

Impulsiveness in the Prices and Volume Traded of Gold Exchange Traded Funds: An Empirical Evidence from Select Gold ETF's Listed on National Stock Exchange

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Abstract

Purpose: The Study attempts to describe the role of Gold Exchange Traded Funds (ETFs) in portfolio management and how it benefits the investors in terms of price, flexibility and efficiency. The study also attempts to determine the price and volume impulsiveness of the few listed Gold ETFs on NSE. Design/ Methodology/Approach: The daily basis data i.e. Opening Price, Closing Price and total Volume traded of 7 listed Gold ETFs is collected from 1st April, 2012 – 31st March 2017. In order to test the data empirically and to discuss the impulsiveness of prices and quantity traded under VAR framework, E-GARCH model is being used. To add robustness to the Co-integration, Granger Causality and VECM were also conducted. Findings: The result reveals the presence of impulsiveness in the prices and volume traded of Gold ETFs and investor's portfolio will become more diversified and riskless with the presence of Gold stocks which will be beneficial for retail investors. Practical Implications: The result will help investors in creating optimal portfolio allotment, risk management and forecasting volatility as far as Gold ETFs are concerned.

Keywords: Impulsiveness, Investors, Portfolio, Price, Volatility

Paper Code: 17904; **Originality Test Ratio:** 25%; **Submission Online:** 19-Aug-2017; **Manuscript Accepted:** 29-Aug-2017; **Originality Check:** 08-Sep-2017; **Peer Reviewers Comment:** 25-Sep-2017; **Double Blind Reviewers Comment:** 03-Oct-2017; **Author Revert:** 14-Oct-2017; **Camera-Ready-Copy:** 03-Nov-2017

1. Introduction

Exchange Traded Funds is an Investment Fund which is traded on Stock Exchange which holds the assets like stock, commodities and bonds. The value and prices of ETFs is based on the market value of the underlying asset of the ETF. It gives a prospect to investors to get the benefits of cost efficiency, tax efficiency, liquidity etc. which attracts investors and helps them to make optimal portfolio management. There are several types of ETFs which are traded on the stock exchanges, like Gold ETFs, Equity index ETFs, Liquid ETFs etc.

Gold ETFs depends on the Net Asset Value of the underlying Gold asset. They are divided into units which signify Physical Gold. It can be in paper form or dematerialized form. Gold ETFs are traded similarly like a stock of a company. It offers a chance to investors to take part in gold bullion markets without physical delivery of metal.

In 1961, "Central Fund of Canada" was first Gold ETF product, which was a close-ended fund. Later, its article of incorporation was amended in 1983, to provide investors to trade in gold and silver bullions. Since 1966, Gold ETFs are been listed on Toronto Stock Exchange. In India, Benchmark Asset Management Company Pvt Ltd in 2002 filed a proposal with the

Securities Board Exchange of India (SEBI) for first Gold ETF. Initially, it did not get approval from SEBI but later in 2007, it was launched with approval. At present, after Japan, India is world's second fastest growing exchange traded fund market.

Currently, there are 13 Gold ETFs listed on National Stock Exchange.

As Indian ETF market is growing, there is lot of impulsiveness in the prices and total quantity traded of Gold ETFs, hence, the need of hour is to understand the volatility which can help investors to frame proper portfolio management and to promote Gold ETF market which renders many benefits as far as cost efficient and tax planning is concerned. So, the study objects to understand the impulsiveness of the 7 Gold ETFs out of 13 listed Gold ETFs on NSE.

1. To understand the Performance of Gold ETFs listed on National Stock Exchange.
2. To discover Co-integration between the Opening Price, Closing Price and Total Volume Traded of Gold ETFs listed on National Stock exchange under VAR framework.
3. To evaluate the impulsiveness between Opening Price, Closing Price and Total Volume traded using E-GARCH model.

In the light of above Objectives, the study proposes to test following Research Hypothesis:

1. H1: There exists a Co-integration between Opening price, closing price and volume traded of Gold ETFs listed on NSE.
H0: There is no existence of Co-integration between Opening price, closing price and volume traded of Gold ETFs listed on NSE.
2. H2: Opening price of Gold ETFs does Granger cause Closing price of Gold ETFs and vice-a-versa.
H0: Opening price of Gold ETFs does not Granger cause Closing price of Gold ETFs and vice-a-versa.
3. H3: Volume traded of Gold ETFs does Granger cause Opening and Closing price of Gold ETFs.
H0: Volume traded of Gold ETFs does not Granger cause Opening and Closing price of Gold ETFs.
4. H4: There is an Impulsiveness between Opening price, Closing price and Volume traded of Gold ETFs.

