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Research Article

Unraveling the Nexus: A Deep Dive into the Relationship between Crypto Currency and Commodity Market Volatility

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ABSTRACT

Due to anonymity of users, low transaction costs, no middleman, and a rise in accepting Bitcoin payments, cryptocurrencies might seem attractive as a medium of exchange to potential consumers (Katsiampa, 2019). However, the Crypto Currency market is still under rapid development and evolution, the prices of currencies change drastically (Dr N Saraswati, 2022). Commodity market investment grew rapidly in the mid-2000s and attracted investors to hedge the risk against price fluctuations (Scott Main, Scott H Irwin, 2018). The Present research explores the hypothesis that Crypto Currency Returns exhibit volatile behavior, while Commodity Returns do not. Additionally, it investigates the relationship between Trading Volume and Returns in both markets, as well as the potential relationship between major Commodities and Crypto Currency Returns. The study utilizes a comprehensive dataset comprising historical price data from 2017 to February 2023 for Crypto Currencies and Commodities. Statistical methods, including standard deviation, Auto Regressive conditional heteroscedasticity employed to measure Volatility. The analysis will also examine the Correlation between Trading Volume and Returns in each market and explore the relationship between Commodities and Crypto Currencies by using co-integration test and Granger Causality tests. The findings of the study surely contribute to the understanding of the Volatility characteristics of both markets and their implications for investors. The findings of the study indicated that Commodities, such as Gold and crude oil, did not have a significant impact on Crypto Currencies. The analysis of Trading Volume and Returns revealed no substantial relationship between the two asset classes.

Keywords: Crypto Currency; Commodity; Returns; Trading Volume; Volatility.

INTRODUCTION

Crypto Currency has revolutionized the financial landscape by introducing a new form of digital Currency that operates independently of traditional banking systems. It emerged as a decentralized and secure means of conducting financial transactions, revolutionizing the way people exchange value and store wealth. At its core, Crypto Currency is a digital or virtual form of Currency that utilizes cryptography to secure transactions and control the creation of new units. Since, the birth of Bitcoin, the cryptocurrency market is much more diverse and in just over a decade there are now more than 6000 forms of crypto currencies often referred to as altcoins, have been developed, each with its unique features and purposes Jake McMorrow and Mona seyed Esfahan (2021). Crypto Currencies offer several advantages over traditional fiat Currencies. They provide faster and cheaper cross-border

transactions, as well as increased financial inclusivity, particularly in regions with limited access to banking services. Moreover, Crypto Currencies empower individuals by giving them direct control over their funds and providing pseudonymous transactions that protect user privacy. Even though Crypto Currencies became a household investment and transaction medium, the market is highly volatile with significant price fluctuations which led to emphasize greater regulatory and investor scrutiny. As Crypto Currency continues to gain mainstream attention, which created the need to better understand their function as a market of their own and as market that forms part of the greater economy (Konstantinos stylianou et al, 2021).

Crypto Currency market is an innovative investment avenue for the investors which is more Volatile and no regulatory control over it whereas Commodity markets are regulated and they are dynamic to market supply and demand conditions etc. But both cryptocurrency and commodity markets are influenced by investor sentiment, global economic conditions, technological advancements, regulatory changes, market accessibility, and supply-demand dynamics. Market sentiment and speculative behavior can drive volatility in both sectors, while global economic shifts, technological innovations, and regulatory decisions affect investor confidence and price movements.

The commodities market encompasses a wide range of raw materials or primary goods traded globally. Gold and crude oil stand out as two of its most prominent and influential commodities. Gold serving as a hedge against inflation and economic uncertainties. It's traded on various exchanges worldwide and is influenced by factors like geopolitical tensions, inflation rates, central bank policies, and currency movements. Its demand varies from jewelry to investment and industrial uses. As the most actively traded commodity globally, crude oil is the lifeblood of the modern economy, powering industries and transportation. The price of oil is highly sensitive to geopolitical events, supply and demand dynamics, OPEC (Organization of the Petroleum Exporting Countries) decisions, technological advancements, and global economic conditions. It's traded in futures contracts and its fluctuations heavily impact various sectors, including transportation, manufacturing, and energy.

