Cardano as an Alternative to Cryptocurrency Investment

Chantique Putri Alessandra Talakua[*]   Muhammad Azhari
Economy and Business Faculty, Telkom University, Jl Telekomunikasi, Bandung 40257, Indonesia

Abstract
Cardano becomes the first cryptocurrency designed and built on scientific philosophy and academic research reviewed by peers. Market participants can assess the potential of Cardano to use it for cryptocurrency investment alternative which can be done through comparing Cardano with traditional financial asset particularly stock and gold. Purpose of the research is to know the difference between Cardano performance to stock and gold. This research used quantitative methods with a comparative and descriptive approach. Performance of each asset measured by Sharpe, Treynor and Jensen indexes from October 2017 to April 2019. Result of the research is Cardano shows good performance in comparison to other assets. It concluded that Cardano shows a significant difference in performance with LQ45 index using Sharpe, Treynor and Jensen indices. While Cardano in comparison to ANTAM gold shows that there is a significant difference in performance using the Sharpe index but no significant difference using Treynor and Jensen indeces.
Keywords: cryptocurrency; Cardano; portfolio performance; Sharpe index; Treynor index; Jensen Index
DOI: 10.7176/RJFA/11-16-10
Publication date: August 31st 2020

1. Introduction
1.1 Background
Cryptocurrency is a digital asset that is designed as an exchange medium that uses cryptographic techniques to secure transactions, control the creation of additional units, and verify asset transfers (Chohan, 2017). In March 2019, there are more than 2,102 types of cryptocurrency spread in 16,188 markets (Coin Market Cap, 2019). Cryptocurrency continues to grow in various business areas, and more and more financial institutions are also involved. That's because cryptocurrency as a digital asset represents a new investment opportunity that does not correlate with other asset classes and investors are generally not allocated to this sector.

Cardano as the third-generation cryptocurrency provides solutions to problems that hinder the adoption of blockchain technology through three elements, namely scalability, interoperability and sustainability. Cardano also became the first cryptocurrency designed and built on scientific philosophy and academic research reviewed by peers (Cardano, 2019). Although it was only launched in 2017, Cardano as a cryptocurrency with characteristics that differ from its predecessor successfully ranked 11th based on Coin Market Cap data (Coin Market Cap, 2019).

Cardano has the potential to become a successful project in developing intervals following its roadmap (Greenspan, 2018; ITF Research Team, 2018). This roadmap also makes Cardano different from other cryptocurrency, which consists of 5 main stages, namely Byron, Shelley, Goguen, Basho and Voltaire that promise a number of features and functionality (Cardano, 2019). The components and developments of each stage are carried out in parallel and the progress of each stage is shown on the official website so that it offers transparency and trust in the development process. Cardano is now in the first stage of Byron by launching the Ouroboros algorithm, which ensures safe and scalable transactions well. In the first quarter of 2018, Cardano will release Shelley which offers a full decentralized system that has not been offered by other cryptocurrency.

1.2 Research Question
From the explanation above, Cardano has the potential to become an investment asset. Market participants can look at Cardano's potential by comparing it with traditional financial asset classes used for investments, namely stocks and gold before making rational and informative investment decisions. Thus the research try to answer: 1) Is there a difference between Cardano's performance and shares incorporated in the LQ45 index? 2) Are there differences between Cardano's and gold's performance?

2. Literature Review and Research Scope
2.1 Literature Review
2.1.1   Cryptocurrency
According to Greensberg in Chohan (2017), Cryptocurrency is a digital asset designed as an exchange medium that uses cryptographic techniques to secure transactions, control the creation of additional units, and verify asset transfers. Lansky (2018) define cryptocurrency as a decentralized digital currency where decentralization is achieved by peer-to-peer architecture and cryptography is used to confirm decentralized transactions. While Nugraha (2018) believe that cryptocurrency is a medium of exchange or digital currency that operates entirely

independently of the central bank that uses encryption techniques to regulate the production of currency units and verify the transfer of the currency. From the three definitions above, it can be concluded that cryptocurrency is a digital asset that is used as a decentralized exchange medium by utilizing cryptography to ensure the security, availability and verification of transactions.

