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How Do Decentralized Finance Protocols Compare to Traditional Financial Products? A Taxonomic Approach

Mark Rüetschi,[*] Carlo Campajola,[†] Claudio J. Tessone [‡]

Reviewers: Reviewer A, Reviewer B

Abstract. The final version of the paper "How Do Decentralized Finance Protocols Compare to Traditional Financial Products? A Taxonomic Approach" can be found in Ledger Vol. 9 (2024) 51-72, DOI 10.5195/LEDGER.2024.360. There were two reviewers involved in the review process, neither of whom has requested to waive their anonymity at present, and are thus listed as Reviewers A and B. After initial review by Reviewers A and B, the submission was returned to the authors with feedback for revision (1A). The author resubmitted their work and responded to reviewer comments (1B). The paper was returned to the reviewers who recommended the paper be accepted, thus ending the peer review process. Author responses have been bulleted for reader clarity. As some author responses were responding to multiple comments, reformatting has led to certain responses appearing multiple times in this document.

1A. Review

Reviewer A

Does this paper represent a useful reference or tool for academic or industry researchers of cryptocurrency and/or blockchain scholarship?

Yes, useful to some or many

Please briefly explain why you think the paper would or would not be useful to researchers.

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[‡] C. J. Tessone (claudio.tessone@uzh.ch) is Professor of the Blockchain & Distributed Ledger Technologies Group, Department of Informatics, University of Zürich, Switzerland, and Chairman and Academic Director at UZH Blockchain Center, Switzerland.

The taxonomy is a good contribution to the field. Some of the other sections are less valuable.

Is the submission's coverage of the topic comprehensive and up to date?

Important references are missing

If only a few important references are missing, please indicate which references are missing. If the coverage is lacking in a broader way, please explain.

There is no review of prior studies or other taxonomies that may be lacking or outdated.

Please assess the article's level of academic rigor.

Good (not excellent but a long way from poor)

Please assess the article's quality of presentation.

Good (not excellent but a long way from poor)

How does the quality of this review compare to other reviews in this field?

This is a good or average review.

Please provide your free-form review for the author in this section.

Overall comments are in the attached PDFs. [Editor's Note: these comments have been appended to the present review and are noted as such.]

Strengths:

>A taxonomy is presented based on current topical protocols and projects that can inform the field

Weaknesses:

>Section 3 is a review of some of the mechanics of defi. And Section 4 is a review of some of the risks in defi. These two sections aren't linked to the overall topic, which, as the title suggests is "a taxonomic approach". This continues in the conclusion where the taxonomy is not mentioned.

>From the abstract: "This paper creates a taxonomy of decentralized finance protocols with the goal of facilitating future research in this area." The future research direction is missing. I would like to know what I, the researcher, can do with the taxonomy and what

are the author's insights (not just explanations of defi mechanics).

>There is no mention of prior research. If there is none, then this is the gap the author's are filling and should be said. If there is prior studies, then they need to be included as part of the review.

[Reviewer A comments from the aforementioned PDF are as follows:]

Introduction 1.1: The introduction outlines DeFi and highlights innovations such as atomic swaps, AMMs, and stablecoins. However, the rationale for developing a taxonomy is not clearly articulated. It would be beneficial to elaborate on the need and significance of this taxonomy within the DeFi ecosystem.

Research Method 1.2: The section on 'dimensions and characteristics' is understandable but could benefit from additional detail for clarity. A clear distinction between a 'dimension' and a 'characteristic', possibly with examples from the DeFi sector. Furthermore, the rationale for selecting the meta-characteristic warrants further explanation. Why not the technical part? Why the economic aspect?

Section 2.1 DeFi Stack: The mention of Schar's stack is appreciated but it requires a listing of its five layers so the reader is on the same page. Also, the term 'aggregation' needs clearer explanation.

Section 2.2 Monetary Assets: The order of 'monetary assets' differs between the text and the accompanying table, leading to confusion. Moreover, there is inconsistency in the terminology used ('staking' vs. 'liquid staking'), and the explanation of 'liquid staking' conflates separate concepts. 'Payments' seems to be missing.