However, investing in Commodities also carries risks. Commodity prices are subject to high Volatility, influenced by Global economic conditions, Government Intervention, Welfare policies, Investor Behaviour, geopolitical tensions, and unexpected events (Arhan Sheth, Tulasi Sushra, Ameya Kshirsagar, and Manan Shah, 2022). Additionally, Commodities face supply and demand risks, such as disruptions in production, changes in consumer preferences, and fluctuations in Currency exchange rates (Amin Sokhanvar, Elie Bouri (2023). Understanding the Volatility of Commodity markets is crucial for producers, consumers, traders, and investors to effectively manage price risks, optimize supply chains, and make informed investment decisions (Mesias Alfeus & Christina Skilibosios Nikitopolous (2022). Hence, understanding the Volatility behavior of Commodities and Crypto Currencies is crucial for investors, market participants, and policymakers. It enables them to assess the potential risks, develop effective risk management strategies, and evaluate the suitability of these markets for diversifying investment portfolios. One approach to assessing Volatility is by examining the Returns of these markets (Isita Mukherjee & Bhaskar Goswami, 2017). Commodity Returns are typically measured by calculating the percentage change in price over a given period of time. Similarly, Crypto Currency Returns are determined by the percentage change in the value of the digital asset over a specific timeframe.

Since, the emergence of Bitcoin in 2008, many similarities of cryptocurrency and precious metals have been thoroughly examined hedging and diversity for risk assets. However, no studies have been conducted on the volatility in the cryptocurrency market might help shed light on and forecast volatility in the markets for precious metals (Raja Nabeel-ud-din-Jalal et al. 2020). The present study aims to compare the Volatility of Commodity Returns and Crypto Currency Returns and explore the relationship between Trading Volume and Returns in these markets.

LITERATURE REVIEW

Tarek Bauaz et al.(2023), Kokulo K et al.(2022), Jerina Ibrahim & Mohamad Yazis (2022), Fathi Jouini et al. (2022) look at the correlation between the returns on Bitcoin and a group of commodities and found that there is a significant relationship between bitcoin, gold, and crude oil. Bitcoin market is not isolated but is rather influenced by commodity markets in terms of return and volatility and that Bitcoin return is positively but weakly influenced by returns of crude oil, gold, silver, and wheat. Waqas Hanif et al. (2023) found that there is a strong correlation between the markets for cryptocurrencies, stocks, and commodities in terms of volatility, which varies over time in

all moments and tends to rise during periods of high uncertainty. Li Li (2023) study findings suggested a positive correlation between all the selected commodity dimensions and the economic growth of China. Chang- Che Wu et al. (2022) observed both global and national economic policy uncertainty, indicating that most national EPUs have a positive association with Bitcoin returns but a negative correlation with Bitcoin's long-term volatility. Meriyani et.al, (2022) study findings point to a connection between energy and Bitcoin, as miners utilizing energy to mine the bitcoin, then the price of Bitcoin rises correspondingly rises the price of energy. Saeed Sazzad Jeris et al. (2022) found several implications for the present state of the literature on cryptocurrency and the stock market, including study gaps and potential future research initiatives. Ghorbel et al. (2022) analysed the Connectedness with network among the major cryptocurrencies, the G7 stock indexes and the gold price over the coronavirus disease 2019 (COVID-19) pandemic period, in 2020. For a stock index portfolio, the results of static connectedness showed a higher independence between the stock markets during the COVID-19 crisis. (Seyram Pearl Kumah & Jones Odei Mensah, 2022) observed that the cryptocurrencies and crude oil have negative influence on each other at bear market but positive influence at bull market across time, signifying hedging possibilities for both assets in bear market. Mei-Yin Lin & Che-Lun-An (2021) simultaneously tested the long- and short-term asymmetries between the price of Bitcoin and resource commodity futures using the nonlinear autoregressive distributed lag method (NARDL). The uneven long-run relationship between the price of resource commodity futures and Bitcoin is confirmed by the Wald tests. Konstantinos stylianou et al. (2021) examined the network effects' use in the Crypto Currency market, and found that network effects certainly exist in crypto assets and are a key factor when determining the market shares of various Crypto Currencies.

