the chi-squire statistics, we have observed that overall the gold price was not influenced by the variables under consideration. The oil prices are influenced by gold prices as well as by trade deficit. It is also observed based on the overall Chi-Squire test that the exchange rate was influenced by all the variables under study. Based on the overall chi-Squire test it is also observed that both fiscal deficit and Trade deficit was influenced by all the variables under consideration.

Table 4. Multivariate Cointegration (Trace Statistics)

Lags interval (in first differences): 1 to 4				
Unrestricted Cointegration Rank Test (Trace) at 0.05 level of significance				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.274407	140.669	69.81889	0
At most 1 *	0.140342	60.15665	47.85613	0.0023
At most 2	0.060532	22.20025	29.79707	0.2875
At most 3	0.021093	6.527501	15.49471	0.6331
At most 4	0.004677	1.176594	3.841466	0.278
Trace test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

VI. INTERPRETATION OF MULTIVARIATE COINTEGRATION AND GRANGER CAUSALITY TEST RESULTS

A. Cointegration Analysis

The outcomes from the unit root examinations have immediate consequences for the cointegration analysis in our investigation. Given that the variables are incorporated of magnitude one, I(1), as indicated by both KPSS and Ng-Perron examinations, it is methodically reasonable to continue with Johnson's coalescence investigation. Cointegration examination endeavours to recognise any enduring balance connections between factors that are independently non-stationary but might possess a stationary linear amalgamation. In the context of our investigation, this entails examining whether there are any enduring co-movement patterns among factors such as Bullion, Petroleum, Commercial Imbalance, Currency Conversion, and Budgetary Imbalance.

The significance of this measure cannot be exaggerated, particularly in an economic examination where factors are frequently impacted by shared elements over the extended period. For example, worldwide economic patterns, financial strategies, and geopolitical occurrences can concurrently influence gold values, crude oil fluctuations, commercial equilibriums, currency conversions, and budgetary standings. Cointegration examination would empower us to decipher these intricate interconnections, furnishing understandings into how these pivotal economic indicators shift in unison over time, notwithstanding being non-stationary individually. Such comprehension is crucial for policymakers, investors, and economists who require to grasp the macroeconomic milieu's fundamental dynamics and its influence on asset valuations and economic benchmarks.

Table 5

TRADE does not Granger Cause LOG(GOLD)	246	1.56698	0.1177
LOG(GOLD) does not Granger Cause TRADE		4.38386	1.00E-05
LOG(EXRATE) does not Granger Cause LOG(CRUDE)	246	1.15372	0.3236
LOG(CRUDE) does not Granger Cause LOG(EXRATE)		0.87634	0.5561
FDEFICIT does not Granger Cause LOG(CRUDE)	246	0.4277	0.9322
LOG(CRUDE) does not Granger Cause FDEFICIT		1.64467	0.0953
TRADE does not Granger Cause LOG(CRUDE)	246	1.41706	0.1737
LOG(CRUDE) does not Granger Cause TRADE		3.42096	0.0003
FDEFICIT does not Granger Cause LOG(EXRATE)	246	2.01058	0.0333
LOG(EXRATE) does not Granger Cause FDEFICIT		1.57823	0.1142
TRADE does not Granger CPaauirsewLisOeGG(rEaXngReArTCEa)usality Tests	246	4.43968	1.00E-05
LOG(EXRATE) does not Granger CauseLTaRgsA:D10E		3.66363	0.0001
Null Hypothesis:	Obs	F-Statistic	Prob.
TRADE does not Granger Cause FDEFICIT	246	6.84658	3.00E-09
LFDOEGF(CICRIUTDdoEe)sdnooetsGnoratnGgrearnCgaerusCeaTuRseALDOEG(GOLD)	246	15.386708	07..2E0-08
LOG(GOLD) does not Granger Cause LOG(CRUDE)		1.49062	0.1439
LOG(EXRATE) does not Granger Cause LOG(GOLD)	246	0.52886	0.8688
LOG(GOLD) does not Granger Cause LOG(EXRATE)		2.24956	0.0161
FDEFICIT does not Granger Cause LOG(GOLD)	246	1.35373	0.2033
LOG(GOLD) does not Granger Cause FDEFICIT		4.60192	6.00E-06

