Research Paper

Comparative Analysis of Portfolio Performance, Risk and Return of Cryptocurrencies (Bitcoin), Stocks and Gold as Alternative Investments in the Digital Age

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Abstract.
In this study, portfolio performance, risk, and return are compared between the cryptocurrency Bitcoin and equities and gold as alternative investments in the digital age. This type of quantitative study uses comparative approaches. Monthly closing price data was located online or on websites for the secondary data used in this study. The saturation sampling approach was used to get 180 data from the sampling of samples. The analytical approach utilized with the SPSS 26.0 for Windows application comprises quantitative analysis, normality testing, homogeneity testing, and hypothesis testing. The study's findings reveal that: (1) the returns offered by bitcoin, IDX30 shares, and Antam gold are not significantly different; (2) the risks offered by bitcoin, IDX30 shares, and Antam gold have significant differences; (3) the performance offered by bitcoin. There are significant differences between IDX30 shares and Antam gold with the Sharpe method; and (4) the performance offered by bitcoin, IDX30 shares, and Antam gold with the Treynor method has a significant difference.

Keywords: cryptocurrency, investment, portfolio performance, stock, gold, risk, return

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1. Introduction

Managing one's finances and investing in the future is crucial if one aspires to achieve the American ideal of financial independence. One definition of investment is "the use of money or other resources that one currently possesses with the expectation of future gain". Fahmi (2015) argues that the point of investing is to ensure the long-term viability of one's investments, maximize one's financial returns, and improve one's standard of living. The financial sector, including investment instruments, has benefited from the fast expansion of modern technology. Stocks, bonds, gold, real estate, and the most current and well-known today is cryptocurrency, all fall under the umbrella term "investment instruments" (crypto currency). When a new investing phenomenon

emerges, like cryptocurrency, it's only natural that investors may be unsure about how to best use their funds. Typically, when deciding on an appropriate investment instrument, investors will think about the performance of the portfolio, the risks involved, and any potential returns.

Since 2008, when an anonymous organization using the moniker Satoshi Nakamoto created the first cryptocurrency, users have been able to transact business using digital tokens that are secured by a string of cryptographic algorithms. Forming the code in this way makes it suitable for archival in a computer system (Robiyanto et al., 2019). Many people are familiar with cryptocurrencies like Bitcoin and Ethereum. Although bitcoin and ethereum have gained popularity as investment vehicles, they are still not accepted as legal tender in Indonesia. Trading in the Futures Market (Kontan.co.id, 2018). Sites like Indodax and LocalBitcoin.com, among others, have begun trading cryptocurrencies like Bitcoin and Ethereum, lending credence to their potential as cutting-edge investing tools. Additionally, on an Indonesian Bitcoin and Ethereum forum, the two cryptocurrencies' returns are routinely compared to those of other investment options popular in Indonesia, such as stocks and gold.

Both stocks and gold are widely held and offer a steady return on investment. Capital market observer Mr. Budi Frensidy from the University of Indonesia claims that many investors claim crypto has attributes like yellow metal, leading to crypto with a market capitalization value being termed the digital counterpart of gold. Gold, on the other hand, has a more consistent movement and a proven track record over the years, therefore he argues that crypto cannot be regarded to be a store of value or a hedge. Furthermore, stock price fluctuations are typically more stable than cryptocurrency price swings. Even if the stock price lowers, investors will still benefit from the shares because of dividends, and if the price rises, investors will make a profit. Furthermore, in today's digital age, stock and gold transactions can be accessed digitally as well. Stockbit, Magic, and Motion Trade provide access to the stock market, while Dinaran, Pluang, and Pegadaian Digital provide access to the gold market. Charts for Bitcoin, the Joint Stock Price Index (JCI), and Antam's Gold are shown below.

Bitcoin, the Joint Stock Price Index (JCI), and Antam's gold are all depicted on a single price chart. Beginning in 2017, Bitcoin prices have been relatively constant in 2018. Then, in the middle of 2018, it spiked and broke through the highest price point, but from 2019 to 2021, the value of bitcoin was highly volatile, moving both up and down. The price of a bitcoin eventually surpassed the previous record high set in April of 2021, when it reached Rp 885,495,500, or about US$ 62,153.60 at the time. There was a rise in JCI from the start of 2017 to the end of 2018. This shows that investors

Figure 1: Antam's Bitcoin, JCI (Joint Stock Price Index) and Gold Price Charts. Source: www.Luno.com, google finance, harga-emas.org.

have a lot of faith in the Indonesian stock market and points to a period of favorable sentiment on the Indonesian capital market. The JCI tends to be volatile, though, from 2018-2021. After a rather stable period in 2019 and 2020, the JCI dropped significantly in March of 2020 as a result of the global spread of the Covid-19 pandemic. In the months following March 2020 and to the end of September 2021, the JCI showed a consistent positive trend, one of growth. From December 2017 to June 2020, the price of gold increased and eventually broke through the ceiling. A decline in gold prices occurred between September 2020 and July 2021. Gold prices will likely be volatile and inconsistent between 2017 and 2021, as evidenced by these trends. The graph data shows that Bitcoin witnessed a much larger price increase than JCI did during the same time period (6.433.89 percent versus 12.42 percent). In comparison, Antam's gold was up 14.31% during the bitcoin period.

