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GLOBAL BITCOIN CRYPTOCURRENCY VOLATILITY
PERFORMANCE: ANALYSIS OF 10 COUNTRIES IN EMERGING
MARKET

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Abstract

The issue of high-frequency trade for bitcoin as a digital currency is considered still new in global cryptocurrency market. This instrument was traded using a block chain which is transparent to all public trader based on cryptocurrency system. Throughout, this study is motivated to investigate the volatility performance from the movement of closing price and trading volume of Bitcoin traded in 10 countries. Secondary data are used for the last trading in year 2018 based on available data for each of the country's cryptocurrency tickers traded accordingly represented N=135. The results revealed that the volatility performance have a significant relationship towards its independent variables for country and ticker. Besides, the finding also suggesting that price is dynamic and progresses significantly over time and in overall there are also significant mean different for closing price and trading volume across country. Therefore, from the investors, investment analysts and managers' perspective, this study will help to value the optimal pricing issue and their investment decisions.

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Keywords: Bitcoin, country, closing price, trading volume, volatility.

1. Introduction

The existence of the Bitcoin trading in 2009 by the enigmatic person named Satoshi Nakamoto. The Bitcoin terminology is derived from two words blended into one, bit and coin. The notion behind the Bitcoin creation is the fast money transfer with less or without transaction fees. In Malaysia, Bitcoin is still new instrument to trade even in year 2014 it still did not get any approval from the Malaysian central bank – Bank Negara Malaysia (BNM). However, in 2017, our BNM considered to revise the procedures and Bitcoin system to be traded. Until now, there is no news to this approval even there are 10 crypto tickers were trading according to Bitcoinmalaysia.com.

According to a series of studies by Brandvold et al. (2015) and Dyhrberg et al. (2018), Bitcoin is defined as a cryptocurrency system in global market exchanges. However, in terms of regulatory and policy mechanisms, it still underregulated in many countries including Malaysia as well. Subsequently, even though Bitcoin is a global currency; its price can vary around the world (Holub & Johnson, 2018). Moreover, Narayanan et al. (2016) in their book mentioned that the trading procedures to tackle the transparency and integrity values is required to be highlighted and enforcements by regulations. Brandvold et al. (2015) argued that the element of pellucidity is important for Bitcoin trading since it was traded by using a transparent code.

According to Gandal and Halaburda (2014), they stated that, cryptocurrency price to the dollar alternately use of bitcoin as the common for comparison because of statistics of frictions in the transactions among cryptocurrencies and the national ordinance money in order to more efficient market and less volatile. Besides that, Aggarwal and Wu (2003) also investigated about the price manipulation of stock. They revealed that small and illiquid stocks are exposed to manipulation. There will be an increase in stock price, volume and volatility when there is illegal manipulation period. There are more than 800 cryptocurrencies are available as illiquid and characterized by very low volumes. Kajtazi and Moro (2018) stated that the advantage of inclusion is connected to the gain in the return that reward for the increase in the risk of the portfolio. A clearer understanding of the performance is played by bitcoin's large volatility and its rise in the value which can allow for a better authority of bitcoin as an asset.

Brauneis and Mestel (2018) investigated that bitcoin is not weakly efficient but contribute to become efficient in the second half subsample. To understand more about the basic drivers of the efficiency, the existing literature had been extended by identifying the turnover ratio as an estimate of liquidity to positively influence the efficiency while the measure of bid-ask spread demonstrate the expected negative impact regarding efficiency and market capitalization which alternate for size relates positively to efficiency. Thus, the trending price at its lowest from 14 December 2018 until 18 December 2018 compared to other days. The pattern for this crypto ticker had increased from 7 January 2019, and then dropped again on 11 January 2018. The fall was more dramatic and rapid and it has taken more than three years for bitcoin to match the progress during this period (Gandal et al., 2018).

The rest of the paper is structure as follows. The next section highlights the main issues in bitcoin to derive the problem statement. Next, the discussion of data and research methodology followed by the result analysis and finally the conclusion and policy implications.

