International Journal of Engineering Research & Management Technology
(Peer-Reviewed, Open Access, Fully Refereed International Journal) ISSN: 2348-4039
Volume 11, Issue-3 May-June- 2024 Impact Factor: 7.09
Email: editor@ijermt.org www.ijermt.org

A STUDY OF DECENTRALIZED FINANCE (DeFi) THE CORRELATION BETWEEN MULTIPLE FINANCIAL VARIABLES AND THE DEFI PROTOCOL VALUATIONS: ISSUES & CHALLENGES

Dr. Balwant Kumar Bari

Assistant Professor Jai Narain Misra P.G. College (KKC), Lucknow

Dr. Sunil Kumar Maddheshiya

Assistant Professor Shri Varshney Degree College Aligarh

Abstract

Decentralized financial systems (DeFi) use an interconnected network of nodes rather than depending on a central bank or other centralized institution. Third parties, like governments or banks, are no longer needed to authorize transactions with this state-of-the-art digital banking system. This article will examine the issues and limitations that are limiting the broad adoption of DeFi in India and will research the relationship between the DeFi Protocol values and other market financial indicators. The study delves into the correlations between the variables used to evaluate the DeFi protocol. We used research methodologies including panel regression and causality analysis to look for relationships between the different types of data. The data used in this study can be either cross-sectional or time-series. Findings from studies examining the links between variables and the prediction of their values are consistent with the idea that individual factors can do double duty in this regard. The relationships between variables can be discovered by examining causality. You can find x with either X or Y. Panel regression typically employs one-sided interactions. Using decentralized finance could help achieve two goals: increasing the level of financial inclusion in India and providing underserved populations with access to financial services. This essay aims to showcase the revolutionary advantages of microfinance, decentralized savings, and peer-to-peer lending in order to promote the growth of financial inclusion.

Keywords: *The study focuses on decentralised finance, blockchain technology, total value locking, gross merchandise volume, and panel data analysis.*

Introduction

Decentralised finance, also known as DeFi, is an alternative financial system that functions on a network of nodes rather than a single point like traditional banking. By eliminating the need for intermediaries such as banks or governments to authorise transactions, this new digital financial system eliminates the need for such authorization. Blockchain ecosystems are immutable ledgers that enable every computer or node on a network of cryptocurrencies to store a copy of the transaction history. As a result, blockchain ecosystems have helped crypto currencies thrive in certain environments. The lack of control over the ledger by any one individual or organisation is the key aspect of this system. Traditional financial institutions, like banks, provide complex financial services through codification and translation into operational code.

The use of DeFi is becoming increasingly widespread, even though it is a relatively new technology. Political entities, businesses, and financial organizations place great importance on the utilisation of this technology. Once implemented, the financial activities will be code-driven and automated, thereby eliminating the need for human intervention. Embedded finance is a term that describes the process of combining non-financial services and goods with financial services and products. This will enhance a wide range of banking and finance-related activities. For example, if you choose a "buy now, pay later" plan, the purchase will instantly transform into a loan. Imagine receiving prize tokens as you advance through your cycle, each time you achieve a specific milestone. You can make use of these reward tokens to settle your obligation.

Embedded finance opens up almost infinite possibilities. It is possible that decentralised finance, often known as DeFi, which is a system that enables transactions to take place across the actual and virtual worlds, will play a significant role in the growth of the meta verse. DeFi projects will achieve increased levels of compliance and safety as they continue to evolve and undergo comprehensive testing. They can ensure their users' safety by conducting regular audits and monitoring. This is necessary for new technology to gain

widespread acceptance and adoption. Because decentralised finance is the way of the future for the financial industry, this shift is currently taking place, and it should not be considered a novel idea.

Impact on Traditional Banking

Decentralised finance will alter our interactions with financial services and goods, potentially impacting conventional banking institutions as well. During its expansion and development, it will inevitably come into contact with conventional financial institutions. Increased rivalry will force established institutions to scrutinize their financial operations strategies, leading to significant changes. The loss of middlemen is one of the most evident effects that decentralised finance has had on traditional banking. By eliminating the need for intermediaries in financial transactions, DeFi makes it possible for individuals to conduct transactions with one another amongst themselves. As a result, the price of financial goods and services may become more affordable, and the profit margins of the respective service providers may increase.

There are several advantages to using DeFi that go beyond monetary savings. Within the context of democratising access to banking services, it has the potential to promote inclusion and remove barriers to entry. In many countries, the majority of the population is unable to afford standard banking services or gain access to them without difficulty. Because DeFi is decentralised, it can easily deliver these financial services to regions that do not have any commercial banks. The impact that DeFi has on traditional banking may lead to the development of new business models. As decentralised finance (DeFi) continues to gain popularity, traditional financial institutions will need to adjust and change to maintain their relevance.

Decentralized Finance (DeFi): The Future of Finance

With DeFi, tokenization is possible for everything, including products, services, music, and artwork, among other things. In the future, you will have access to a variety of payment methods. For instance, you could use crypto currency tokens backed by Tesla shares or silver to pay for everything you buy. Crypto currency

lending is the most common application of decentralized finance. It will become a more secure and efficient ecosystem for asset-backed Bitcoin lending.