This study will shed light on how bitcoin, IDX30 shares, and Antam gold stack up against one another in terms of portfolio performance, risk, and return based on observed occurrences. The Sharpe, Treynor, and Jensen measurement techniques will be employed to quantify this comparison and serve as a model measuring instrument for assessing portfolio performance characteristics. Then, we'll employ standard deviation models and return measurement ratios for our risk and return variables. As an added bonus, portfolio theory is cited throughout this study. John (2005) argues that in order to properly construct a portfolio, one must take into account not only the potential for loss, but also the potential for gain, assuming that some sort of formal framework exists

within which these factors can be measured. The Reward to Variability Ratio (RVAR) is a metric developed by capital market theorist William Sharpe to assess portfolio performance. The Treynor model is a way to quantify the reward to volatility ratio (RVOL), which evaluates the relationship between return and risk. Difference: Treynor's model incorporates systematic risk (Jones, 2016). The Jensen measurement model is a way to quantify the extent to which a portfolio's actual performance exceeds its predicted performance. The Jensen Alpha, as the portfolio performance indicator known as the CAPM has come to be known, is of great interest to Jensen (Jones, 2016). Investment risk and return are conditions encountered by investors in the form of profits or losses in a period (Fahmi, 2016), hence there is a strong relationship between risk and return.

Portfolio theory recommends spreading investment capital across a variety of assets to reduce the impact of any one asset's volatility on returns (Tandelilin, 2010: 115). The two main methods used by investors to diversify their portfolios are naive (random) diversification and the Markowitz method (Tandelilin, 2010:202). The term "optimal portfolio" refers to a portfolio that has optimal return and risk characteristics. Use the Markowitz Model to construct a winning portfolio (Hartono, 2014:367). One of the most common methods of portfolio selection is the Markowitz model's recommendation that investors create a portfolio of investments (Solanki, 2014). Results from a study by Arifa Prita Meiyura and Azib (2020) found that bitcoin investors saw significantly higher returns than gold investors. This is consistent with the findings of a study by Ezra Putranda Setiawan (2020), who found that cryptocurrency investments typically yield greater returns than those on offer from either foreign exchange or the stock market.

Hypothesis 1: Bitcoin returns are drastically different from stock and gold returns.

When deciding on a financial instrument, investors must weigh a number of factors, one of the most crucial being risk. According to portfolio theory, there is a linear relationship between risk and return in an investment instrument, which means that a low level of risk naturally results in a low rate of return, while a high level of risk will undoubtedly be matched by a high rate of return. In this instance, investors need to pay close attention so that they don't lose money. Investment risk is inevitable, but it can be controlled via careful planning of a diversified portfolio. A portfolio is a group of assets carefully chosen from different categories and held together with the goal of reducing the portfolio's overall level of risk. According to Markowitz's portfolio theory, which emphasizes diversification as a means of lowering risk, this is a valid strategy. Christopher and Sadalia's (2021) study shows that the risk of bitcoin stocks is significantly higher than that of gold. Furthermore, the study results demonstrate a

substantial difference between the danger of investing in bitcoin and gold, as stated by Arifa Prita Meiyura and Azib (2020).

Hypothesis 2: Bitcoin, equities, and gold all carry different levels of risk.

If you want to evaluate your portfolio's performance relative to the market, use the Sharpe ratio. In contrast to the Treynor technique, which only takes into account the standard deviation of the numerator, this one takes into account the standard deviation of the denominator when analyzing a portfolio's risk-adjusted returns or its rate of return and diversification. Because the Sharpe ratio allows for a more precise evaluation of portfolio risk, it is more suited to a diversified portfolio. Husnan (2003) explains in portfolio theory that in order to reduce the risk borne, the selection of an investment instrument must be carried out through a diversification of investment instruments. When comparing bitcoin, equities, and gold using Sharpe's performance measurements, Christopher and Sadalia's (2021) findings demonstrate that there are substantial variations. Meitta, Rossje, Efan, and Hendy (2021) claim that when comparing the performance of LQ45 stocks to that of Sharia stocks, bitcoin, and gold, there are substantial discrepancies. Radinka Dynand Mahessara and Budi Rustandi Kartawinata (2018) assert that when comparing the returns on bitcoin, equities, and gold using the Sharpe ratio, there is little to no difference between the three assets.

H3: Using Sharpe's method, bitcoin's performance is significantly different from that of stocks and gold.

According to portfolio theory, which underpins the Treynor approach, investors need to take into account the potential for loss as well as the potential for gain when constructing a portfolio. Furthermore, the "Markowitz" portfolio theory states that investors or investors must arrange diversification of investment goods in order to overcome a risk in investing, as the Treynor approach only accounts for the systematic risk that exists in investment instruments. By comparing bitcoin, equities, and gold using Treynor's performance measures, Christopher and Sadalia's (2021) findings reveal that there are substantial variations between the three assets. Siti Nurlaeli and Dwi Artati's (2020) study, meanwhile, demonstrates that testing with the Treynor approach yields identical results.

H4: There is a significant difference between the performance of bitcoin, stocks and gold with the Treynor method.

