



Post-Covid Dynamics: An Empirical Analysis of Correlation Between Gold Prices and Indian Stock Market Indices

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Abstract

The COVID-19 pandemic has greatly influenced international commerce, including the stock market in India as well as commodity markets such as gold. Although gold has always been considered a safe-haven option during uncertain times, investors have faced both advantages and challenges with gold during the Covid period.

In this paper, we study the interaction between the price of gold and the performance of benchmark indices in the Indian stock market post COVID-19 using empirical methods. Econometric tools such as ADF for testing stationarity, correlation, and Granger causality tests are employed on time series data from 2020 to 2024 for analyzing the relationship between gold and the key index Nifty 50.

The results show a complicated relationship between gold prices and Nifty 50 returns post COVID-19. Gold price relations with stock indices have clearly changed due to government actions, inflationary trends, and changes in investors' psychology, while gold continues to be a safe-haven asset during periods of uncertainty in the market. The study also obtains additional information regarding how such macroeconomic variables as interest rates, inflation, and world commodity prices can affect this situation.

This study adds to the body of literature available relating to the reactions of financial markets during international crises while providing empirical evidence related to India specifically. This also helps investors and legislators and financial analysts overcome the complexities of the finance field after the COVID pandemic crisis.

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Introduction

The outbreak of COVID-19 led to severe disruptions to the world economy and very high volatility in the financial markets. Because there was increased uncertainty, investors had to alter their investment strategies and allocate their assets differently. The markets for gold and stocks were the two most important financial markets that went through sharp changes in their parameters, which had a significant influence on risk management and investment practices. The impact of gold prices on stock prices has been in the interest of economists, politicians, and market analysts for a long time.

Gold has always been regarded as a safe asset that protects one against inflation, devaluation of currencies, and economic uncertainties (Baur & Lucey, 2010)^[4]. The stock market, on the other hand, is often viewed as a reflection of macroeconomic conditions and corporations' profitability. The pandemic raised several questions about the relationship between the movements of gold prices and stock indices (Mahajan & Mahajan, 2021a)^[14].

India offers a compelling case for examining the post-pandemic association between these assets because it is one of the biggest consumers of gold and has a strong equity market. In the past, gold and stocks have shown an inverse association; investors typically gravitate to gold as a risk-averse strategy during stock market downturns. Asset price dynamics were impacted by the

COVID-19 pandemic, which brought about several new aspects of market behavior, including supply chain disruptions, fiscal stimulus measures, and previously unheard-of monetary policies (Yousef & Shehadeh, 2020)^[24].

During the pandemic, there was a great deal of volatility in the Indian stock market, which is represented by important indices like the Sensex and the Nifty 50. Stock prices fell precipitously because of early lockdowns and economic recession, but a quick recovery was made possible by later monetary and fiscal measures. Due to its perceived reputation as a safe-haven asset during global economic upheaval, gold prices simultaneously shot up to all-time highs (Kumaraswamy *et al.*, 2023)^[13]. Market dynamics changed after the pandemic as economies started to recover and interest rates were changed (Joseph, 2023)^[10]. This called for a closer examination to determine whether the conventional inverse relationship between gold and stocks still exists or if new trends have formed.

Considering the significance of gold in terms of Indian families and investment strategies and with the swift rise of the Indian stock exchange, empirical studies can provide some insight on methods of diversification, risk reduction, and portfolio management. Considering financial systems becoming more integrated and globalized, it is crucial that investors, officers, and analysts get a grasp on market behavior after global shocks, including pandemics. Determining whether gold remains a hedge against stock market downturns or whether its correlation with equities has changed can aid in the development of effective investment and policy strategies. (Kumaraswamy *et al.*, 2023)^[13].

Important financial theories pertaining to market efficiency, risk management, and asset correlation are expanded upon in this paper. Among the prominent theories are:

A key idea in contemporary portfolio management is Harry Markowitz's Market Portfolio Theory, (Modern Portfolio Theory, 2023)^[18] which was first presented in 1952. It places a strong emphasis on diversification to choose the best combination of assets to optimize returns for a given degree of risk. Investors should build portfolios that are located on the efficient frontier, where no other portfolio gives higher returns for the same risk, according to the theory. Assuming that investors are risk averse, it balances expected returns and volatility via mean-variance optimization. According to the extension of capital market theory, the market portfolio consists of all investable assets that are weighted according to their market valuations.

