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HOW RETURNS OF METAVERSE TOKENS ARE INTERRELATED?

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Abstract

Metaverse tokens belong to a virtual world that has recently emerged and their growth potential is of interest to numerous parties. Theoretically, the number of ecosystems may increase infinitely. However, strong financing and technological backing are required for the survival of the projects. Thus, various factors may influence these tokens' returns. How these tokens' returns are affected by each other is analyzed via a multi-regression model. ENJIN returns are found to be the sole factor in MANA returns for our sample (99%). The remaining results of the study indicate that returns of metaverse tokens are interrelated when everything else is held constant and trading volumes have an impact on these returns. The future for these ecosystems may depend on various factors and they are discussed in the light of literature as well.

Keywords

Metaverse Tokens, Cryptocurrency Returns, Trading Volume, Non-Fungible Tokens

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1. Introduction

Metaverse, play-to-earn, and non-fungible tokens are the recent innovations in the crypto world and they are of interest to many parties, including users, investors, and regulators. Despite the concerns for this crypto space in general, its dimensions are expanding day by day. Platforms provide tokens in order end-users to consume for the services rendered and goods that are for sale.

The objective of this study is to understand the structure of returns in these tokens. Mainly, the interrelations among metaverse tokens' returns and their volume are under study. Authors believe that investors may have the hardship differentiating among them and they may trade these tokens as a cluster. In other words, when a metaverse token increase, investors rush to the other one as they cannot read the differences among them. It may be valuable to cause and effect the relationship between these tokens' yields and trading volume. Thus, in this study, some kind of a spill-over effect is sought in these coins. The theory for herding in assets is generally within the scope of behavioral finance and investors are informed about valued investors' actions and they follow the suit rather than analyzing the fundamentals themselves. For metaverse tokens, it is simply hard to state that investors can analyze the fundamentals of metaverse tokens. Financial or software literacy may not be adequate to differentiate among projects. Consequently, a favorable trend towards trading these tokens may lead to demand even in the weakest project as it is listed in the metaverse token set. Investors may eye out the metaverse token that has the weakest return in to hope that particular token will converge the group in the following period.

One of the constraints of this study is that the market for these tokens is not yet developed therefore, returns may be overstated and they may smoothen over time. Similarly, volumes may be thin and higher volumes may be possible when the market is better known. Therefore, the inferences made from our analysis are subject to change as time passes and the market grows. Risks could also be incorporated into the models used but unfortunately, data are insufficient for a robust analysis of the risks involved in these tokens.

Theoretically, investors need to be cautious about all the relevant and material information of the underlying assets that they are trading. The efficient Market Hypothesis states that all public information is reflected in prices simultaneously. However, this may not hold for the non-fungible

tokens or cryptocurrencies as there may not be media available for investors to follow or they may have hardship in accessing the media. They may select to move with the herd not because of behavioral issues but with the expectation that others may possess the public or non-public information.

2. METAVERSE TOKENS

Ecosystems are being developed for the virtual world and they compete. There is also rivalry among tokens that are used in these metaverses. They are a recent phenomenon therefore there are a limited amount of studies in the literature about them.

2.1. What are Metaverse Tokens?

A metaverse is a virtual space where users can enjoy various activities and share experiences. For instance, a metaverse land can be purchased or rented. Platforms like OVR, Sandbox, or Decentral enable investors to possess virtual parcels throughout the virtual world. There are 90,601 lands in Decentral and metaverse and 166,464 virtual lands in Sandbox metaverse. Metaverse may be regarded as a social good in terms of accessibility, diversity, equality, and humanity (Duan, Fan, Lin, Wu, & Cai, 2021).

2.2. Architecture of Metaverse Tokens

Academic articles propose various architectures for metaverse; a three-layer one is proposed and layers are composed of an infrastructure layer that supports the operations in the system, an interaction layer where user experience takes place, and, finally, the ecosystem where artificial intelligence may make life easier for the users (Jeon, Youn, Ko, & Kim, 2022).

2.3. Discussion for the Future of Metaverse Tokens

Extended Reality(XR) may play a higher role in the futuristic metaverses. A mirror world, where people may join via a digital avatar to platforms, may create a market as well (Lee, Braud,

Zhou, Wang, Xu, Lin, ... & Hui, 2021). Presumably, if these markets can take the place of the real markets, their tokens will then replace the currencies we hold physically.

For a metaverse to be viable, realism is needed and this can be achieved if extended reality extends further. Ubiquity, interoperability, and scalability may be other components of these ecosystems (Dionisio, & Gilbert, 2013).

When the mirror worlds are created, virtual workplaces or even higher education services may be rendered in these ecosystems (Collins, 2008). The majority of internet users are believed to have a Second Life (Hendaoui, Limayem, & Thompson, 2008). Metaverses are promising projects where family needs and society may be harmonized (Calongne, Sheehy, & Stricker, 2013).