2. Problem Statement

Even though, Malaysia is still under consideration to approve the Bitcoin trading, we have a body that managed the transaction called BitcoinMalaysia.com which is possessed by admin AT bitcoinmalaysia.com. According to this owner, the Bitcoin is a computer-generated and simulated currency that upsurges in value even the capping of this coin is only 21 million. They claimed that there are several major advantages of using Bitcoin such as zero fees to transfer money, transfers are instant, workings worldwide, no boundaries and limitations, allows the allocation of capital with no counter-party risk, ability to transfer about investment controls, and anybody can trade Bitcoin by generate their own account user and crate a e-wallet. However, the drawbacks include sharp erudition arc, entails own obligation in monitoring and more important is the value fluctuates and is relatively volatile. Therefore, Bitcoin prices as well as trading volume and volatility issue is become a systematic risk to the market player that requires investigating further on their performance as well as the consent of the Muslim towards the shariah compliant to involve and as a landmark in Islamic eschatology for future currency.

3. Research Questions

Two main research questions can be asked to achieve the research objectives as follows:

- 3.1.** Do the closing price, country and ticker of global bitcoin traded have any relationship with the trading volume?
- 3.2.** Is there any significant mean difference for bitcoin's closing price and trading volume across 10 countries?

4. Purpose of the Study

Considering the issues raised in the preceding section, this study focuses on the relationship between Bitcoin's independent with volatility performance by considering crypto ticker traded in 10 countries as a control variables. Furthermore, this study is aim to analyse a Post Hoc comparison of mean performance for closing price and trading volume for each of the selected country respectively. The research objectives are summarised as follows:

- 4.1.** To examine the relationship between global bitcoin's closing price, country and ticker with trading volume as a volatility performance in cryptocurrency market.
- 4.2.** To investigate the significant mean different for bitcoin's closing price and trading volume across 10 countries.

5. Research Methods

Secondary data are utilized in this study. The data collected from the bitcoin website of the country respectively from crypto ticker's website from the country origin for the end period traded in 2018. Stata are utilized for this unbalanced data observations total of 135 from 10 countries, including Malaysia, Australia, China, Canada, UK, New Zealand, US, Hungary, India and Singapore. In this study, there are two main variables, and the proxies that represent the both variables as shown in table 01 below:

Table 01. Dependent and Independent Variables

| Variables | Proxies |
|---|---|
| Dependent Bitcoin’s Volatility Performance | <ul style="list-style-type: none"> • Trading Volume by crypto ticker for each of country |
| Independent <ul style="list-style-type: none"> • Closing Price • Ticker • Country | <ul style="list-style-type: none"> • Last Price traded in 2018 • Number of crypto ticker traded in the country • Refer to country code, 1.Malaysia, 2. Australia, 3.China, 4.Canada, 5.UK, 6.New Zealand, 7.US, 8.Hungary, 9.India and 10.Singapore. |

Therefore, the hypothesis of the study can be explained as follows:

H1: There is a relationship between global bitcoin’s closing price, country and ticker with trading volume as a volatility performance in cryptocurrency market.

H2: There is a significant mean different for bitcoin’s closing price and trading volume across 10 countries.

5.1. Robust Regression

This research study is tested the relationship between Bitcoin of crypto tickers’ performance and price changes. Thus, robust regression model be applied. It also probably can be tested by using STATA software for further analyze on the fixed and random effect of such equation model relationships. This model is established based on trading volume for each of the crypto ticker for each of the country respectively.

The ordinary least square model has preserved standard error by using identically and autonomously dispersed conflicts that are uncorrelated with the correlations of standard error for independent variables. In this case, the data can be pooled, and OLS can be used to estimate the model with denoting the estimator of the slope. The intercept and slope coefficients are constant across N and T represented by tranche issuances of each issuer which postulates that both the intercept and the slope are the same across observations. The robust regression model equations can be signified as belows:

$$\text{Volatility} = \alpha + \beta_1 \ln\text{Price} + \beta_2 \text{Ticker} + \beta_3 \text{Country} + \varepsilon_{it, \text{robust}} \dots \dots \dots (1)$$

Where:

Volatility = log of trading volume for each of the country’s ticker respectively.

a = intercept

lnPrice = log in closing price for each of the country’s ticker respectively.