H0: There is no Impulsiveness between Opening price, Closing price and Volume traded of Gold ETFs.

In order to accomplish the objectives and to test the hypothesis, the paper is divided into Six Sections. Section I gives the understanding of ETFs listed on NSE. Section II gives a comprehensive Picture of existing Literature. Section III defines Data and Methodology used to analyse the data. Section IV involves the analysis and explanations of the results, tailed by Section V which inculcates the Conclusion and Policy Implications Section VI will highlight the References used.

3. Data and Methodology

This section illuminates Data and Methodological used in the study. The data regarding 7 listed Gold ETFs .i.e Opening Price, Closing Price and Total Volume Traded has been collected from official Statistical database portal of National Stock Exchange. The time period taken for the same is 1st April 2012 to 31st March 2017 on a daily basis. First, data properties need to be studied to find co-integration and error correction to form equilibrium. Granger Causality test is performed to test the causality and to

2. Review of Literature

Author & Year	Objectives	Research & Methodology	Results
Joel.et.al.(2006)	To relate the performances of Foreign ETFs and Closed-Ended funds in terms of risk and return.	Sharpe ratio	Researchers established that ETFs has higher mean and Sharpe ratios. The researchers also determined that passive investment in ETFs is better than active investment in closely held funds.
Fisher (2008)	To highlight that gold ETFs are best option for investment.	Existing literature	The researcher mentioned that Gold ETFs offers an opportunity to participate in gold bullion market and it has made investment in yellow market very convenient and economical.
Huang and Guedj (2009)	To investigate the efficiency of ETFs in comparison to Open-Ended Mutual Funds.	Existing Literature	Authors revealed that ETFs provides best opportunity for investment in narrow and less liquid underlying indexes.
Johnson (2009)	To make a comparative study between Foreign ETFs and domestic ETFs.	Existing Literature	The author proposed that underlying index returns and foreign ETFs has tracking errors.

Jack et al. (2009)	To study and scrutinise the US ETFs	Daily data was gathered for a specified period	Researchers pronounced that US ETFs are traded at premium than discount and there are large fluctuations in their daily prices.
Meric et al. (2009)	To do sectoral comparison of the performance of different Index funds.	Data was collected from 2007 -2009. Total 38 sector index funds were selected and analysed. Data was analysed using Sharpe and Treynor measures.	Researcher reported the presence of worst bear market in US stock market. They also established that healthcare index funds and consumer sector index funds have best performance whereas worst performance is seen in financial and home construction index funds.
Noblett, Jackie (2010)	To analyse performance of Gold ETFs.	Existing literature	Researchers suggested that Gold ETF witness substantial flows as investors and institutions get exposure to invest in this yellow metal.
Pandey, Neha (2010)	To investigate the opportunity to capitalize in Gold ETFs.	Existing literature	Researchers favoured Gold ETFs more appropriate and price effective than buying physical form of metal gold.
Blitz & David (2011)	To assess the performance of ETFs of emerging markets globally.	Existing literature	The researcher pinpointed that ETFs of emerging markets of worldwide exhibits higher tracking error.
Goyal & Joshi (2011)	To study the financial performance and analyse the risk behaviour of select Gold ETFs in contrast of NSE.	The data was gathered from NSE website from 2008 to 2010. Sharpe's index, Treynor's ratio were used to analyse the data.	The researchers determined that the study will be beneficial for the investors who seek the best opportunities in the Gold ETFs.
Houweling (2012)	To compare the pattern of Treasury ETFs and Bond ETFs.	Existing literature	Author stated that treasury ETFs can easily trace their benchmark, whereas, Corporate bond ETFs fail to track their benchmark.
P. Krishna Prasanna (2012)	To analyse the ETFs floated in Indian stock market.	82 exchange traded schemes were taken floating in Indian stock market was evaluated using DEA.	Researchers found that large funds were not efficient and it was also inferred that size does not indicate superior performance.
Nemavathi & Nedunchezian (2013)	To analyse the volatility of Gold ETF and Physical Gold.	Daily data was gathered for a specified period and tools like standard deviation, Beta and EGARCH was applied to analyse the data.	Researchers determined that the return of ETFs depends on its volatility.
Shefali Sinha and Mahua Dutta (2013)	To analyse the pattern and performance of Goldman Sach ETF.	Tracking error and trend analysis methods	The researchers found that Goldman Sachs ETF perform better than Gold.

