

IMPACT OF DOMESTIC GOLD PRICES ON INDIAN STOCK MARKET INDICES WITH SPECIAL REFERENCE TO GLOBAL FINANCIAL CRISIS - AN EMPIRICAL STUDY

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ABSTRACT

The study investigates the impact of domestic gold price on Indian stock market indices during the Pre and Post Global financial crisis era for the period from April 1999 to March 2013 using appropriate descriptive statistics and econometric analysis such as Augmented Dickey Fuller Unit Root Test and Linear Regression model. The domestic gold price in India is perpetually escalating in corollary of its passionate domestic demand on account of liquidity, protection and spreader portfolio. Indian households vacillate to consider the capital market as a viable asset class for parking their savings. When the stock market dishevels or when the dollar aggravates, gold protracts to act as a safe haven investment. Households persistently and predominantly invest in their quintessential favorite "Gold", which has the character of splendid at trouncing inflation. Rupee depreciation has caused gold prices in India to ascend appreciably and to hit high record. The study is based on secondary data obtained from World Gold Council database and NSE database. ADF Unit root test indicates that the selected time series are stationary at 1st difference. Linear Regression Methodology was employed to examine the impact of Domestic gold price on Indian Stock market indices during pre and post Global financial crisis era. More explicitly, the study concludes that the Global financial crisis has refocused investors' attention to safe haven assets such as gold and the equity markets have experienced hectic inconsistency. Domestic gold price continues to rule high. Gold effortlessly crushes most other investment options especially in equities in the aftermath Global Financial crisis.

Keywords : Gold Prices, Financial Crisis, Indian Stock Market, ADF Unit Root Test, Stock Market Indices

PRELUDE

"What motivates most gold purchasers is their belief that the ranks of the fearful will grow. During the past decade that belief has proved correct. Beyond that, the rising price has on its own generated additional buying enthusiasm, attracting purchasers who see the rise as validating an investment thesis. As 'bandwagon' investors join any party, they create their own truth - for a while."
Warren Buffet

INTRODUCTION

An undersized conflagration in the US housing finance market in 2007 enlarges and becomes forest fire that initially engulfed the US, then the Western Countries and ultimately the rest of the world. The Financial crisis was associated with the hasty and vulnerable lending practices resulting from the deregulation and securitization of real estate mortgages. A more broad-based credit boom fed a global speculative bubble in real estate and equities, which served to reinforce the risky lending practices. The intense and protracted crisis in global

financial markets, the tremendous level of risk aversion, the swelling of losses suffered by banks and financial institutions, adverse hike in the level of commodity prices and their consequent collapse, and the prickly correction in a range of asset prices, all collectively, had abruptly led to a sharp slowdown in the growth impetus of the major advanced economies, especially since the Lehman Failure. The entire financial system was in cardiac arrest, the alarm set up and the crisis spread with astounding pace, shaking the confidence of investors, and disrupting the lending practices of the banks. No

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sooner than the dual devils, recession and inflation raised their ugly heads in late 2007 did gold began to sparkle as a safe harbor for investors. While the world was on a roll on the economic crisis, India was not only struggling with phantom inflation, but also with the sluggish Indian economy. The wobbly financial situation was made more complex with the sharp hike in oil and food prices.

Indian Households persistently and predominantly invest in their quintessential favorite "Gold", which has the character of splendid at trouncing inflation. Rupee depreciation has caused gold prices in India to ascend appreciably and to hit high record. Gold serves as a capital preserver during the times of a market hassle as it tends to deliver a sound performance when other asset classes languish. With current prospects for domestic equity returns uncertain, Indian households vacillate to consider the capital market as a viable asset class for parking their savings.