Section 2.4: Just some thoughts about the term 'intermediary'. This term borrows from traditional finance, I think that with these blockchain defi protocols you're more trusting the smart contract to replace the intermediary and therefore I don't see the pool as being considered an intermediary or even the vault as being an intermediary. The pool is the pool. Not an intermediary, which is managed by a smart contract similarly so is the vault.

Section 2.5: This section assumes a significant amount of prior knowledge. An improved explanation would enhance accessibility and understanding for readers less familiar with the subject.

Section 2.6: The subjective nature of 'integrity' suggests it may be best to exclude this as a characteristic.

Section 2.7: An inflationary or deflationary supply can put pressure on the token's price but that is not what inflationary or deflationary means. Also I do not see dynamic in the list. What is dynamic and what's the explanation?

Section 2.8: Integration is between single chain or multichain. This seems like an unnecessary dimension. There can't be a no-chain protocol, so everything is at least single-chain. Then, after success and development, they can only expand to multichain. I don't see the benefit to the user of including this dimension.

Figure 3.1: A descriptive caption is needed to clarify its relevance and significance to the reader.

Section 3.1: The use of color in the dendrogram would greatly aid in visual differentiation of clusters, especially since the reader is being exposed for the first time to the tokens that you are listing in the diagram. When reading the clusters we're now trying to figure out what protocol the token belongs too rather than gaining your insight from doing the analysis.

Section 3.3: The link between the discussion of Biswap mechanics and the DeFi taxonomy is tenuous. A stronger connection is required to justify its inclusion. Integrating the specific features and protocols discussed from Section 3.1 to 3.6 into Section 2 could provide depth to the taxonomy and illustrate its real-world applicability. This would also address the issue of Section 3 feeling isolated from the rest of the paper.

Section 4: This section seems only tangentially related to the taxonomy and could benefit from a closer integration with the paper's main focus.

Conclusion: The conclusion fails to revisit the taxonomy, instead offering a more general discussion. Highlighting the paper's contributions to the field would reinforce its value and significance.

Taxonomy Display: The presence of empty boxes within the taxonomy is aesthetically unappealing and suggests an incomplete picture. You want the characteristics to take up whole available knowledge space. Moving forward to test the taxonomy, new protocols and defi products should fit into the present set of boxes, rather than leaving blanks for innovation. You want the present tax to capture future innovation.

Appendix B: The repetition of the taxonomy with percentages adds little value and lacks clarity regarding the ordering of characteristics. What do the distribution values means? Why are they ordered as they are?

Appendix C: The classification of collateral in Aave and similar protocols as 'other cryptocurrencies' is inconsistent with the taxonomy presented. Given the paper's focus on comparing DeFi protocols to traditional finance, leveraging the taxonomy to categorize traditional financial mechanisms could offer insightful parallels and contrasts.

Reviewer B

Does this paper represent a useful reference or tool for academic or industry researchers of cryptocurrency and/or blockchain scholarship?

Yes, useful to most or all

Please briefly explain why you think the paper would or would not be useful to researchers.

The paper provides an useful taxonomy of DeFi protocols in economic (rather than technological) terms.

Is the submission's coverage of the topic comprehensive and up to date?

- Yes

Please assess the article's level of academic rigor.

Good (not excellent but a long way from poor)

Please assess the article's quality of presentation.

Good (not excellent but a long way from poor)

How does the quality of this review compare to other reviews in this field?

The review ranks highly but it may not be among the most authoritative in the field.

Please provide your free-form review for the author in this section.

The manuscript tries to provide a taxonomy of DeFi protocols from an economic, rather than technological, perspective. The work is timely and highly relevant considering the speed at which the DeFi ecosystem is evolving. However, the manuscript has several shortcomings that need to be addressed before it can be considered for publication. I outline some specific points below. In general, the manuscript would benefit from proof-reading and restructuring to make it more coherent.

Specific points to the authors:

- I don't think that the section 1.2. (Research method) adds much to the manuscript, as it explains in too much detail general principles for the construction of the taxonomy. I believe that for the average interested reader it would be much more useful to just to start presenting the taxonomy as soon as possible, with the most important specific methodological choices outlined. In that respect the Fig. 1 is definitely not needed.