To kickstart the digital revolution, several countries are getting ready to launch central bank digital currencies, often known as CBDCs. It should not come as a surprise that traditional banks have begun to use decentralised finance. If decentralized finance can provide high levels of security and user-friendly features, then it has the potential to transform how we interact with financial services and goods. Transactions can take place in a matter of seconds when using payment gateways that are based on DeFi. It can provide free services for transactions that occur across international borders. We anticipate that well-known e-commerce websites will eventually incorporate these payment gateways in the future.

Challenges and Limitations: Identification and analysis of challenges hindering DeFi adoption in India

Several obstacles prevent decentralised finance (DeFi) from being widely used and growing in India. The successful integration of DeFi into the Indian financial ecosystem depends on understanding and addressing these obstacles. In this article, we will examine the main obstacles that are preventing the widespread use of DeFi in India:

1. **Regulatory Uncertainty:** Neither users nor developers can be sure of what to expect from DeFi due to the absence of precise and well-defined restrictions. Innovation and participation in the DeFi industry may suffer due to a lack of legal frameworks that take into account the sector's specifics. To inspire trust and encourage responsible expansion in the DeFi industry, it is essential to set forth transparent standards and provide a fair regulatory framework.
2. **Security Concerns:** DeFi platforms are built on well-known and trusted blockchain technology. Smart contracts, dApps, and third-party integrations all have their own set of security flaws, though. There have been instances of hackers and exploits resulting in substantial monetary losses. It is critical

to promote best practices in smart contract development, conduct comprehensive audits, and enhance security measures to mitigate these dangers and build confidence among users.

3. **Scalability and User Experience:** Especially during peak demand times, scalability is a major obstacle for DeFi. The user experience and scalability of DeFi applications can be negatively impacted by transaction congestion and high gas fees on the Ethereum network. To overcome these scaling issues and enhance the user experience, layer-2 solutions should be developed, and other blockchain platforms should be investigated.
4. **Financial Literacy and Accessibility:** People's familiarity with blockchain, cryptocurrency, and smart contracts is crucial to DeFi's success. The general population's low financial knowledge and unfamiliarity with DeFi concepts hinder adoption. The availability of DeFi infrastructure and services, such as mobile networks and internet access, may also be an issue in some areas. Overcoming these obstacles can be achieved through user education and the enhancement of accessibility through mobile applications and user-friendly interfaces.
5. **Market Volatility and Risk Management:** The inherent volatility of cryptocurrencies, which frequently serve as the basis for DeFi operations, puts users at risk. Lenders and borrowers alike are vulnerable to the value of assets kept on DeFi platforms due to the possibility of abrupt price volatility. By creating risk management tools like decentralised insurance and strong rules for risk evaluation, we can reduce these risks and make the DeFi ecosystem more stable.
6. **Interoperability and Fragmentation:** Users are unable to enjoy frictionless experiences and liquidity flows due to the disjointed nature of DeFi protocols and the lack of compatibility across various platforms. Liquidity fragmentation can decrease efficiency and make it harder for users to navigate across platforms. Encouraging cooperation across DeFi projects and promoting standards for interoperability can improve the efficiency and usability of the ecosystem as a whole.

Many obstacles impede the widespread use of DeFi in India. If we want DeFi to thrive, we need to solve problems with regulation, security, scalability, financial education, market instability, and interoperability.

India can overcome these difficulties and realise the revolutionary potential of decentralised banking by fostering collaboration between regulators, industry participants, and technology experts and taking measures to enhance security, scalability, and accessibility.

Review of Related Literature

Dirk Zetzsche (2020). Along with "financial technology," "regulatory technology," cryptocurrencies, digital assets, and "DeFi" (an acronym for "decentralized finance"), one of the most talked-about emerging technological trends in the global finance industry is RegTech. Nevertheless, its significance, its legal implications, and its policy implications remain poorly understood. This article explains what decentralized finance (DeFi) is, how it fits into the bigger picture of the traditional banking sector, how it relates to open banking, and then touches on some regulatory considerations. We argue that decentralization can undermine the effectiveness of long-standing financial regulatory and enforcement mechanisms and conventional forms of accountability. Meanwhile, we've seen that when parts of the financial services value chain are decentralized, resources are redirected to another part of the chain that can be less regulated, less accessible, and least transparent. This refocused part of the value chain should and might be the focus of decentralized finance regulation. To achieve its main objective of decentralization, decentralized finance (DeFi) necessitates regulation, not the other way around. One further way decentralized finance could change the way rules are made is through the introduction of "embedded regulation." Decentralization of both finance and its regulation—the pinnacle of RegTech—may be within reach if DeFi's architecture were to incorporate regulatory approaches. **Johannes Rude Jensen (2021)** A new type of consumer-facing financial application, decentralized financial apps (DeFi) use permissionless blockchain technology to deploy smart contracts. In addition to situating the DeFi concept within the theoretical framework of permissionless blockchain technology, this essay aims to offer a taxonomical overview of agents, incentives, and hazards. An examination of the primary target audiences and use cases for decentralized financial apps is presented in this article. Furthermore, prospective stakeholders should be mindful of four major risk categories while

assessing the advantages of decentralized financial applications. Our work sheds new light on an emerging area with enormous implications for the banking sector, and our contributions reflect that.