According to the Safe Haven Hypothesis, some assets—like gold, US Treasury bonds, etc. — serve as havens for investors when the market is volatile or unstable. Safe-haven investments offer protection particularly during periods of severe market distress, such as stock market crashes, economic crises, or geopolitical wars, in contrast to standard hedging assets, which continuously counter risk. When riskier investments lose value, investors move their money into these assets to protect their wealth and reduce losses. Depending on the market and time, a safe-haven asset's efficacy can change.

The 1970 Efficient Market Hypothesis (EMH), proposed by Eugene Fama, asserts the notion that financial markets are "informationally efficient." This condition influences the ability to make investment decisions, as new information quickly transforms asset prices. Following the event of the COVID crisis, financial markets seem to have been

experiencing completely different phenomena than those which would be expected regarding EMH. Certain anomalies arising in post-COVID markets, such as extreme volatility, excessive optimism associated with various assets (i.e. meme stocks and cryptocurrencies), and delayed prices adjustments pose severe challenges for EMH. In a situation where markets are efficient, one would believe that the entire information regarding the pandemic would be quickly disseminated and the respective market prices would reflect it instantly without undergoing any fluctuations. Therefore, analyzing the post-COVID price movements could reveal whether the EMH works as it should or markets suffer from inefficiencies created by dissatisfaction from investors and irrational market actions that lead to the misallocation of resources in financial markets.

This study's main goal is to objectively examine the dynamics of the link between gold and the main Indian stock indexes (Nifty 50) following the pandemic. This study will add to the body of literature by using statistical and econometric techniques like ADF, Granger Causality test and Johansen test to offer new perspectives on asset class behavior in a financial environment following a crisis. The results will add to the body of knowledge and provide useful guidance for investors and decision-makers negotiating the post-COVID financial environment.

This paper's remaining portion is organized as follows. The research context for this study is provided by the literature evaluation of the gold market in India and its comparative significance in the Indian stock market in Section 2. The section that follows comprises the study technique, including sections on the description of the data, the preliminary diagnosis, and the empirical model used. The empirical results are presented in Section 4. Lastly, Section 5 wraps up the study by discussing its future scope as well as its social and practical ramifications.

Literature Review

The connection between gold prices and stock indices has been the subject of numerous research. (Khan, 2024)^[12] in their research by using data from various market indices, oil and gold and applying Time-Varying Parameter Vector Autoregression (TVP-VAR) model, concluded that the dynamics of volatility further reveal a time-varying behavior, as evidenced by the magnitude and direction of risk transmission among different asset classes during the pandemic and investor should consider adjusting their investments by incorporating oil and gold.

Research conducted by (Kalaivani Elangovan *et al.*, 2023)^[11], in their paper (An Empirical Analysis on Indian Gold Trade Due to The Impacts of COVID-19 and Demonetization, 2023)^[2] have used ADF, Granger Causality Test and using various macro-economic variables along with gold have found that the special case in this study on demonetization has boosted the gold investment and lead to heavy demand of gold in Indian market during post crisis period. (Thangaraj, n.d.-a) in his paper using ADF, regression and correlation and taking data on gold and nifty 50 index have concluded that the results of econometric regression suggest that the Indian stock market indicator, the NSE-Nifty 50 index, was significantly impacted by gold prices. The findings of the correlation test show that rising gold rates caused the NSE Nifty 50 index to rise, and rising gold rates caused the NSE Nifty 50 index to climb. It displays the interdependency between the Nifty 50 index and gold.

(Mahajan & Mahajan, 2021b) ^[15] investigated the impact exerted by lockdown due to COVID-19 on gold and stock market return using Augmented Dickey-Fuller (ADF) Test, Correlation test, GARCH (1,1) model, and Bi-variate Granger causality test by taking daily data from January 2020 and May 2020. The research inexorably recommends that the gold price covers some noteworthy evidence to estimate Nifty return. Outcomes based on GARCH and E-GARCH models show a substantial negative influence of gold on nifty yields throughout the sample period.

Gold has historically been considered a hedge against inflation and a safe-haven asset during financial distress (Baur & Lucey, 2010) ^[4]. During market downturns, investors often shift their portfolios from risky equities to gold, believing in its ability to preserve value. Baur and McDermott (2010) ^[4] extended this view by identifying gold as a “strong safe haven” for the US and major European stock markets, particularly during periods of extreme negative market returns.