2.1.2   Cardano

Cardano is a blockchain and cryptocurrency project that is publicly decentralized and fully open source. Cardano is developing a smart contract platform that seeks to deliver features that are more sophisticated than any previously developed protocol. Cardano became the first blockchain project developed on scientific philosophy, and the only one designed and built by a global team consisting of academics and technicians, namely The Cordano Foundation, Hong Kong Input (IOHK) and Emurgo for the conceptualization of Charles Hoskinson. The team that initiated Cardano wanted to comply with a set of principles and philosophies, not departing with a roadmap or scientific journal. Instead, Cardano focuses on embracing a collection of design principles, engineering best practices, and avenues for exploration (Cardano, 2019)

2.1.3   Stock

Stocks are a sign of ownership or possession of a person or entity in a corporation or limited liability company (Darmadji & Fakhruddin, 2011). Meanwhile, according Husnan, Stocks is a piece of paper that shows the investor rights that the parties have the papers to acquire part of the prospect or the wealth of the organization issuing securities, and various conditions that allow the investors exercise their right (Husnan, 2005). According to Hadi stock is one of the financial commodity traded in the stock market the most popular. Investments in shares by investors are expected to be able to provide benefits, but on the other hand stocks also carry risks. Based on the notion that has been stated, it can be concluded that the stock is a financial commodity that states the ownership of a person or entity over a company or limited liability company.

2.1.4   Gold

Gold is a precious metal that can maintain its value and is used in transactions. Gold is known in history as a currency and a relative standard for the exchange rate equivalence of an economic region or country. At present, gold is one of the largest investments or foreign exchange providers for the country (Oei, 2009). Gold is a global currency and its value is universally recognized. The intrinsic value is fixed and standard so that it can be bought and disbursed anywhere. Gold has properties not affected by inflation (zero inflation) so that the price of gold always follows the movement of inflation (Handiani, 2014). Gold can also be used as a profitable gold investment and has little risk. Currently gold is divided into two types, namely gold for jewelry and gold for investment. Investment in gold is investment in gold or gold futures.

2.2 Research Hypotheses

Based on the theory that became the basis of this research and the findings of the research results before, two hypothesis are formulated as follows:

- H_0: There is no difference between Cardano and LQ45 stock's performance
  H_1: There is a difference between Cardano and LQ45 stock's performance
- H_0: There is no difference between Cardano and gold's performance
  H_1: There is a difference between Cardano and gold's performance

3. Research Method

This type of research is a quantitative research method with a descriptive and comparative approach. Where based on research involvement does not intervene data and based on implementation time including cross section. The operational variables used are the Sharpe index, Treynor index and Jensen index are illustrated in table 1. In this study the population is the class of investment assets including cryptocurrency, shares and gold. Where the authors took a sample of the closing price of Cardano, LQ45 index, ANTAM gold, Cryptocurrency Index, Composite Stock Price Index and S&P/TSX Global Gold Index in the period October 2017 - December 2018. Sampling in this study used a purposive sampling method.

The data in this study used secondary sources. Data collection techniques used in this study are library research and documentation. The secondary data source of this research was obtained from Yahoo Finance, the site of Bank Indonesia and the CCI30 website. As part of the analysis technique, normality tests are used first to find out whether the data is normally distributed or not. To test the comparative hypothesis, independent sample t-test is carried out for normal distributed data and the Mann-Whitney test for data that is not normally distributed.

4. Result

4.1 Performance Measurement Results using Sharpe, Treynor and Jensen Indices

From figure 1, it can be seen that the majority of the Sharpe index values show negative values. Only Cardano in November and December 2017 shows positive values. The movement of the Sharpe index of Cardano and Gold

ANTAM tends to fluctuate compared to the stable LQ45 index. Although stable, the LQ45 index shows the index value under Cardano and ANTAM Gold. From the research period, Cardano's performance based on the Sharpe index was superior to ANTAM's LQ45 and gold index. Only ANTAM's gold value in July 2018 was able to surpass the Sharpe Cardano index value.

From the results of the descriptive statistics the Sharpe index for Cardano has the highest value of 11.59%, namely in December 2017 and the lowest of -90.71%, namely in July 2018. While the Sharpe index value for the LQ45 index has the highest value of -94.11 % that is in May 2018 and the lowest is -99.40%, namely in October 2017. For ANTAM gold, the Sharpe index is the highest at -63.01% in December 2018 and the lowest is -97.12% in October 2017 By looking at the average, it can be concluded that the assets with the highest Sharpe index average of Cardano are -56.65%, followed by ANTAM's gold of -88.04% and the lowest is the LQ45 Index of -97.46%.