S.Malathy and Ms.T. Radhulya (2013)	To outline the performance of Gold ETFs.	Data for returns, NAVs was collected for a specified period.	Researchers established that the Gold ETFs does not reflect the movement of spot gold prices.
Goyal (2014)	To compare different investment choices.	The prices of Gold ETFs, NSE 500, Nifty, bank deposits, etc. were taken From 2007 to 2014 from the official NSE website.	The findings revealed that Gold ETFs gives higher returns in comparison to other investment options present in market.

Table 1. ADF Result

Null Hypothesis: Unit root (individual unit root process)
 Series: CLOSE_PRICE, OPEN_PRICE, VOLUME
 Date: 06/13/17 Time: 17:29
 Sample: 1 8645
 Exogenous variables: Individual effects
 Automatic selection of maximum lags
 Automatic lag length selection based on SIC: 1 to 17
 Total number of observations: 25913
 Cross-sections included: 3

Method	Statistic	Prob.**
ADF - Fisher Chi-square	94.6059	0.0000

Intermediate ADF test results UNTITLED

Series	Prob.	Lag	Max Lag	Obs
CLOSE_PRICE	0.0171	1	36	8643
OPEN_PRICE	0.0137	1	36	8643
VOLUME	0.0000	17	36	8627

Table 2. Johanson's Co-integration Result

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.144518	2073.691	29.79707	1.0000
At most 1 *	0.079328	725.0714	15.49471	0.0001
At most 2 *	0.001268	10.95832	3.841466	0.0009

test the Stationarity of sample series, Augmented Dickey Fuller (ADF) test is being used. In order to comprehend short term dynamics between opening and closing markets, Vector Error Correction Model (VECM) is being used and to add robustness to VECM results Variance Decomposition Analysis is also done followed by Graphical Representation using Impulse Response method. Additionally, to study Volatility Impulsiveness, E-GARCH framework is being used. The empirical analysis is based on two-stage estimation. The first and foremost step is to apply VECM test followed by the use the residuals of VECM in the E-GARCH model.

4. Analysis and Interpretation of Results

This section highlights the outcomes of data of 7 gold ETFs listed On NSE under VAR framework and also displays the impulsiveness of Opening Price, Closing Price and Volume Traded of Gold ETFs using E-GARCH.

H1: There exists a Co-integration between Opening price, closing price and volume traded of Gold ETFs listed on NSE.

H0: There is no existence of Co-integration between Opening price, closing price and volume traded of Gold ETFs listed on NSE.

Table 3. Vector Error Correction Model (VECM) Results

Cointegrating Eq:	CointEq1		
CLOSE_PRICE(-1)	1.000000		
OPEN_PRICE(-1)	-0.998533 (0.00057) [-1755.61]		
VOLUME(-1)	-1.07E-05 (1.4E-05) [-0.77990]		
C	-0.661133		
Error Correction:	D(CLOSE_...	D(OPEN_PR...	D(VOLUME)
CointEq1	-0.493258 (0.02601) [-18.9618]	0.390485 (0.03013) [12.9584]	9.423979 (23.1792) [0.40657]
D(CLOSE_PRICE(-1))	-0.009003 (0.02238) [-0.40234]	0.066132 (0.02592) [2.55122]	-8.197472 (19.9392) [-0.41112]
D(CLOSE_PRICE(-2))	0.012575 (0.01644) [0.76515]	0.035845 (0.01904) [1.88279]	-1.774030 (14.6445) [-0.12114]
D(OPEN_PRICE(-1))	-0.015642 (0.02233) [-0.70039]	-0.091336 (0.02587) [-3.53033]	6.712878 (19.9008) [0.33732]
D(OPEN_PRICE(-2))	-0.010830 (0.01633) [-0.66329]	-0.030050 (0.01891) [-1.58877]	8.401610 (14.5489) [0.57747]
D(VOLUME(-1))	-1.65E-06 (1.1E-05) [-0.14471]	1.41E-06 (1.3E-05) [0.10646]	-0.651749 (0.01015) [-64.1968]
D(VOLUME(-2))	-2.63E-06 (1.1E-05) [-0.23085]	2.88E-06 (1.3E-05) [0.21846]	-0.332407 (0.01015) [-32.7467]
C	-0.001951 (0.45000) [-0.00434]	0.014378 (0.52128) [0.02758]	-0.209581 (400.976) [-0.00052]
R-squared	0.101898	0.076807	0.323456
Adj. R-squared	0.101169	0.076059	0.322907
Sum sq. resids	15109739	20275538	1.20E+13
S.E. equation	41.83333	48.45964	