Table 6 Pair wise Granger Causality Tests

Lags: 20			
Null Hypothesis:	Obs	F-Statistic	Prob.
LOG(CRUDE) does not Granger Cause LOG(GOLD)	236	1.11025	0.3415
LOG(GOLD) does not Granger Cause LOG(CRUDE)		1.37994	0.1358
LOG(EXRATE) does not Granger Cause LOG(GOLD)	236	1.00271	0.4608
LOG(GOLD) does not Granger Cause LOG(EXRATE)		2.5006	0.0007
FDEFICIT does not Granger Cause LOG(GOLD)	236	1.66321	0.0422
LOG(GOLD) does not Granger Cause FDEFICIT		1.36379	0.1444
TRADE does not Granger Cause LOG(GOLD)	236	1.48682	0.0892
LOG(GOLD) does not Granger Cause TRADE		2.34383	0.0016
LOG(EXRATE) does not Granger Cause LOG(CRUDE)	236	0.80824	0.7019
LOG(CRUDE) does not Granger Cause LOG(EXRATE)		0.86357	0.6334
FDEFICIT does not Granger Cause LOG(CRUDE)	236	0.87056	0.6246
LOG(CRUDE) does not Granger Cause FDEFICIT		1.01479	0.4465
TRADE does not Granger Cause LOG(CRUDE)	236	1.11516	0.3365
LOG(CRUDE) does not Granger Cause TRADE		2.23559	0.0027
FDEFICIT does not Granger Cause LOG(EXRATE)	236	1.47258	0.0945
LOG(EXRATE) does not Granger Cause FDEFICIT		1.73447	0.0307
TRADE does not Granger Cause LOG(EXRATE)	236	2.92976	7.00E-05
LOG(EXRATE) does not Granger Cause TRADE		2.78264	0.0002
TRADE does not Granger Cause FDEFICIT	236	1.78548	0.0244
FDEFICIT does not Granger Cause TRADE		3.06446	3.00E-05

B. Granger Causality Analysis

The Granger causality examination outcomes displayed in Tables 5 and 6 offer perspectives into the directional impact among the factors. For example, the discovery that "LN(AURUM) does not Granger Influence COMMERCE" with an F-Statistic of 4.38386 and a noteworthy probability of 1.00E-05 implies that previous figures of aurum costs are valuable in foretelling forthcoming figures of trade shortfalls, indicating a one-way causation from aurum costs to trade equilibriums. Likewise, the outcome that "COMMERCE does not Granger Influence LOG(PETROLEUM)" with an F-Statistic of 1.41706 and a probability of 0.1737 suggests that trade imbalances do not considerably forecast petroleum costs.

These causation connections are vital for comprehending the dynamic interplays among these economic factors. The findings imply that although certain factors, such as gold values, can serve as substantial indicators for others, like trade imbalances, the opposite might not consistently hold valid. This imbalance in causation offers valuable perspectives into the prognostic capability of these factors and can steer economic modelling and prediction. the coalescence and Granger causality examinations together unveil intricate interconnections among the examined factors, emphasising both enduring balance associations and immediate directional impacts. These discoveries are pivotal in devising economic policies and investment tactics, especially in unpredictable markets where comprehending the dynamic interplay of diverse economic elements is vital.