In figure 2, LQ45 index at 19 months in the study period showed a positive and stable value. Whereas ANTAM's Cardano and gold values show fluctuating values. The LQ45 index also shows values that tend to be superior to Cardano and ANTAM. From the results of descriptive statistics, the Treynor index for Cardano has the highest value of 690.75%, namely in March 2019 and the lowest of -179.79%, namely in January 2018. While the Treynor index value for the LQ45 index has the highest value of 136.91 % that is in November 2018 and the lowest is 106.55%, namely in March 2018. For ANTAM gold, the highest Treynor index value is 147.87% in August 2018 and the lowest is -287.56% in January 2019.

In figure 3, the movement of the Jensen index from Cardano and Gold ANTAM tends to fluctuate while the LQ45 index shows a stable value. Jensen's index on the LQ45 index showed a positive value whereas ANTAM's gold showed a negative value during the 19 months of the study period. While Cardano shows that the Jensen index tends to be negative with the exception of the last 3 months, namely February to April 2019 which shows a positive value. From the research period, the LQ45 index performance based on the Sharpe index was superior to ANTAM's LQ45 and gold index.

From the results of descriptive statistics, the Jensen index for Cardano has the highest value of 4.24%, namely in March 2018 and the lowest of -8.03%, namely in December 2018. While the Treynor index value for the LQ45 index has the highest value of 1.95 % that is in November 2018 and the lowest is 0.23%, namely in March 2018. For ANTAM gold, the highest Jensen index value is 0.87% in June 2018 and the lowest is -16.24% in July 2018. With see the average can be concluded that assets with the highest average Jensen index are LQ45 index of 1.07%, followed by Cardano of -4.68% and the lowest that is ANTAM gold of -5.35%.

4.2 Hypothesis Test

First, the normality of the Sharpe, Treynor and Jensen index data tests from Cardano, ANTAM's LQ45 and gold indexes using Shapiro-Wilk, given the amount of data is less than 20 with a significance of 5% (0.05). Table 1 shows the result of normality test processed with SPSS. Each variable shows a different significance value. From the criteria of normality test, it shows that Cardano Sharpe index, LQ45 Sharpe index, ANTAM Sharpe index and Cardano Treynor index are not normally distributed while LQ45 Treynor index, ANTAM Treynor index, Cardano Jensen index, LQ45 Jensen index and ANTAM Jensen index are normally distributed. In accordance with the hypothesis test criteria, then to test the Sharpe and Treynor index used the non-parametric Mann-Whitney test while the Jensen index used a different test t.

The results of the hypothesis test are as follows.The results of the first hypothesis test show the Sharpe index, Treynor and Jensen an alternative hypothesis is accepted. From the results of the hypothesis test it can be concluded that there are significant differences in performance between Cardano and the LQ45 Index when viewed from the Sharpe, Treynor and Jensen indices. The results of the second hypothesis test show that the Sharpe index of the alternative hypothesis is accepted while the Treynor and Jensen indices show the alternative hypothesis is rejected. From the results of the hypothesis test it can be concluded that there are significant differences in performance between Cardano and ANTAM gold when viewed from the Sharpe index while there is no significant difference in performance based on the Treynor and Jensen indices.

4.3 Discussion

The results of the first hypothesis test show the Sharpe index, Treynor and Jensen an alternative hypothesis is accepted. From the results of the hypothesis test it can be concluded that there are significant differences in performance between Cardano and the LQ45 Index when viewed from the Sharpe, Treynor and Jensen indices. The results of the second hypothesis test show that the Sharpe index of the alternative hypothesis is accepted while the Treynor and Jensen indices show the alternative hypothesis is rejected. From the results of the hypothesis test it can be concluded that there are significant differences in performance between Cardano and ANTAM gold when viewed from the Sharpe index while there is no significant difference in performance based on the Treynor and Jensen indices.

Based on the Sharpe index, Cardano has a higher average value than the LQ45 index. The positive value on

the Sharpe index shows the performance of assets better than the risk free rate and vice versa negative values indicate the performance of assets is not better than the risk free rate (Robiyanto, 2017). Based on the Sharpe index, Cardano has a higher average value than the LQ45 index. In both assets the majority have negative values indicating that the return given is smaller than the risk-free investment return. The average Sharpe Cardano index shows -56.65% greater than the LQ45 index of -97.47%. It can be concluded that Cardano shows better performance than the LQ45 index.