To calculate risk associated with shifts in the distribution of returns, portfolio theory first assumes that the rate of return-on-investment instruments can be estimated. Assuming that Jensen's measurement is one of the measures to view the return assumed in advance to get a return above the market, this is consistent with portfolio theory

in an attempt to predict a portfolio's performance. Furthermore, the Jensen ratio will provide the best results when applied to a diversified portfolio, which is consistent with Markowitz's portfolio theory, which states that risk can be reduced by increasing the number of types of assets, and that the level of expected return can be increased if the investment has price movements that are different from one another. Using the Sharpe, Treynor, Jensem, and Sortino ratios as measures of portfolio performance, Anggreni and Robiyanto (2019) found that bitcoin outperformed the LQ45 index. This study concludes that there is a distinction between the LQ 45 index and Cryptocurrency based on Jensen's efficiency ratio. Research by Radinka Dynand Mahessara and Budi Rustandi Kartawinata (2018), on the other hand, suggests that there is no significant difference in the performance of bitcoin, equities, and gold using Jensen's performance measures. Furthermore, when comparing bitcoin, equities, and gold using Jensen's performance measures, Christopher and Sadalia (2021) find no substantial difference.

H5: There is a significant difference between the performance of bitcoin, stocks and gold with the jensen method.

2. Method

The study was conducted with a quantitative strategy, and it was a comparison study. A quantitative study is one in which the information collected is numeric in nature and analyzed with statistical procedures. Analyzing whether or not two sets of variables differ constitutes the goal of comparative study. Thus, this study can be defined as an effort to compare numerical data from many samples to draw conclusions about differences between groups. In total, 180 observations (monthly closing prices for bitcoin, IDX30 shares, and antam gold) are used to draw conclusions. There are a total of 180 people in the sample. This study use a saturated sampling strategy to draw from a sample of 60 records for each investment instrument. Portfolio performance, risk, and return with an emphasis on digital currencies, stocks, and gold are the primary variables of this study.

This study used a refined kind of quantitative analysis—so called because the data being studied may be reduced to numbers using a mathematical model—to examine its findings. Bitcoin, equities, and gold are all subjected to quantitative research in order to evaluate their respective performance indicators. Initial online research focuses on locating Bitcoin, IDX30 stock, and antam gold price histories. Calculated using Microsoft Excel, the Sharpe, Treynor, and Jensen measures return, standard deviation (Risk), and performance. A normality test and a homogeneity test were then performed to

determine if the data followed a normal distribution and if the variance was consistent throughout the sample. Parametric statistical tests, such the one-way analysis of variance test, are used to examine the hypothesis if the data conform to the assumptions of normality and homogeneity. In order to conduct the test and analyze the results, we used SPSS, which stands for the Statistical Package for the Social Sciences.

3. Findings And Discussion

3.1. Descriptive Statistics Analysis

Table 4.1 shows that there are no gaps in our knowledge about any investment vehicle, as all variables contain the same number of observations (60). During our analysis period of January, 2017 to December, 2021, the average monthly return of bitcoin is 10%. In May 2019, bitcoin saw a monthly return of 67%, while in May 2021, it saw a monthly return (loss) of -41%. During the study period of January 2017 - December 2021, the average monthly return of IDX30 shares was 0%. November 2020 saw the highest monthly return (gain) of 12%, while March 2020 saw the lowest monthly return (loss) of -20%. Return From January 2017 through December 2021, the average monthly gold price at Antam was 3%. The worst monthly return (loss) for gold was -22% in March 2020, and the best was 69% in December 2020.

Bitcoin's average risk value is 4% from January 2017 to December 2021. Bitcoin risk peaked at 9% in March 2020 and dropped to 1% in October 2018, March 2019, and July 2020, respectively. During the time period of January 2017 through December 2021, IDX30 shares have an average risk value of 1%. The most dangerous month for stock prices is March 2020, at 6%, while the safest month is September 2017, at 0%. In the period between January 2017 and December 2021, Antam's average gold risk value is 3%. In January of 2021, the value of gold risk was at its peak, at 8%, and at its lowest, at 1%, in April of that year, October of that year, November of that year, and December of that year.

Between January 2017 and December 2021, the average sharpe value of bitcoin was -10.4557, with a peak of 6.031587 in August 2017 and a trough of -49.4229 in October 2018. During the time frame we're looking at (January 2017-December 2021) the average sharpe value of IDX30 shares is -37.9356. Sharpe ratios for stocks ranged from a high of -9.77169 in March 2020 to a low of -91.1543 in September 2017. From January 2017 through December 2021, Antam's average gold sharpe value was -15.4186. For gold,

Table 1: Descriptive analysis results.

