An Analytical Study on the Crypto Assets and Mutual Funds ETF Returns in India

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Abstract:- The present study conducts a time series analysis of 15 crypto assets and mutual funds. The time series data is put through stationarity tests and modelled using ARIMA to forecast the projected return and is observed that both asset classes show increased returns over the study period. The volatility modelling is conducted using GARCH and is observed that crypto assets are more volatile than mutual funds over the study period.

Keywords:- Crypto Assets, Mutual funds, GARCH, ARIMA

I. INTRODUCTION

Cryptocurrency is a digital money which can likewise be called as coins, is the advanced currency which is protected by the utilization of cryptography, the encoding and translating of messages in a cipher. Mutual funds are categorized into a variety of sections, reflecting the types of stocks they target for their portfolios and the type of returns they seek. There is a fund for virtually any form of investor or investing strategy. Other general categories of mutual funds include money market funds, sector funds, alternative funds, smart-beta funds, target-date funds, and even funds or mutual funds that purchase shares of other mutual funds

In cryptographic forms of money, blockchain innovation is utilized as a decentralized and distributed ledger which is utilized to ensure the exchanges and control the generation of new units, which is worked freely without a focal authority except if somebody controls dominant part of the figuring influence. Bitcoin is the main cryptographic money which rose in 2009 by Satoshi Nakamoto, its market in the global budgetary market after advancement of almost ten years has gotten significant. A cryptographic money is a hybrid of a currency and a digital resource which can be utilized to pay for things like a currency and which can be utilized to put resources into for long haul increases like an advanced asset. There are presently in excess of 2000 dynamic currencies in the market, with a complete market top of over $139 billion approx. Bitcoin is generally utilized and advertised alongside Ripple, Litecoin, Ethereum and some more.

There are various advantages of mutual funds over traditional and other sources of investments are diversification, liquidity ,economies of scale and professional management. The objective of the research paper is to find out the better performer on the basis of returns of crypto-assets and mutual funds ,to analyse the volatility of the crypto-assets and mutual funds and to a determine better investment asset for the investor between crypto-assets and mutual funds.The subsequent part in the paper is organized as Section 2 is Review of literature, Section 3is Research Design, Section 4 Data Analysis, Section 5 Conclusion and Section 6 Limitations.

II. REVIEW OF LITERATURE

Mariana Durcheva, Pavel Tsankov (2019)target to research the similarities and variances between cryptocurrency and stocks networks obtained from log-return and volatility statistic and whether exhibits similar behaviour once it involves examination graph theoretical properties. The analysis is associate degree analytical analysis wherever data sets of each a hundred stocks and crypto-currencies statistic areunit processedand analyzed severally from one another, solely the graph obtained at the ultimate step area unit directly compared by mistreatment totally different tools like correlation and spanning trees... Cryptocurrencies and stocks with high capitalization tend to be densely connected or occupy central positions within the graphs. Suda D., Spiteri L. (2019) work on identifying market regimes, mainly bull and bear market phases of cryptocurrencies with the use of hidden Markov models (HMMs) and hidden semi-Markov models (HSMMs). In the case of BTC/USD, the states of the 4-states HSMM model are not as interpretable as in the case of S&P 500.

Klein, Tony & Pham Thu, Hien & Walther, Thomas. (2018) analyzes and compares conditional variance properties of Bitcoin and Gold as well as other assets and find differences in their structure and to explore the hedge and safe heaven capabilities of cryptocurrencies in comparison to Gold. In the study BEKK GARCH model is used to estimate time varying conditional correlations and regression. Sample size is limited as it observes only a very small number of the downturns in the market. This results that Bitcoin returns have an asymmetric response to market shocks, which is of the same direction than precious metals. Bitcoin behaves completely different from Gold particularly in market distress.

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Liang, Jiaqi & li, Linjing & Chen, Weiyun & Zeng, Daniel Dajun. (2019) offers to provide analytical insights to help understand cryptocurrency by treating it as a financial asset by comparing its dynamic characteristics with two traditional and massively adopted financial assets: foreign exchange and stock. The paper uses correlation matrices and asset trees on all three markets and then conduct comparisons on five properties. The dynamics of cryptocurrency are more similar to stock than foreign exchange. The paper only identifies the similarity and dissimilarity among the three markets and not give any knowledge about the market which will be better for the investor. As to the robustness and clustering structure, the analysis shows cryptocurrency market is more fragile than stock market whereas foreign exchange market is a stable market, thus it is currently a high-risk financial market.