Based on the Sharpe index, Cardano has a higher average value than the ANTAM gold index. As previously discussed the positive value on the Sharpe index shows the performance of assets better than the risk free rate and vice versa negative values indicate the performance of assets is not better than the risk free rate In both assets the majority of values and averages have negative values indicating that returns what is given is less than the risk-free investment return. The average Sharpe Cardano index shows -56.65% greater than ANTAM's gold of -87.21%. It can be concluded that Cardano showed better performance than ANTAM's gold index.

The Treynor Index provides an excess return on risk free return per unit of systematic risk (Purwanto, 2015). Based on the Treynor index, Cardano has a higher average value than the LQ45 index. The average Treynor Cardano index is -5.18% smaller than the LQ45 index of 121.22%. This shows the performance of the LQ45 index return on systematic risk is better than Cardano.

When compared with ANTAM, Cardano has a higher average score. The Treynor Index provides an excess return on risk free return per unit of systematic risk. Where 12 months Cardano shows a positive value while ANTAM's gold shows 9 months positive value. So that in the 19 months Cardano's research period showed a positive trend compared to ANTAM's gold. The average Treynor Cardano index is -5.18% smaller than ANTAM's gold of 2.40%. This shows Cardano's return performance on systematic risk is better than ANTAM's gold index.

Based on the Jensen index, the average value of the LQ45 index is higher than Cardano. It can be seen that the average Jensen index of Cardano shows a negative value so it can be concluded that Cardano's performance is inferior compared to the market index, namely the Cryptocurrency Index. Whereas the LQ45 index shows an average positive value so that it shows superior performance compared to the market index, namely the Composite Stock Price Index. The average Jensen Cardano index of 1.59% shows a value greater than the LQ45 index of 1.06%. This shows that Cardano's performance is better than the LQ45 index using the Jensen index.

Based on the Jensen index, the average Cardano value is higher than ANTAM's gold. Jensen's index looks at investment performance where returns are given according to the risks they have. The average Jensen index from Cardano and ANTAM gold shows a negative value so that it can be concluded that the performance is inferior compared to the respective market index. The average Jensen Cardano index of 1.59% shows a higher value than ANTAM's gold average of -5.96%. This shows Cardano's performance is better than ANTAM's gold by using the Jensen index.

From the discussion above, it can be seen that the Sharpe index of Cardano shows a better value compared to ANTAM's LQ45 and gold index. Judging by the Treynor index from Cardano, it shows a value that is no better than ANTAM's LQ45 and gold index. Based on the Jensen index of Cardano, it shows a better value compared to the LQ45 index and a better value compared to ANTAM's gold.

5. Conclusion

From the research conducted, the Sharpe and Jensen indices from Cardano show better values compared to the LQ45 index. In contrast, based on the Treynor index, the LQ45 index shows a better value than Cardano. Based on the results of hypothesis testing, conclusions can be drawn based on the Sharpe, Treynor and Jensen indexes, there are significant differences between Cardano's performance and the LQ45 stock index.

The Sharpe and Jensen indices from Cardano show better values compared to ANTAM's gold. On the contrary, based on the Treynor index, it shows a better value compared to ANTAM's gold. Based on the results of hypothesis testing, conclusions can be drawn based on the Sharpe index, there are significant differences between the performance of Cardano and ATNAM while there is no significant difference in performance based on the indexes of Treynor and Jensen.

Based on the results of the study, Cardano has a potential compared to the capital market when considering Jensen's return and index. This certainly needs to pay attention to the high rate of return on investment, along with high risk, so there needs to be further studies such as portfolio studies that include binary assets such as Cardano. Although Cardano has more performance than ANTAM's gold in the Sharpe, Treynor and Jensen indices but the results of different tests show that the performance difference is not significant. For these results, ANTAM should be chosen by investment managers and investors who are not too familiar with digital investment assets such as Cardano. Given that ANTAM has real assets that can be used as asset guarantees compared to Cardano whose assets are imaginary.