REVIEW OF LITERATURE

Amalendu Bhunia and Somnath Mukhuti (2013) focus that the domestic gold price in India is eternally escalating in consequence of its intense domestic demand on account of protection, liquidity along with efficient portfolio diversification. The underlying principle behind the retail investors not entering the equity markets is, high returns which they obtain from the alternative asset class, viz., gold. Moreover, there is high volatility in the equity markets. When the stock market crashes or when the dollar exacerbates, gold prolongs to be a safe haven investment

Dirk Baur and Brain Lucey (2009) examine the hedging/haven behavior of gold for stocks and bonds during normal market conditions and during extreme market events. Using daily MSCI stock and long -term bond indexes and daily spot gold prices from the end of Novemeber 1995 through November 2005 (ten years), they conclude that, the long-run correlation of returns for US stocks and gold is reasonably negative, while the correlation of returns for US bonds and gold is slightly positive suggesting that gold acts as a hedge/safe haven against stocks but not for bonds. They also conclude that the results are not clearly consistent across sub samples, which means the stocks-bonds-gold relationship may vary with market conditions.

Dirk Baur and Thomas Mc Dermott (2009)

investigate whether gold represents a safe haven with respects to stocks of major and developing countries investigating the correlations between gold returns and stock market returns in 13 countries over the past three decades. Using daily, weekly and monthly return data for the stock markets of the seven largest developed countries (G7), the largest emerging markets (BRIC), Australia and Switzerland and spot gold prices from the beginning of March 2009, they conclude that gold is generally a hedge and safe haven for stocks in developed markets, but not in emerging markets.

Natalie Dempster and Juan Carlos (2009) after studying the inter-relationship between four asset classes namely Gold (represented by closing gold rate in New York), Commodities (represented by S&P, GSCI), Real estate (represented by BBREITs) and Treasury Bills (TIPS) conclude that gold proved more effective than the other three assets at achieving both the maximum risk- reward portfolio and minimum-variance portfolio by using a portfolio optimizer. They also found that gold brings additional diversification to the portfolio comprising of the above three assets.

Prakash, A. (2007) points out that "India looks poised to remain the world's leading gold consumer for many years to come. Its vibrant increase in the population and powerful cultural and religious affinity to gold will continue to underpin structural demand."For generations, Indians have an opinion that one's significance is either measured by the amount of gold or the amount of land he owns. Every household in India owns gold. It's a customary form of investment.

David Hiller, Paul Draper, and Robert Faff (2006) investigate the investment role of precious metals in financial markets by analyzing the daily data for gold, platinum and silver from 1976 to 2004. The authors point out all three precious metals have low correlations with stock index returns and suggest that these metals may provide diversification within broad investment portfolios. Besides the data disclosed that three precious metals have some hedging capability, particularly during periods of "abnormal" stock market volatility.

Geoffrey H Moore (1990) emphasizes that many individuals invest in gold as a hedge against inflation, as gold prices are directly related to general price level. For this purpose, the author uses a set of signals based on the leading index of inflation and

examined their relation with New York Gold prices for a period of 1970 to 1988. The author employs six month smoothed growth rate, based on the ratio of the current month's leading index to the average level of index during the proceeding twelve months. The result indicates that the investor buy gold when the up signal flashed and switched from gold to a diversified stock portfolio, when the downswing signal appears. Finally, the author concludes that investors earn profit from the gain in gold prices during the signaled upswings and from the gain in bond prices (plus interest) or stock prices (plus dividends) during the signaled downswings.

Keynes, J.M. (1913) argued that India "wastes far too high a proportion of her resources in the needless accumulation of the precious metal" claiming that "If a time comes when Indians learn to leave off their unfruitful habits and to divert their hoards into the channels of productive industry and to the enrichment of their fields, they will have the money markets of the world at their mercy"

RESEARCH METHODOLOGY

Statement of Problem

Indian capital market suffers with structural weaknesses as it lacks width and depth. Absence of financial deepening is a key obstacle in developing a nationwide equity investor culture. Indian Stock market is plagued with severe price volatility and suffers from menace of over speculation and excessive price fluctuation. Gold persist to magnetize Indians even if gold prices whoosh to Rs. 50,000 per ten grams in the subsequent few years. Besides, the trashing of market value a matter of months after 2008 Global Financial crisis has driven a generation of investors away from the equity markets.