McMorrow & Seyed Esfahan in (2021) reviewed past studies on Crypto Currencies and discovered that there were differences in an individual's intent to utilize them. The research revealed that individual perceptions of Crypto Currencies were greatly influenced by their understanding of the technology and their understanding of the risks associated with employing it. Hut Haifa alqaralleh et al. (2020) study found that all Crypto Currencies have significant Volatility dynamics, and accurate forecasting might help investors to assess every Crypto Currency's particular risk-return Characteristics. Raja Nabeel-ud-din-Jalal et al.(2020) found Bitcoin's composition and market dynamics are likely responsible for its long-term Volatility. The asymmetric information affects may occur, although this has not been proven.

Luca Barbaglia et al. (2020) identified that, significant volatility spillovers between energy and biofuel commodities, as well as between energy and agricultural commodities. Jiaqi Liang et al. (2019) found that Crypto Currencies are dynamic properties that were superior to those of traditional financial securities and that they were highly susceptible and vulnerable to market changes. Katsiampa (2019) revealed that both previous squared errors and past conditional Volatility had a major effect on the conditional variance for all of the five Crypto Currencies such as Bitcoin, Ether, Ripple, Litecoin, and Stellar Lumen. Giacarlo Giudici et al (2019) focused on the recently emerging phenomena of cryptocurrencies, for which a decentralized cryptographic system assures property and transfers of ownership. They felt that cryptocurrencies might have certain advantages and rise in value, there were solid reasons for favouring market regulation. Jose almeida, et al. (2018) in "Bitcoin Volatility: A Systematic Literature Review": with a special focus on the main sources of price Volatility, such as Trading Volume, liquidity, regulatory changes, investor state of mind, and macroeconomic data. It provides details on the cause and effect of Bitcoin Volatility. Frode Kjaeland et al. (2018) studied the variables influencing Bitcoin price fluctuation, such as speculative demand, technological advancements, and governmental actions. Pedro Chaim et al. et al. (2018) make use of high-frequency data to investigate the occurrence and features of the surges, offering light on the wildly volatile and abrupt price changes seen in Crypto Currencies. Christian et al. (2018) aimed to identify a connection between long-term Bitcoin Volatility and actual S&P 500 Volatility and found that long-term Bitcoin Volatility was negatively and highly affected by actual S&P 500 Volatility. Levent Erdas & Abdullah Emmre Caglar (2018) utilized the Hatemi-J (2012) tested the asymmetric causal relationships between Bitcoin, US dollar, gold, Brent oil, S&P 500, and BIST 100 Indices. Results revealed a causal link between the price of bitcoin and the S&P 500 Index. Lansky (2016) thrown light on the characteristics of the Crypto Currency industry and its potential as a sound investment option and revealed the investors are to be familiar cautious about the volatility and the factors influence the price development before making investment.

Research gap

Though there are studies on commodity markets and cryptocurrencies, they have focused only on Bitcoin from the crypto currency market and commodities like crude oil, gold, and natural gas to analyze market interdependency and volatility. They have not explored other currencies such as Ethereum, Litecoin, Ethereum Classic, IOTA, XRP, Dogecoin, Tether, USD coin, BNB, Binance USD, Cardano, Polygon, and Dai extensively. Analyzing the relationship between major commodities and cryptocurrency returns is pivotal for discerning cross-market dynamics and investment diversification. Hence a crucial need emerges for a more expansive analysis encompassing a broader spectrum of cryptocurrencies and commodities. By extending beyond isolated comparisons, the present study aims to provide deeper insights into the multifaceted nature of volatility and relationship between cryptocurrency and commodity markets, offering valuable contributions to both academic research and practical applications for investors and policymakers.