References

Cardano. (2019). Retrieved Maret 12, 2019, from Roadmap - Cardano: https://cardanoroadmap.com/

Cardano. (2019). *What is Cardano? - Cardano*. Retrieved March 12, 2019, from Cardano: https://www.cardano.org/en/what-is-cardano/

Chohan, U. (2017). Cryptocurrencies: A Brief Thematic Review. *SSRN*.

Coin Market Cap. (2019). *Cryptorcurrency Market Capitalization*. Retrieved March 13, 2019, from Coin Market Cap: https://coinmarketcap.com/

Darmadji, & Fakhruddin. (2011). *Pasar Modal di Indonesia* (Vol. edisi 3). Jakarta: Salemba Empat.

Greenspan, M. (2018). *Cardano Market Research.* eToro.

Handiani, S. (2014). Pengaruh Harga Emas Dunia, Harga Minyak Dunia dan Nilai Tukar Dollar Amerika/Rupiah Terhadap Indeks Harga Saham Gabungan Pada Periode 2008-2013. *E-Journal Graduate Unpar, 1*(1).

Husnan, S. (2005). *Dasar-dasar Teori Portofolio dan Sekuritas* (Kelima ed.). Yogyakarta: BPFE.

ITF Research Team. (2018). *Research Report: Cardano.* Intelligent Trading.

Lansky, J. (2018). Possible State Approaches to Cryptocurrencies. *Journal of System Integration*, 19-31.

Nugraha, G. K. (2018). *Pengaruh Respons IMF Terkait Penggunaan Cryptocurrency terhadap Kebijakan Pemerintah Indonesia.* Semarang: Universitas Dipenegoro.

Nurfajri, D. (2013). *The Importance of Consumer Rights Protection on E-commerce in Indonesia.* Tilburg University.

Oei, I. (2009). *Kiat Investasi Valas, Emas, Saham.* Jakarta: Gramedia Pustaka Utama.

Purwanto, B. I. (2015). *Analisis Kinerja Portofolio Saham LQ-45.* Fakultas Ekonomi dan Bisnis, Program Studi Manajemen. Jakarta: Universitas Islam Negeri Syarif Hidayatullah.

Robiyanto. (2017). Performance Evaluation of Stock Price Indexes in the Indonesia Stock Exchange. *International Research Journal of Business Studies, 10*(3), 173-182.
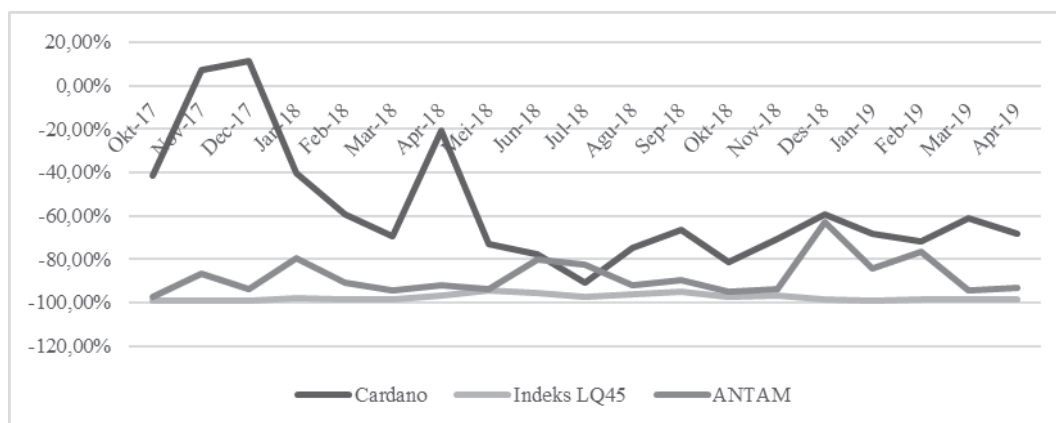