- The most important figure of the manuscript is Fig. 2 (Cluster Dendrogram) and it should be much better presented. I would like to see at least some basic labels for the

categories mentioned in text (for example, stablecoins which are on the far left of dendrogram). This figure should be the central point of the manuscript and it should be prepared in a way which is visually appealing and informative.

- In addition to the previous point, it seems to me that at least some of the information in the Appendix tables should be included in the main paper in the form of visually dense infographic. This is really the central point of the manuscript. My suggestion is to include the information in Table 2. (Distribution of Decentralized Finance Products) in a more compact form - there is much wasted space in the table.

- It seems to me that most of the other figures are pretty much arbitrary taken from various specific topics in DeFi, and don't fit coherently in the taxonomy topic. This is true for Fig. 3 (Biswap Liquidity Ticks), Fig. 4 (Sandwich attack on Harvest) and maybe Fig. 5 as well. The purpose of the manuscript should not be to try to explain each individual protocol but rather to provide a taxonomic overview of all protocols.

- ABS acronym is used without being defined.

1B. Author Response

Reviewer A

Strengths:

>A taxonomy is presented based on current topical protocols and projects that can inform the field

Weaknesses:

>Section 3 is a review of some of the mechanics of defi. And Section 4 is a review of some of the risks in defi. These two sections aren't linked to the overall topic, which, as the title suggests is "a taxonomic approach". This continues in the conclusion where the taxonomy is not mentioned.

- As suggested, we restructured the manuscript. We integrated parts of the explained mechanics of section 3 into section 2 as we believe this enhances the understandability of the characteristics in section 2. Section 3 now predominantly focuses on the taxonomy itself, showcasing its structure and encompassing a discussion of the clustered protocols alongside their distribution among the taxonomy's characteristics. The primary objective of Section 4 is to make a comparison with traditional finance, based on the taxonomy.

>From the abstract: "This paper creates a taxonomy of decentralized finance protocols with the goal of facilitating future research in this area." The future research direction is missing. I would like to know what I, the researcher, can do with the taxonomy and what are the author's insights (not just explanations of defi mechanics).

- We rewrote significant parts of section 4 and the conclusion to address this concern.

>There is no mention of prior research. If there is none, then this is the gap the author's are filling and should be said. If there is prior studies, then they need to be included as part of the review.

Introduction 1.1: The introduction outlines DeFi and highlights innovations such as atomic swaps, AMMs, and stablecoins. However, the rationale for developing a taxonomy is not clearly articulated. It would be beneficial to elaborate on the need and significance of this taxonomy within the DeFi ecosystem.

- We extended the introduction to explain better the rationale for developing this taxonomy. We also referred to prior studies and taxonomies in the field to justify the creation of this taxonomy

Research Method 1.2: The section on 'dimensions and characteristics' is understandable but could benefit from additional detail for clarity. A clear distinction between a 'dimension' and a 'characteristic', possibly with examples from the DeFi sector. Furthermore, the rationale for selecting the meta-characteristic warrants further explanation. Why not the technical part? Why the economic aspect?

- The explanation of the research method is reduced and the associated figure is removed. Instead, we extended the section about the motivation for this review.

Section 2.1 DeFi Stack: The mention of Schar's stack is appreciated but it requires a listing of its five layers so the reader is on the same page. Also, the term 'aggregation' needs clearer explanation.

- The DeFi stack is explained in more detail and all of Schär's layers are now explained.

Section 2.2 Monetary Assets: The order of 'monetary assets' differs between the text and the accompanying table, leading to confusion. Moreover, there is inconsistency in the terminology used ('staking' vs. 'liquid staking'), and the explanation of 'liquid staking' conflates separate concepts. 'Payments' seems to be missing.

- Inconsistencies pertaining to monetary assets and staking have been rectified.

Section 2.4: Just some thoughts about the term 'intermediary'. This term borrows from traditional finance, I think that with these blockchain defi protocols you're more trusting the smart contract to replace the intermediary and therefore I don't see the pool as being considered an intermediary or even the vault as being an intermediary. The pool is the pool. Not an intermediary, which is managed by a smart contract similarly so is the vault.

