

# Decentralized Insurance in Defi: An Application on Insuring Financial Products

Fatih Coşkun ERTAŞ<sup>1</sup> , Batuhan KARABAY<sup>2</sup> 

## ABSTRACT

The decentralized finance (DeFi) ecosystem is an environment where financial services are provided using decentralized technologies such as blockchain and smart contracts instead of traditional intermediaries. While the absence of intermediaries offers many advantages, it also brings significant disadvantages, the most critical being security issues. As a digital ecosystem, DeFi faces threats such as hacking attacks and smart contract errors, which can undermine trust. This study focuses on insurance activities aimed at enhancing ecosystem safety, emphasizing the role of trust. Pioneering insurance platforms were examined, and a financial asset insurance transaction was conducted using the Nexus Mutual platform. The findings reveal that although DeFi insurance can significantly reduce user risks, high Ethereum transaction fees and limited protocol liquidity reduce its accessibility. To address these challenges, offering insurance services on alternative blockchains and integrating them into centralized exchanges is recommended.

**Keywords:** Decentralized Finance, Insurance, Cryptocurrency, Blockchain Technology, Smart Contract.

**JEL Classification Codes:** B17, B26, D53, E44, F65, G15, P34, P45, G22

**Referencing Style:** APA 7

## INTRODUCTION

Decentralized finance (DeFi) emerges as a rapidly growing ecosystem in today's financial landscape. Derived from the words "Decentralized" and "Finance," DeFi aims to provide users with various conveniences. When examining the structure of the ecosystem, it is observed to mimic traditional/legacy finance to some extent. The most fundamental departure from traditional finance in the DeFi ecosystem is the absence of any intermediary institution or organization. This decentralization, which eliminates intermediaries, presents an advantage for users who desire complete control over their usage of the ecosystem. However, this absence of intermediaries also brings about certain challenges. The most significant of these challenges is the issue of trust. Trust is indispensable in financial markets. Before investing, an investor's primary concern is trust. Once they are convinced that the financial product they are considering is reliable, they proceed with the necessary steps to make the investment.

When investing in a financial product within the DeFi ecosystem, the Whitepaper (*a detailed document explaining the purpose, technology, and features of a*

*blockchain project*) of that financial product is typically reviewed to assess the project's contributions to the ecosystem, the problems it addresses, and whether the project is successful and sustainable. However, even if a project is successful, there can still be some issues. For example, instead of being established with strong capital, the company behind the project may have its financial strength directly linked to the value of the cryptocurrency, which could lead to difficulties in covering expenses such as company overheads and personnel salaries if the expected demand for the cryptocurrency is not met or if there is a downward trend in the price curve. In such cases, the company may face bankruptcy, turning a project that investors trusted into an unsuccessful one overnight.

Classical insurance is a financial service developed to facilitate the collective sharing of risks and to reduce the financial losses to which individuals are exposed. Risk management processes in insurance are shaped around the concepts of moral hazard, adverse selection, and risk pooling. These factors constitute more pronounced and critical issues in the insurance market compared to other financial instruments such as futures contracts (Rejda & McNamara, 2017, p. 46).

<sup>1</sup> Prof. Dr., Atatürk University, Faculty of Economics and Administrative Sciences, Department of Accounting and Finance, fatihcoskun.ertas@atauni.edu.tr

<sup>2</sup> Corresponding Author, Doctoral Student, Atatürk University, Institute of Social Sciences, Department of Accounting and Finance, batuhan\_karabay@hotmail.com

DeFi insurance, on the other hand, reinterprets these principles within a decentralized framework.

For example, the concept of moral hazard is also relevant in DeFi insurance; being insured may lead users to engage in riskier transactions. However, in the DeFi ecosystem, the automated functioning of smart contracts can facilitate the detection and management of such risks. Adverse selection risk, on the other hand, refers to the tendency of only high-risk users to benefit from insurance. While in traditional insurance this situation is managed through premium pricing, in DeFi insurance it can be addressed more precisely through onchain data analysis.

In this context, platforms such as Nexus Mutual preserve the risk-sharing logic of traditional insurance while basing their governance mechanisms on community voting and smart contracts. This structure enhances transparency in risk management and enables the execution of transactions without intermediaries.