However, the nature of this relationship has been shown to vary across markets and over time. (Hood & Malik, 2013) ^[8] argued that gold’s safe-haven property is more pronounced during short-term shocks but may not be reliable in the long term. In the Indian context, (F. Dicle & D. Levendis, 2017) ^[6] found that gold acted as a consistent hedge against inflation and stock market volatility, reinforcing its role in traditional Indian investment portfolios.

Before the onset of the COVID-19 pandemic, several empirical research aimed at determining the relationship between the gold prices and the Indian Stock market indices, like Nifty 50 and Sensex. (Ghorbani *et al.* 2011) ^[7] noted that this relationship was mostly negative during market upheavals which indicates that gold was a haven for timid investors. However, the intensity of this relationship was influenced by other macroeconomic factors such as inflation, rate of exchange, and even international political relations (BM & BV, 2024) ^[5].

According to (Jain & Biswal, 2016) ^[9], India’s gold prices and stock market exhibited a weak inverse correlation as per their correlation regression analysis. The authors supported their claims by concluding that gold and stocks did not move in unison, which indicates that the assets could be utilized for effective portfolio diversification. Similarly, Jain and Biswal (2016) ^[9] found a time-varying and asymmetric relationship, asserting that during high volatility periods, gold prices and stock indices diverged significantly.

COVID-19 brought about the most significant upheaval in the financial sector internationally in early 2020. The Indian equity market suffered a significant downturn in March 2020 owing to uncertainty and panic selling. At the same time, since gold is considered a safe asset, its price rose. According to the World Gold Council (2021), during the first wave of the pandemic, there was an increase in demand for gold due to the inflow of funds into gold ETFs and an increase in retail interest in gold.

After the market started to recover post COVID, the association between gold and Indian stock indexes started exhibiting new patterns. Some studies highlighted that even when the negative association continued to exist, it was not as powerful or steady anymore, unlike the first stages of the pandemic. (Thangaraj, n.d.- b) performed a wavelet coherence analysis and identified that gold price movement has undergone time and frequency changes, meaning the

gold-Nifty 50 link proved to be a dynamic and non-linear one after COVID.

additional empirical observations from (Mukherjee & Bardhan, 2024) ^[19] indicated that the interdependence of the commodity and equity markets has significantly gotten increased in post-pandemic India to some extent due to a rise in institutional investor participation and increase in retail investor awareness. The researchers also observed that gold’s traditional role as a hedge is possibly fading away in a low-interest-rate context in which equities continue to attract a huge amount of capital.

Another important contribution comes from (Maharana *et al.*, 2024) ^[16], who applied GARCH models to measure volatility spillovers between gold and stock prices in India during the COVID and post-COVID periods. Their results indicated a bidirectional spillover effect which means that shocks in one market affected the other and was a shift from pre-COVID unidirectional models.

Recent research has employed sophisticated econometric and machine learning methods to model the changing and nonlinear dynamics of the relationship between gold and equities more accurately. (Risse, 2017) ^[20] The time-frequency characteristics and dependence relations between the markets have been frequently studied using wavelet coherence DCC-GARCH models, copula models, or other similar approaches.

In the Indian context, studies like that of (Sopipan *et al.*, 2012) ^[21] used Markov regime switching regression models to study shifting strategies in the gold-stock relationship after post COVID. It was observed that the shift from high volatility regime to low volatility regime significantly altered the correlation between the two assets both in strength and direction.

The changing relation of gold with the stock market carries important lessons for investors, decision makers, and portfolio managers. According to (Aggarwal, 2024) ^[1], portfolio diversification strategies must be recalibrated periodically, particularly during post-crisis recovery phases. For Indian investors, maintaining a dynamic allocation strategy between gold and equities can help balance risk and return.

In addition to this, the monetary strategy pursued by RBI during and post-COVID-19, which encompassed liquidity provisions to the financial system and reduction in interest rates, affected both the gold and equity markets via influencing their relationship. Papers like (Mathew, 2022) ^[17] underline the importance of consistency in policymaking so as not to diminish confidence in the capital markets and destabilize investor behavior.

Despite any progress in this research area, there is still a need to close some knowledge gaps. The majority of papers conduct research on short and mid-term horizons and do not pay attention to structural changes in investing behavior plus measures taken by regulators. Besides, the role of digital gold and a growing role of algorithm trading are to be considered as well.

The post-COVID period has marked the starting point for the complications and developments in the relations between gold prices and Indian stock market indices. Though gold remains a refuge asset with the emergence of market volatility, the sensitivity of the correlation and the type of relationship between the gold price movement and stock indices is changing over time and depending on the market

situation. As investors become more evolved and the market adjusted to the new realities of modern economic fundamentals, the instruments used for analyzing and capitalizing on the relationship of gold and stock prices must be adapted accordingly.