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
return	Bitcoin	60	.097725	.2492863	.0321827	.033328	.162123	-.4073	.6669
IDX30	ANTM	60	.001932	.0499608	.0064499	-.010974	.014839	-.2027	.1168
Total		60	.028221	.1722412	.0222362	-.016273	.072716	-.2174	.6900
		180	.042626	.1809050	.0134839	.016019	.069234	-.4073	.6900
risk	Bitcoin	60	.035172	.0166648	.0021514	.030867	.039477	.0086	.0924
IDX30	ANTM	60	.012149	.0074303	.0009592	.010230	.014069	.0041	.0570
Total		60	.029394	.0141184	.0018227	.025747	.033041	.0122	.0825
		180	.025572	.0164807	.0012284	.023148	.027996	.0041	.0924
sharpe	Bitcoin	60	-1.045566E1	11.2962823	1.4583438E0	-13.373801	-7.537523	-49.4299	6.0316
IDX30	ANTM	60	-3.793565E1	16.8789639	2.1790649E0	-42.295944	-33.575347	-91.1543	-9.7717
Total		60	-1.541861E1	9.6454514	1.2452224E0	-17.910294	-12.926926	-39.4393	6.1938
		180	-2.126997E1	17.6183649	1.3131954E0	-23.861308	-18.678637	-91.1543	6.1938
treynor	Bitcoin	60	-.043469	1.0338278	.1334666	-.310535	.223597	-3.8253	2.0223
IDX30	ANTM	60	-.335133	.0710095	.0091673	-.353477	-.316790	-.4768	-.2032
Total		60	.021536	.2797125	.0361107	-.050722	.093793	-.2109	.7050
		180	-.119022	.6355525	.0473713	-.212500	-.025544	-3.8253	2.0223
jensen	Bitcoin	60	-.188292	.7646397	.0987146	-.385820	.009235	-1.5695	1.0261
IDX30	ANTM	60	.053044	.0445801	.0057553	.041528	.064560	-.0621	.1304
Total		60	.532590	.6741535	.0870328	.358438	.706743	-.7887	1.4146
		180	.132447	.6583588	.0490712	.035615	.229280	-1.5695	1.4146

the highest monthly sharpe ratio was 6.1937 in December 2020, while the lowest was -39.4393 in November 2019.

During the time period of January, 2017 to December, 2021, the average Bitcoin treynor value is -0.04347. August 2017 saw the highest Bitcoin treynor value at 2.0223, while March 2017 saw the lowest at -3.8252. During the time period of January 2017 through December 2021, the average treynor value of IDX30 shares is -0.3351. When looking the stock treynor values, the highest value is -0.2032 in November 2020,

Table 2: Kode.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	*bitcoin*	60	33.3	33.3	33.3
IDX30	ANTM	60	33.3	33.3	66.7
Total		60	33.3	33.3	100.0
		180	100.0	100.0	

Table 3: Statistics.

		return	*risk*	Sharpe	treynor	jensen
N	Valid	180	180	180	180	180
Missing		0	0	0	0	0

Source: Data processed, 2022

and the lowest is -0.4768 in March 2020. During the time period of January, 2017 to December, 2021, the average value of one gold treynor was 0.0215. Gold treynor values have ranged from a high of 0.7050 in September 2017 to a low of -0.2108 in March 2020.

Between January 2017 and December 2021, the average Bitcoin Jensen value is -0.1882. In January of 2021, the bitcoin jensen value will reach a high of 1.0261, while in November of same year, it will reach a low of -1.5694. Throughout the study period of January 2017 - December 2021, the average Jensen value for IDX30 shares was 0.0530. The minimum Jensen value was -0.0621 in June 2021, while the maximum was 0.1303 in November 2017. From 2017-01 to 2021-12, the average gold jensen price for Antam was 0.5325. August 2019 saw gold's highest Jensen value at 1.4146, while September 2017 saw its lowest Jensen value at -0.7886.

Normality test was performed on all variables. In the table above, it can be seen that the return, risk, Sharpe, Treynor and Jensen data are not normally distributed with p value < 0.05.

In addition, a homogeneity test was run across all of the variables to ensure that the data was consistent. The results of the tests show that the data for return, risk, sharpe, Treynor, and Jensen are consistent within a 0.05 significance level. This implies that not all investment instruments are created equal in terms of return, risk, sharpe, treynor, and jensen variables.

Table 4: Normality Test Results. One-Sample Kolmogorov-Smirnov Test.

		Return	risk	sharpe	treynor	jensen
N	Mean Std. Deviation Absolute Positive Negative	180	180	180	180	180
Normal Parameters[a]		.042626	.025572	- 2.126997E1	-.119022	.132447
		.1809050	.0164807	1.7618365E 1	.6355525	.6583588
Most Extreme Differences		.163	.119	.088	.248	.155
		.163	.119	.060	.176	.089
		-.068	-.107	-.088	-.248	-.155
Kolmogorov-Smirnov Z		2.188	1.594	1.179	3.325	2.073
Asymp. Sig. (2-tailed)		.000	.012	.124	.000	.000

Source: Output SPSS 24.0 for Windows

Table 5: Homogeneity Test Results. Test of Homogeneity of Variances.

	Levene Statistic	df1	df2	Sig.
Return	45.150	2	177	.000
Risk	12.757	2	177	.000
Sharpe	10.127	2	177	.000
Treynor	20.433	2	177	.000
Jensen	65.703	2	177	.000

Sumber: Output SPSS 24.0 for Windows

3.2. Hypothesis testings

SPSS (Statistical Package for the Social Sciences) normality and homogeneity tests were run, and the findings indicated that the data in the study were not normally distributed and homogenous; thus, a non-parametric test with the Kruskal Wallis test was run to answer the hypothesis.