2.4. Metaverse Tokens Market

The metaverse tokens market is assumed to be independent of the cryptocurrency market due to its structure (Vidal-Tomás, 2022). There are numerous tokens but the leading metaverse tokens attract investors with their growth potential. Enjin (ENJ) is used in the virtual game industry and it is Ethereum based (Jeon, Youn, Ko, & Kim, 2022).

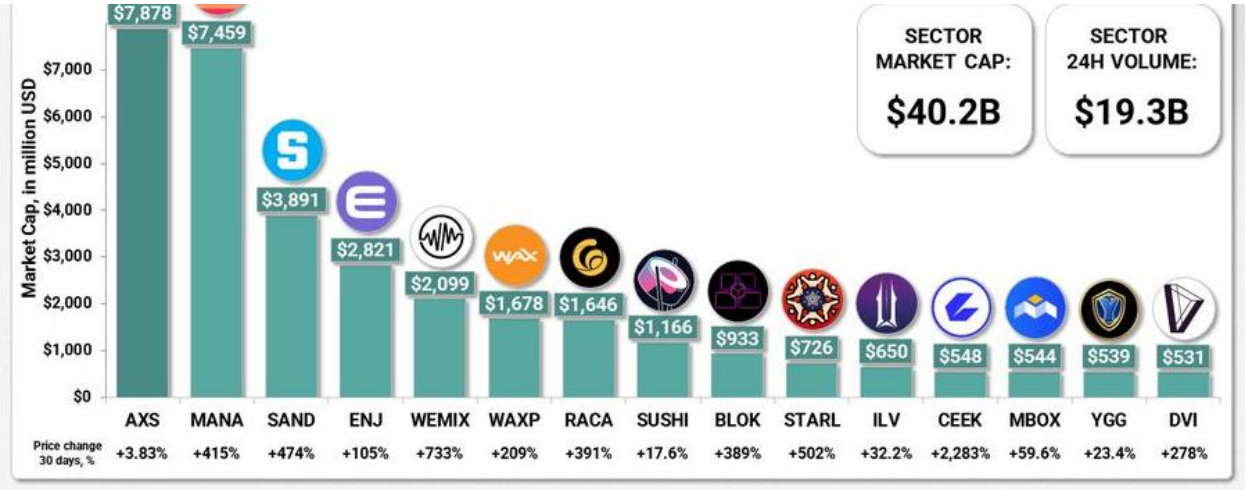

***Figure 1**: (Top 15 Metaverse Coins by Market Capitalization as of 19 November 2021)*
(Source: CryptoDiffer)

Decentraland (MANA) is another metaverse token backed by Ethereum. MANA-denominated virtual lands are traded or rented by real investors. The Sandbox (SAND) is another play-to-earn Project such as Axis Infinity (AXS) that enables users to create their characters or trade crypto assets. The Metaverse market is estimated to be worth USD 814.2 billion by 2028 (Kaur, & Gupta, 2021). When compared with the sector market cap of 40.2 Billion USD as of

November 2021 provided in Figure 1, the estimate above highlights how bright the prospects for this market are.

There is an increasing number of new projects being introduced in this niche market of the crypto world. However, it resembles horse races on one hand; one needs to guess the successful project that will win in the future but on the other hand, there may be more than one winner depending on the demand for these ecosystems. The latter possibility enables funds to be channeled to various dubious projects. Investors seem not to guess the winning project but rather split their bets as can be seen in Figure 1.

2.5. Literature Review

The authors could not notice relevant literature regarding with interrelations of the returns of metaverse tokens. The reason may be due to being at the infant stage in terms of metaverse projects. However, some authors have studied units of accounts for metaverse tokens; transactions settled in different denominations are shown to influence willingness to pay, with wETH-settled LAND priced 30% lower, while SAND-settled LAND priced 3-4% higher. (Nakavachara & Saengchote, 2022). Some authors provide evidence that non-fungible tokens earn 130% on the first listing day and enjoy an average investment multiple of 40 in the long run (Mazur, 2021). An inverse relationship between one-week and two-month cryptocurrency returns and the total amount of capital raised is found for 62 NFT projects (Liu, 2022).

2.6. Research Design

The problem that the study aims to shed light on is whether the metaverse tokens' returns and trading volumes are affected by each other or not. Normally, each underlying asset shall be evaluated apart from other assets based on their fundamentals. The objective of the research is to put forth the claim that there is limited ability to read the differences between these tokens for investors for this particular market and the study aims to provide evidence for the strong relationships between cryptocurrency returns and trading volumes. If the investors can assess the intrinsic value for these tokens well with distinct characteristics of the particular project, a lower

relation among the returns is expected. To our knowledge, there is a gap in the literature for this kind of inferential analysis.