Objective of the study

This study aims to examine the impact of domestic gold prices on Indian Stock market indices of NSE (S& P CNX NIFTY) in two different economic scenarios (Pre and Post of Global Financial Crisis)

Hypothesis of the Study

Hypothesis 1

H_0 : There is no relationship between domestic gold prices and Indian Stock market indices of NSE (S&P CNX NIFTY) during the pre global financial crisis era

H_1 : There exist the significant relationship between domestic gold prices and Indian Stock market indices of NSE (S&P CNX NIFTY) during the pre Global Financial Crisis era

Hypothesis 2

H_0 : There is no relationship between domestic gold prices and Indian Stock market indices of NSE (S&P CNX NIFTY) after the episode of Global financial Crisis

H_1 : There exist the significant relationship between domestic gold prices and Indian Stock market indices of NSE (S& P CNX NIFTY) after the occurrence of Global Financial Crisis

Sources of Data

The study is based on secondary data acquired from various appropriate data sources such as NSE database, Database of World Gold Council website etc.

Research Design

The study is empirical in nature. We have measured the data encompassing monthly averages of the closing indices of NSE (S&P CNX NIFTY) and monthly averages of Gold prices (Unit per troy ounce) expressed in terms of Indian Rupee. The sample period is for 12 years which extends from April 1999 to March 2013, This period is further subdivided into Pre Global Financial Crisis (April 1999-2000 to March 2005-06) and Post Financial Crisis (April 2006-07 to March 2013). "Stata13" Data Analysis and Statistical Software package program have been used for coordinating the data and the undertaking econometric analysis. The econometric analysis like Augmented Dickey Fuller (ADF) Test, Correlation and Linear Regression Model has been employed.

ECONOMETRIC ANALYSIS

This study empirically determines the impact of domestic gold prices on Indian stock market indices of NSE (S& P CNX NIFTY) in two diverse economic situations (Pre and Post Global Financial Crisis)

Augmented Dickey- Fuller (ADF) test

Augmented Dickey-Fuller (ADF) stationarity test has been employed to monthly average of the closing indices of NSE (S&P CNX NIFTY) and monthly averages of gold prices (Unit per troy

ounce) expressed in terms of Indian rupee. Unit Root Test is used to test whether the time series are stationary or not. A time series is considered as stationary if its mean and variance remains static over a period of time. Its probability distribution remains unchanged as time proceeds. In order to test the unit root problem, the most popularly used tests are Augmented Dickey-Fuller (ADF) test. The general form of ADF Test can be written as mentioned below:

$$\Delta Y_t = \alpha + \beta t + \delta Y_{t-1} + \gamma_i \sum \Delta Y_{t-i} - \xi$$

If $\delta = 0$, then the series is said to have a unit root and is non-stationary. Hence, if the null hypothesis, $\delta = 0$ is rejected for the above equation, it can be concluded that the time series does not have a unit root and is integrated to the order zero (I(0)) i.e. it has stationary properties. The decision rule is that if "t*" is greater than ADF critical value, then, unit root exists, and in which case null hypothesis will be accepted. If "t*" is less than ADF critical value, then unit root does not exist, and in which case null hypothesis will be rejected.

Linear Regression Model

Econometric Linear Regression model is the technique to check the impact of Gold Price on Stock market indices. The Linear Regression Model in its general form is written as

$$Y = \alpha + \beta X_i + \epsilon_i$$

Where $\alpha, \beta, \epsilon_i$ are unknown parameters that must be estimated. $\epsilon_i \in [1, n]$ is the unobserved error term. Y is Dependent Variable, X is Independent Variable, α, β are Regression Coefficients, ϵ_i is Error or Disturbance term. Here in our study we carried out this method to see and interpret the effect of the gold price on Stock market indices.