Table 4 shows the results of a Kruskal Wallis test of rankings, and Bitcoin Returns ranks first with a value of 98.98. IDX30 stocks come in at number two with an index value of 86.27. Antam's gold ranks last with a total of 86.25. At a 125.23 valuation, Bitcoin represents the largest possible loss. Antam's gold comes in second with a price tag of $109.08. The IDX30 index index has the lowest beta at 37.18. Bitcoin's 125.90 Sharpe ratio is the highest of any asset. Gold from Antam, with a value of 103.95, is ranked second. IDX30 stock, at 41.65, is at the very bottom of the ranking. Bitcoin, with a Terynor value of 118.40, is the most valuable cryptocurrency. Antam's gold, at

Table 6: Uji Kruskal-Wallis.

kode		N	*Mean* Rank
return	*bitcoin* IDX30 ANTM Total	60	98.98
		60	86.27
		60	86.25
		180	
risk	*bitcoin* IDX30 ANTM Total	60	125.23
		60	37.18
		60	109.08
		180	
sharpe	*bitcoin* IDX30 ANTM Total	60	125.90
		60	41.65
		60	103.95
		180	
treynor	*bitcoin* IDX30 ANTM Total	60	118.40
		60	38.85
		60	114.25
		180	
jensen	*bitcoin* IDX30 ANTM Total	60	71.52
		60	74.48
		60	125.50
		180	

Source: Output SPSS 24.0 for Windows

an estimated $114.25 per ounce, is currently ranked second. IDX30 stock, at 38.85, is ranked last. Antam's gold, at a value of 125.50 Jensen, is the highest value of any metal in existence. IDX30 stock, at a price of 74.48, is ranked second. Bitcoin, at a value of $71.52, is the lowest-ranking currency.

Table 7: Kruskal-Wallis Test Results.

	return	risk	sharpe	treynor	jensen
Chi-Square	2.386	97.114	84.428	88.623	40.705
df	2	2	2	2	2
Asymp. Sig.	.303	.000	.000	.000	.000

Source: Output SPSS 24.0 for Windows

Based on the results of hypothesis testing using the Kruskal Wallis test, the following results were obtained:

1. The significance level for the return variable is 0.303 > 0.05. H0 is then approved. This indicates that the returns of bitcoin, IDX30 stocks, and Antam's gold with a p value of 0.303 do not differ significantly from one another.
2. The significance level for the risk variable is 0.000 0.05. H0 is then disregarded. This indicates that the risk of bitcoin, IDX30 shares, and Antam's gold with a p value of 0.000 differ significantly from each other.
3. Sharpe variable has a significance value of 0.000 <0.05. Then H0 is rejected. This means that there is a significant difference between the performance of bitcoin, IDX30 shares and Antam's gold using the Sharpe method with a p value of 0.000.
4. The significance level for the Treynor variable is 0.000 0.05. H0 is then disregarded. This indicates that using the Treynor method with a p value of 0.000, there is a considerable difference in the performance of bitcoin, IDX30 shares, and Antam's gold.
5. The significance level for the Jensen variable is 0.000 0.05. H0 is then disregarded. This indicates that using the Jensen technique with a p value of 0.000, there is a significant difference in the performance of bitcoin, IDX30 shares, and Antam gold.

4. Discussion

4.1. Comparison of Return on Bitcoin, IDX30 Stock and Antam's Gold

The first hypothesis was tested, and it was found that the returns from bitcoin, IDX30 shares, and Antam's gold are not statistically distinct from one another. The significance level of 0.303 is higher than 0.05, proving this to be the case. Therefore, a p-value of 0.303 indicates that there is no statistically significant difference between the returns on bitcoin, IDX30 shares, and Antam's gold. Based on this metric, Bitcoin is ranked at the top with a value of 98.98, making it the most valuable asset in terms of Return. IDX30 stocks come in at number two with an index value of 86.27. Antam's gold ranks last with a total of 86.25. Arifa Prita Meiyura and Azib (2020) found a big discrepancy between Bitcoin and Gold in terms of investment returns, therefore this doesn't square with their findings. However, this is consistent with findings from a study conducted by Mahessara & Kartawinata (2018) that found no statistically significant difference in returns between bitcoin, stock, and gold. If the findings of the ranking are correct, then

investing in most cryptocurrencies yields larger returns than foreign currencies and the stock market, as found in the research of Ezra Putrananda Setiawan (2020).

It appears from the frequency distribution of returns that Bitcoin's returns are roughly equivalent to those of IDX30 shares and Antam's gold, falling into the 25% and below range. According to the available data, the price of bitcoin, stocks, and gold all respond to investor demand in the same way, therefore all three offer roughly the same rate of return.

4.2. Risk Comparison of Bitcoin, IDX30 Stock and Antam's Gold

The findings of the second hypothesis's testing demonstrate that there are notable differences between the risks posed by bitcoin, IDX30 stocks, and Antam's gold. It is evident that there is a statistically significant difference between the risks related to bitcoin, IDX30 shares, and Antam's gold with a p-value of 0.000. So, when only the risks are taken into account, Bitcoin (now worth $125.23) is the most hazardous. Second place goes to Antam's gold, which has a price of $109.08. The IDX30 index index has the lowest beta at 37.18. Christopher and Sadalia's (2021) study supports this idea, finding that bitcoin equities are more volatile than gold. Furthermore, the study results demonstrate a substantial difference between the danger of investing in bitcoin and gold, as stated by Arifa Prita Meiyura and Azib (2020).