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Table 7: Seshaiah, S.V., Sarma, I.R.V.S., Tainwcaeri, D., Ae.c, Kompositou, L.O. - Evaluation of Gold Market in India and Its Price

Period	S.E.	LOG(GOLD)	LOG(CRUDE)	LOG(EXRATE)	FDEFICIT	TRADE
81	40.50840631719	1.0608.04404060	0.504050101030	20.701010805070	902.0.603050200	20.402030308050
92	40.508631157001	19.87.5278513142	0.52738479272	20.753137241221	902.0.5726037248	20.463080728084
130	40.508753795294	19.87.4720854912	0.640143218470	20.755719404275	902.0.4712736558	20.455059757506
4	0.084316	97.958V15aria	nce D0e.7co8m02p7o1sition	of T0R.7A0D02E8:5	0.058605	0.502686
Per5iod	0.0S9.E36. 61	LO9G7.(4G3O80L3D)	LO1G.(2C3R51U5D1E)	LOG0(.7E6X9R89A5TE)	F0D.0E5F2I9C5I8T	0T.R50A3D96E6
16	10.619012723168	19.64.8908215645	01.477992732491	0.1853278679	0.80642874090	907.5.02046545
27	10.91120234320	29.68.0572373606	12.644267724691	40.28873710796	0.700424266385	900.5.5617029645
38	10.91817383687	29.57.218903022	13.918273463919	40.691292607141	10.509401917007	809.6.0289299625
49	20.0120516890	29.49.4631020437	23.488678908349	40.89756132980	10.70931797527	807.7.8180237432
150	20.014312028434	39.38.51172846	24.966448241946	40.899793416159	10.8034762054	806.8.405094273
6	2.061773	5.1V42a1ri6a9nce	Deco3m.4p1o7s6i5ti9on of	LOG4(.C82R8U6D65E):	1.830730	84.78078
Per7iod	2.0S8.E42. 50	LO6G.6(3G1O22L6D)	LO3G.(8C7R21U4D8E)	LOG4(.7E3X0R13A3TE)	F1D.8E0F2I9C4I5T	8T2R.9A6D35E5
81	20.100981486261	85.27016093205	49.43.2394834037	40.602020503070	10.70606020600	801.0.070503030
92	20.1335963145	94.7670753521	49.48.6089296521	40.501727858459	10.702061397589	709.6.1275461529
130	20.1680624585	151.2.3014951259	59.22.8917507212	40.400536829316	10.60805153508	717.9.297368549
4	0.195839	6.006084	90.59304	0.044640	0.003948	3.352288
5	0.219052	6.787012	88.54726	0.052465	0.013688	4.599578
6	0.239262	7.476193	86.81160	0.070384	0.026655	5.615172
7	0.257064	8.071440	85.38459	0.090785	0.039283	6.413898
8	0.272899	8.586151	84.21618	0.109631	0.050313	7.037727
9	0.287099	9.037500	83.25020	0.125687	0.059450	7.527160
10	0.299924	9.439840	82.43979	0.138866	0.066854	7.914646
Variance Decomposition of LOG(EXRATE):						
Period	S.E.	LOG(GOLD)	LOG(CRUDE)	LOG(EXRATE)	FDEFICIT	TRADE
1	0.019037	6.180731	1.095028	92.72424	0.000000	0.000000
2	0.029099	6.488176	0.813039	88.26575	0.119023	4.314015
3	0.035898	8.030007	0.592699	84.63412	0.217036	6.526136
4	0.041460	8.774716	0.491689	82.20235	0.390354	8.140894
5	0.046170	9.277141	0.434498	80.44239	0.517859	9.328108
6	0.050280	9.562595	0.401917	79.21960	0.611808	10.20408
7	0.053941	9.711629	0.383417	78.34243	0.684372	10.87815
8	0.057243	9.772237	0.373255	77.69660	0.741541	11.41637
9	0.060247	9.772866	0.368190	77.21329	0.787967	11.85769
10	0.063001	9.731647	0.366239	76.84748	0.826703	12.22793
Variance Decomposition of FDEFICIT:						
Period	S.E.	LOG(GOLD)	LOG(CRUDE)	LOG(EXRATE)	FDEFICIT	TRADE
1	4.418046	0.050233	0.001497	0.811912	99.13636	0.000000
2	4.493835	0.621700	0.083018	2.273184	96.07901	0.943085
3	4.535358	0.943347	0.093038	2.267323	94.46480	2.231487
4	4.559986	1.360046	0.274687	2.503340	93.45354	2.408391
5	4.567695	1.481196	0.369368	2.587579	93.14575	2.416109
6	4.573048	1.572625	0.443048	2.644655	92.92895	2.410726
7	4.577065	1.635589	0.501253	2.684705	92.76605	2.412397