R-squared is identified as co-efficient of determination which is frequently used to evaluate the model fit of a regression equation. This highlights how good is independent variable (Stock market indices) at predicting the dependent variable (Gold Price)

4 EMPIRICAL RESULTS AND DISCUSSION

4.1 Descriptive Statistics

In this section, the researcher attempts to present the empirical results obtained from Descriptive statistical analysis as well as Econometric

techniques such as Augmented Dickey Fuller Test and Linear Regression Model. Descriptive Statistics exhibited in Table 1 (Appendix) includes the delineation of mean, standard deviation of monthly averages of the closing indices of NSE (S&P CNX NIFTY) and monthly averages of domestic gold prices. It is viewed that mean and standard deviation of both gold price and S&P CNX NIFTY are quite high during both Pre and Post Global Financial crisis period. For normally distributed series the skewness coefficient is zero and Kurtosis is 3. In a Gaussians distribution, the kurtosis coefficient is expected to be 3. Generally, a much higher or lower kurtosis indicates extreme leptokurtic or extreme platykurtic. In this study the highest coefficient of kurtosis observed for NIFTY is 3.828455 at times of post global financial crisis period. It falls under leptokurtic distribution. The lower coefficient of kurtosis is observed in gold Price (1.748455) during post global financial crisis, which indicates that the series is slim and has a long tail. Generally, values for skewness zero and kurtosis value 3 indicate that observed distribution is normally distributed. Thus, skewness and leptokurtic frequency distribution of gold price and NIFTY at times of pre and post financial crisis indicate that the distribution is not normal. In order to check whether the series are stationary or non-stationary, ADF unit root test is applied in which the error term is assumed to be normal.

From April 1999 to May 2007, the domestic gold prices on Indian Stock market indices of NSE (S& P CNX NIFTY) exhibit a strong positive correlation ($r=0.916328$). From June 2007 onwards, the above mentioned twin variables show evidence of decline in the affirmative association ($r= 0.4605$). Correlation statistics point out that gold prices and Nifty are positively correlated during the period of study. Results obtained from Correlation analysis are extremely sturdy, however it does not reveal about their impact in Pre and Post Global financial distress. In order to make out an explicit explanation of the impact of domestic gold prices on NIFTY, it is necessary to execute the Linear Regression model between the selected variables.

Augmented Dickey- Fuller (ADF) test

Table-2 (Appendix) and Table-3 (Appendix) illustrates the results of unit root test. It divulges that the gold price and NSE Stock price indices are stationary at 1st difference. It is obvious from Table-

2 (Appendix) discloses the computed ADF test-statistic for NSE (S&P CNX NIFTY) during the Pre-Global Financial Crisis is 7.711. The relevant critical values are 3.516 at the 1 % significance level, 2.893 at the 5 % significance level and 2.583 at the 10 % significance level respectively. The computed ADF test-statistic for the gold price during Pre- Global Crisis era is 10.185. The relevant critical values 3.516 at the 1 % significance level, 2.893 at the 5 % significance level and 2.58 at the 10 % significance level. Therefore, we can conclude that there exist the significant relationship between domestic gold prices and Indian Stock market indices of NSE (S&P CNX NIFTY) during the pre Global Financial Crisis era and the researcher reject H_0 during the pre - Crisis era. It means that both NSE (S&P CNX NIFTY) and gold Price series doesn't have a unit root problem and Both series are stationary series at 1%, 5% and 10% significant level. The results given in Table-3 (Appendix) reveal that the computed ADF test-statistic for NSE (S&P CNX NIFTY) during Post-Global Financial Crisis is 5.905. The relevant critical values are 3.555 at the 1 % significance level, 2.916 at the 5 % significance level and 2.593 at the 10 % significance level respectively. The computed ADF test-statistic for the gold price during Post Global Financial Crisis era is 8.185. The relevant critical values are 3.555 at the 1 % significance level, 2.916 at the 5 % significance level and 2.593 at the 10 % significance level. Therefore, we can conclude that there exist the significant relationship between domestic gold prices and Indian Stock market indices of NSE (S& P CNX NIFTY) after the occurrence of Global Financial Crisis and the researcher reject H_0 during the post - Crisis era. It means that both NSE (S&P CNX NIFTY) and gold Price series doesn't have a unit root problem and Both series are stationary series at 1%, 5% and 10% significant level