Vladimir N. Soloviev, Symon P. Yevtushenko, Viktor V. Batareyev (2019) demonstrates the comparative possibility of constructing indicators of critical and crash phenomena in the volatile market of cryptocurrency and developed stock market. Baur, Dirk G. and Dimpfl, Thomas and Kuck, Konstantin (2017) uses descriptive analysis while using asymmetric GARCH model for all assets separately to make state differences about volatility processes across the assets. The study demonstrates that Bitcoin is very different from gold and fiat currencies showing that Bitcoin has unique risk-return characteristics, follows a different volatility process when compared with other assets and is uncorrelated with other assets.

Erik Johan Helland, Hilde Camilla Mari Sæther (2018) describes and clarify the inner workings in the cryptocurrency market by analyzing its components separately by highlighting the financial analysis based on market history and challenges in the market. In the study price volatility is compared using interval graphs and a correlation analysis to analyze different cryptocurrencies in the market are correlated. The paper states that cryptocurrency market has been shown to be exceptionally volatile, difficult to regulate, have a significant security risk tied to its exchange and wallet services, have deep-rooted issues with scalability in many of the operating blockchains. The paper only used the data of over one year only which is very less time for any data to show an established relationship.Corbet, Shaen & Meegan, Andrew & Larkin, Charles & Lucey, Brian & Yarovaya, Larisa. (2018) study about the relationship between three popular cryptocurrencies and a variety of other financial assets and explore the role of cryptocurrency market in the integrated financial system. The paper employs generalized variance decomposition methodology using VAR model. Giudici G, Milne A & Vinogradov D, Cryptocurrencies: extend the existing knowledge about cryptocurrencies, that themselves embodies innovations and technological changes, and may appear to be a lucrative form of fund raising for small businesses and extra emphasis is made on areas, such as environment, sustainability and social responsibility.

Motamed, A.P., Bahrak, B. (2019) study the financial exchange network of the cryptocurrencies has been studied with intend to compare the transaction graph of Bitcoin, Ethereum, Litecoin, Dash, and Z-Cash, with respect to the dynamics of their transaction graphs over time and discuss their properties. The paper used data collected from peer to peer network using client software converting it into human-readable format for further analysis by building transaction graph. The paper found that in all the coins, the number of edges of cumulative transaction graphs increase linearly with respect to the number of nodes. It observed that in the cumulative transaction graph, the density is always decreasing.Ardia, David & Bluteau, Keven & Rüede, Maxime. (2018) use Markov–switching GARCH (MSGARCH) models, it explores the role of regime shifts in the GARCH volatility dynamics of Bitcoin log–returns. In addition, MSGARCH is compared to standard single–regime GARCH requirements in predicting one–day ahead Value–at–Risk (VaR). To approximate model parameters and calculate VaR forecasts, the Bayesian approach is used. It discovers clear evidence of regime transitions in the GARCH mechanism and demonstrates that MSGARCH models outperform single–regime requirements in forecasting VaR.

III. RESEARCH DESIGN

A. Sample Size

A sample of 10 mutual funds and 15 cryptocurrency of crypto-assets has been taken to make the sample for the period of 10 years.

The sampling method chosen for the research is "Simple random sampling" method, in which samples are picked from the l population.

B. Data

The data collected for historical data of past 10 years of Mutual funds from amfiindia.com and crypto-assets from in.investing.com was transferred to excel worksheets. From here, the data was then transferred to R studios software.

C. Variables used in study

➢ *Volatility*

Volatility is the evaluation of previous performance as it permits for a larger long-term risk-assessment. Volatility is largely utilised by researchers and speculators in creating investing plan. It is used for comparing the risk the different types of investments, mentioned above, contain. Volatility is linked to the standard deviation i.e. level where prices differentiate from mean. If the prices fluctuate rapidly in short span of time, it is termed as high volatility meaning higher risk investment and vice versa if prices fluctuate slowly in longer span of time, it is termed as low volatility meaning lower risk investment.

D. Research Tools

➢ *GARCH Model*

The generalized autoregressive conditional heteroskedasticity (GARCH) process is associate economics term that describes associate approach to estimate volatility in money markets. Heteroskedasticity portrays the unpredictable example of variety of erroneous conclusion term, or variable, in an exceptionally applied math model. essentially, any place there's heteroskedasticity, perceptions don't conform to a direct example. All things considered, they tend to group. The outcome's that the ends and

prognosticative cost drawn from the model will not be solid. GARCH might be an applied arithmetic model that might be acclimated examine assortment of different types of cash data, for instance, political economy data. cash foundations by and large utilize this model to gauge the instability of profits for stocks, securities, and market records. They utilize the resulting information to see rating, pick that resources can presumably offer better yields, and figure the profits of current ventures to aid there in addition to designation, supporting, hazard the executives, and portfolio improvement choices.