Table 4. Variance Decomposition Result

Variance Decomposition of CLOSE_PRICE:				
Period	S.E.	CLOSE_PR...	OPEN_PR...	VOLUME
1	41.83333	100.0000	0.000000	0.000000
2	59.07603	94.54883	5.450651	0.000521
3	72.41404	92.54955	7.450085	0.000362
4	83.83216	91.11351	8.885787	0.000702
5	93.91290	90.14550	9.853760	0.000744
6	103.0244	89.48140	10.51785	0.000755
7	111.3987	88.99841	11.00078	0.000813
8	119.1874	88.63468	11.36448	0.000833
9	126.4981	88.35170	11.64745	0.000850
10	133.4090	88.12550	11.87363	0.000869

Variance Decomposition of OPEN PRICE:				
Period	S.E.	CLOSE PR...	OPEN PR...	VOLUME
1	48.45964	64.38761	35.61239	0.000000
2	64.15417	74.21289	25.78686	0.000258
3	76.97084	77.84411	22.15569	0.000192
4	87.92554	79.68565	20.31403	0.000324
5	97.63272	80.90171	19.09799	0.000304
6	106.4608	81.72605	18.27367	0.000277
7	114.6095	82.32600	17.67371	0.000285
8	122.2158	82.78208	17.21764	0.000278
9	129.3756	83.14002	16.85970	0.000272
10	136.1594	83.42847	16.57126	0.000271

Variance Decomposition of VOLUME:				
Period	S.E.	CLOSE_PR...	OPEN_PR...	VOLUME
1	37275.68	0.000576	0.006858	99.99257
2	39470.01	0.000546	0.006173	99.99328
3	42751.13	0.005308	0.006246	99.98845
4	48195.83	0.004958	0.004915	99.99013
5	51209.21	0.005100	0.004434	99.99047
6	54479.85	0.005711	0.004022	99.99027
7	57830.58	0.005782	0.003599	99.99062
8	60701.15	0.005939	0.003317	99.99074
9	63545.45	0.006117	0.003073	99.99081
10	66292.50	0.006209	0.002858	99.99093

Cholesky Ordering: CLOSE_PRICE OPEN_PRICE VOLUME				
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Table 5. Impulse Response Result

**Response of CLOSE_PRICE to Cholesky
One S.D. Innovations**



**Response of OPEN_PRICE to Cholesky
One S.D. Innovations**



**Response of VOLUME to Cholesky
One S.D. Innovations**

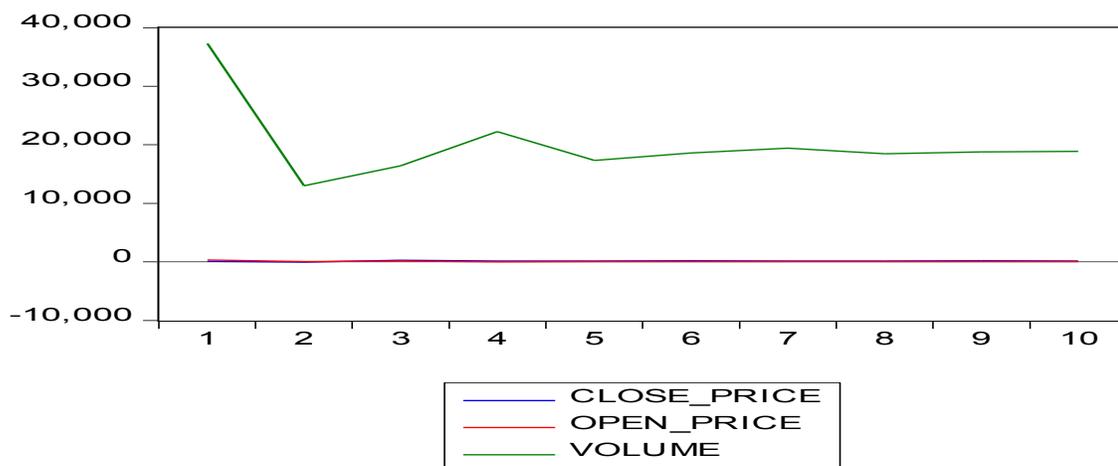


Table 6. Granger Causality Test Result

Null Hypothesis:	Obs	F-Statistic	Prob.
OPEN_PRICE does not Granger Cause CLOSE_PRICE CLOSE_PRICE does not Granger Cause OPEN_PRICE	8643	476.498 239.602	5E-197 5E-102
VOLUME does not Granger Cause CLOSE_PRICE CLOSE_PRICE does not Granger Cause VOLUME	8643	0.14960 7.63866	0.8611 0.0005
VOLUME does not Granger Cause OPEN_PRICE OPEN_PRICE does not Granger Cause VOLUME	8643	0.09365 7.60598	0.9106 0.0005

