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Tema: Optimal cryptocurrency and bist 30 portfolios with the perspective of markowitz portfolio theory

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| 2 | Crypto Currencies such as Bitcoin, Ethereum, Tether, Dodge, etc. are in close watch of investors, financial and government organizations, central banks, policymakers, economists, entrepreneurs, and the public, all around the World. Due to the high level of liquidation as a result of monetary easing and small yields from invested assets, the relevancy to the speculative assets increased over the years. Nowadays, the main discussion occurs specific to Bitcoin, if it can have accepted as a kind of payment tool (currency) or can be treated as a speculative financial asset, because of its high level of exchange rate volatility [1]. The economists canalize their attention to Bitcoin as it has the potential of turning the conventional monetary and payment system upside down [2]. Since the high level of volatility and even daily fluctuations keep away the accountability of Bitcoin, the common view is to consider Bitcoin as an asset [3]. The European Central Bank stated Bitcoin should be considered a high-risk asset [4,5]. The return and volatility of cryptocurrencies are more interested and examined research areas for the economics and finance literature [6,7]. The only thing we are sure of about these cryptocurrencies is that, even if they are considered as a tool for transaction systems or a high-risk asset, they are already in the financial system and the portfolio of some investors.  Bitcoin has been created by Nakamoto [8] and since then, many other cryptocurrencies have been created and introduced to the financial system. No doubt, Bitcoin is the most known and remarkable among thousands of others [9]. The philosophy of Bitcoin triggers its demand. The enthusiasm of freedom, invisibility, and singularity besides the willingness to pay low transaction costs are the key drivers of the use of Bitcoin. The possibility of avoiding currency controls and tax evasion programs may also be the other reasons for the favor of Bitcoin for large mass | Easing monetary: flexibilização monetária  Yields: rendimentos |
| 3 | Gold has always been a safe haven for investors as it is stable when fluctuations or risks occur either in financial markets or in politics. But the limited production and the supply of Bitcoin by non-governmental organizations make both similar. Gold is well known for its hedging capabilities against stocks  An asset can be considered as a safe-haven only if the evidence of predictability from a stock index to that asset in the low quantiles of both the stock and the asset returns Some researchers consider Bitcoin as an asset and analyze the relationship between gold and bitcoin [12-17].  Reference [15] examine the volatility behavior of cryptocurrencies, compare to stock indices and commodities. As the result of their study, they conclude that Bitcoin cannot be named as the Gold. Even though some dynamics of the behavior of Bitcoin may be like Gold and Silver, but from a viewpoint of portfolio structure, Bitcoin is far to be safe-haven and replace Gold. Reference [14] replace Gold with Bitcoin in an investment portfolio. They use Modern Portfolio Theory to argue the possible effects of this replacement. Their findings show that to substitute Gold for Bitcoin in a portfolio is possible but attain a high-risk adjusted return.  Bitcoin/Gold price increase exponentially after December 2020 (left hand-side of the figure) and the return variance of bitcoin and is gold is not comparable since Bitcoin is too volatile to compare with gold in terms of volatility.  Reference [16] studies the classification of Bitcoin as a currency, a commodity, or an investment asset. He concludes that the ability of Bitcoin can be considered as an alternative product for investment assets. But, as the others conclude, the risk premium is significantly high. Reference [17] estimate the unconventional contribution of Bitcoin within portfolios of various asset classes and asses the return of the portfolio to consider the transaction costs. They conclude that considerable benefits can be obtained when Bitcoin is included in the investment portfolio. They dissociate from other studies, asserting that Bitcoin, because of its low correlation with other assets, may decrease the total risk of the investment portfolio. | Hedging capabilities: capacidade de cobertura |
| 4 | Reference [26] shows that the investment outcome can be improved due to the portfolio diversification over different cryptocurrencies  Markowitz is known as the “Father of the Modern Portfolio Theory” but as he mentioned [28], Roy also proposed making choices based on the mean and variance of the portfolio as a whole [29]. The main differences between both analyses can be concluded as follow: a. Markowitz’s analysis necessitate nonnegative investments but Roy’s Analysis tolerate the invested amount in any security to be positive or negative b. Markowitz set free the investors to make a choice any portfolio from the efficient edge, but Roy suggests the choice of a specific portfolio [27]. Markowitz states that there exist three very important circumstances that differ Portfolio Theory from the theory of the company and the theory of the consumer. 1. The Portfolio Theory tends to focus on investors 2. Economic agents try to make their decisions in an uncertain environment, and the Portfolio Theory tends these economic agents 3. The Portfolio Theory can be used by a large group of investors, just by computer aid and database [30]. Markowitz sees the portfolio as a mathematical problem. Markowitz's portfolio theory depends on an investor how he or she is risk-averse [31].  Markowitz’s Theory is then considerably developed by Markowitz’s fellow William Sharpe, who is known for The Capital Asset Pricing Model work on the theory of financial asset price formation [32]. Multiple numbers of studies in different countries all around the World are done based on Markowitz’s Portfolio Theory since it is developed. But a few consider the cryptocurrencies in Markowit’s Theory  The mean values are close to zero for all the returns however cryptocurrencies are still more clustered compared to BIST 30. The statistics of each return differ from each other, but in common the skewness of each return is not equal to zero and neither is the kurtosis, indicating that each return has typical characteristics of leptokurtosis and fat-tail. It is well known that leptokurtosis and fat-tail are the typical characteristics of financial time series. The J-B statistic of each return is significant from zero, which means none of the returns obeys the normal distribution. Further, the stationarity of the variables has been examined using the Augmented Dickey-Fuller (ADF) unit root test. The null hypothesis of the unit root is strongly rejected for all return series. |  |
| 5 | In our attempt to address and quantify portfolio effects in the crypto-asset universe we rely on the traditional mean variance portfolio selection framework as proposed by Markowitz [27]. As a starting point for mean-variance optimization, we calculate daily log-returns rit for CC i at time t, derived from close prices P according to  Rit = ln(Pt) – ln(Pt-1)  Markowitz portfolio theory enables us to analyze how good a given portfolio is based on only the means and the variance of the returns of the assets contained in the portfolio which requires an investor is supposed to be risk averse. In this context let us consider a portfolio with n different assets where asset number i will give the return Ri where mean, and variance will be represented with 𝜇𝜇𝑖𝑖 𝑎𝑎𝑎𝑎𝑎𝑎 𝜎𝜎𝑖𝑖 2. The covariance between Ri and Rj . Finally xi will represent the portion of the value of the portfolio invested in asset i. If R is the return of the whole portfolio:  M = E[R] = ∑mixi |  |
| 9 | in this study we provide a pioneer study to understand the effects of diversified cryptocurrency investments to Turkish financial markets in a traditional Markowitz mean-variance framework. Although Markowitz model has limitations, we find this exercise useful to understand different characteristics of cryptocurrency assets and exchange indices. One weakness of Markowitz model is that the variance of a portfolio is not a complete measure of the risk taken by the investor. The model does not tell an investor which portfolio he/she can afford to buy if he/she is willing to take a certain high-level risk. As a result, without any specific constraint for maximization or minimization problems Markowitz model totally crowds out whether cryptocurrency or BIST 30 index based on the objective function. In context, applying different constraints of mean-variance investments, our study identifies wide range of diversified portfolios to derive risk-adjusted outperformance. Our next attempt will cover alternative approaches to portfolio optimization for further research. | conclusão |