Country = refers to country code proxies as presented in Table 01, and

E = error term.

5.2. Scheffe Approach for Post Hoc Test Comparisons

Scheffé's method or approach consider established of estimations of all potential disparities amongst the average of factor level (means), not just the pairwise disparities considered by other techniques like

Tukey's method. The synchronised confidence factor is closely $1-\alpha$, whether the factor level sample sizes are equal or unequal. The Scheffé confidence interval procedure that generates simultaneous intervals for all contrasts is considerably wider. Therefore, Scheffe's test is one of the most stringent adjustments that can used to decrease experiment wise error rates when testing multiple comparisons. This means that each pairwise comparison has to have the same significance as the variance for all comparisons when using Scheffé's test. An arbitrary contrast is defined by this study for such evaluation analysis is a below:

$$\text{Scheffé: } 0.95 < \mu_2 - \mu_1 < 5.49$$

Where; μ refers to the set of estimates of all possible contrasts among the factor level means.

6. Findings

6.1. The Descriptive Statistics Analysis

From the Table 02, we can see that most of the country's crypto ticker had issue for 15.607 million of bitcoin as represented by mean value. Otherwise, the volume can be drop until they have negative online wallet (min= -0.958) even sometimes they pooled the cryptocurrency up to maximum level of 26.191. With respect to the closing price, there are significantly huge different between the value of mean, min and max as shown in table 01 whereas the risk level represented by standard deviation (only at 3.988) is at low to moderate level for the risk adverse investors to trade. With regards to the country and ticker involved, there are maximum 10 countries have been analyse with 50 tickers whereby Canada become a dominant of bitcoin issuer at mean value of 5.274 and 13.200 respectively.

Table 02. The Descriptive Statistical Results

| Variable | Mean | Std. Dev. | Min | Max |
|----------------|--------|-----------|--------|--------|
| Trading Volume | 15.607 | 7.060 | -0.958 | 26.191 |
| Closing Price | 15.607 | 3.988 | -7.601 | 23.762 |
| Country | 5.274 | 2.520 | 1 | 10 |
| Ticker | 13.200 | 13.270 | 1 | 50 |

6.2. The Robust Regression Analysis on the Global Volatility Performance

The relationship between trading volume and its independent variables was reported in Table 03. Multi-collinearity test is run to test the variance of inflationary factor (VIF) and its tolerance (1/VIF) for all independent variables in the robust regression models. Based on the previous study by Williams (2015) and Nguyen et al. (2015), they mentioned that the normal VIFs supposedly 10 or higher. Justifying that, those result was shown the value of VIF is 10 or more requires to be revised since it was reveal about the issue of the incidence of multi-collinearity problematic. From the result, the entire variables show that the mean values for VIF are reported below 10. The result implying that there is no multi-collinearity problem for the data used.

Table 03. The Robust Regression and Multicollinearity Results

| Variable | Coefficient | Std. Err. | t-value | P>t | [95% Conf. Interval] | | VIF | 1/VIF |
|---------------|-------------|-----------|---------|-------|----------------------|--------|-------|-------|
| lnPrice | 0.201 | 0.137 | 1.470 | 0.144 | -0.070 | 0.471 | 1.020 | 0.984 |
| Country | -1.078 | 0.223 | -4.850 | 0.000 | -1.518 | -0.638 | 1.080 | 0.929 |
| Ticker | 0.112 | 0.042 | 2.640 | 0.009 | 0.028 | 0.195 | 1.080 | 0.930 |
| _cons | 19.574 | 1.520 | 12.870 | 0.000 | 16.566 | 22.582 | | |
| Fixed Effect | No | | | | | | | |
| Random Effect | No | | | | | | | |
| Mean VIF | 1.060 | | | | | | | |
| F-value | 13.22*** | | | | | | | |
| R-squared | 0.232 | | | | | | | |
| Adj R-squared | 0.215 | | | | | | | |
| N | 135 | | | | | | | |