Another issue arises from the fact that the ecosystem is entirely digital, making it susceptible to digital attacks (hacking) or errors originating from smart contracts. These potential problems mentioned above are frequently encountered in the ecosystem. Steps are being taken to address these issues and deficiencies, aiming to make the ecosystem more reliable and healthy.

This study aims to examine decentralized insurance practices within the DeFi ecosystem, focusing on how these mechanisms contribute to enhancing user trust and managing risks associated with financial products in a fully digital and intermediary-free environment. The Nexus Mutual protocol was selected for the application stage due to its pioneering position as the largest DeFi insurance provider, its significant market share in crypto-native insurance protocols, and its established reputation for transparent and community-driven risk assessment. Examining Nexus Mutual allows for a deeper understanding of how decentralized insurance can function effectively in practice and highlights the practical challenges and opportunities within the ecosystem.

## CONCEPTUAL FRAMEWORK

### Concept of Insurance in Decentralized Finance

Decentralized finance (DeFi) is an ecosystem where financial intermediaries are eliminated, and open-source software and blockchain technology are utilized. Blockchain-based applications are also being adopted by traditional insurance companies to securely store data and manage transactions in various industries. For

instance, “State Farm,” one of the largest auto insurers in the United States, along with “United Services Automobile Association (USAA),” resolves claims between each other in the property and casualty insurance sector using blockchain technology (Cousaert et al., 2022: 2).

In the context of decentralized finance, the concept of insurance aims to protect users’ financial assets against risks emerging within this ecosystem. Asset protection is achieved through smart contracts and projects (tokens/cryptocurrencies). Insurance and controlled smart contracts in the DeFi ecosystem play a crucial role. The use of insurance and smart contracts for the financialization of risks is also critically important for the DeFi ecosystem to achieve its goals (Wronka, 2023: 111).

Insurance in the DeFi ecosystem operates on the same principles as insurance in traditional finance. DeFi insurance functions through the collaboration of blockchain nodes instead of traditional insurance intermediaries. As a result, all users can create their own insurance policies, and decisions on insurance claims become a transparent and verifiable process (Jiang et al., 2023: 8).

In traditional insurance services, verifying the cause of damage and determining whether it falls within the insurance coverage typically requires a significant amount of time and effort. This process can sometimes be inconclusive, leading to the inability to file an insurance claim. However, blockchain technology has the potential to change this situation. Blockchain technology has the potential to revolutionize legal systems and traditional banking processes. By using blockchain-based smart contracts instead of traditional legal processes, agreements between parties can be automatically executed and verified, resulting in reduced costs and ensuring honesty for everyone (Vigna and Casey, 2015: 334). Blockchain automatically records the status and cause of products’ damages, and these records are immutable. Data on the blockchain is reliably recorded using timestamps. This data is automatically uploaded by devices, and service providers cannot intervene later. Therefore, when an insurance transaction is within the scope of a contract, service providers do not need to worry about contract breaches or denial of compensation. Similarly, concerns about service providers having to compensate for intentional damage to a user’s device are eliminated. This situation ensures the protection of both users and service providers and contributes to reducing the possibility of a trust crisis. As a result, insurance transactions become fairer and more reliable, providing a better experience for both users and

service providers (Teng et al., 2022: 576).

In Mastando's article "DeFi: Blockchain Risks and the Case for Blockchain Insurance" published in 2022, he discusses the risks associated with cryptocurrencies, citing that commentators have identified certain risks arising from the unique nature of DeFi, categorizing these risks into three main types: smart contract risk, governance risk, and oracle risk. Smart contract risk encompasses dangers inherent in smart contracts, such as coding errors or hack attacks, while governance risk refers to inadequate or abusive governance mechanisms of DeFi protocols. Oracle risk relates to the reliability or manipulation risk of oracles providing external data. The presence of these risks is increasing the demand for insurance products day by day.

Users need to be aware that the security of the protocol is as strong as the smart contracts underlying it. Unfortunately, an average user cannot read contract code and, worse still, cannot evaluate its security (Schär, 2021: 19). The security of smart contracts is critically important for protocol security because these contracts execute transactions and manage funds. Funds are lost as a result of errors or attacks in smart contracts, which are potential risks in DeFi protocols. Seeking insurance services to prevent these fund losses is an important option for users.