3. Data and Methodology

For Table 1, Table 2, Table 3, and Table 4, token price data are obtained from CoinGecko at a daily frequency. Trades that are not listed on exchanges are excluded due to the nature of this unrecorded transaction.

3.1. Data

Our data are composed of 394 daily observations of various cryptocurrency returns for the sample period between 27 December 2020 to 27 January 2022. Some variables like Sandbox are dropped from our data set due to an inadequate number of observations to date. MANA, ENJ, THETA, and AXS are chosen as representatives from the metaverse world and Bitcoin and Ethereum coins are chosen from the crypto world. Changes in their trading volumes are also analyzed for controlling purposes.

3.2 Methodology

Metaverse token returns are analyzed with multi regression analysis and insignificant variables are delisted from our model for each of our models. Preliminary tests for unit roots are conducted and the series are controlled for serial autocorrelation, multicollinearity, and heteroscedasticity. Our first model uses MANA returns as a dependent variable and returns for

Enjin, Theta, Axs, Bitcoin and Ethereum, and the trading volume for MANA as independent variables;

$$MANA_i = \beta_0 + \beta_1 ENJ + \beta_2 THETA + \beta_3 AXS + \beta_4 BTC + \beta_5 ETH + \beta_6 MANAVOL + u_t \quad (1)$$

The second model uses ENJIN returns as the dependent variable and returns for Mana, Theta, Axs, and Ethereum, and trading volume for BTC and MANA as independent variables;

$$ENJ_i = \beta_0 + \beta_1 MANA + \beta_2 THETA + \beta_3 AXS + \beta_4 ETH + \beta_5 BTCVOL + \beta_6 MANAVOL + u_t \quad (2)$$

The third model is used to explain the changes in THETA token and MANA, AXS, ENJIN and BTC return and trading volumes for BTC and ETH are used as explanatory variables.

$$THETA_i = \beta_0 + \beta_1 MANA + \beta_2 AXS + \beta_3 ENJ + \beta_4 ETH + \beta_5 BTCVOL + \beta_6 ETHVOL + u_t \quad (3)$$

The fourth model is used to explain the changes in AXS token and ENJ, THETA, BTC and ETH return and trading volumes for AXS and ETH are used as explanatory variables.

$$AXS_i = \beta_0 + \beta_1 ENJ + \beta_2 THETA + \beta_3 BTC + \beta_4 ETH + \beta_5 AXSVOL + \beta_6 ETHVOL + u_t \quad (4)$$

These models aim to put forth the influence of the top metaverse tokens and their trading volumes as well as two leading cryptocurrencies.

4. Findings

Table 1 depicts the affecting factors for MANA returns. Change in ENJ returns are positively related to changes in MANA returns with 99% statistical significance. The rest of the variables in our data set is found to be insignificant. Thus, an omitted variable hypothesis may hold for MANA returns for our sample.

Table 1: (*Regression Analysis for MANA Returns)*

Newey MANARET ENJRET THETA RET AXSRET BTC ETHRET MANAVOL, LAG (0)						
				NUMBER OF OBS		394
				F(6, 387)		65.63
				Prob > F		0.0000
MANARET	Coef.	NW st. Err.	t	P>|t|	95% Conf. Interval	
ENJRET	0.6367	0.1567	4.06***	0.000	.3286	.9448
THE TARGET	0.1961	0.1623	1.21	0.228	-.123	.5150
AXSRET	0.0759	0.0571	1.33	0.184	-.036	.188
BTC	-0.0086	0.2201	-0.04	0.969	-.441	.424
ETHRET	0.0022	0.1566	0.01	0.989	-.306	.310
MANAVOL	-0.0020	0.0063	-0.32	0.752	-.014	010
CONS	0.0054	0.0049	1.09	0.275	-.004	.015

(Source: CoinGecko)

Enjin returns are affected positively by MANA, THETA, AXS, and ETH return (99%) as shown in Table 2. Their returns are interestingly negatively influenced by their trading volume (95%).