Rishabh Garg (2023) Without the need for intermediaries, blockchain technology could revolutionize the banking and financial industries by allowing dispersed, untrusted parties to reach a consensus on database integrity. In the same way that a bookkeeper would handle payments and settlements, it may also manage securities, loans, credits, and trade financing, among other financial transactions. Potentially surpassing previous systems in use, it facilitates identity verification, asset transfers, P2P transfers, hedge funds, security, and auditability. Short for "blockchain-based decentralized finance," this new financial technology is called DeFi. Its openness and programmability allow for the implementation of various use cases for distributed finance. Tokenization, asset management, decentralized autonomous organizations, data analysis and valuation, payments, lending and borrowing, compensation, prediction markets, yield farming, gambling, and many more use cases are all part of this category. Financial transactions, cash flow, programmable money, no-loss lotteries, and related operations can all be simplified with its help. Using the blockchain-enabled Ethereum platform, this paper aims to evaluate decentralized finance's potential as a substitute for traditional business processes. In addition, this study aims to examine the possible challenges and solutions associated with decentralized finance's implementation, as well as its effects on prediction markets, quadratic fundraising, and crowdsourcing.

Johannes Rude Jensen (2021) A new type of consumer-facing financial application, decentralized financial apps (DeFi) use permissionless blockchain technology to deploy smart contracts. In addition to situating the DeFi concept within the theoretical framework of permissionless blockchain technology, this essay aims to offer a taxonomical overview of agents, incentives, and hazards. An examination of the primary target audiences and use cases for decentralized financial apps is presented in this article. Furthermore, prospective stakeholders should be mindful of four major risk categories while assessing the advantages of decentralized financial applications. Our work sheds new light on an emerging area with enormous implications for the banking sector, and our contributions reflect that.

Research Gap

This is a new branch of knowledge in the banking sector in India. The study requires a thorough understanding of numerous theoretical and operational aspects. Investigate The study delves into the impact of DeFi on traditional banking, lending markets, and financial stability, encompassing potential systemThe study does not provide a comprehensive examination of particular attack vectors and how DeFi protocols address them.

Objectives of the Study

1. To study the challenges and limitations in the adoption of DeFi in India.
2. To styudy aim to investigate the correlation between the DeFi Protocol valuations and various market financial factors.

RESEARCH DESIGN AND METHODOLOGY

Data Collection

We were able to collect data on thirty different DeFi currencies all at once by mining the defillama, token terminal, and dap radar databases. Table 1 lists all of the DeFi types and protocols that were considered. When it comes to gathering financial data for DeFi protocols and important indications for DeFi platforms, the two most comprehensive data aggregators are Token Terminal and Defillama. Crucial metrics on the efficiency of DeFi protocols were retrieved from the aforementioned databases. Inflation factors for each DeFi protocol, market capitalization, total revenue, TVL, and protocol revenue were among the measures used.

Table 1. In this investigation, DeFi protocols were applied.

Decentralized Marketplaces	**Lending Procedures**	**Asset Arrangement**
UnSWap	Ave	Finance Convex
Mixture	CreatorDAO	Lido Financial
Looping	Mixture	A YearnFinance
Pancake Exchange	Money from Abracadabra	Games with Yield Guilds
Bend	centrifugal force	Protocol of Fei
One inch	Availability of liquid assets	Ribbon Funding
Osmotic	Venus	Capital Rari
Mayar	Maple Accounting	Finance by Enzyme
0x	RealFi	Finance at Alchemix
SushiSwap	Homora	Financial Harvest

The present study seeks to examine the associations between the characteristics used to evaluate the DeFi protocol. We used the causality analysis and the panel regression research to look for correlations in this kind of data, since they both examine longitudinal data along with cross-sectional and time series data. Studies on causation have shown that it is possible to use information about individual components to estimate future values and assess correlations between variables. The relationships between variables can be discovered by examining causality. Although X defines y, y can also define X. It is possible for one-sided interactions to occur during panel regression.

Data was gathered from January 11, 2022, to July 8, 2022, as part of the experiment. The question of how to prevent valuation drops amid negative market conditions can be better answered by selecting a data frame of this kind. Limiting the supply of tokens while simultaneously introducing inflation is one approach to this problem. It would be possible to explore many more options. The application of protocol investment strategies is one potential component. With its growing suite of institutional-grade, regulatory-compliant DeFi products, Umami Finance is spearheading the DeFi industry's acceptance. Extreme scalability and rigorous testing are hallmarks of the vaults that Umami is creating. Sustainable returns on major crypto assets like $USDC, $ETH, and $BTC are also being offered by them. It is Umami's intention to empower investors with the ability to make autonomous financial decisions by laying the groundwork for a global financial system with permissionless, decentralized smart contracts. Market players who have invested in governance tokens can share in the profits created by Umami Finance. To sum up, the Umami Protocol makes use of a delta-neutral approach to profit from both long and short financial positions. It should also provide returns of 15-35% while remaining delta neutral. By May 2022, Umami Finance's non-native treasury assets had lost $0.2 million, or 3.5% of their original value, and had dropped to $5.4 million. Within the same time span, the whole market has declined by thirty percent. Paying protocol token holders, covering operational costs, and outperforming the market were all achieved by the Treasury through returns and fees, even if the market was falling.