Decentralized finance systems enable users to achieve higher efficiency compared to traditional financial systems by utilizing their funds and other assets across a range of DeFi protocols. However, users in DeFi protocols may be exposed to various factors such as market fluctuations, smart contract errors, and liquidity risks. Decentralized insurance protocols, such as Nexus Mutual, provide users with protection against various risks in the DeFi sector, allowing everyone to contribute to insurance pools to protect themselves against these risks. At the same time, users have the opportunity to earn returns as they take on risk. This enables DeFi users to enhance their financial security while also contributing to the overall resilience of the sector (Moreland, 2023). For example, when a user provides liquidity in DeFi protocols and the protocol encounters a security vulnerability, an insurance policy can compensate for the user's potential losses. A blockchain-based financial infrastructure becomes more effective when smart contract risks are transferable. Risk-averse investors can share a portion of their expected returns as compensation from an insurance policy covering smart contract risks in the relevant liquidity pool (Nadler et al., 2023: 1).

In insurance protocols operated through smart contracts, users can purchase insurance policies by undergoing risk assessment and paying a certain premium. The user's insurance claim is automatically triggered in the event of damage, and compensation is provided by the insurance company according to the conditions specified in the insurance policy. Insurance plays a significant role in ensuring the security of users and protecting their financial assets, allowing DeFi users to be in a more secure position against risks and conduct their transactions more safely. DeFi users who are willing to take on more risks potentially can earn higher returns. A functioning risk transfer market will provide flexibility for DeFi users to structure their portfolios according to individual risk preferences, benefiting everyone. This way, providing access to various financial instruments tailored to different risk appetites and strategies can make the DeFi ecosystem more robust and user-friendly (Nadler et al., 2023: 1).

Decentralized finance insurance is typically implemented through smart contracts. Smart contracts are programmable contracts designed to execute financial transactions, manage assets, and operate automatically under certain conditions. These contracts are used to manage insurance transactions in decentralized finance ecosystems. Smart contracts can provide a mechanism that determines the terms of insurance policies and automatically compensates when these terms are met. For example, if a user provides liquidity in a particular DeFi protocol and a security vulnerability occurs in that protocol, the smart contract can detect this situation and automatically provide compensation to the user according to the conditions specified in the insurance policy.

Smart contracts manage transactions in a transparent, reliable, and code-defined manner. This fosters trust between parties and enables insurance transactions to occur more quickly and automatically. However, it is crucial that smart contract code is written correctly. A smart contract that is not written in accordance with security standards or is written incorrectly carries potential risks.

Any insurance initiative's initial stage involves identifying insurable risks and assessing their financial feasibility. However, in the DeFi context, this process becomes complex due to the multi-layered risk profiles (Bekemeir, 2023: 656). A proper assessment process assists insurance protocols in identifying risks and providing users with appropriate premiums. Each DeFi protocol or financial product has its own risk profile, and these risks

play a critical role in determining insurance premiums. The past performance and reliability of a DeFi protocol are significant risk factors for users. Reliable protocols may have lower premiums. The liquidity situation in the protocol is another factor that affects premiums. Low liquidity can increase user risk and, consequently, raise insurance premiums.

The security of smart contracts is a critical factor in determining a protocol’s risk profile. Security vulnerabilities in smart contracts can increase the risk of users losing their funds and may lead to higher insurance premiums.

The overall volatility in the financial market affects fluctuations in the value of an asset. A more volatile asset can increase insurance premiums because users may face higher risks. The staking and governance mechanisms of a protocol also play a role in risk assessment. Users locking their funds in staking or governance processes may bring certain risks along with them.

The complexity and nature of the financial product or service offered by the protocol are another factor determining the level of risk. More complex financial

products generally carry higher risks, so risk premiums will be correspondingly higher.

Decentralized insurance platforms utilize liquidity pools to support insurance policies and provide insurance services to users. Liquidity pools are used to finance insurance premiums and claim payments, contributing significantly to the platform’s operation.