Linear Regression Model

Linear Regression estimates the coefficients of the linear equation, involving one or more independent variables, that best predict the value of the dependent variable. The researcher employs Linear Regression model to study the impact of Domestic gold Prices on Stock market indices NSE (S&P CNX NIFTY) during Pre and Post Global Financial Crisis. In the present study the model becomes

$$dy = \beta_0 + \beta_1 dx$$

The estimated form of the above model is given by:

Pre Global Financial crisis
 $dy = 24.98317 + .0505798dx$
 Std Error = (11.83562) (.0141059)
 t-statistic = 2.11 3.59
 R squared = 0.1192
 F- statistic = 12.86
 and
 Post Global Financial crisis
 $dy = 49.05006 - .0304277dx$
 Std Error = (38.01408) (.0154487)
 t-statistic = 1.29 -1.97
 R squared = 0.0547
 F- statistic = 3.88

The table-4 (Appendix) highlights about the linear regression test for Domestic gold price and NSE (S&P CNX NIFTY). Rsquared shows the model fitness of a regression equation for Domestic gold Prices and NSE (S&P CNX NIFTY) at times before Global Financial crisis (April 1999 to May 2007) and aftermath Global Financial crisis (June 2007 to March 2013). The predictability of the linear regression can be measured by R- squared and adjusted R- squared. During the times of pre global financial crisis, the regression model is statistically significant, $F(1, 95) = 12.48$, $p = .0005$. This indicates that, overall, the model applied can statistically significant to predict the dependent variable. R squared was 0.1192 and the adjusted R squared being 0.1099 which means that NIFTY explains 11 percent variability of gold price. During the post financial crisis, the regression model is statistically significant, $F(1, 67) = 3.88$, $p = .0005$. This indicates that, overall, the model applied can statistically significantly to predict the dependent variable (Domestic gold price). R squared was 0.0547 and Adjusted R squared was 0.0406 which implies that NIFTY explains 4 percent of the variability of gold Price. The global financial crisis has refocused investors' attention to safe haven assets such as gold and the equity markets have experienced chaotic variance. Domestic gold price continues to rule high. The unabated hunger for gold has helped the bullion industry to flourish in India. Gold effortlessly crushes most other investment options especially in equities in the aftermath Global Financial crisis. This findings is analogous to the results of Baur and Lucey (2010) who formally tested whether gold is a hedge and/ or a safe-haven asset in context of US, UK, and German stock markets. Their results demonstrate

that gold is a hedge against stocks on average and a safe-haven asset in times of crisis. Safe haven assets offer hedging benefits under adverse general market conditions, enabling the reduction of investors' losses.

CONCLUSIONS

Our empirical results have considerable implication that gold acts as an exclusive asset class to deliver on its "diversification" promise during the times of crisis. The paper provides an empirical evidence to study the impact of domestic gold prices on Indian Stock market indices NSE (S&P CNX NIFTY) during the pre and post global uncertainty. The results are particularly significant in terms of information availability for Indian households who buy gold, retail equity investors and stock brokers. The gold price spurt is taking place against the milieu of global qualms. Gold is a commodity that does not comply with the Law of Demand. The association between gold price and gold demand is unshakable and positive. Thus, Indians are said to be fanatical about gold. The surge in gold price has been depicted as bullish - taken from the glossary of stock market. When the stock market indices moved up progressively during the pre global financial crisis, equity investors were so thrilled to sing and dance with excitement. The exhilaration however,