- We appreciate the suggestion regarding the term "intermediary" and have consequently replaced it with "liquidity storage," thereby delineating how a protocol

manages user liquidity, whether through a pool, a vault, or enabling over-the-counter transactions. This refinement aligns with our original intent.

Section 2.5: This section assumes a significant amount of prior knowledge. An improved explanation would enhance accessibility and understanding for readers less familiar with the subject.

- This section was extended with an enhanced explanation.

Section 2.6: The subjective nature of 'integrity' suggests it may be best to exclude this as a characteristic.

- We are aware that the "integrity" of governance structures is subjective. However, we only focus on the mechanics of the governance system in this paper. These governance structures are an essential part of DeFi protocols. Therefore we kept this section in the paper.

Section 2.7: An inflationary or deflationary supply can put pressure on the token's price but that is not what inflationary or deflationary means. Also I do not see dynamic in the list. What is dynamic and what's the explanation?

- This section was rewritten to provide a better explanation of this dimension.

Section 2.8: Integration is between single chain or multichain. This seems like an unnecessary dimension. There can't be a no-chain protocol, so everything is at least single-chain. Then, after success and development, they can only expand to multichain. I don't see the benefit to the user of including this dimension.

- We acknowledge that DeFi protocols may expand from single-chain to multichain. However, the classified protocols represent a snapshot of the DeFi ecosystem at the time of writing. Protocols that expand to multichain would be visible in a future snapshot. Capturing this development will help to map the evolution of the DeFi ecosystem over time and therefore be valuable to future research. The according dimension was therefore left in the paper.

Figure 3.1: A descriptive caption is needed to clarify its relevance and significance to the reader.

- The according description was adjusted.

Section 3.1: The use of color in the dendrogram would greatly aid in visual differentiation of clusters, especially since the reader is being exposed for the first time to the tokens that you are listing in the diagram. When reading the clusters we're now trying to figure out what protocol the token belongs too rather than gaining your insight from doing the analysis.

- Section 3 has been revised in accordance with the suggestions provided. The illustration of the taxonomy is now presented within this section, rather than in the appendix. The cluster dendrogram is enhanced with colors to improve readability. The discussion is also extended and reworked. Additionally, there is now a section about the distribution of protocols among the characteristics. It discusses the most important numbers while the full distribution remains in the appendix.

Section 3.3: The link between the discussion of Biswap mechanics and the DeFi taxonomy is tenuous. A stronger connection is required to justify its inclusion.

- With the rewriting of section 3, this discussion and other explanations were removed. However, parts of it were integrated in section 2.

Integrating the specific features and protocols discussed from Section 3.1 to 3.6 into Section 2 could provide depth to the taxonomy and illustrate its real-world applicability. This would also address the issue of Section 3 feeling isolated from the rest of the paper.

- As suggested, we integrated parts of section 3 into section 2. This allowed us to focus on the results and the discussion of the cluster dendrogram in section 3.

Section 4: This section seems only tangentially related to the taxonomy and could benefit from a closer integration with the paper's main focus.

- Significant revisions have also been made to Section 4 to address the concerns raised by the reviewers. This section now offers a comparative analysis with the traditional financial ecosystem, based on the taxonomy. This way, the section is more integrated into the paper's main focus.

Conclusion: The conclusion fails to revisit the taxonomy, instead offering a more general discussion. Highlighting the paper's contributions to the field would reinforce its value and significance.

- The conclusion has been revised significantly to address this concern.

Taxonomy Display: The presence of empty boxes within the taxonomy is aesthetically unappealing and suggests an incomplete picture. You want the characteristics to take up whole available knowledge space. Moving forward to test the taxonomy, new protocols and defi products should fit into the present set of boxes, rather than leaving blanks for innovation. You want the present tax to capture future innovation.

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Appendix C: The classification of collateral in Aave and similar protocols as 'other cryptocurrencies' is inconsistent with the taxonomy presented. Given the paper's focus on comparing DeFi protocols to traditional finance, leveraging the taxonomy to categorize traditional financial mechanisms could offer insightful parallels and contrasts.

- This has been corrected.

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Reviewer B

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