Next, the study also revealed a validity results as represented by F-statistics and R square to ensure that the development of the model is best-fit in explaining such relationship. Firstly, as regards to the F-statistics (13.22), the model is valid at 99% confidence level, suggesting that the association revealed by the model estimation equation for variables towards bitcoin trading volume. Secondly, R-square is reported at 23.20% and adjusted R-squared at 21.50% explains a somewhat not so strong relationship because around 21 to 23% of the deviation in volatility' performance is clarified by the deviation in the closing price, country and ticker variables in issuances.

The findings from the robust regression shows that there is a significant relationship at 99% confidence level between volatility performance with their indicators as represented by p-value of -4.850 and 2.640 by country and tickers respectively. Thus, hypothesis 1 is failed to be rejected. Since, the robust regression is dynamic to show the relationship for volatility performance, the result for other model like fixed effect model and random effect model generated by Stata are no effects.

6.3. The Result of Post Hoc Test Comparison of Bitcoin's Closing Price by Country using Scheffe Approach

In Table 04, the acquired means on the rows and columns and detracted changes between each pair of means in the central compartments making a table of total mean differences to use in assessing the post hoc tests. Scheffé post hoc comparisons showed all means were significantly different, $p < .05$ (two-tailed) majorities for the volatility proxy by Panel B for 22 pairwise comparisons however, only 2 unique pairs have showed a significant level in Panel A. As a conclusion, Scheffé post hoc comparisons showed that weight gain was higher in the trading volume and closing price whereby the superior country belongs to Singapore and Hungary (significant pair to trading volume) and Australia and China (significant pair to closing price). Therefore, the hypothesis 2 is failed to be rejected for both panels.

Table 04. The Results of Post Hoc Test Comparison using Scheffe Approach

Panel A: Post Hoc Test Comparison of Bitcoin's Closing Price by Country using Scheffe Approach

| Row Mean-Col Mean | 1-Malaysia | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---------------------|-----------------|----------------|----------------|-----------------|-----------------|----------------|-----------------|-----------------|-----------------|
| 2-Australia | -7.127 0.056 | | | | | | | | |
| 3-China | -5.806 0.485 | 1.321 1.000 | | | | | | | |
| 4-Canada | -3.091 0.732 | 4.036 0.485 | 2.715 0.978 | | | | | | |
| 5-UK | -2.806 0.998 | 4.321 0.958 | 3.000 0.998 | 0.285 1.000 | | | | | |
| 6-NZ | -5.042 0.249 | 2.084 0.995 | 0.763 1.000 | -1.952 0.947 | -2.237 0.999 | | | | |
| 7-US | -1.870 0.996 | 5.257 0.289 | 3.935 0.878 | 1.221 0.998 | 0.936 1.000 | 3.172 0.762 | | | |
| 8-Hungary | -1.127 1.000 | 6.000 0.217 | 4.678 0.781 | 1.964 0.981 | 1.679 1.000 | 3.915 0.637 | 0.743 1.000 | | |
| 9-India | 0.275 1.000 | 7.402 0.049 | 6.080 0.440 | 3.365 0.680 | 3.081 0.996 | 5.317 0.220 | 2.145 0.991 | 1.402 1.000 | |
| 10-Singapore | -3.995 0.730 | 3.132 0.948 | 1.811 1.000 | -0.904 1.000 | -1.189 1.000 | 1.048 1.000 | -2.125 0.990 | -2.868 0.957 | -4.269 0.680 |