Portfolio theory states that the risk and return of an investment instrument are directly proportional to one another; in other words, if the level of risk is low, the rate of return will also be low, but if the level of risk is high, the rate of return will be high to compensate. Descriptive research shows that bitcoin's price level is typically higher than that of the IDX30 and Antam Gold stocks. Nonetheless, when compared to Antam's bitcoin and gold, the risks associated with IDX30 shares are often more stable. Due to the fact that bitcoin is still a digital currency, it is not recognized as such in Indonesia. Stocks and gold, which exist in a physical form and are regulated by institutions, are inversely affected.

4.3. Antam's Bitcoin, IDX30 and Gold Performance Comparison with the Sharpe Method

The results of the third hypothesis test show that there is a statistically significant difference between the returns produced by bitcoin, IDX30 shares, and Antam's gold when using the Sharpe method. When using the Sharpe method to assess the returns

on bitcoin, IDX30 shares, and Antam's gold, a p-value of 0.000 denotes a statistically significant difference between them. Looking at the rankings from the Kruskall Wallis test, bitcoin has the greatest Sharpe value, with a score of 125.90. Gold from Antam, with a value of 103.95, is ranked second. IDX30 stock, at 41.65, is at the very bottom of the ranking. This agrees with the findings of Christopher and Sadalia (2021), who found that there were substantial disparities between bitcoin, equities, and gold using the measures of performance developed by Sharpe. Meitta, Rossje, Efan, and Hendy (2021) claim that when comparing the performance of LQ45 stocks to that of Sharia stocks, bitcoin, and gold, there are substantial discrepancies.

When comparing a portfolio to the market, one can use Sharpe's total risk method, which involves either using a risk-adjusted return metric or evaluating a portfolio's rate of return and diversification by factoring in the portfolio's total risk, as measured by standard deviation, into the evaluation. When compared to the risk associated with IDX30 shares, Antam's bitcoin and gold have a sharpe value above 4, indicating that they offer a better return than the risk-free rate. Since bitcoin returns throughout the research period are extremely volatile, leading to substantial return dispersion compared to IDX30 stocks and Antam's gold, when examined from the performance measurement based on the Sharpe method, bitcoin's performance is superior to stocks and gold.

4.4. Antam's Bitcoin, IDX30 and Gold Performance Comparison with the Treynor Method

Using the treynor approach, the results showed that there were substantial discrepancies between the performances of bitcoin, IDX30 shares, and Antam's gold. When using the Sharpe method to assess the returns on bitcoin, IDX30 shares, and Antam's gold, a p-value of 0.000 denotes a statistically significant difference between them. The Kruskal-Wallis test findings show that Bitcoin has the highest Treynor value, with a value of 118.40. With a projected price of $114.25 per ounce, Antam's gold is currently in second place. At 38.85, IDX30 stock is ranked last.. This is consistent with the findings of Meitta, Rossje, Efan, and Hendy (2021), who used Treynor's performance as a metric and found that equities, bitcoin, and gold all performed differently.

The Treynor technique is an approach to measuring performance that seeks to develop metrics that can be used by all investors despite differences in risk tolerance. Market risk and the risk associated with variations in specific securities are at issue here. Compared to IDX30 shares and Antam gold, Bitcoin's intrinsic value has the highest treynor value. The beta value of bitcoin also tends to change, so this isn't a surprise.

The frequency distribution table clearly shows that bitcoin owns the extremes of the distribution. Aves (2018) concurs with the findings of this study, arguing that the Treynor approach does not provide comparable performance measurements across the three investment instruments.

4.5. Antam's Bitcoin, IDX30 and Gold Performance Comparison with the Jensen Method

Using the Jensen approach, we find that bitcoin, IDX30 shares, and Antam's gold all perform differently. A significance level of 0.000 0.05 supports this. With a p-value of 0.000, the Jensen approach indicates a statistically significant distinction between the returns on bitcoin, IDX30 shares, and Antam's gold. Antam's gold, according to the Kruskal Wallis grading, has the highest Jensen score (125.50). IDX30 stock, at a price of 74.48, is ranked second. Bitcoin, at a value of $71.52, is the lowest-ranking currency. Consistent with the findings of Anggreni and Robiyanto (2019), who measured portfolio performance with the Sharpe, Treynor, Jensen, and Sortino ratios, the current study concludes that bitcoin outperforms the LQ45 index. This study concludes that there is a distinction between the LQ 45 index and Cryptocurrency based on Jensen's efficiency ratio.

