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Executive Summary of the Thesis

Token Valuation: A Systematic Literature Review and Empirical Analysis

Laurea Magistrale in Management Engineering - Ingegneria Gestionale

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1. Blockchain and Features

Blockchain technology is becoming an increasingly integral part of the modern economic and financial landscape. Every day, new blockchain projects are developed with the aim of addressing various challenges and inefficiencies inherent in traditional systems. Since the launch of Bitcoin (Nakamoto, 2008), which marked the advent of Blockchain, the technology has seen substantial growth, both in terms of usage and economic value. Despite this unstoppable growth, there remains a heated debate on how to properly evaluate blockchain projects and their associated tokens (Metelski & Sobieraj, 2022). Accurate valuation methodologies are essential for navigating this rapidly evolving space and for maximizing the potential of blockchain technology in the financial sector. The absence of a structured framework for the valuation of digital assets is partly due to the lack of a unified starting point. Indeed, there is still no universally accepted taxonomy that clearly defines and categorizes token projects and their associated tokens in a consistent and unambiguous manner (Alzhrani & Zhao, 2022). This lack of standardization continues to pose challenges for investors and analysts in assessing the true potential and value of various tokens. Despite various attempts to classify tokens into specific categories, establishing a consistent taxonomy remains a challenging goal (Puschmann & Huang-Sui, 2024). Toepffer and Thatmann (2020) argued that a well defined taxonomy of tokens is crucial for addressing regulatory questions, fostering innovation, and improving understanding and interoperability.

Kaal et al. (2022) discussed that traditional financial models, designed for conventional assets, often fail to accommodate the decentralized, rapidly evolving nature of digital assets. Tokens, unlike typical financial instruments, lack intrinsic value tied to tangible assets or predictable revenue streams, making standard valuation methods inadequate (Liu & Zhang, 2023). Additionally, studies made by Marin et al. (2023) and by Şoiman et al. (2023) reported that the speculative nature and volatility of cryptocurrency markets further complicate valuation.

As highlighted in the papers mentioned, there is currently no universally recognized and unified taxonomy, despite a strong need for one. Similarly there is also a lack of a structured framework for guiding the valuation of digital assets. The subsequent work will aim to address these

gaps by thoroughly analyzing the existing taxonomies in academic literature, evaluating the materials available for valuation and examining the key characteristics of Layer 2 (L2) and Decentralized Exchange (DEX) projects in order to extrapolate parameters usefull for a relative valuation. Finally, an empirical test on the L2 project was conducted to propose guidelines for the valuation of digital assets. This comprehensive approach seeks to bridge the theoretical and practical understanding of blockchain project evaluation, offering a structured method to assess the value of tokens and their underlying projects.
Identifying these gaps in academic literature, our research question (RQ) is twofold:

1st RQ: *"What are the key features at both the system and token levels that enable a more effective and comprehensive classification of Distributed Ledger Technology (DLT) systems and associated tokens?"*

2nd RQ: *"What are the key characteristics to be considered when performing a token valuation?"*

2. Methodology

To address the research questions, a structured methodology was outlined. First, as suggested by Barry et al. (2022), a literature review was conducted to analyze and understand the current state of the art, aiming to consolidate our understanding of the existing gaps in the literature and, consequently, address the research questions.

Specifically, a search was performed using the Scopus database for each topic of interest. The following queries were used:

- **Taxonomy:** *(token OR crypto OR crypto-asset OR dlt) AND blockchain AND taxonomy*
- **Valuation:** *blockchain AND valuation AND (asset* OR token* OR crypto)*
- **Layer 2:** *blockchain AND Layer 2 AND scalability AND solutions*
- **Decentralized Exchange**: *blockchain AND dex*

Next, to perform a systematic review of the literature and select relevant papers from the initial search, the PRISMA method was applied (Page et al., 2021).
From the papers retrieved in the Scopus search, several were excluded based on various criteria, including their title, abstract and full-text reading. Other factors, such as relevance, contribution to the topic and the credibility of the methodologies were also considered. Additionally, to enhance and complete the various chapters, papers from grey literature were later integrated. These articles added significant value to our research by providing practical insights and complementing the academic literature, offering a more comprehensive and well-rounded analysis.
The methodology for the empirical tests on L2 project builds on insights from the literature reviews, focusing on identifying key parameters for Layer 2. The aim is to empirically test these parameters to determine which factors most significantly influence the valuation of L2 tokens and to establish relevant valuation multiples for a relative valuation model.
The SARIMAX model was selected for the time series analysis due to its ability to handle seasonality, trends and exogenous variables (Tiwari et al., 2023). A Variance Inflation Factor (VIF) analysis was performed to check for multicollinearity among the variables before applying the model. Non-stationary variables were adjusted using the Augmented Dickey-Fuller (ADF) test. Since residuals were not normally distributed, logarithmic transformations were applied to stabilize variance. To account for time-varying volatility, a GARCH model was used, fitted with Student's t-distribution to better capture extreme variations, particularly useful in volatile financial data.