Research Methodology

Data Description

Examining experimentally the relationship between gold prices and Indian stock market indices in the post-COVID era is the main goal of this study. It evaluates the evolution of the gold- equity market relationship during the COVID-19 epidemic. Additionally, it establishes the causal relationship between the two indices.

The dataset focusing on the relationship between gold and Indian stock market (Nifty 50) was taken from April 1, 2020, to January 31, 2025, on daily basis. It includes two main variables: spot prices of Gold which signifies the present price at which gold can be bought or sold for instantaneous transfer and the Nifty 50 Opening Price, representing the daily opening value of India's leading stock market index. The data is sourced from www.invesing.com for spot prices of Gold and the National Stock Exchange (NSE) for Nifty 50 closing prices, ensuring accuracy and reliability.

Methodology

The research instrument was an online questionnaire divided The association among gold prices and stock market indices has been the subject of much discussion, but little actual data

has been found regarding how this association has changed since the COVID-19 pandemic, especially in the Indian context. The conventional dynamics between the gold and equity markets may have been drastically changed by the pandemic's effects on the economy, investor behavior, and monetary policy. Few studies have explicitly looked at gold's role in India's stock market recovery after COVID. By examining the post- COVID connection patterns between gold prices and major Indian stock indexes, this study seeks to close these gaps and provide new understandings of market interdependencies in a changing economic environment.

The study utilizes Augmented Dickey Fuller Test (ADF) to test whether the series is stationary or not on the chosen time series of variables for said period. Johansen's Co-integration test is employed to check their inter-connectedness for long period of time. At last, Granger causality test is employed to check whether GOLD1 impacts NIFTY1 and NIFTY1 impacts GOLD1 or not. Here, GOLD1 represents spot prices of gold at first difference and NIFTY1 represents opening prices of Nifty 50 at first difference.

Econometric Modelling

The hypothesis below was formed to fulfil the objective and to find whether variables granger causes each other or vice versa. In Table 1, the hypothesis formed are drafted. Furthermore, taking references from other scholarly literature, applied model for this paper is mentioned is described in Table 2.

Table 1: Hypothesis for Direction of Causality Test

H ₀₁	GOLD1 does not Induce NIFTY1 in Granger sense.
H ₁₁	GOLD1 Induce NIFTY1 in Granger sense.
H ₀₂	NIFTY1 does not induce GOLD1 in Granger sense.
H ₁₂	NIFTY1 Induce GOLD1 in Granger sense.

Equation 1

To check whether GOLD1 granger causes NIFTY1.
 $GOLD1 = f(NIFTY1)$ (1)

Equation 2

To check whether NIFTY1 granger causes GOLD1.
 $NIFTY1 = f(GOLD1)$ (2)

Table 2: Research Models

Direction of Causality	Models
$GOLD1 \rightarrow NIFTY1$	$GOLD_t = \sum_{i=1}^n \alpha_i NIFTY_{t-1} + \mu_t$
$NIFTY1 \rightarrow GOLD1$	$NIFTY1_t = \sum_{i=1}^n \alpha_i GOLD_{t-1} + \mu_t$

Research Findings

The investigation is alienated into two broad sections. First section comprises descriptive analysis and correlation tests. Second section comprises of time series analysis consisting of the results of ADF, Granger Causality test and Johansen's Cointegration test.

Descriptive Statistics

The descriptive statistics (Table 1) highlight key features of spot prices of gold (GOLD1) and NIFTY 50 opening prices (NIFTY1) over 1197 trading days.

Table 3: Descriptive Statistics of Spot Prices of Gold and NIFTY 50 Closing Prices

Statistics	GOLD	NIFTY
Mean	156656.2	17779.54
Median	144557	17656.35
Maximum	241991	26216.05
Minimum	118851	8083.8
Std. Dev.	28713.62	4067.815
Skewness	1.27771	-0.09083
Kurtosis	3.598956	2.571832
Jarque-Bera	343.585	10.78934
Probability	0	0.004541
Sum	188000000	21282112
Sum Sq. Dev.	986000000000	19800000000
Observations	1197	1197

The descriptive statistics reveal key insights into the behavior of gold prices and the NIFTY 50 index during the post-COVID period. Gold prices ranged from ₹118,851 to ₹241,991, while NIFTY moved between 8,083.80 and 26,216.05, reflecting significant volatility in both markets. The standard deviation for gold (₹28,713.62) and NIFTY (4,067.82) confirm high variability, likely driven by global uncertainty and investor sentiment. Gold exhibited positive skewness (1.2777), indicating frequent small declines with occasional sharp rises, whereas NIFTY showed slight negative skew (-0.0908), suggesting rare but notable drops. Both distributions failed the Jarque-Bera normality test, with p-values below 0.01, indicating non-normality. For gold, this was influenced by skewness and kurtosis, while NIFTY

showed less deviation but still did not follow a normal distribution. These characteristics highlight the need for advanced econometric modelling to show the true dynamics between gold and stock indices in the post-pandemic era.

