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Effect of Commodities on the Cryptocurrency Market – A Study Based on Crude Oil, Gold, and CIX100

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***Abstract*: Cryptocurrency is a digital currency. Like the stock market, it is also volatile. Crude oil and gold are leading macroeconomic factors which affect the stock market. As cryptocurrency is also very famous nowadays; so, the time has also come to know whether crude oil and gold affect cryptocurrency like the stock market. A statistical study is conducted to know the significant relationship between cryptocurrency, crude oil, and gold.**

***Keywords*: Cryptocurrency, Crude oil, Gold.**

1. Introduction

Cryptocurrencies refer to digital currencies, made of Blockchain Technology, and have no physical existence. The term becomes famous nowadays. People are getting attracted by it day by day. Like Stock Market, it is not regulated by any government, and it has no exchanges (like BSE, NYSE for the stock market); but by one similarity it tries to run in the same ground where the stock market has been running through, is 'Capital Gain returns.' While it is trying to run through the ground of the stock market, does the macroeconomic effect touch its volatility? This study will try to understand this question based on crude oil and gold prices.

2. Review of Literature

Bitcoin started its journey as the first concept of Cryptocurrency in 2009 with an open-source software algorithm connected to a global internet connection (Ciaian, Rajcaniova, & Kancs, 2016). Cryptocurrencies do not have any official currency status from the government (Gozbasi, Altinoz, & Sahin, 2021). Crude Oil prices and gold prices are two major leading macroeconomic factors. When crude oil price leads to a change in the general price level, this may further lead to a change in the price of Bitcoin (Ciaian, Rajcaniova, & Kancs, 2016). As the oil price affects the cryptocurrency market, the gold price also affects that market. Gold price negatively affects the demand for cryptocurrency and it's most influential on cryptocurrency integration. (Ji, Bouri, Lau, & Roubaud, 2019). It's further found that negative pairs are there between bitcoin-gold and bitcoin-oil (Yousaf, Ali, Bouri, & Saeed, 2022). This study will verify whether these findings have statistical correctness and the exact relationship of oil and gold with cryptocurrency.

3. Data and Methodology

A. Dataset

For cryptocurrency, CIX100 (crypto index) is taken which is available from July 2019 onwards in Yahoo Finance. Weekly data from July 2019 to October 2022 are taken into account for CIX100, Crude Oil, and gold prices. 173 samples are taken.

B. Methodology

This study is generally concerned with the effect of Crude Oil and Gold's capital gain returns which are independent variables on cryptocurrency's capital gain returns based on CIX100 which is a dependent variable.

A linear regression model is constructed based on these three variables:

$$CC_t = \beta_0 + \beta_{10t} + \beta_2 G_t + \varepsilon_t$$

Where, C_t, O_t, and G_t are Capital Gain Returns of CIX100, Crude oil, and Gold respectively for the time 't'. β_0 is the intercept, β_1 and β_2 are the coefficients of Crude oil and Gold returns respectively. ε_t is the random error for time 't'.

Furthermore, the above regression model is tested for its statistical significance using the following hypothesis:

H_0: The model is insignificant, i.e., $\beta_i = 0$

H_1: The model is significant, i.e., $\beta_i \neq 0$

Where β_i is the intercept and coefficients for observations 'i'.

Along with this regression, Pearson's Bivariate correlation and Partial correlation are also found and tested for their statistical significance using the following hypothesis:

H_0: The coefficient of correlation is insignificant.

H_1: The coefficient of correlation is significant.

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4. Empirical Results

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.125	2	.062	1.028	.360[b]
	Residual	10.295	170	.061		
	Total	10.419	172			

a. Dependent Variable: CIX

b. Predictors: (Constant), Gold, Crude

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	.004	.019		.236	.814
	Crude	.304	.256	.092	1.187	.237
	Gold	.495	.829	.046	.596	.552

a. Dependent Variable: CIX

The ANOVA table shows the significance of the Regression model. Here, the P value is 0.360 which is greater than 0.05; so, at 5% level of significance, we accept the Null Hypothesis, and the regression model is found to be statistically insignificant. In the coefficients part, all the coefficients for constant, crude oil, and gold are also statistically insignificant at 5% level as the P values are 0.814, 0.237, and 0.552 which are all greater than 0.05.

Correlations

Correlations

		CIX	Crude	Gold
CIX	Pearson Correlation	1	.099	.061
	Sig. (2-tailed)		.193	.423
	N	173	173	173
Crude	Pearson Correlation	.099	1	.166*
	Sig. (2-tailed)	.193		.029
	N	173	173	173
Gold	Pearson Correlation	.061	.166*	1
	Sig. (2-tailed)	.423	.029	
	N	173	173	173

*. Correlation is significant at the 0.05 level (2-tailed).

In this correlation part, the coefficient between CIX100 and crude oil is 0.099, and the P value is 0.193. The coefficient between CIX100 and gold is 0.061 and the P value is 0.423.

Partial Corr

Correlations

Control Variables			CIX	Crude
Gold	CIX	Correlation	1.000	.091
		Significance (2-tailed)	.	.237
		df	0	170
	Crude	Correlation	.091	1.000
		Significance (2-tailed)	.237	.
		df	170	0

Partial Corr

Correlations

Control Variables			CIX	Gold
Crude	CIX	Correlation	1.000	.046
		Significance (2-tailed)	.	.552
		df	0	170
	Gold	Correlation	.046	1.000
		Significance (2-tailed)	.552	.
		df	170	0

These two Partial correlation tables show the coefficient between CIX100 and crude oil keeping gold as a constant is 0.091 and the P value is 0.237, and the coefficient between CIX100 and gold keeping crude oil as a constant is 0.046 and the P value is 0.552. These all-significance values of correlation and partial correlation table are greater than 0.05. At 5% level, all coefficients are statistically insignificant.

5. Conclusion

From the all-statistical tests, it can be exposed that crude oil and gold generally don't have any significant effect on Cryptocurrency as all the found P values are greater than critical values and the Null hypothesis failed to be rejected for all cases. The Regression model which was constructed to know the effect of crude oil and gold on cryptocurrency is insignificant; the correlation coefficients between CIX100 and gold and also crude oil are insignificant too. Some researchers have opined about the significant effect of commodity goods like crude oil and gold on cryptocurrency as discussed earlier, but this study has statistically shown that all those statements can be rejected.

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