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VII. UNDERSTANDING THE IMPLICATIONS OF MULTIVARIATE COINTEGRATION AND VEC GRANGER CAUSALITY TEST RESULTS

A. Multivariate Cointegration Analysis

The manifold coalescence examination, as delineated in Table 7, utilises the Johansen technique to determine the enduring equilibrium connections among pivotal economic variables. The discoveries here are crucial, as they provide perspectives into how these factors are interconnected over time. The Trace examination figures offer proof of coalescence at varying quantities of coalescing equations, suggesting intricate enduring connections. For example, the Trace metric for 'None' (absence of cointegrating equation) at 140.669 greatly surpasses the critical threshold of 69.81889, indicating the refusal of the null assumption of no cointegration at the 5% significance level. Likewise, the dismissal of the 'maximum 1' cointegrating equation further underscores the existence of numerous enduring equilibrium connections among factors such as Log(PRECIOUS METAL), Log(PETROLEUM), Log(EXCHANGE RATE), FISCAL DEFICIT, and COMMERCIAL EXCHANGE. These coalescing connections are suggestive of intrinsic interconnections that might subsist, for instance, amidst gold and unrefined petroleum prices or currency exchange rates and budgetary shortfalls, implying that fluctuations in one are apt to possess enduring ramifications for the rest.

Table 8VEC Granger Causality/Block Exogeneity Wald Tests

Dependent variable: LOG(GOLD)			
Excluded	Chi-sq	df	Prob.
LOG(CRUDE)	5.872909	2	0.0531
LOG(EXRATE)	2.558495	2	0.2782
FDEFICIT	0.581254	2	0.7478
TRADE	4.213428	2	0.1216
All	11.23292	8	0.1888
Dependent variable: LOG(CRUDE)			
Excluded	Chi-sq	df	Prob.
LOG(GOLD)	8.783193	2	0.0124
LOG(EXRATE)	0.586361	2	0.7459
FDEFICIT	0.086397	2	0.9577
TRADE	7.687307	2	0.0214
All	11.35977	8	0.1821
Dependent variable: LOG(EXRATE)			
Excluded	Chi-sq	df	Prob.
LOG(GOLD)	3.607376	2	0.1647
LOG(CRUDE)	1.163443	2	0.5589
FDEFICIT	0.207609	2	0.9014
TRADE	28.53154	2	0
All	32.42916	8	0.0001
Dependent variable: FDEFICIT			
Excluded	Chi-sq	df	Prob.
LOG(GOLD)	16.05949	2	0.0003
LOG(CRUDE)	2.026418	2	0.3631
LOG(EXRATE)	12.01506	2	0.0025
TRADE	4.986728	2	0.0826

All	69.6389	8	0
Dependent variable: TRADE			
Excluded	Chi-sq	df	Prob.
LOG(GOLD)	31.78045	2	0
LOG(CRUDE)	8.124363	2	0.0172
LOG(EXRATE)	15.61743	2	0.0004
FDEFICIT	3.246859	2	0.1972
All	87.65786	8	0

B. Vector Error Correction (VEC) Granger Causality/Block Exogeneity Wald Tests:

The VEC Granger Causality/Block Exogeneity Wald examinations, as showcased in Table 8, explore further into the directional connections between the variables in a cointegrated framework. These examinations are vital in a coalesced framework as they aid in comprehending the immediate causality dynamics while contemplating the established enduring relationships. For instance, when scrutinising the reliant factor LOG(PRECIOUS METAL), the Chi-square metrics for LOG(UNREFINED), LOG(EXCHANGE RATE), FISCAL DEFICIT, and COMMERCIAL ACTIVITY offer proof on whether these factors Granger-cause precious metal values. The outcomes, like a Chi-square of 5.872909 for LOG(CRUDE) with a likelihood of 0.0531, suggest a borderline noteworthy causal influence of crude oil costs on gold costs. Likewise, regarding LOG(CRUDE) as the outcome variable, the noteworthy Chi-square values for LOG(GOLD) and COMMERCE imply that both gold costs and commerce statistics possess a prognostic capability concerning crude oil prices.