Augmented Dickey Fuller Test

The NIFTY 50 index and gold price series were examined for their stationarity properties using the Augmented Dickey-Fuller (ADF) Test. As defined in the literature, a time series is stationary if its statistical properties such as mean and variance remain constant over time. In the context of cointegration, vector autoregression models, and more broadly time series econometrics, stationarity is one of the primary requirements.

Table 4: ADF results of variables to check the stationarity

Variable	Null Hypothesis	ADF Test Statistic
NIFTY	NIFTY has a unit root	-1.950383
D(NIFTY)	D(NIFTY) has a unit root	-35.28799
GOLD	GOLD has a unit root	1.110968
D(GOLD)	D(GOLD) has a unit root	-35.58689

p- Value	5% Critical Value	Conclusion
0.3092	-2.863748	Non-stationary
0	-2.86375	Stationary
0.9976	-2.863748	Non-stationary
0	-2.86375	Stationary

Note: The Schwarz Information Criterion (SIC) was used to automatically choose the lag length, and the test included a constant term as an exogenous variable.

With both series, the ADF test was performed using the level and differenced forms of the data. For each time series, the null hypothesis assumed the presence of a unit root in the series which indicates that the series is non-stationary. The lag length was set to be optimal based on the Schwarz Information Criterion (SIC) while a constant was treated as an exogenous variable added into the model under consideration.

The ADF test results suggest that the gold price series is non-stationary in its level form because the test statistics (1.1109) surpasses all critical values and the p-value (0.9976) is excessively large relative to 0.05, thereby failing the hypothesis test of a unit root. This implies that the series possesses time-varying mean and variance which makes it incompatible with time series models assuming stationarity. However, after applying first differencing, the ADF test statistic improves significantly to -35.5869 and p-value of 0.0000 making it possible to reject the null hypothesis and thus conclude that the differenced series is stationary. Such transformation makes the gold price series suitable for

advanced analysis like forecasting and regression modelling. The Augmented Dickey-Fuller (ADF) test results for the NIFTY index suggest that the level form of the series is non-stationary, as the test statistic (-1.950383) is greater than the 1%, 5%, and 10% critical values and the p-value (0.3092) is not below the 0.05 significance level leading to a failure to reject the hypothesis. However, at the first difference, the ADF test statistic (-35.28799) is highly negative, and the p-value is 0.0000, providing strong evidence to reject the null hypothesis. This confirms that the first-differenced NIFTY series is stationary and suitable for time series analysis. Since both Nifty 50 and gold prices are found to be I (1) (as seen in earlier tests), it sets the stage for testing cointegration between the two variables. This will help determine whether there is a long-term equilibrium between gold prices and stock market indices.

Johansen's Cointegration Test

The Johansen Cointegration Test was conducted to examine the long-term equilibrium association between the gold price

series (GOLD1) and the NIFTY 50 index (NIFTY1). The test includes a linear deterministic trend and employs first-

differenced data with a lag interval of 1 to 1, selected automatically.

Table 5: Johansen's Cointegration Test Results

Variables	Hypotheses	Eigen Value
GOLD1, NIFTY1	$H_0: r = 0$	0.365506
GOLD1, NIFTY1	$H_0: r \leq 1$	0.337941

Trace Statistics	Critical Value (5% Significance Level)	Prob.	R = 0 Accept / R = 1 Reject
1035.588	15.49471	1.0000	R = 0 Reject
492.4055	3.841466	0.0000	R = 1 Reject

Note: $p < 0.05$ means rejection of null hypothesis at 0.05 level.