Figure 1. The Performance Measurement of Cardano, ANTAM and LQ45 with the Sharpe Index
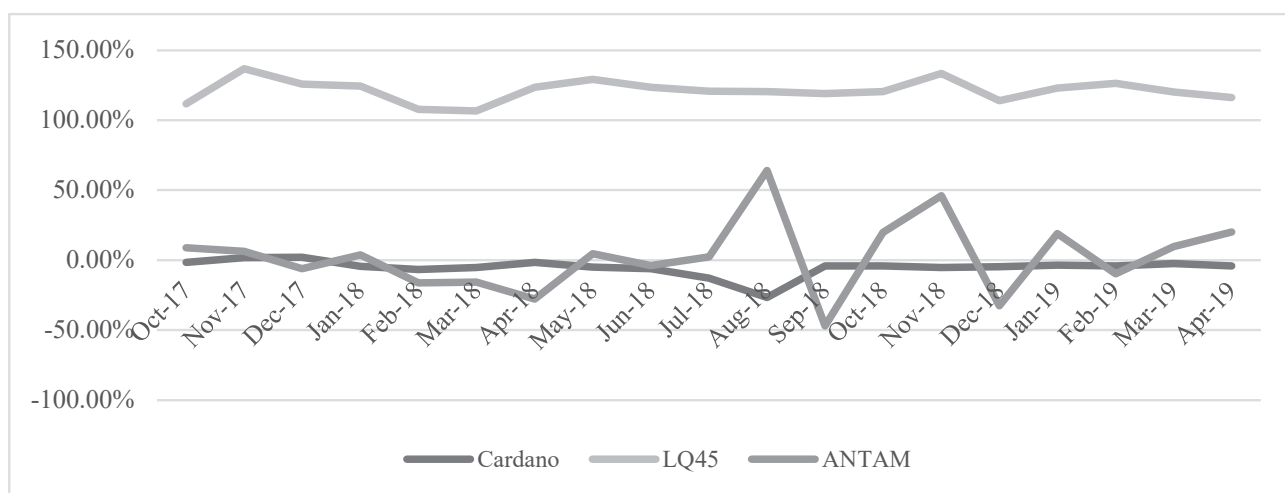

Figure 2. The Performance Measurement of Cardano, ANTAM and LQ45 with the Treynor Index
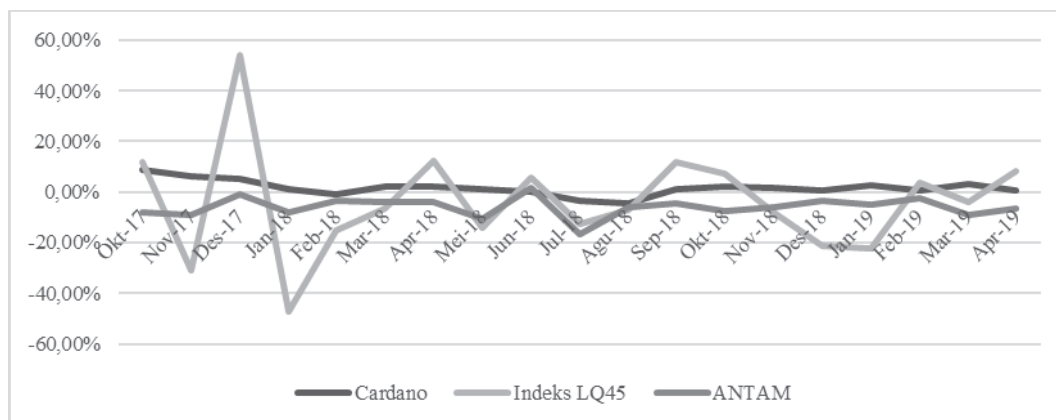
Figure 3. The Performance Measurement of Cardano, ANTAM and LQ45 with the Jensen Index

Table 1. Operational Variables

Variable	Definition	Formula	Scale
Sharpe Index (S_R)	Comparison of the average between portfolio return difference and risk-free return with total portfolio risk.	$$S_R = \frac{R_i - R_{FR}}{\sigma_i}$$	Ratio
Treynor Index (T_R)	Comparison of the average between portfolio return difference and risk-free return with total portfolio risk.	$$T_R = \frac{R_i - R_{FR}}{\beta_i}$$	Ratio
Jensen Index (α)	Comparison of the average between portfolio return difference and risk free return with total portfolio risk.	$$\alpha = (R_i - R_{FR}) - \beta_i (Rm - R_{FR})$$	Ratio

Table 2. Normality Test Result

Variable	Significance
Cardano Sharpe Index	,002
LQ45 Sharpe Index	,018
ANTAM Sharpe Index	,006
Cardano Treynor Index	,000
LQ45 Treynor Index	,853
ANTAM Treynor Index	,727
Cardano Jensen Index	,317
LQ45 Jensen Index	,530
ANTAM Jensen Index	,513