was a diminutive existence. When the stock market indices severely dropped at times of the Global Financial crisis, the same investors were flustered and depressed. Indian Stock market had touched the sky and had suddenly plummeted to the earth in the aftermath global financial Crisis. In the wake of the financial market turbulence and loss of equity values across the globe, investor's inclination seems to robustly shift towards gold as an asset class. Whilst the general global economy is slipping into global recession, the gold market is a lucrative investment for investors. Slump in equity market could stimulate a change to safety and hence in the short run, there could be augmented demand for gold in domestic market leading to ascend in domestic gold prices. The movements in stock market indices can surrogate positive or negative exceptions, regarding future, and hence it can be an idyllic challenger variable to symbolize features like shift to safer assets during times of crisis. Gold is considered as inflation hedge in the long run the level of inflation can affect the gold prices. If the inflation level is towering, gold consumption may amplify leading to higher gold prices in India. The upward movement in gold prices appears to have gained strong momentum, and the yellow metal has attracted sustained demand during periods of economic uncertainty.

Appendix

Table 1

Descriptive Statistics

Pre-Global Financial Crisis (April 1999 to May 2007)			Post-Global Financial Crisis (June 2007 to March 2013)	
Particulars	Gold price	NIFTY	Gold Price	NIFTY
Mean	17582.04	1816.581	58671.77	4958.978
Standard Deviation	5417.524	908.6995	21240.99	843.0201
Skewness	0.941232	1.226194	.3063486	-1.1468431
Kurtosis	2.815477	3.320251	1.748455	3.828455
Correlation				
Gold Price	1.00000	0.916328	1.00000	0.4605
NIFTY	0.916328	1.00000	0.4605	1.00000

Source: Computed Data

Table 2
Results of ADF test for stationarity of NIFTY and Gold Price during Pre Global Financial Crisis

Particulars	ADF Test Statistic (At 1st Difference)	1% Critical value	5% Critical Value	10% Critical Value
NSE (S&P CNX NIFTY)	(-7.711)	(-3.516)	(-2.893)	(-2.582)
Gold Price	(-10.169)	(-3.516)	(-2.893)	(-2.582)

Mackinnon approximate p-value for $Z(t) = 0.000$

Source: Computed Data

Table-3

Results of ADF test for stationarity of NIFTY and Gold Price during Post Global Financial Crisis

Particulars	ADF Test Statistic (At 1st Difference)	1% Critical value	5% Critical Value	10% Critical Value
NSE (S&P CNX NIFTY)	(-5.905)	(-3.555)	(-2.916)	(-2.593)
Gold Price	(-8.185)	(-3.555)	(-2.916)	(-2.593)

Mackinnon approximate p-value for $Z(t) = 0.000$

Source: Computed Data

Table 4

Results of Linear Regression to investigate the impact of domestic Gold Price on Stock market indices (NIFTY) during Pre and Post Global Financial Crisis

Pre-Global Financial Crisis (April 1999 to May 2007)		Post-Global Financial Crisis (June 2007 to March 2013)	
Particulars	Regression Results	Particulars	Regression Results
F statistic	12.86	F statistic	3.88
Prob>F	0.0005	Prob>F	0.053
R-squared	0.1192	R-squared	0.0547
Adjusted R-squared	0.1099	Adjusted R-squared	0.0406

Source: Computed Data

Table 4.1
Regression Table from April 1999 to May 2007 (Pre- Global Financial Crisis)

D. nifty	Coef.	Std. Err	t	p>t
Gold Price DI.	0.0505798	.0141059	3.59	0.001
_cons	24.98317	11.83562	2.11	0.037

Source: Computed Data

Table 4.2
Regression Table from June 2007 to March 2013 (Post- Global Financial Crisis)

D. nifty	Coef.	Std. Err	t	p>t
Gold Price DI.	-.030427	.0154487	-1.97	0.053
_cons	49.05006	38.01408	1.29	.201

Source: Computed Data

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