The Trace and Maximum Eigenvalue statistics powerfully reject the null hypotheses of no cointegration and at most one cointegrating equation at the 5% significance level. Particularly, the trace statistics of 1035.588 and 492.4055 alongside the maximum eigenvalues of 543.1829 and 492.4055 exceed the critical value benchmarks by significant margins. Supporting evidence is produced, as the p values remain well below the 0.05 mark, reinforcing the claims of two cointegrating vectors existing, signifying that although both gold and the NIFTY index are individually non-stationary, they possess a stable long-term relationship and association with one another. This is crucial in understanding that the two markets are bound by a shared stochastic trend and therefore are able to adjust in sync over a duration of time.

Moreover, the long-term association indicates a negative correlation between the price of gold and the NIFTY 50 index as proposed by the normalized cointegrating coefficients. Furthermore, the cointegration equation seems to suggest that rising values of gold are assumed to correlate with rising values of the NIFTY index which highlights a possible diversification or hedge strategy. With that said, the adjustment coefficients indicate that gold prices exploit the

equilibrium restoration mechanism more vigorously when deviating from the relationship, illustrated by a high negative alpha value for $D(\text{GOLD1})$. The opposite trend can be noticed with the NIFTY index, who adjusts at a slower rate. This creates a backbone for the statement that gold functions as an anomaly in the system that corrects disequilibrium.

Pairwise Granger Causality Test

To examine the short-run predictive relationships of gold prices (GOLD1) and the NIFTY 50 index (NIFTY1), a Pairwise Granger Causality Test was conducted for both time series with a lag length of two. The objectives of the test were to evaluate if the historical values of one variable could forecast the other in a statistical sense. The results indicated that NIFTY1 does not Granger-cause GOLD1 as evidenced by an F-statistic of 0.04309 and a p -value of 0.9578. In the same manner, the null hypothesis stating that GOLD1 does not Granger-cause NIFTY1 was also not rejected with an F-statistic of 0.6772 and p -value of 0.5082. In both cases, p -values over the 5% significance threshold there is a lack of a causal relationship between the two financial variables in the short run.

Table 6: Pairwise Granger Causality Test Results

Null Hypothesis	F-Statistic	p-Value	Decision (at 5%)
NIFTY1 does not Granger Cause GOLD1	0.04309	0.9578	Fail to Reject Null Hypothesis
GOLD1 does not Granger Cause NIFTY1	0.6772	0.5082	Fail to Reject Null Hypothesis

Note: $p < 0.05$ means rejection of the null hypothesis at a 0.05 level

These findings indicate the absence of short-term predictability between the gold and stock markets in India during the post-COVID period. Despite the existence of a long-run cointegrating relationship confirmed by the Johansen Cointegration Test, the short-run movements in one market do not significantly influence or forecast the other.

Conclusion

This study investigates the post-COVID relationship between gold prices and the NIFTY 50 index using robust econometric techniques. The analysis confirms that both time series are non-stationary at levels but become stationary after first differencing, justifying the use of cointegration techniques. The Johansen Cointegration Test reveals the presence of a long-term equilibrium relationship between the two variables, suggesting that despite short-term volatility, gold and equities tend to move in tandem over time. As expected, the normalized cointegration equation depicts a counterintuitive relationship as increased stock market performance goes hand in hand with the reduction in gold prices. This solidifies the age-old perception of gold being a

safe haven in times of market turmoil. Yet, the Pairwise Granger Causality Test reveals an absence of meaningful causal relationship in both directions within a short-term window. This suggests that while gold and NIFTY 50 may co-move over an extended timeframe, they do not influence each other's prices in the short term.

Moreover, the combination of long-term cointegration with short-term independence shows growing synergy between time frames, thus facilitating a new approach for thinking about how assets interact with each other. Both investors and decision-makers will benefit from the findings. Gold is still the key asset of diversification against equity in a medium- and long-term perspective, particularly during periods of heightened volatility. Policies should make gold more affordable for investors in terms of building diversification mechanisms. National risk management concepts could be further improved with the inclusion of gold into those by decision-making and financial institutions. Information improvements about gold trading might lead to better mistrust management. Depending on the situation, strategic gold reserves could be used as stabilizing instruments while

restrictions on speculative activities could help to reduce market shocks.

Distinguishing features of different regions should prevail when applying this analysis to stock exchange markets. In addition, the process may be greatly enriched by including factors like inflation or interest rate or currency rate. It also needs to be added that high-frequency or intraday data can uncover volatility patterns that may be of interest to traders. Furthermore, exploring structural breaks due to economic crises using techniques like the Bai-Perron test can help identify regime shifts. Expanding diversification research to include commodities like oil, silver, or cryptocurrencies could further inform optimal asset allocation strategies.

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