In decentralized finance, insurance covers not only specific financial products like collateralized borrowing, liquidity mining, and Automated Market Makers (AMMs) but also a wide range of assets. This diversity within the DeFi ecosystem allows users to diversify their risks by insuring various asset classes. For example, tokens traded on DeFi platforms that provide various rights to their holders can be included in insurance coverage. Issuing insurance policies on these tokens helps protect users against potential losses in token value. Users can insure their funds deposited into DeFi protocols for collateralized borrowing or liquidity provision purposes, providing protection against potential protocol risks and liquidity losses. Additionally, non-fungible tokens (NFTs), which are unique assets, can also be insured by their owners through insurance policies to safeguard against loss or damage.

### Comparative Analysis of DeFi Insurance Platforms

Platform	Governance & Model	Coverage	Premium / Funding Model	Advantages	Disadvantages
<b>Nexus Mutual</b>	DAO & community governance (NXM token holders vote)	Smart contract hacks, custody risks, broad range of protocols	Capital pool staking with community-set premiums	Broad coverage, strong DAO structure, high liquidity	Membership KYC required, relatively high transaction costs
<b>Cover Protocol</b>	Decentralized CLAIM / NOCLAIM token system	Limited set of protocols	Higher prices, lower capital efficiency due to isolated pools	Fast listing, tokenization offers yield opportunities	Costly, narrow coverage, dependency on specific systems
<b>Armor FI</b>	Broker platform based on Nexus Mutual infrastructure	Covers smart contract hack risks	Time-based payments; staking NXM for rewards	Ease of use, instant protection, staking rewards	Dependent on intermediary model, platform dependency risk
<b>InsurAce</b>	Decentralized DAO with community voting	Multi-chain support; protocol and custody insurance	Staking in risk pools with related premium structure	Multi-chain support, portfolio-based products, low premiums	Relatively new; DAO activity may vary
<b>BarnBridge</b>	Risk tranching and tokenization-based (peer-to-peer)	Financial tranche risk adjustment; not direct insurance	User-defined, yield-segmented structured strategies	Choice of different risk profiles	Not direct insurance; limited coverage
<b>Saffron Finance</b>	Peer-to-peer risk-adjusted tranche structure	Lower-risk insurance via yield tranching	User-driven risk/return profile with stable tranche structuring	Flexibility, stabilized low-risk segment	Not direct insurance; acts as a risk mitigation tool

Source: [https://www.coingecko.com/research/publications/decentralized-insurance-deep-dive?utm\\_source](https://www.coingecko.com/research/publications/decentralized-insurance-deep-dive?utm_source), [https://university.mitosis.org/defi-insurance-protocols-how-nexus-mutual-and-insurace-mitigate-risks-in-decentralized-finance/?utm\\_source](https://university.mitosis.org/defi-insurance-protocols-how-nexus-mutual-and-insurace-mitigate-risks-in-decentralized-finance/?utm_source), [https://threesigma.xyz/blog/infrastructure/defi-insurance-guide-risks-rewards?utm\\_source](https://threesigma.xyz/blog/infrastructure/defi-insurance-guide-risks-rewards?utm_source), [https://opencover.com/state-of-crypto-and-defi-insurance-alternatives-coverer/?utm\\_source](https://opencover.com/state-of-crypto-and-defi-insurance-alternatives-coverer/?utm_source), [https://streamflow.finance/blog/defi-insurance/?utm\\_source](https://streamflow.finance/blog/defi-insurance/?utm_source), [https://opencover.com/defi-insurance/defi-insurance-protocols/?utm\\_source](https://opencover.com/defi-insurance/defi-insurance-protocols/?utm_source), [https://www.chaincatcher.com/en/article/2060099?utm\\_source](https://www.chaincatcher.com/en/article/2060099?utm_source), [https://slashdot.org/software/crypto-defi-insurance/for-maker/?utm\\_source](https://slashdot.org/software/crypto-defi-insurance/for-maker/?utm_source), [https://sourceforge.net/software/compare/Armor.Fi-vs-Nexus-Mutual/?utm\\_source](https://sourceforge.net/software/compare/Armor.Fi-vs-Nexus-Mutual/?utm_source), [https://defiprime.com/insurance?utm\\_source](https://defiprime.com/insurance?utm_source), [https://sourceforge.net/software/product/Nexus-Mutual/alternatives?utm\\_source](https://sourceforge.net/software/product/Nexus-Mutual/alternatives?utm_source), [https://sourceforge.net/software/product/InsurAce/alternatives?utm\\_source](https://sourceforge.net/software/product/InsurAce/alternatives?utm_source), [https://slashdot.org/software/comparison/Saffron-Finance-vs-iTrust.Finance/?utm\\_source](https://slashdot.org/software/comparison/Saffron-Finance-vs-iTrust.Finance/?utm_source)