Tables 2, 3, and 4 Give some descriptive data and explain the lending protocols, decentralized exchanges, and decentralized financial applications.

Table 2 descriptive data for the token class that belongs to the lending protocol.

Lending	**Total Lending Revenue**	**Aave Dominance**	**Median Lending Revenue**	**Median Lending P/S Ratio**

	$1.25b	+43.6%	$736.44k	17.2x

Note: The total lending revenue is the sum of all the interest payments made by all the lending procedures on the list. Dominance is the proportion of all borrower interest that can be explained by the most widely used lending protocol. In this context, "median lending revenue" is the total interest income produced by all of the listed lending strategies. This article discusses financing alternatives with a median price-to-sales ratio (P/S).

Table 3 descriptive data about the class of tokens known as decentralized exchanges.

Exchange	**Total Exchange Revenue**	**Uniswap Dominance**	**Median Exchange Revenue**	**Median Exchange P/S Ratio**
	$5.80b	+41.4%	$3.87m	14.6x

Note: How much money is made from trading fees or from listed exchanges in total? What percentage of trading expenses are collected by the biggest exchange; Money exchanges usually earn from trades is called "exchange revenue." In the context of publicly listed companies, the median price-to-sales ratio is used.

Table 4 descriptive data for tokens in the DeFi class.

DeFi	**Total DeFi Revenue**	**Uniswap Dominance**	**Median DeFi Revenue**	**Median DeFi P/S Ratio**
	$13.14B	+25.7%	$6.33m	13.4x

Note: Total revenue earned by DeFi is the sum of all the money that came in from the many DeFi protocols that are detailed here. A protocol's "dominance" is the proportion of overall transaction fees paid to it, whereas a protocol's "median DeFi Revenue" is the amount that averages out the money generated by

each protocol in the list of DeFi protocols.A listed DeFi protocol's P/S ratio is called the Median DeFi P/S ratio.

Table 5 also shows similar results for the conventional blockchain class of blockchains. Ethereum is the backbone of many decentralized finance systems.

Table 5 descriptive data for the token class in the blockchain.

Blockchain	**Total Blockchain Revenue**	**Ethereum Dominance**	**Median Blockchain Revenue**	**Median Blockchain P/S Ratio**
	$20.12b	+76.3%	$3.87m	7559.8x

Note: Total Revenue from Blockchains (Profits from All Listered Blockchains) The dominance of a blockchain can be described as the proportion of total transaction expenses that it handles. The median blockchain P/S ratio is the middle value of all the transaction fees earned by listed blockchains. Median DeFi P/S ratios are used to describe the price-to-stake ratios of publicly traded blockchains.

Granger causality analysis and panel data analysis are two popular methods for discovering the nature of the link between many variables. This study aims to acquire a greater understanding of the market and its performance by investigating the connections between the values of the DeFi Protocol and key financial indicators. Data with only two dimensions, like time-series or cross-sectional data, can be easily analyzed using panel data analysis. In the empirical part of the procedure, panel regressions are used to estimate valuations. For the next several days, the screens will likely show both the time and the DeFi protocols. The premise is made in the pooled OLS definition that different DeFi projects are not heterogeneous. The following equation expresses this assumption:

$$Val_{it}=\alpha+\beta X'_{it}+(1)$$

The log-linearized valuation for each project is denoted as X to simplify the computations, gain a better understanding of the projects' dynamic features, and account for variances. As an example, think about the database; it contains details on thirty separate projects. In this context, "**ν**′" denotes the prediction variables' vector and "β" is the common intercept. The outcomes are produced by employing a certain set of control variables. This model uses the following predictors: protocol revenue (pr), total value locked (tvl), inflation factor (inf), and total revenue (tr). These variables are consistent across all m.There is an additional equation that reflects the error component; it was previously supplied for the model. To illustrate the FE specification with fixed individual effects, consider the following equation:

$$Val_{it}=\alpha i+\beta X'_{it}+e_{it} \quad (2)$$

Fixed effects, represented by the symbol βi, are present in every single DeFi protocol. This functionality ensures that the different DeFi protocols are compatible with one other. The FE specification differs from the OLS model since it considers the effects of DeFi protocols, denoted by the symbol βi. Therefore, X' can be seen as a lack of knowledge about all the other systematic criteria that predict the values of DeFi projects, except for X'. The data supports this interpretation.

The study endeavor will also include a correlation analysis to look for any causal relationships between the variables. Because of this, we find out if Granger causality is real and if it can be turned back on. You can find a more detailed explanation of the Granger causality method over here.

FINDINGS AND CONCLUSION

Using daily data, we examined the following values for the first two quarters of 2022 (11 January-8 July): circulation market capitalization (val), total value locked (tvl), protocol revenue (pr), total revenue (tr), gross merchandise volume (gmv), and inflation factor (inf). This covered all thirty distinct DeFi protocols exhaustively. In order to find out how the TVL and other explanatory factors affect procedure assessments, this study examines a variety of them. To further understand why protocol intrinsics and metrics are so

important for DeFi valuations, panel regression analysis is employed. All of the correlation coefficient pairs that we obtained had p-values less than 0.05, as shown in Figures 1 and 2. It is reasonable to assume that the estimates of the variables' correlation are statistically significant given the results. According to the statistical analysis, there is a strong relationship between the DeFi protocol's value and TVLs. The degrees of freedom are determined to be 4723, the Pearson t-test value is 52.639, and the p-value is below 2.2 × 10−16. The use of time-series data, in contrast to cross-sectional data, does cast doubt on the accuracy of such assessments.