Table 7. E-GARCH Result

Dependent Variable: CLOSE PRICE
 Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
 Date: 06/13/17 Time: 18:05
 Sample: T8645
 Included observations: 8645
 Convergence achieved after 45 iterations
 Coefficient covariance computed using outer product of gradients
 Presample variance: backcast (parameter = 0.7)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
OPEN PRICE	0.999053	0.000105	9485.355	0.0000
VOLUME	-3.07E-06	3.47E-06	-0.886699	0.3752
C	0.214901	0.169777	1.265782	0.2056
Variance Equation				
C(4)	-0.091129	0.002864	-31.82243	0.0000
C(5)	0.193025	0.002169	89.00731	0.0000
C(6)	-0.003055	0.002219	-1.376857	0.1686
C(7)	0.993561	0.000340	2920.005	0.0000
R-squared	0.997635	Mean dependent var		2565.871
Adjusted R-squared	0.997635	S.D. dependent var		599.9203
S.E. of regression	29.17766	Akaike info criterion		9.162441
Sum squared resid	7357245.	Schwarz criterion		9.168161
Log likelihood	-39597.65	Hannan-Quinn criter.		9.164391
Durbin-Watson stat	1.906286			

Table 8. ARCH LM Result

Heteroskedasticity Test: ARCH

F-statistic _____	0.745149	Prob. F(1,8642)		0.3880
Obs*R-squared	0.745257	Prob. Chi-Square(1)		0.3880
Test Equation:				
Dependent Variable: WGT_RESID^2				
Method: Least Squares				
Date: 06/13/17 Time: 18:06				
Sample (adjusted): 2 8645				
Included observations: 8644 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.990609	0.051631	19.18616	0.0000
WGT_RESID^2(-1)	0.009285	0.010757	0.863220	0.3880

The first and foremost step is to examine the stationarity of data and to evaluate the Co-integration between data series, which is being tested using ADF test. The results given in Table 1 and Table 2 portrays significant results.

Then, it is necessary to comprehend the short term dynamic forces of the Opening and Closing prices of Gold ETFs using VECM test. The outcomes of VECM test are unveiled in Table 3.

To add robustness to the results, Variance Decomposition Analysis is being applied, Table 4 and Table 5 reveals the results using Impulse Response.

After VECM test, it is imperative to apprehend the Causality among the sample series. Hence, Granger causality test is being conducted and their results are reported in Table 6.

H2: Opening price of Gold ETFs does Granger cause Closing price of Gold ETFs and vice -a -versa.

H0: Opening price of Gold ETFs does not Granger cause Closing price of Gold ETFs and vice- a -versa.

H3: Volume traded of Gold ETFs does Granger cause Opening and Closing price of Gold ETFs.

H0: Volume traded of Gold ETFs does not Granger cause Opening and Closing price of Gold ETFs.

After Granger Causality Test, now it's important to evaluate empirically the impulsiveness volatility, for which, E-GARCH framework is being used, its results in Table 7 shows significant results which rejects the null Hypothesis.

H4: There is an Impulsiveness between Opening price, Closing price and Total Volume traded of Gold ETFs.

H0: There is no Impulsiveness between Opening price, Closing price and Total Volume traded of Gold ETFs.

At last, the standardised residuals of E-GARCH are tested to unveils additional ARCH, ARCH Lagrange Multiplier (LM) is being applied, the results of the same is being depicted in Table 8. The result represents that E-GARCH(1,1) captures all the impulsiveness dynamics.

5. Conclusion and Policy Implications

The study targets to analyse the volatility and impulsiveness of the prices and volume traded of listed Gold ETFs. The result proposes that the presence of impulsiveness in all 7 selected listed Gold ETFs. The empirical outcome delivers a way to describe the pattern of impulsiveness which will be worthwhile for future empirical research to assess the volatility effects. The results would be helpful for investors to make optimal portfolio management and Gold ETFs would emerge as a Strong Asset for investment in future.

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Annexure-I

IMPULSIVENESS IN THE PRICES AND VOLUME TRADED OF GOLD EXCHANGE TRADED FUNDS: AN EMPIRICAL EVIDENCE FROM SELECT GOLD ETF'S LISTED ON NATIONAL STOCK EXCHANGE

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 "Impulsiveness in the Prices and Volume Traded of Gold Exchange Traded Funds: An Empirical Evidence from Select Gold ETF's Listed on National Stock Exchange",
 Global Journal of Enterprise Information System. Volume-9, Issue-4, October-December, 2017. (<http://informaticsjournals.com/index.php/gjeis>)
 DOI: 10.18311/gjeis/2017/17904

Conflict of Interest:

Author of a Paper had no conflict neither financially nor academically.