Objectives

- To measure the volatile behaviour of Crypto Currency Returns
- To measure the volatile behaviour of Commodity Returns
- To analyse the relation between Crypto Currency Trading Volume and Crypto Currency Returns.
- To analyse the relation between Commodity Trading Volume and Commodity Returns
- To explore the relationship between major Commodities and Crypto Currency Returns

MATERIALS AND METHODS

In this study, Crypto Currencies including as Bitcoin, Ethereum, Litecoin, Ethereum Classic, IOTA, XRP, Dogecoin, Tether, USD coin, BNB, Binance USD, Cardano, Polygon, and Dai are chosen to focus on Commodities like gold and crude oil. Data on daily values for all the above variables are obtained from www. Yahoo.com for a period of 6years i. e from 2017 to February 2023. The gathered data is analysed by using statistical tools namely ARCH, Correlation by Co-integration Test, and Granger Causality Test. In order to examine Volatility for long-term data of Commodities and Crypto Currencies, ARCH models are appropriately used. The Co-integration test also used to examine the Correlation between two or more variables in time series data over the long term. Granger Causality was applied to the time series data to analyse the connection between two variables.

RESULTS AND DISCUSSIONS

Table 1: Descriptive Statistics of Crypto Currency Market

S. No	Crypto Currency	Mean	MAX	MIN	SD	Var
1	Bitcoin	0.00225	0.2524717	-0.3717	0.04044	0.00164
2	Ethereum	0.00386	0.336601	-0.4235	0.05433	0.00295
3	Litecoin	0.00311	0.6658711	-0.3617	0.05954	0.00354
4	Ethereum Classic	0.00223	0.4225098	-0.3982	0.06363	0.00405
5	IOTA US Dollar	0.00168	0.4692702	-0.4193	0.06476	0.00419
6	XRP US Dollar	0.00235	0.8347079	-0.4233	0.06612	0.00437
7	Dogecoin	0.00572	3.5554665	-0.4026	0.11017	0.01214
8	Tether	0.00057	0.05821716	-0.5125	0.00444	0.0002
9	USD Coin	0.00053	0.04335231	-0.0365	0.00365	0.00013
10	BNB	0.00435	0.6976471	-0.4189	0.05999	0.0036
11	Binance	0.00048	0.05514337	-0.0563	0.00345	0.00012
12	Cardano	0.00369	1.336681	-0.3957	0.07395	0.00547
13	Polygon	0.00764	0.6422764	-0.5112	0.08621	0.00743
14	Dai USD	0.00317	0.6422764	-0.0865	0.00713	0.00051

The above table 1, reveals volatility and stability of various cryptocurrencies. Bitcoin has a positive mean and relatively low standard deviation, indicating moderate variability around the mean and indicating substantial fluctuations. Ethereum has a positive mean with slightly higher variability than Bitcoin and have significant fluctuations between the maximum and minimum values. Dogecoin has a notably higher mean compared to others and shows significant variability with a considerable range between the maximum and minimum values. Tether and USD Coin have means close to zero, indicating stability in their value with minimal fluctuations. Their standard deviations and Max and Min ranges are comparatively very low, suggesting stability in their values. Polygon shows a relatively high mean and standard deviation and indicating substantial fluctuations. Dai USD shows a positive mean with a low standard deviation, implying moderate variability around the mean. Higher mean values often hint at potential higher returns but are accompanied by increased volatility, making them riskier. Investors seeking stability might favor stablecoins, while those open to risk might explore the potential of more volatile cryptocurrencies like Dogecoin or Polygon.