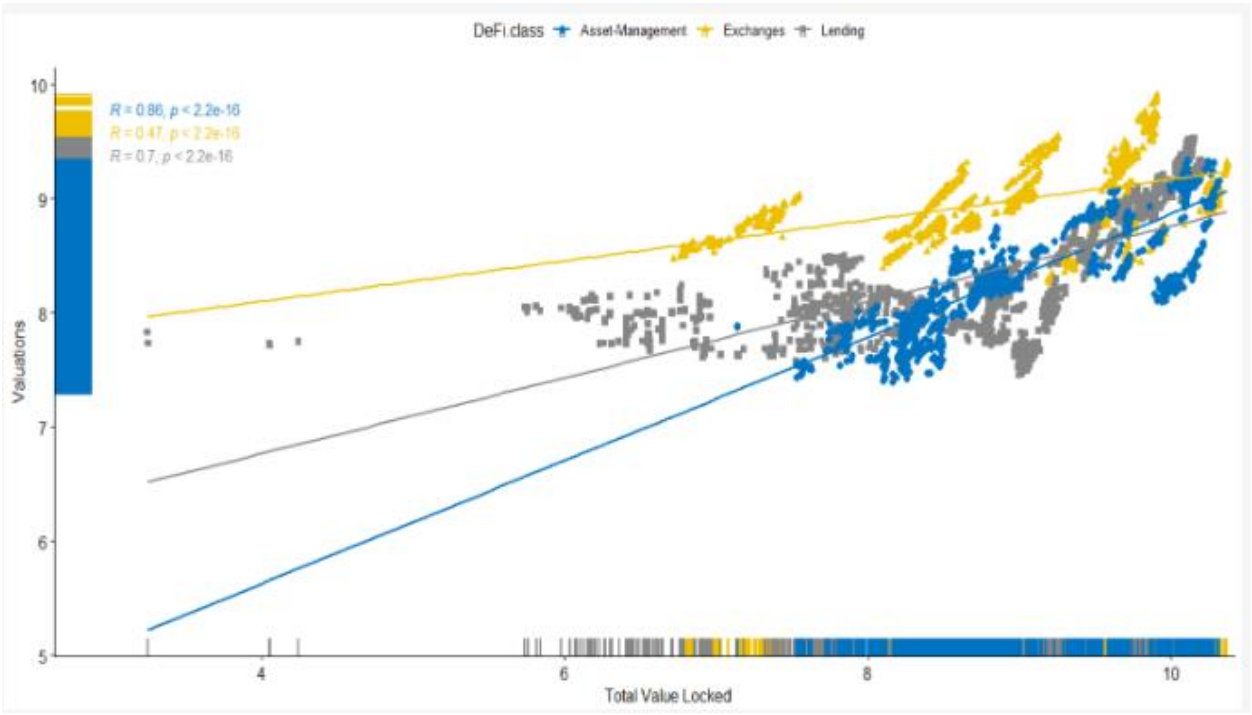

Figure 1 Relationships between TVLs and valuations for three distinct protocols in the DeFi classes.

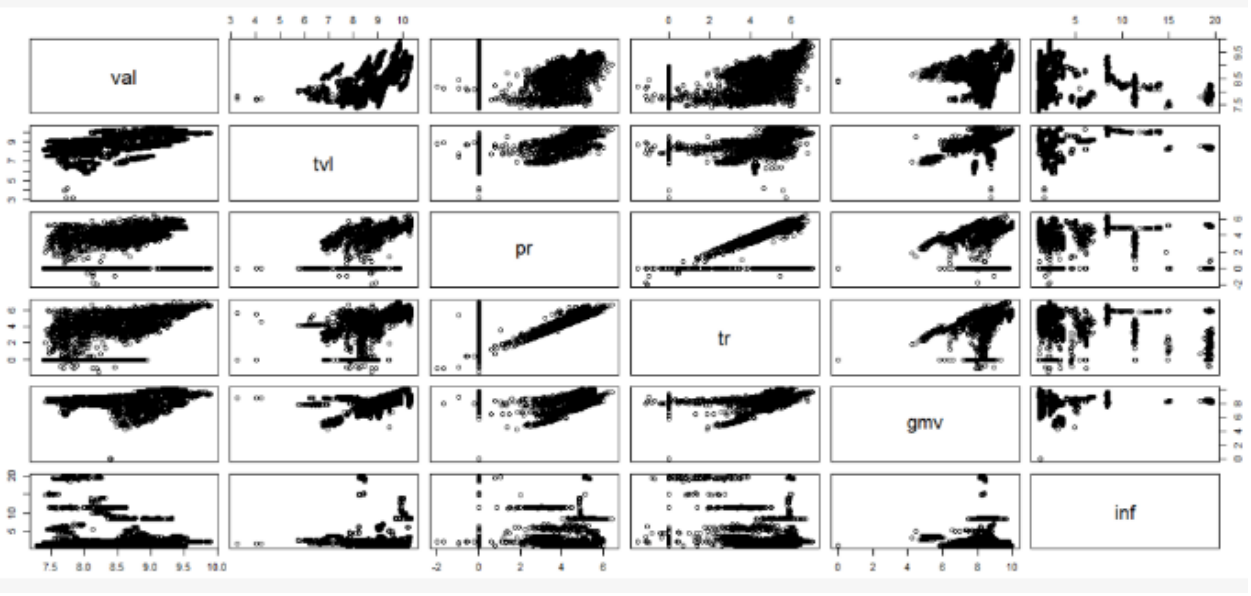

Figure 2 Correlations between pairs for the study's variables.