Jones (2016) claims that the Capital Asset Pricing Model (CAPM) forms the basis of both Jensen's and Treynor's measurement techniques (CAPM). When calculating the portfolio's performance, Jensen is extremely concerned with the CAPM, which is commonly referred to as the Jensen Alpha. Here, the Jensen approach cares a lot more about the unexpected outcomes than the predicted ones. If Jensen's value is positive, the investment instrument has done well; if it's negative, it has done poorly. The descriptive study shows that Jensen's performance with respect to his bitcoin holdings is comparable to that of Antam's gold, while the IDX30 stock is rather stable. Compared to IDX30 shares and Antam gold, bitcoin's Jensen value is significantly lower. Bitcoin's lowest point in value was 1.5694 USD, below even IDX30 shares and Antam gold. Only bitcoin instruments have a negative average value according to Jensen's average value, while IDX30 stock instruments and Antam's gold both have positive average values. Based on Jensen's evaluation of performance, Antam's bitcoin, IDX30 stock, and gold all have different values and ratings.

5. Conclusions And Suggestions

6. Conclusions

The study found that when comparing bitcoin, IDX30 shares, and Antam's gold along risk metrics, Sharpe's performance, Treynor's performance, and Jensen's performance, bitcoin performed much worse than the other two assets. As far as returns are concerned, however, there is little distinction between bitcoin, IDX 30 shares, and Antam gold.

7. Suggestions

The goal of diversification is to allow investors to maximize earnings while minimizing risk. Further, by calculating a portfolio's performance with any of the three approaches discussed above, investors can see how their money is doing. Future researchers are encouraged to extend the study time, employ a wider variety of cryptocurrencies, and incorporate additional factors used to quantify the performance of investment instruments in order to get more reliable and actionable results.

References

[1] Abrar Ramadhan MA. Analisa Perbandingan Abnormal Return Antara Bitcoin, Saham Pt Telekomunikasi Indonesia Tbk Dan Emas Antam Dalam Masa Pandemic Covid 19 (Periode 15 Maret 2020 Sampai Dengan 15 Juni 2020). E-Proceeding Of Management; 2021.

[2] Anggreini Pamilangan, R. (2019). Perumusan Portofolio Dinamis Cryptocurrency . Ilmu Sosial Dan Humoniora, 283-292.

[3] Arifa Prita Meiyura, A. (2020). Analisis Perbandingan Return Dan Risk Investasi Antara Emas Dan Bitcoin Periode Juli 2016-Juni 2019. Prosiding Manajemen, 299-303.

[4] Asep Muhammad Lutfi, N. S. (2019). Pengaruh Current Ratio (Cr), Return On Equity (Roe), Dan Sales Growth Terhadap Harga Saham Yang Bedampak Pada Kinerja Keuangan Perusahaan (Pada Perusahaan Manufaktur Sektor Makanan Dan Minuman Yang Terdaftar Di Bursa Efek Indonesia. Jurnal Sekuritas, 83-100.

[5] Christopher Lumbantobing, I. S. (2021). Analisis Perbandingan Kinerja Cryptocurrency Bitcoin, Saham Dan Emas Sebagai Alternatif Investasi. Studi Ilmu Manajemen Dan Organisasi (Simo), 33-45.

[6] Finance G. (2021). Google Finance. Retrieved From Google Finance: https://Www.Google.Com/Finance/Quote/Composite:Idx?Sa=X&Sqi=2&Ved=

2ahukewjl96vxxotzahv7hv0hhvxnc1gq3ecfegqicxac

[7] Gina Handayani, M. A. (2021). Analisis Perbandingan Abnormal Return Antara 3 Aset Komoditas Berjangka Dan Saham Yang Tergabung Dalam Indeks Lq45 Dalam Masa Pandemi Covid-19 (Periode 2 Maret 2020 Sampai Dengan 30 Juni 2020). E-Proceeding Of Management, 833-839.

[8] Harga-Emas.Org. (2021). Harga-Emas.Org. Retrieved From Harga-Emas.Org: Https://Harga- Emas.Org/Grafik/

[9] Kontan.Co.Id. (2020, Maret 05). Perlukan Milenial Investasi Bitcoin? Retrieved From Kontan.Co.Id: Htttp://Www.Kontan.Co.Id

[10] Luno. (2021). Luno.Com. Retrieved From Luno.Com: Https://Www.Luno.Com/Id/Price/Btc Meitta Adiyono, R. V. (2021). Analisis Alternatif Pilihan Investasi Pada Era Digitalisasi. Jurnal

[11] Akuntansi Trisakti, 227-248.

[12] Mutia Fitri Chania, O. S. (2021). Analisis Risk Dan Return Investasi Pada Ethereum Dan Saham Lq45 (Risk And Return Analysis Investment On Ethereum And Lq45 Stocks). Studi Ilmu Manajemen Dan Organisasi (Simo), 139-150.

[13] Setiawan, E. P. (2020). Analisi Potensi Dan Risiko Investasi Cryptocurrency Di Indonesia. https://doi.org/10.12695/jmt.2020.19.2.2.

[14] Jurnal Manajemen Teknologi, 130-144.

[15] Siti Nurlaeli, D. A. (2020). Analisis Kinerja Portofolio Saham Dengan Metode Sharpe, Treynor, Dan Jensen (Saham Idx30 Tahun 2015 Sampai 2019). Jurnal Ilmiah Mahasiswa Manajemen, Bisnis Dan Akuntansi, 972-990.

