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Tema:Cross-correlation dynamics and community structures of cryptocurrencies

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| 1 | Bitcoin is a type of decentralized digital currency [1], where Decentralized means Bitcoin is peer-to-peer payment and is not regulated by any third party.  (...)  Investors of cryptocurrencies commonly use traditional methods [3,4] in the stock market trading. For instance, the basic notion of buying the commodity when at a low price and selling at a high price is applied by the investors  (...)  one such method commonly used for risk analysis isMarket TechnicalAnalysis (MTA).MTArecognizes the trend ofthe market given the historical market data  (...)  the results of EMH (Efficient Market Hypothesis) would be inconsistent, as according to Fama [7,8] for analysis to work the prices should follow a random walk. |  |
| 2 | Previously, such correlations have been a strong area of research [18,21] revealing collective market behaviour and correlations that spread throughoutthe entire system [17,16,19]. Gopikrishnan et al. [22] have discovered correlations being localized within various business sectors  (...)  cryptocurrencies are unique and extensively complex compared to other financial markets because of the unique nature of each cryptocurrency.  (...)  Ankenbrand and Bieri [24] examined the financial characteristics of cryptocurrency markets have concluded that currently no consensus exists on their uniqueness as a market or whether there exist similarities to other asset classes  (...)  Guglielmo et al. [26] have examined 4 types of cryptocurrencies over the sample period of 2014–2017 (...)Their findings indicate the market is persistent and its degree changes over time and conclude that the cryptocurrency market is ineficiente  (...)  Urquhart [4] has purposed another analysis of Bitcoin to study the market efficiency of Bitcoin and have used Hurst exponent analysis. The analysis shows when the full sample period is split into two sub-samples, the first sub-sample period rejects the null hypothesis of randomness and the R/S Hurst statistic indicates strong anti-persistence. However, when the second sub-sample period was studied, the Ljung-Box and Auto Variance Test (AVR) tests both fail to reject the null hypothesis, indicating absence of auto-correlation. This means that Bitcoin is inefficient, meaning investors cannot use previous information to forecast future values. The results obtained show that Bitcoin is efficient in the long run but currently the market is very volatile  (...)  Rebane et al. [28] have used auto-regressive integrated moving average (ARIMA) and Seq2Seq Recurrent Neural Network(RNN) on Bitcoin and Altcoin to determine the best method to predict future values. The comparative analysis showed neural networks performed dramatically better than ARIMA as the cumulative errors were less for RNN. Furthermore, including social data from websites along with RNN reduced the error rate. (...)  Bakar and Rosbi [3] have also put forth a study of forecasting on Bitcoin using ARIMA and results indicate a non-stationary time series and obtain a MAPE of 5.36% over the period from January 2013 to October 2017. Kinderis et al. [30] have examined Bitcoin fluctuations using text mining of news articles and tweets to infer the relationship between these and cryptocurrency price direction using uses LSTM RNNs and a mix of hybrid models. Their modelling achieves higher accuracy in predicting the direction. However,their study indicates that sentiment analysis does not have an immediate effect on the cryptocurrency market.  (...) Stosic et al. [23] have examined 119 different cryptocurrencies and analysed their cross-correlation matrix. Their findings indicate that the cross-correlation matrix of cryptocurrencies price changes exhibits non-trivial hierarchical structures and groupings in cryptocurrency pairs. For partial cross-correlation, anti-correlation was dominant in the matrix elements. Moreover, the findings revealed that most eigenvalues do not agree with universal predictions of the Random Matrix Theory (RMT), which is the exact opposite to the case of financial markets [19]. Later, the analysis of deviations from RMT revealed that the largest eigenvalue and its eigenvector represents the influence of the entire cryptocurrency market.  (...)  Dyhrberg and Haubo [31] explore the hedging capabilities of Bitcoin by applying Generalized Autoregressive Conditional Heteroskedasticity (GARCH) methodology. Their results indicate that Bitcoin has hedging capabilities against the Financial Times Stock Exchange (FTSE) and the American Dollar. They conclude that Bitcoin can be used alongside gold to minimize specific market risks. However, it should be emphasized that the correlations against the dollar are very small in value and indicative of short term capabilities.  (...)  Klein et al.[32] have also performed similar research into Bitcoin as a hedge. They initially analyse and compare the conditional variance properties of Bitcoin and gold. Next, they have implemented a Baba-Engle-Kraft-Kroner (BEKK-GARCH) model to estimate timevarying conditional correlations. Results obtained showed Bitcoin behaves exact opposite of gold and a positive correlation exists with downward markets. In conclusion, and in contrast to [31], Bitcoin and gold are fundamentally different which showed no evidence of Bitcoin having stable hedging capabilities. |  |
| 8 | These distinct communities represent (we speculate) collective behaviour in the market. This would seem to be in contrastto the concept of some major cryptocurrencies influencing the whole market, as advanced earlier by Stosic et al. [23]. We discover eight distinct communities in both the periods studied. Also, we find that the community structures change over time and exhibit few similarities over the period studied. Unlike Stosic et al. [23], we conclude that, over the two periods, the cryptocurrencies in the communities are not persistente  (...)  (Sovbetov) They also examine relation with S&P500 index and discover it seems to have weak positive long run impact on Bitcoin, Ethereum and Litecoin. Similarly, Poyser [43] defines three types of cryptocurrency influence factors organized into internal and external factors: Supply and demand being themajor internalfactor whereas attractiveness, legalization, and some macro-finance factors being the external factors |  |
| 10 | These communities can have certain economic implications as using these community groupings can be useful for constructing diverse investment portfolios. This was previously suggeseted by Mensi et al. [44] who study Bitcoin and five major cryptocurrenies (Dash, Ethereum, Litecoin, Monero and Ripple) and examine their portfolio risk implications. They consider different portfolio strategies and examine the implications of diversification. The results show that use of mixed portfolio strategy provides better diversification and risk reductions for portfolio managers and investors.  Also, the findings show such risk minimization is time-horizon dependent which suggests investors need to be wary of changes in each community grouping for different time periods. Although we would suggest that implications of these changes remain to be confirmed as part of future work. |  |
| 10 | We find and verify that cross-correlations matrix have non-trivial structures and groupings among cryptocurrency pairs.  e analyze the eigenvector components to validate their influence on the market. we construct minimum spanning trees and discover distinct community structures. Although, these communities structures do not persist over time but crosscorrelation dynamics suggests a collective behaviour exists among these communities. Lastly, we conclude our analysis of community groupings can be useful to construct cryptocurrency investment portfolios. |  |