The elasticities of the regression lines in Figure 1 show that the correlations between DeFi protocol valuations and TVLs vary from class to class, which is an interesting observation. The regression line is most flat in the "Decentralised Exchanges" category, while it's the steepest in the "Asset Management" category. You may understand why the TVL is becoming more and more crucial for "asset management" protocols when you think about how their effectiveness is proportional to the quantity of money they are entrusted with. The quantity of money under administration is the most important factor to consider when estimating the worth of mutual funds, in comparison to other types of financial organizations. Subtracting a fund's obligations from its assets is the standard method for calculating the net asset value (NAV). An investment firm's market value and assets under management (AUM) are both determined by the capital given by investors. Fund pricing is affected by asset under management (AUM) due to the fact that asset management costs money.

The variables do not show any signs of causation in their pairwise relationships. These results do not allow us to determine if TVL and other external factors lead to higher DeFi valuations. Our analysis holds water if our premise that DeFi valuations are determined by the TVL, total income, and gross merchandise volume—

all measures of the protocol's efficacy—is right. A large body of evidence lends credence to it. Correlation coefficients corroborate these results. We can determine the relationship between variables with utmost accuracy by applying the Granger causality test. It can tell us whether any explanatory variables may be used to estimate future DeFi valuations, which is useful information from a statistical perspective. Granger causality tests show that DeFi valuations may make TVL value predictions [F = 5.6021, Pr (>F) = 0.009755]. The basis of these tests is the daily circulating market capitalization. Out of all the characteristics that were explored in this study, only gross merchandise volume (GMV) has the capacity to predict DeFi protocol valuations [F = 2.6968, Pr (>F) = 0.04435]. The acquired associations are detailed in Table 6.

Table 6 Granger causality tests in pairs.

Dependent Variable	**Hypothesis Tested:**	**F-Statistic**	***p*-Value**
VAL	TVL: A unidirectional relationship (VAL→TVL) exists.	5.1128	
	PR: A unidirectional relationship (VAL⇒PR) exists.	5.556	0.001566 **
	TR: The relationship is unidirectional (VAL⇒TR).	27.354	0.0008394 ***
	GMV: A bilateral relationship exists (VAL⇔GMV).	2.6968; 13.749	$<2.2 \times 10^{-16}$ ***
TVL	PR: The relationship is unidirectional (TVL⇒PR).	18.321	0.04435 *; 6.531×10^{-9} ***

	TR: A bilateral relationship (TVL⇔TR) exists.	4.6502; 31.471	8.4×10^{-12} ***
	GMV: The relationship is unidirectional (TVL⇒GMV).	17.384	0.003005 **; $<2.2 \times 10^{-16}$ ***
PR	TR: A bilateral relationship (PR⇔TR) exists.	9.3282; 11.368	3.385×10^{-11} ***
	INF: A unidirectional relationship (PR⇒INF) exists.	3.4802	3.819×10^{-6} ***; 2.008×10^{-7} ***
TR	GMV: A unidirectional relationship (TR⇐GMV) exists.	3.7378	0.01071 *
	INF: A unidirectional relationship (TR⇐INF) exists.	3.4491	0.01592 *

Note: Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05.

Results from Granger causality tests show the most probable correlations between variables. Total income, gross merchandise volume, protocol revenue, and TVL are all affected by the DeFi protocol values, according to the statistics. Both total and gross merchandise volume are mostly influenced by TVL. Perhaps this is a sign that these protocols are attracting new users and liquidity providers due to their higher valuations in the early stages of the demand for decentralized finance sector. Additionally, as a result of this, their total revenue and payments to token holders are increasing, which brings in more people and money. When looking at the other explanatory variables that impacted gross merchandise volume, the DeFi protocol valuations were only associated in one direction. No other relationships existed than this one. By utilizing this data analysis, a more profound understanding of the variables' correlations can be achieved.

Greater liquidity, popularity, and usability of DeFi protocols with greater TVLs will indicate the project's success. The boost in funding for DeFi protocols that comes from a higher TVL is good news for everyone. The daily revenue of the protocol decreases as the number of TVLs decreases since fewer TVLs mean fewer liquidity pools.

We were able to explain the relationship between DeFi protocol valuations and other parameters by using a short panel regression analysis, ordinary least squares (OLS), and fixed effects model assumptions.