[16] Sulistiana, I. (2017). Pengaruh Pengungkapan Corporate Social Responsibility Dan Rasio Profitabilitas Terhadap Harga Saham Pada Perusahaan Manufaktur Yang Terdaftar Di Bursa Efek Indonesia. Jurnal Akuntansi, 65-74.

[17] Warsito, D. L. (2020). Analisis Volatilitas Cryptocurrency, Emas, Dollar, Dan Indeks Harga Saham Gabungan (Ihsg). International Journal Of Social Science And Business, 40-46.

[18] Wijaya, D. A. (2016). Mengenal Bitcoin & Cryptocurrency. Tanjung Rejo, Medan: Puspantara. Mahessara, R. D., & Kartawinata, B. R. (2018). Comparative Analysis Of Cryptocurrency In Forms Of Bitcoin, Stock, And Gold As Alternative Investment Portofolio In 2014 –2017.

[19] Sugiyono. (2017). Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif, Dan R&D). Bandung: Alfabeta

[20] Aves A. (2018). How To Get Started In Cryptocurrency. Quoine Liquid. Bitcoin.Org. (N.D.).

[21] Faq. Retrieved From Bitcoin.Org: Https://Bitcoin.Org/Id/Faq#Umum

[22] Coinvestasi.Com. (2018, July 9). Belajar: Coinvestasi. Retrieved From Coinvestasi: Https://Coinvestasi.Com/Belajar/Apa-Itu-Cryptocurrency/

[23] Bank Negara Indonesia. (2020). Tips Investasi Emas Bagi Pemula. Https://Www.Bnilife.Co.Id/Id/Lifeblog/Tips-Investasi-Emas-Bagi-Pemula. (Diakses Tanggal 5 Juni 2021).

[24] Bappepti (2019). Peraturan Badan Pengawas Perdagangan Berjangka Komoditi No 5 Tahun 2019 Tentang Ketentutan Teknis Penyelenggaraan Pasar Fisik Aset Kripto Di Bursa Berjangka.

[25] Sujarweni, V. W. (2019). Spss Untuk Bisnis Dan Ekonomi. Yogyakarta: Pustaka Baru Press Sepdiana, N. (2019). Kinerja Reksa Dana Syariah Di Pasar Modal Indonesia. Jas (Jurnal

[26] Akuntansi Syariah), Vol. 3, No. 1:118-132. Stie Syariah Bengkalis

[27] Hartono, J. (2017). Teori Portofolio Dan Analisis Investasi Edisi 11. Yogyakarta: Bpfe. Yohandi, A., Trihastuti, N., & Hartono, D. (2017). Implikasi Yuridis Penggunaan Mata Uang

[28] Virtual Bitcoin Sebagai Alat Pembayaran Dalam Transaksi Komersial (Studi Komparasi Antara Indonesia & Singapura). Diponegoro Law Journal, 6, 1–19. Https://Doi.Org/10.1017/S026988890700101

[29] Dyhrberg AH. Bitcoin, Gold And Dollar - A Garch Volatility. Finance Res Lett. 2015;000:1–8. Available from: Https://Doi.Org/10.1016/J.Frl.2015.10.008

[30] Robiyanto, & Pangestuti, I. R. D. (2018). Weak Form Market Efficiency Analysis In The Cryptocurrency Market. Jurnal Of Economic And Bisnis, 2(C), 124–128

[31] Robiyanto R. Gold Vs Bonds: What Is The Safe Haven For The Indonesian And Malaysian Capital Market? Gadjah Mada International Journal Of Business. 2018;20(3):277.

[32] 302. Https://Doi.Org/10.22146/Gamaijb.27775

[33] Robiyanto R, Susanto YA, Ernayani R. (2019). Examining The Day-Of-The-Week-Effect And The-Month-Of-The-Year-Effect In Cryptocurrency Market. Jurnal Keuangan Dan Perbankan, 23(3), 361–375. Https://Doi.Org/10.26905/Jkdp.V23i3.3005 https://doi.org/10.26905/jkdp.v23i3.3005.

[34] Marihot Tua Efendi Hariandja DM. Manajmen Sumber Daya Manusia Pengadaan, Pengembangan, Pengkompensasian, dan Peningkatan Produktivitas Pegawai. Jakarta: PT Grasindo; 2007.

[35] Nurhaliza S. (2021, November 24). Market News. Retrieved from IDX Channel.com: https://www.idxchannel.com/amp/market-news/ada-bbca-hingga-asii-begini-perbedaan- lq45-dan-idx30

[36] Santosa UA. (2020, Juli 14). Apa Itu Emas Antam. Retrieved from Buka Review: https://review.bukalapak.com/amp/finance/emas-antam-112198

[37] Tandelilin, Eduardus 2010. Portofolio dan Investasi. Edisi Pertama. Yogyakarta: Kanisius. Hartono, Jogiyanto.2014. Teori Portofolio dan Analisis Investasi. Edisi Kesembilan.

[38] Yogyakarta: BPFE.

[39] Nurdin, D. W. (2020). Analisis Perbandingan Return dan Risk Antara Cryptocurrency dan Saham DI Indonesia Tahun 2017-2018. Prosiding Manajemen, 71-75