Table 2: (*Regression Analysis for ENJ Returns)*

Newey ENJRET MANARET THETARET AXSRET ETHRET BTCVOL ENJVOL, LAG (0)						
				NUMBER OF OBS		394
				F(6, 387)		59.13
				Prob > F		0.0000
ENJRET	Coef.	NW st. Err.	t	P>|t|	95% Conf. Interval	
MANARET	0.2881	0.0977	2.95***	0.003	.095	.480
THETARET	0.2072	0.0559	3.70***	0.000	.097	.317
AXSRET	0.1773	0.0505	3.51***	0.001	.077	.276
ETHRET	0.3985	0.1022	3.90***	0.000	.197	.599
BTCVOL	-0.0000	0.0000	-0.60	0.546	-.000	.000
ENJVOL	-0.0089	0.0039	-2.32**	0.021	-.016	-.001
CONS	0.0014	0.0031	0.44	0.661	-.004	.007

(Source: CoinGecko)

In Table 3, it is apparent that THETA returns are positively affected by BTC and ENJIN returns at 99 % whereas, for MANA the significance is at 95% AXS is at 90%. Strikingly, THETA returns have the highest positive relation with the BTC trading volume (99%). Theta deviates from other tokens as it is the only asset that has been influenced by the trading volume of the leading coins.

Table 3*: (Regression Analysis for THETA Returns)*

Newey THETARET MANARET ENJRET AXSRET BTC BTC VOL ETHVOL, LAG (0)						
				NUMBER OF OBS		394
				F(6, 387)		45.72
				Prob > F		0.0000
THETARET	Coef.	NW st. Err.	t	P>|t|	95% Conf. Interval	
MANARET	0.0669	0.0271	2.47**	0.014	.0136	.1202
ENJRET	0.1472	0.0494	2.98***	0.003	.0500	.2443
AXSRET	0.0653	0.0346	1.89*	0.060	-.0027	.1334
BTC	0.8820	0.0963	9.16***	0.000	.6927	1.071
BTCVOL	0.0002	0.0000	4.35***	0.000	.0000	.0003
ETHVOL	-0.0017	0.0011	-1.58	0.115	-.0037	.0004
CONS	0.0000	0.0029	0.01	0.991	-.0058	.0059

(Source: CoinGecko)

A positive change in Enjin returns explains the change in AXS returns with 99 % significance. Table 4 also provides evidence that THETA returns, ETH returns and the constant has a positive relationship with the AXS token. BTC return has a positive but merely insignificant effect on the token.

Table 4*: (Regression Analysis for AXS Returns)*

Newey AXSRET ENJRET THETARET BTC ETHRET AXSVOL ETHVOL, LAG (0)						
				NUMBER OF OBS		394
				F(6, 387)		28.96
				Prob > F		0.0000
AXSRET	Coef.	NW st. Err.	t	P>|t|	95% Conf. Interval	
ENJRET	0.3915	0.0817	4.79***	0.000	.2307	.5522
THE TARGET	0.1843	0.0872	2.11**	0.035	.0127	.3559
BTC	0.3399	0.2074	1.64	0.102	-.0678	.7478
ETHRET	0.2206	0.1026	2.15**	0.032	.0188	.4224
AXSVOL	-0.0026	0.0045	-0.59	0.556	-.0117	.0063
ETHVOL	-0.0011	0.0015	-0.73	0.467	-.0041	.0019
CONS	0.0112	0.0048	2.34**	0.020	.0018	.0207

(Source: CoinGecko)

5. Conclusion

Despite the concerns with the virtual world, investors are channeling their funds to metaverses in terms of non-fungible tokens or parcels in particular metaverse ecosystems. Play-to-earn tokens enable users to trade their assets by using the metaverse tokens and demand for these tokens depends on the success of the game or the metaverse in terms of popularity.

Our results indicate that these tokens are positively influenced by their rival tokens' returns as well as their trading volumes. For MANA returns, ENJIN returns have a positive 99% statistical significance but for ENJIN returns, MANA, THETA, AXS, and ETH returns have a positive 99% statistical significant effect. The trading volume of ENJIN has a 95 % negative statistically significant effect on its own returns. Similarly, for THETA, other token returns and BTC trading volume have explanatory power. Only for AXS, a positive constant (95%) is found to be statistically significant as well as returns of ENJIN (99%), THETA (95%), and ETH (95%). The results of this study provide evidence for the interrelations among the returns and trading volumes of metaverse tokens ceteris paribus.

This result may also indicate that investors see metaverse tokens as a cluster for investment and they may not know how to differentiate them yet. BTC Volume is found to be effective on THETA only and ETH volume is found to have almost no effect on these tokens' returns. It may not be possible to obtain the exact trading volume data which may be a constraint to mention for this study.

Regarding research limitations, a relatively short period of metaverse tokens is our apparent research constraint. Longer sample periods may lead to a more robust analysis. Macroeconomic variables and risk factors may be incorporated into models in the future. Older metaverses or non-fungible tokens are not necessarily the most promising projects but they are the ones eligible for analysis.

Digital life may sound mundane to the majority but businesses, colleges, and various industries will enjoy not paying rent to physical buildings and they will be able to serve their customers similar to the real world. The question should not be about the presence of metaverse ecosystems in the future but which ones will prevail matters for the tokens of this world. Still, the prospects for metaverse tokens seem bright and require further research.

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