Table 2: Descriptive Statistics of Commodity Market

S. No	Commodity	Mean	MAX	MIN	SD	Var
1	Gold	0.00034	0.059477	-0.0498	0.00922	0.0085
2	Crude Oil	-0.0017	0.376623	-3.0597	0.09006	0.00811

The above table 2 presents that Gold appears to have a relatively stable performance. The standard deviation and variance show moderate variability around the mean. Maximum value and minimum values are also within a certain range. Crude Oil shows more volatility and extreme fluctuations. The standard deviation and variance are larger than those of Gold, indicating more variability and spread in its values and maximum and minimum values indicating extreme highs and lows. It reveals that Gold might be a more stable and safe investment due to its relatively stable performance whereas Crude Oil might offer higher potential returns but carries higher risk due to its volatility, making it more suitable for investors comfortable with higher risk levels.

Ho_1: There is no volatile behaviour of Crypto Currency Returns

Ha_1: There is a volatile behaviour of Crypto Currency Returns

A crucial need emerges for a more expansive analysis encompassing a broader spectrum of cryptocurrencies and commodities. By extending beyond isolated comparisons, this study aims to provide deeper insights into the multifaceted nature of volatility and relationship between cryptocurrency and commodity markets, offering valuable contributions to both academic research and practical applications for investors and policymakers.

Table 3: ARCH Test results for volatile behaviour of Crypto Currency Returns

S. No	**Crypto Currency**	**P-value**
1	Bitcoin	0.0000693
2	Ethereum	0
3	Litecoin	0.00000102
4	Ethereum Classic	0
5	IOTA US Dollar	0
6	XRP US Dollar	0
7	Dogecoin	0
8	Tether	0.0000114
9	USD Coin	0
10	BNB	0
11	Binance	0.00023
12	Cardano	0.0000149
13	Polygon	0
14	Dai USD	0

As per the above table 3, P-value of 0 (Bitcoin, Ethereum, Ethereum Classic, IOTA US Dollar, XRP US Dollar, Dogecoin, USD Coin, BNB, Polygon, Dai USD) indicates that returns of these cryptocurrencies significantly deviate from a stable, non-volatile state. Which tells they have significant volatility in their returns. Whereas Non-zero but very small P-values (Litecoin, Tether, Cardano, Binance) shows that the returns of these cryptocurrencies also significantly deviate from stability and exhibit noteworthy volatility. It implies that nearly all listed cryptocurrencies, marked by either a P-value of 0 or close to it, exhibit statistically significant fluctuations and volatile behaviour of Crypto Currency Returns challenging the notion of stability and urging caution among investors due to the pronounced volatility in their returns.

Ho_2: There is no volatile behaviour of Commodity Returns

Ha_2: There is volatile behaviour of Commodity Returns

Table 4: ARCH Test results for volatile behaviour of Commodity Returns

S. No	Commodities	p-value
1	Gold	0
2	Crude Oil	0

p-value from the above table 4 is 0 from the ARCH test for both Gold and Crude Oil commodity returns indicates strong evidence against the null hypothesis of no ARCH effects. In brief, it suggests that these commodity returns exhibit significant volatility in their returns over time. This volatility clustering should be considered by investors or analysts due to the non-uniform variance, potentially influencing risk and investment strategies in these commodities.

Table 5: GARCH Test results for volatile behaviour of Crypto Currency and Commodity Returns

S. No	Crypto Currency	P-value
1	Bitcoin	0.000002
2	Ethereum	0.000002
3	Litecoin	0.000002
4	Ethereum Classic	0.000002
5	IOTA US Dollar	0.000002
6	XRP US Dollar	0.000002
7	Dogecoin	0.000002
8	Tether	0.000002
9	USD Coin	0.000002
10	BNB	0.000002
11	Binance	0.000002
12	Cardano	0.000002
13	Polygon	0.000002
14	Dai USD	0.000002
S. No	Commodity	P-value
1	Gold	0.000002
2	Crude Oil	0.000002

Table no 5, GARCH (Generalized Autoregressive Conditional Heteroskedasticity) test, similar to ARCH, examines volatility clustering but with a more complex model that considers both past variances and past error terms. In the above table, both the cryptocurrencies and commodities exhibit extremely low p-values (0.000002) from the GARCH test, indicating strong evidence against the null hypothesis of no GARCH effects. For both cryptocurrencies (Bitcoin, Ethereum, Litecoin, etc.) and commodities (Gold, Crude Oil), these low p-values suggest substantial evidence of volatility in their returns.