Table 7 displays the results of the test run on the FE model specification. Compared to the FE specification, the OLS model specification performed worse in the F-test. With a df1 value of 19 and a df2 value of 3174, the F-value was 713.02. A p-value below 0.000000000000022 indicates that the null hypothesis is that there were no significant impacts. Every one of the variables' logarithms was used. Making changes to model variables using a logarithmic method has many advantages. Differences of one unit between the response and explanatory variables define a transformation-free regression model. If you change the independent variable in this model, the dependent variable stays the same. Consideration of the logarithm of any variable converts the situation from percentage to unit.

Table 7 Panel regression model with fixed effects.

Predictor	**Estimate**	**Std. Error**	***t*-Value**	**Pr(>|t|)**
Total Value Locked	0.3886304	0.0102634	37.8655	<0.00000000000000022 ***
Protocol Revenue	−0.0193467	0.0047426	−4.0793	0.00004628 ***
Total Revenue	0.0168036	0.0041144	4.0841	0.00004534 ***

Gross merchandise volume	0.1757711	0.0103339	17.0092	<0.00000000000000022 ***
Inflation factor	−0.0192243	0.0017573	−10.9399	<0.00000000000000022 ***
Total Sum of Squares:	138.75			
Residual Sum of Squares:	75.903			
R^2/R^2 adjusted	0.45293/0.44897			
F-statistic:	525.57 on 5 and 3174 DF, *p*-value: < 0.000000000000000222			

Note: Signif. codes: 0 '***' 0.001.

We checked the model's assumptions to make sure it was solid and trustworthy. With a p-value of 0.1344, the Breusch-Pagan LM independence test revealed a chi-square value of 191.56. The goal was to rule out any potential influence from cross-sectional data. A updated Wald test with a chi-square value of 27.09 and a probability of 0.10257 did not reveal any heteroskedasticity concerns. This is because fixed effects are an essential component of a well-specified model. The stationarity was investigated using Fisher's test. The results show that stationarity is true, hence we may reject the null hypothesis (H0) with a p-value of 0.0052, an inverse chi-square of 60, and a p-value of 91.6689. Cointegration tests are used by researchers to determine if non-stationary time series are consistently and long-term related. After making the necessary changes to the data and keeping the model in its stationary state, the cointegration test analysis is no longer necessary. In addition, the F-test for overall significance shows that the independent factors explain the fluctuations in

the dependent variable, which is the evaluations of the DeFi protocol in this case. The execution of the F-test serves as evidence of this. As a result, the regression model provides a more accurate substitute for a model devoid of independent variables. The F-test is used to determine if the variability in the dependent variable (Valuations of DeFi protocols) is explained by the independent factors or not. The purpose of this is to find out how important the multiple regression process is. Furthermore, the model fits the data well (adjusted R2 = 0.44897), and the explanatory factors explain almost 45% of the variance in the endogenous variables that affect the DeFi protocol's value. So, it looks like the model is doing a good job of capturing the data.

Factors such as Gross Merchandise Volume, Total Revenue, and TVL contribute to a higher DeFi protocol valuation. All of these variables have positive and statistically significant beta coefficient estimates. The value of a DeFi protocol is significantly related to the variable TVL. These results are quite realistic considering that we are using proxies for the DeFi protocol. Decentralized financial technologies are worth more when more money is invested in them, which means that their prices will go up. Values for TVL that are above average indicate that protocols are more valuable. The reason behind this is that the worth of the capital put into smart contracts may be measured by TVL values. The value of sales is proportional to the quantity of goods sold. It denotes something unique in every class of DeFi protocols. Decentralized exchanges use all of the trading volume, lending protocols use all of the borrowing volume, and asset management uses all of the product trading volume. Fees, which are essentially income, are paid by users of the DeFi protocol. At regular intervals, it is calculated. Hence, a day's wages are the same as a day's taxes and fees. While inflation and the protocol's revenue components naturally have a significant influence on the DeFi protocol's valuations, this is not surprising. The protocol's revenue is directly proportional to the earnings of those who receive DeFi tokens. Like dividends paid out by publicly listed corporations, income from protocols is a kind of investment income. Funds sent via protocols utilized by DeFi applications are a type of capital outflow. Values are diluted by inflation in the same way that they are by the process by which traditional firms issue more shares. In general, the value of a stock corporation will decline as the number of shares in circulation increases.

As part of our research, we have looked into the possible problems, dangers, and outcomes that could come from increasing public-facing cloud computing applications. Decentralized financial apps built on permissionless blockchains have the potential to revolutionize customer-facing financial services, but there are still major risks to utilizing them. Before putting money into DeFi applications, stakeholders should do their homework and weigh the main dangers. They need to wait till that period has gone before becoming involved.

The use of decentralized finance can achieve two goals: increasing the level of financial inclusion in India and giving economically disadvantaged communities access to financial services. This study aims to increase the number of individuals who can access financial services by showcasing the game-changing advantages of microfinance systems, decentralized savings, and peer-to-peer lending. The future of decentralized banking in India will be heavily influenced by developments in scalability, interoperability, and user experience, according to our analysis. In order to attract more users and foster wider adoption, it is crucial to have user interfaces that are easy to access, well-designed, and supported by a solid infrastructure. Collaboration between governments, corporate leaders, and digital entrepreneurs is crucial for India to reach a decentralized finance rollout that is long-term sustainable and ethical. The paper goes on to say that organizations and individuals alike need to enroll in extensive training programs to fully understand distributed finance (DeFi).