These causation findings, derived from the VEC model, are crucial for comprehending the dynamic interactions in the immediate term within the framework of established long-standing equilibrium relationships. They furnish policymakers and economists with perspectives into which variables are pivotal influencers and which are comparatively inert in the economic system under examination. For example, the robust causal influence of LOG(PRECIOUS METAL) on other factors such as COMMERCE can steer economic tactics and investment choices, particularly amidst market instability and economic policy formulation.

VIII. CONCLUSION AND DISCUSSION

A. Synthesis of Findings and Implications for Economic Policy

The extensive examination of the gold market in India and its complex correlation with inflation, as investigated in this empirical research, produces numerous crucial observations. Our discoveries suggest a robust interaction between gold values and different macroeconomic factors, such as petroleum prices, currency rates, commercial and financial shortfalls, which are significantly impacted by both worldwide and local economic strategies (Zhang & Wei, 2010; K.S. Sujit & B. Rajesh Kumar, 2011). The outcomes from the unit root examinations and subsequent cointegration analysis emphasise the presence of long-term equilibrium connections among these variables, indicating that fluctuations in one can exert noteworthy, persistent impacts on the others. For example, the function of gold as a safeguard against price increases is notably apparent in the framework of the Indian economy, where gold is not only an economic resource but also a cultural fundamental (Levin & Wright, 2006; Kolluri, 1981).

The Granger causality examination additionally elucidates the directional impacts among these variables. Discoveries such as the consequential influence of gold prices on trade imbalances indicate the possibility of gold as a prognostic factor for specific economic indicators. This facet is pivotal for policymakers and investors, as it furnishes a foundation for well-informed decision-making in the milieu of fiscal policy, investment tactics, and economic blueprinting (Sherman, 1983; Moore, 1990).

B. Cultural and Socio-economic Dimensions of Gold in India

Our investigation additionally explores the socio-cultural facets of gold in India, acknowledging its function beyond a mere investment instrument. The historical and cultural importance of gold, profoundly ingrained in customs and everyday rituals, plays a crucial role in shaping its demand dynamics (Mehta, 2018; Kapoor, 2021). This cultural ingraining, combined with socio-economic aspects like rural earnings and farming efficiency, emphasises the diverse character of gold's function in the Indian economy. The influence of monsoon patterns on farming revenue and, consequently, on the desire for gold, emphasises the interdependence of ecological, financial, and societal aspects (Nair, 2022; Agarwal & Singh, 2019).