IV. ANALYSIS AND FINDINGS

A. Stationarity Testing
Bitcoin

Table 1: ADF test for statonarity for Bitcon and ETF

Augmented Dickey-Fuller Test, Data: bitcoin
Dickey-Fuller = -13.179
Lag order = 15
p-value = 0.01
alternative hypothesis: stationary
KPSS Unit Root Test
Test is of type: mu with 9 lags.
Value of test-statistic is: 0.0694
Critical value for a significance level of:
10pct 5pct 2.5pct 1pct
critical values 0.347 0.463 0.574 0.739

Augmented Dickey-Fuller Test, Data: litecoin
Dickey-Fuller = -13.192
Lag order = 13
p-value = 0.01
alternative hypothesis: stationary
KPSS Unit Root Test
Test is of type: mu with 8 lags.
Value of test-statistic is: 0.1881
Critical value for a significance level of:
10pct 5pct 2.5pct 1pct
critical values 0.347 0.463 0.574 0.739

Augmented Dickey-Fuller Test, Data: uti
Dickey-Fuller = -13.195
Lag order = 13
p-value = 0.01
alternative hypothesis: stationary
KPSS Unit Root Test
Test is of type: mu with 8 lags.
Value of test-statistic is: 0.1124
Critical value for a significance level of:
10pct 5pct 2.5pct 1pct
critical values 0.347 0.463 0.574 0.739

From the above table, it is evident that the p-value 0.01 is less compared to the significant level of 0.05. This inidcates that the alternate hypothesis will be selected, meaning that the data is stationary. Also as per KPSS Test, atleast one critical value is greater than the value of test statistic 0.112, meaning the data is stationery

B. ARIMA modelling
Bitcoin and ETF

Table 2: Forecated Value from ARIMA for Bitcoin and ETF

Point	Forecast	Lo 80	hi 80	lo 95	Hi 95
2444	0	-0.05187	0.051871	-0.07933	0.07933
2445	0	-0.05187	0.051871	-0.07933	0.07933
2446	0	-0.05187	0.051871	-0.07933	0.07933
2447	0	-0.05187	0.051871	-0.07933	0.07933
2448	0	-0.05187	0.051871	-0.07933	0.07933
2449	0	-0.05187	0.051871	-0.07933	0.07933
2450	0	-0.05187	0.051871	-0.07933	0.07933
2451	0	-0.05187	0.051871	-0.07933	0.07933
2452	0	-0.05187	0.051871	-0.07933	0.07933
2453	0	-0.05187	0.051871	-0.07933	0.07933
2454	0	-0.05187	0.051871	-0.07933	0.07933
2455	0	-0.05187	0.051871	-0.07933	0.07933
2456	0	-0.05187	0.051871	-0.07933	0.07933
2457	0	-0.05187	0.051871	-0.07933	0.07933
2458	0	-0.05187	0.051871	-0.07933	0.07933
2459	0	-0.05187	0.051871	-0.07933	0.07933
2460	0	-0.05187	0.051871	-0.07933	0.07933
2461	0	-0.05187	0.051871	-0.07933	0.07933
2462	0	-0.05187	0.051871	-0.07933	0.07933
2463	0	-0.05187	0.051871	-0.07933	0.07933
2464	0	-0.05187	0.051871	-0.07933	0.07933
2465	0	-0.05187	0.051871	-0.07933	0.07933
2466	0	-0.05187	0.051871	-0.07933	0.07933
2467	0	-0.05187	0.051871	-0.07933	0.07933
2468	0	-0.05187	0.051871	-0.07933	0.07933
2469	0	-0.05187	0.051871	-0.07933	0.07933
2470	0	-0.05187	0.051871	-0.07933	0.07933
2471	0	-0.05187	0.051871	-0.07933	0.07933
2472	0	-0.05187	0.051871	-0.07933	0.07933
2473	0	-0.05187	0.051871	-0.07933	0.07933

The above table shows the forecasted values of Bitcoin ans SBI Gold FTF for the next 30 days after the time period taken for research. The values in 80% and 95% are constant showing that the returns are in constant interval and in the upward trend for Bitcoin ans SBI ETF MF