The study's findings indicate that India is an ideal market for the development of decentralized finance (DeFi). Legislative backing, financial inclusion, technology advancements, teamwork, and instruction are also emphasized. By resolving these issues, India has the potential to become a world leader in decentralized finance, ushering in a period of unprecedented opportunity for equitable growth and financial innovation.

Limitations of the Study

During the research phase, we encountered a number of issues that significantly aided fellow researchers in the same field. The first limitation faced at the time of data collection was that the banking sector is the most sophisticated area, and it does not enable customers to share information regarding their bank transactions and the channels used to operate these transactions. Secondly, persuading customers, particularly those in rural areas who may not possess a high level of education, proved to be a challenging task for the researcher. He had to instill confidence in them, reassuring them that the data collection was solely for research purposes and would remain confidential. Thirdly, gathering information from bank officers about their customers proved to be a formidable challenge. Some of them were not ready to share this information, and others were not willing to spare time for it. Therefore, we can generalize the study's findings while considering the mentioned factors.

Any research has its limitations. While the majority of the study's findings were statistically significant, the researcher has identified the following limitations in the study:

1. Banking is a highly sophisticated area of research due to the reluctance of customers, particularly in rural areas, to divulge details about their bank accounts or the banking modes they use. Therefore, customers were hesitant to express their opinions about their transaction modes.

2. The majority of the respondents to the study were educated and young. Therefore, the study has not adequately considered the perceptions of older and less educated individuals regarding digital financial inclusion, which could potentially impact the study's results.

3. Since digital financial inclusion is a relatively new concept in India, the researcher had to rely on studies conducted in other countries due to a lack of relevant information regarding the impact of digital banking on financial inclusion.

Future scope of the study

The issues discussed in the limitations section provide guidance for continuing research in a similar area. We are still in the nascent stage of research on the impact of digital banking on financial inclusion, with much more to study and conclude in this area. We discuss some potential avenues for future research in this field below.

1. We should conduct research on elderly, low-income, and less-educated individuals with bank accounts, particularly in rural areas, to understand the precise usage of digital banking in these areas.

2. Thorough research on the impact of digital banking on many formal financial sectors, including insurance and other goods, is needed to understand the importance of financial inclusion. Every customer should be able to take advantage of almost all financial services based on their overall welfare.

3. Only non-users of digital channels should be the subject of research to understand what prevents them from using digital financial services and to recommend necessary steps for those who have not yet used digital platforms.

REFERENCES

1. Abdulhakeem, AhmedSaif, and Hu.Qiuling, (2021), Powered by Blockchain technology, DeFi (Decentralized Finance) strives to increase financial inclusion of the unbanked by reshaping the world financial system. *Modern Economy* 12: 1.

2. KenAlabi,(2017), Digital blockchain networks appear to be following Metcalfe's Law. *Electronic Commerce Research and Applications* 24: 23–29.

3. José,Almeida, and GonçalvesTiago Cruz,(2022), A Systematic Literature Review of Volatility and Risk Management on Cryptocurrency Investment: A Methodological Point of View. *Risks* 10: 107.

4. LennartAnte, (2020), Bitcoin transactions, information asymmetry, and trading volume. *Quantitative Finance and Economics* 4: 365–81.

5. Sirio Aramonte, Huang Wenqian, and Andreas Schrimpf,(2021), *DeFi Risks and the Decentralisation Illusion*. Basel: Bank for International Settlements (BIS), pp. 1–36.

6. Azar, Pablo, Baughman Garth,Carapella Francesca,Gerszten Jacob,Lubis Arazi, Perez-SangiminoJuan Pablo,Scotti Chiara, Swem Nathan,Vardoulakis Alexandros, and Rappoport David,(2022), *The Financial Stability Implications of Digital Assets*. Washington, DC: Federal Reserve Board, pp. 1–31.

7. Bartoletti, Massimo, James Hsin-yu Chiang, and Alberto Lluch Lafuente,(2021), Towards a Theory of Decentralized Finance. Paper presented at International Conference on Financial Cryptography and Data Security, Berlin/Heidelberg, Germany, March 1–5.

8. Felix Bekemeier, (2021), Deceptive Assurance? A Conceptual View on Systemic Risk in Decentralized Finance (DeFi). Paper presented at 2021 4th International Conference on Blockchain Technology and Applications, Xi'an, China, December 17–19.

9. Svetoslav Borisov, (2022), DEFI–Potential, Advantages and Challenges. *Economic Studies* 31: 33–54.

10. JacobBoudoukh,Richardson Matthew,Stanton, Richard, andF. Whitelaw Robert. (2004), *Valuing Mutual Fund Companies*. Berkeley: UC Berkeley.24:556

11. Anders C. Brucker, (2022), De-Fi Protocol Token Valuation by Projecting Token Flows and Estimating an Appropriate Risk Premium. Durham: University of New Hampshire 5365

12. CraigCalcaterra, and A. Kaal Wulf. (2021) *Decentralized Finance (DeFi). Decentralization-Technology's Impact on Organizational and Societal Structure*. Berlin: Degruyter Publishers.64:5-56