Correlation by Co-integration test

Ho_3: There is no relation between Crypto Currency Trading Volume and Crypto Currency Returns.

H_3: There is a relation between Crypto Currency Trading Volume and Crypto Currency Returns

Table 6: Correlation by co-integration test results for Crypto Currency Trading Volume and Crypto Currency Returns

S. No	Crypto Currency	p-value	Normality	Co-integration	ADF Test	PO. TEST
1	Bitcoin	0.0000022	Not Normal	0.2415	0.02407	0.01
2	Ethereum	0.0000022	Not Normal	0.249	0.07403	0.01
3	Litecoin	0.0000022	Not Normal	0.6932	0.08682	0.01
4	Ethereum Classic	0.0000022	Not Normal	0.000001637	0.01	0.01
5	IOTA US Dollar	0.0000022	Not Normal	0.000000022	0.01	0.01
6	XRP US Dollar	0.0000022	Not Normal	0.00004726	0.01	0.01
7	Dogecoin	0.0000022	Not Normal	0.00000022	0.01	0.01
8	Tether	0.0000022	Not Normal	0.6932	0.08682	0.01
9	USD Coin	0.0000022	Not Normal	0.9692	0.01	0.01
10	BNB	0.0000022	Not Normal	0.00002972	0.02036	0.01
11	Binance	0.0000022	Not Normal	0.7969	0.01	0.01
12	Cardano	0.0000022	Not Normal	0.001681	0.02072	0.01
13	Polygon	0.0000022	Not Normal	0.00001488	0.01	0.01
14	Dai USD	0.0000022	Not Normal	0.8419	0.01	0.01

Table no 6 shows the Correlation by cointegration test which indicates the correlation between two variables in the long-run in time series data. The above table containing several statistical results, including p-values, normality test, co-integration tests, ADF (Augmented Dickey-Fuller) test, and PO. (Phillips-Ouliaris) test for the relationship between cryptocurrency trading volume and cryptocurrency returns for various cryptocurrencies. All cryptocurrencies have identical p-values (0.0000022), which might indicate strong evidence against some null hypotheses, possibly related to the relationship between trading volume and returns. Most cryptocurrencies exhibit co-integration between trading volume and returns, indicated by the values (e.g., 0.01). Co-integration implies a long-term relationship between the variables despite short-term fluctuations. The values from ADF Test and PO. Test (e.g., 0.01) might represent significance levels or critical values for accepting or rejecting the null hypothesis. Hence it can be said that there's evidence of a long-term relationship (co-integration) between trading volume and returns for most cryptocurrencies.

Ho_4: There is no relation between Commodity Trading Volume and Commodity Returns

Ha_4: There is a relation between Commodity Trading Volume and Commodity Returns

Table 7: Correlation by co-integration test results for Commodity Trading Volume and Commodity Returns

S. No	Commodity	P-value	Normality	Co-integration	ADF Test	Po. Test
1	Gold	0.0000022	Not Normal	0.2275	0.01	0.01
2	Crude Oil	0.0000022	Not Normal	0.005743	0.01	0.01

As per the Correlation by co-integration test in table no 7, the p values for both Gold and Crude Oil exhibit the same p-value (0.0000022), suggesting strong evidence against certain null hypotheses related to the relationship between trading volume and returns. This indicates significance in the relationship between the two variables. Both Gold and Crude Oil display co-integration between trading volume and returns, indicated by the values (e.g., 0.01). This suggests a long-term relationship between the variables despite short-term fluctuations. The values from ADF Test and Po. Test (e.g., 0.01) might represent significance levels or critical values for accepting or rejecting the null hypothesis. In brief there is a significant relationship and co-movement between Commodity Trading Volume and Commodity Returns for both Gold and Crude Oil.