C. GARCH Model
Bitcoin & UTI ETF Gold

Table 3: Result of GARCH Modelling for Bitcon and UTIGold ETF

$JB
JB-Test (multivariate)
data: Residuals of VAR object VLU
Chi-squared = 41859, df = 4, p-value < 2.2e-16
$Skewness
Skewness only (multivariate)
data: Residuals of VAR object VLU

Chi-squared = 402.36, df = 2, p-value < 2.2e-16
$Kurtosis
Kurtosis only (multivariate)
data: Residuals of VAR object VLU
Chi-squared = 41457, df = 2, p-value < 2.2e-16

In the above table, it is evident that bitcoin has more sigma, indicating the volatility, is more than sbi etf gold over the next 20 observations. This states that bitcoin is more volatile than sbi etf gold.

D. VAR Analysis
Bitcoin & SBI ETF

GARCH Model Forecast	
Model: sGARCH - litecoin	Model: sGARCH- UTI ETF Gold
Horizon: 20	Horizon: 20
Roll Steps: 0	Roll Steps: 0
Out of Sample: 0	Out of Sample: 0
0-roll forecast [T0=2461-01-01]:	0-roll forecast [T0=2461-01-01]:
Series Sigma	Series Sigma
T+1 0.001227 0.03112	T+1 -0.3396 18.24
T+2 0.001468 0.03298	T+2 -0.3231 18.44
T+3 0.001305 0.03474	T+3 -0.3088 18.63
T+4 0.001415 0.03641	T+4 -0.2965 18.82
T+5 0.001341 0.03801	T+5 -0.2858 19.00
T+6 0.001391 0.03954	T+6 -0.2766 19.18
T+7 0.001357 0.04102	T+7 -0.2687 19.36
T+8 0.001380 0.04244	T+8 -0.2619 19.53
T+9 0.001365 0.04381	T+9 -0.2560 19.70
T+10 0.001375 0.04514	T+10 -0.2509 19.86
T+11 0.001368 0.04644	T+11 -0.2465 20.02
T+12 0.001373 0.04769	T+12 -0.2427 20.18
T+13 0.001369 0.04891	T+13 -0.2394 20.34
T+14 0.001372 0.05010	T+14 -0.2366 20.49
T+15 0.001370 0.05126	T+15 -0.2342 20.64
T+16 0.001371 0.05240	T+16 -0.2321 20.79
T+17 0.001370 0.05351	T+17 -0.2303 20.93
T+18 0.001371 0.05460	T+18 -0.2287 21.07
T+19 0.001371 0.05566	T+19 -0.2273 21.21
T+20 0.001371 0.05670	T+20 -0.2262 21.34

The above table shows whether the data is normally distributed and whether any skewness and kurtosis present in the data. Since the above 3 p values for JB Test, Skewness and Kurtosis are within the accepted confidence level of 0.05, the data is normally distributed.

V. CONCLUSION

The graphical representation shows the returns over the years for cryptocurrencies and mutual funds..From plots of the returns, we can see that the data is stationery as no trend can be seen.The stationarity of the datas can also be seen by the adf test and kpss test in which the null hypothesis is rejected, indicating that alternate hypothesis is accepted which is the data is stationary.The ARIMA Modeling is done to forecast the future values of cryptocurrencies and mutual funds.The values in the model shows the change in the values from the current value of the last date taken in the research. It can be seen that the returns of cryptocurrencies is more than that of the mutual funds' returns.VAR analysis done for all cryptocurrencies and mutual funds shows that the data is normally distributed and no skewness present in any of the data.The GARCH modeling is used to forecast the sigma, which is the volatility, for all cryptocurrencies and mutual funds.From the GARCH model it can be seen that most of cryptocurrencies have more volatility than most of the mutual funds

VI. LIMITATIONS

The research is limited to the secondary data due to the outbreak of a pandemic disease throughout the world, Covid-19, due to which primary data was not feasible. Since cryptocurrency does not a regulated exchange for it, due to which many countries have banned or made it not legal to trade in that country for example, Nepal, Egypt and many more. So many investors who would like to take advantages of cryptocurrencies and its returns may not be able to. Since

the study is based on the sample of cryptocurrencies taken from more than 2000 cryptocurrencies, which means that the result from this study may not be applicable to the whole population of the cryptocurrencies. Similarly, sample of mutual funds have been taken from more than 2500 mutual fund schemes.Even though the result of the study indicate that cryptocurrency is more beneficial for the investors, due to its high volatility the risk-taking ability of the investor plays a very important role for investing.

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