Panel B: Post Hoc Test Comparison of Bitcoin's Trading Volume by Country using Scheffe Approach

| Row Mean-Col Mean | 1-Malaysia | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---------------------|------------------|-----------------|------------------|------------------|------------------|------------------|------------------|-----------------|------------------|
| 2-Australia | -11.278 0.000 | | | | | | | | |
| 3-China | -3.941 0.790 | 7.336 0.052 | | | | | | | |
| 4-Canada | -0.101 1.000 | 11.177 0.000 | 3.840 0.631 | | | | | | |
| 5-UK | -6.179 0.419 | 5.099 0.740 | -2.237 0.999 | -6.078 0.286 | | | | | |
| 6-NZ | -2.019 0.977 | 9.258 0.000 | 1.922 0.997 | -1.918 0.874 | 4.159 0.868 | | | | |
| 7-US | -2.210 0.959 | 9.067 0.000 | 1.731 0.999 | -2.110 0.794 | 3.968 0.898 | -0.191 1.000 | | | |
| 8-Hungary | -17.564 0.000 | -6.286 0.038 | -13.622 0.000 | -17.463 0.000 | -11.385 0.001 | -15.545 0.000 | -15.353 0.000 | | |
| 9-India | 1.138 1.000 | 12.415 0.000 | 5.079 0.468 | 1.239 0.999 | 7.317 0.191 | 3.157 0.747 | 3.348 0.673 | 18.702 0.000 | |
| 10-Singapore | -17.964 0.000 | -6.686 0.019 | -14.022 0.000 | -17.863 0.000 | -11.785 0.000 | -15.945 0.000 | -15.753 0.000 | -0.400 1.000 | -19.102 0.000 |

7. Conclusion

Bitcoin markets nowadays go global in emerging market whereby the ticker is traded by several countries. The findings show that, there is a relationship between volatility performances with the

independent variables. The outcome of the study can be a guideline by all emerging economies especially those who have an intention to trade cryptocurrency either local or foreign market. From the Muslim investors, investment analysts and managers' perspective, this study will help to value the optimal pricing issue and their investment decisions. From the regulators point of view, such as central bank and Securities Commission, the study will be able to help them to monitor the development of Bitcoin since their trading procedures is still under revised process for trading approval especially in Malaysia.

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References

- Aggarwal, R. K., & Wu, G. (2003). Stock market manipulation-theory and evidence. In AFA 2004 San Diego Meetings.
- Brandvold, M., Molnár, P., Vagstad, K., & Valstad, O. C. A. (2015). Price discovery on Bitcoin exchanges. *Journal of International Financial Markets, Institutions and Money*, 36, 18-35.
- Brauneis, A., & Mestel, R. (2018). Price discovery of cryptocurrencies: Bitcoin and beyond. *Economics Letters*, 165, 58-61.
- Dyhrberg, A. H., Foley, S., & Svec, J. (2018). How investible is Bitcoin? Analyzing the liquidity and transaction costs of Bitcoin markets. *Economics Letters*, 171, 140-143.
- Gandal, N., & Halaburda, H. (2014). Competition in the cryptocurrency market. Bank of Canada Working Paper 2014-33. <https://www.banqueducanada.ca/wp-content/uploads/2014/08/wp2014-33.pdf>
- Gandal, N., Hamrick, J. T., Moore, T., & Oberman, T. (2018). Price manipulation in the Bitcoin ecosystem. *Journal of Monetary Economics*, 95, 86-96.
- Holub, M., & Johnson, J. (2018). Bitcoin research across disciplines. *The information society*, 34(2), 114-126.
- Kajtazi, A., & Moro, A. (2018). Bitcoin and portfolio diversification: Evidence from portfolios of US, European and Chinese assets. *European and Chinese Assets*.
- Narayanan, A., Bonneau, J., Felten, E., Miller, A., & Goldfeder, S. (2016). *Bitcoin and cryptocurrency technologies: a comprehensive introduction*. Princeton University Press.
- Nguyen, T., Locke, S., & Reddy, K. (2015). Ownership concentration and corporate performance from a dynamic perspective: Does national governance quality matter? *International Review of Financial Analysis*, 41, 148-161.
- Williams, R. (2015). Multicollinearity. University of Notre Dame. <https://www3.nd.edu/~rwilliam/stats2/111.pdf>