3. Results

This thesis addresses gaps in token taxonomy and valuation through a deep review of the literature. The analysis of taxonomy literature highlights several key characteristics that consistently emerge across the majority of analyzed papers regarding token taxonomy. These results underscore the complex nature of Distributed Ledger Technology systems, with a greater focus on the systems themselves rather than the

tokens. Once a class of DLT system is defined, token characteristics show limited variation, reinforcing the idea that the system heavily influences token behavior.
A summary table has been proposed, outlining the shared characteristics among the various taxonomies discussed in the literature. This table offers a clear overview of the key features that consistently emerge, providing valuable insights into the commonalities and distinctions within different classification frameworks.
Although a unified taxonomy has yet to be established, some academically sound proposals, such as the one by Alzhrani et al. (2022), offer valuable frameworks for classification.
Shifting the focus to valuation methodologies, the analysis of both academic and grey literature reveals a clear divergence in the valuation methods used for cryptocurrencies and DeFi tokens. Most of the existing academic and grey literature is heavily focused on cryptocurrencies, with valuation models that primarily rely on revenue generation metrics such as Price to Earnings ratios. These models are applicable to cryptocurrencies that generate profits through activities such as mining or staking, where fees or financial returns are a key aspect of their value. In contrast, DeFi tokens, which often serve governance or utility roles within decentralized ecosystems, present a unique challenge for valuation, as they do not typically generate profits in the same way. Given the lack of structured valuation models for DeFi tokens, this thesis proposes a relative valuation model to fill the gap. The model draws insights from both academic and grey literature and adapts them for empirical testing in the context of DeFi tokens. The DeFi token space is particularly promising for relative valuation, where different tokens can be assessed based on their utility and role within decentralized financial systems.
The fundamental parameters for the relative valuation were derived from the literature review on valuation, combined with an in-depth review focused on two specific types of projects: Layer 2 and Decentralized Exchange. The proposed parameters are, therefore, tailored to suit the characteristics and requirements of these projects. Specifically, for L2 projects, parameters such as new daily active addresses, daily transactions, the price of the Layer 1 blockchain on which the L2 is built and gas fees emerged as significant. For DEX platforms, the key metrics included new unique addresses, price slippage, gas fees and Total Value Locked (TVL). The proposed relative valuation model has been applied to a specific category: Layer 2 solutions. Four L2 were selected for the analysis: Arbitrum, Optimism, Mantle and Polygon.
The analysis proceeded with the application of a relative valuation methodology, using Market Capitalization per Daily Transactions (MC/TPD) as the primary metric, given the importance of daily transactions in the Layer 2 ecosystem. TVL was used as a companion variable, as it reflects the capital committed to each L2 network. A regression analysis between MC/TPD and TVL on 20/08/2024 showed a strong correlation, with an R^2 of 0.72, indicating that both transaction activity and locked assets are key drivers of token valuation.
The analysis was expanded to include daily data from June to August 2024, calculating MC/TPD multiples for various projects. While these multiples exhibited a negative slope and positive intercept, the average R^2 value of 0.52 highlighted moderate robustness over the period. External factors, such as changes in ETH prices, introduced some fluctuations but did not invalidate the model's conclusions.
Following this, a SARIMAX model was applied to examine the influence of different parameters on market capitalization. The results revealed that Ethereum's price had a consistently strong impact on market capitalization, while other variables such as gas fees and daily transactions varied in influence across different projects. The GARCH model further addressed volatility, showing that baseline volatility was a major driver of market capitalization variance for most projects, while for Optimism, recent price shocks played a larger role.

4. Conclusions

The study demonstrates that a unified taxonomy is still far from being achieved; however, key characteristics have emerged, forming the foundation for an effective taxonomy. The token valuation methods available in the literature regarding DLT systems are insufficient. To address this, a relative valuation approach was proposed, focusing on L2 and DEX projects.

The findings revealed that by carefully selecting parameters for the valuation multiples, and grounding this approach in a thorough literature review, it is possible to achieve satisfactory results concerning key variables. Additionally, models like SARIMAX can be effectively implemented to assess the statistical relevance of variables influencing token market capitalization, even in the presence of non-stationary data and the challenge of modeling non-normal residuals. These techniques offer insightful methods for understanding the dynamics within volatile financial markets, particularly in the context of Layer 2 blockchain projects.

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