Granger causality test

Ho_5: There is no relationship between major Commodities and Crypto Currency

Ha_5: There is a relationship between major Commodities and Crypto Currency

Table 8: Granger causality test results for relationship between major Commodities and Crypto Currency

S. No	Crypto Currency	P-value
1	Bitcoin	0.4388
2	Ethereum	0.9538
3	Litecoin	0.9289
4	Ethereum Classic	0.3238
5	IOTA US Dollar	0.5023
6	XRP US Dollar	0.5955
7	Dogecoin	0.1052
8	Tether	0.5594
9	USD Coin	0.1495
10	BNB	0.9591
11	Binance	0.9031
12	Cardano	0.7238
13	Polygon	0.9709
14	Dai USD	0.9072

In table 8, Granger Causality test is used to explore the potential causality between the commodity market and the cryptocurrency market and the analysis indicates an absence of causality. Specifically, the results suggest that commodities do not exert a significant causal influence on the cryptocurrency market. Moreover, within the cryptocurrency market itself, the Granger Causality test identifies BNB as having the highest value, indicating a relatively stronger potential influence, while Dogecoin exhibits the lowest value, implying a comparatively weaker causal relationship. Consequently, these findings explain that commodities do not have a causal effect on the cryptocurrency market, while variations within the cryptocurrency market itself may exhibit differential degrees of influence or interrelationships.

FINDINGS

Most cryptocurrencies displayed substantial deviations from stability, potentially indicating higher risk and fluctuation in their returns. GARCH Test for Crypto Currencies and Commodities suggested that there is strong evidence of volatility in their returns. This implies that these assets tend to have periods of high volatility followed by other periods of high volatility, despite short-term fluctuations. As per Granger Causality Test between Commodities and Crypto Currencies, Higher p-values for most cryptocurrencies indicated insufficient evidence to support a significant relationship between major cryptocurrencies and major commodities. Dogecoin showed a slightly lower p-value, hinting at a potential but not definitive relationship with major commodities. Overall, the present study revealed significant volatility in crypto returns and long-term relationships between trading volume and returns for both cryptocurrencies and commodities, but found limited evidence for a strong directional causal link between major cryptocurrencies and major commodities.

CONCLUSION

The aim of this paper is to forecast the Volatility of both the Commodity and Crypto Currency markets using ARCH and GARCH models. The study includes several Crypto Currencies such as Bitcoin, Ethereum, Ethereum Classical, Litecoin, Dogecoin, IOTA, Tether, USD, XRP, BNB, Binance, Cardano, Polygon, and Dai, as well as Gold and Crude Oil. The results indicate that all the Crypto Currencies and Commodities have a high level of Volatility. In addition to Volatility, the study also examined the relationship between Volume and Returns for each Commodity and Crypto Currency. The co-integration test indicates that the correlation between Volume and Returns for Ethereum, Litecoin, and Tether is very highly positive, while Gold does not have any effect on any Crypto Currency. This suggests that these three Crypto Currencies are more susceptible to changes in Trading Volume compared to the other Crypto Currencies and Commodities. The use of ARCH and GARCH models in forecasting market Volatility can provide valuable insights for investors in the Commodity and Crypto Currency markets. The high P values of Bit coin , Ethereum, Litecoin, IOTA USD, XRP USD, Tether , BNB, Binance, Cardano, Polygon, Dai USD shows that they do not have a granger Causal relationship with major commodities. Their returns do not have a significant influence on commodity market movements. USD coin, Dogecoin stands with a relatively lower p value may have a slight possibility of influence compared to other crypto currencies. This shows that most of cryptocurrencies except potentially Dogecoin and USD Coin exhibit high p-values, implying a lack of significant predictive influence on major commodity market movements. These findings suggest a limited or non-existent directional causal relationship between most major cryptocurrencies and major commodities. By understanding the level of Volatility and the relationship between crypto currency and commodity markets, investors can better manage their risk and make informed investment decisions.

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