C. The Global Economic Context and its Influence on the Indian Gold Market

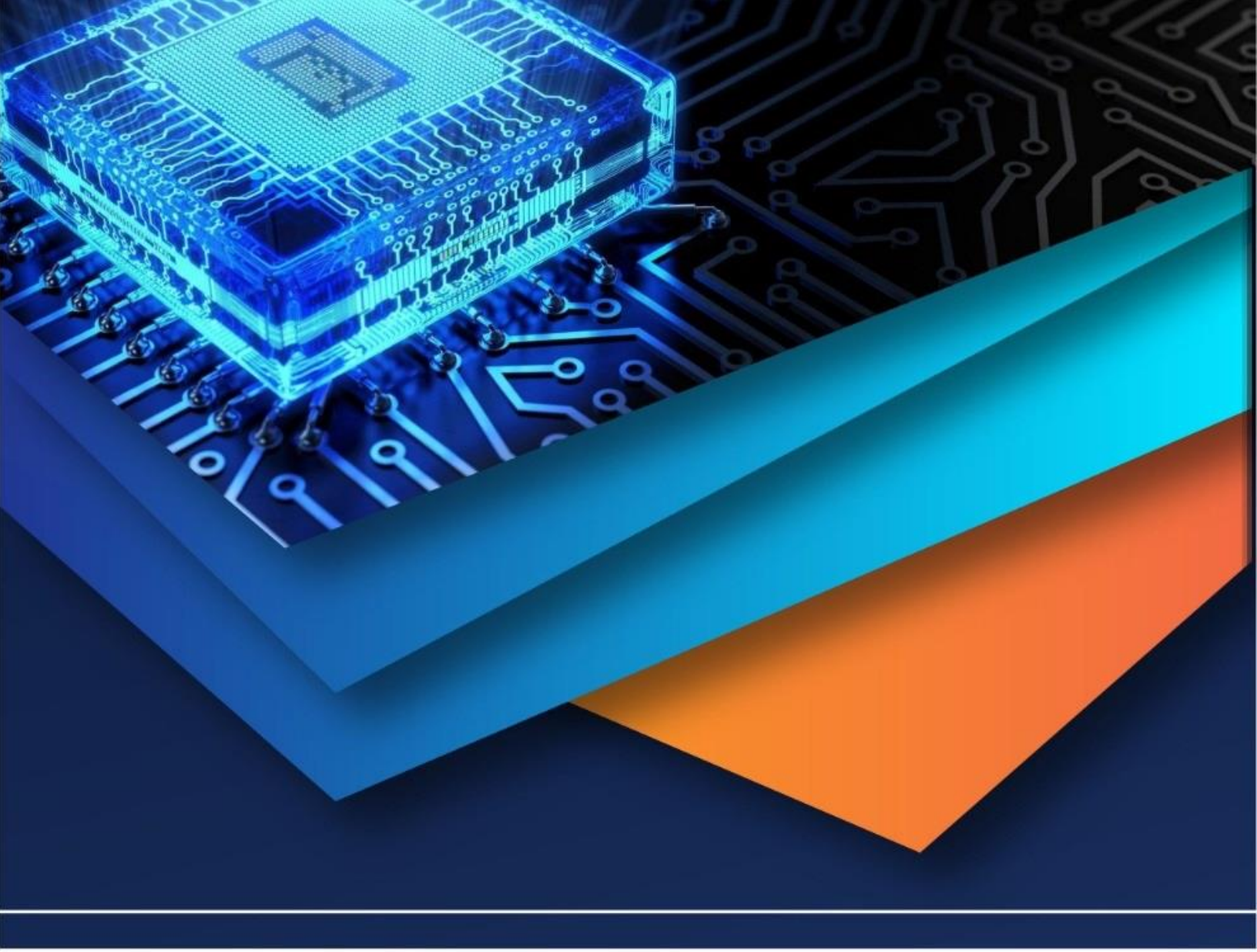
The research's discoveries additionally illuminate how worldwide economic patterns, for example, variations in unrefined petroleum costs and changes in currency exchange rates, impact the Indian gold market. The emancipation of the Indian economy and its escalating amalgamation with global markets have heightened these impacts, rendering the gold market more vulnerable to international economic occurrences (Khan, 2018; Lee & Chaudhary, 2021). Grasping these worldwide dynamics is crucial for apprehending the intricacies of the gold market in India and for foreseeing forthcoming patterns.

D. Future Research and Policy Recommendations

In summary, this investigation not just offers an intricate examination of the correlation between gold costs and inflation in India but also underscores the necessity for forthcoming research that delves deeper into the intricacies of this correlation. Decision-makers and monetary establishments could gain from these perspectives, notably in devising approaches that take into account both the fiscal and societal aspects of gold. Furthermore, a more profound investigation into the influence of emerging worldwide economic situations on the Indian gold market could offer a more all-encompassing comprehension, assisting in the formulation of resilient economic policies and investment approaches.

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