Below are listed protocols that provide insurance services and risk management, either indirectly or directly, in the decentralized finance ecosystem. There are numerous protocols in the ecosystem that offer insurance services and risk management. As the operational principles of these protocols are similar, only a few pioneering ones are included. In the practical part of the study, we will execute the insurance transaction using the Nexus Mutual platform. The reason for choosing this platform is its pioneering position in the insurance sector of the DeFi ecosystem.

### Research Method

This study adopts a qualitative research approach to examine the operational mechanisms of insurance platforms operating within the DeFi ecosystem.

### Data Collection Process

The research utilizes information obtained from the official documentation, onchain transaction data, project websites, and community forums of leading DeFi insurance platforms, primarily Nexus Mutual.

### Platform Selection Criteria

The platforms selected for analysis were determined based on the following criteria:

- Market share and transaction volume
- Number of users and level of community engagement
- Product diversity
- Regulatory compliance and security standards

### Method of Analysis

The collected data were evaluated using a comparative analysis method, highlighting the advantages and disadvantages of Nexus Mutual in comparison with other platforms.

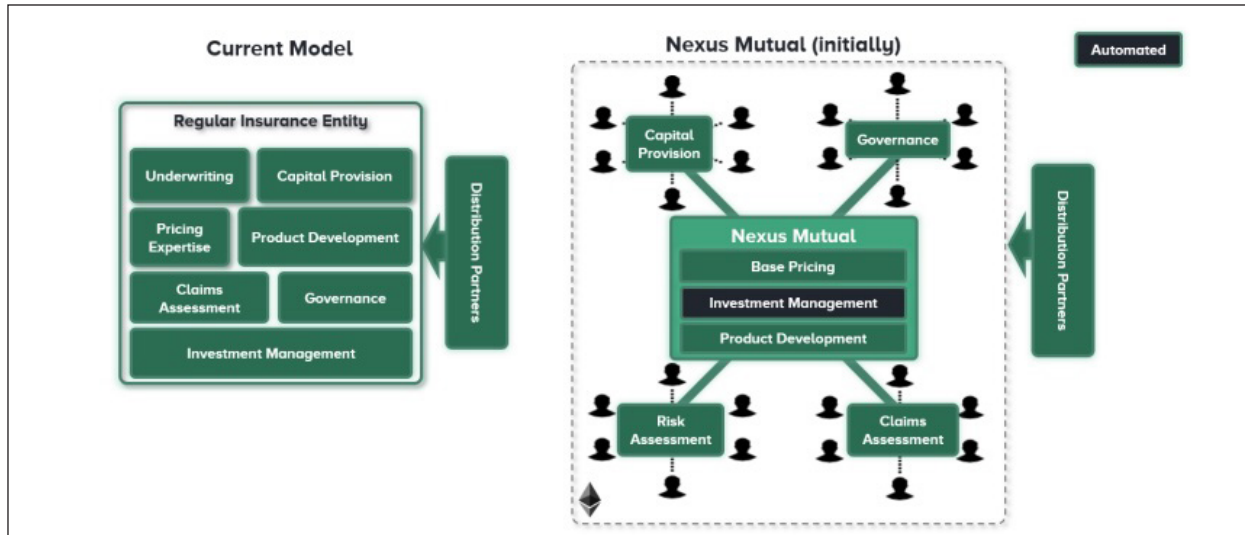
## INSURANCE PLATFORMS OPERATING IN DECENTRALIZED FINANCE

### Nexus Mutual

Nexus Mutual is a DeFi protocol that operates on the Ethereum blockchain, allowing users to purchase policies against specific risks and offer each other mutual insurance. The Nexus Mutual platform determines premium rates by conducting risk assessments. The premiums that users pay for insurance policies vary depending on the risk level of the insured asset. The advisory board of Nexus Mutual operates based on two fundamental principles. The first

is sustainability, aiming to ensure the sustainability of the entire fund by managing the organization's financial resources and assets in line with sustainability principles to protect existing members. The second is growth, aiming to encourage more members to join the platform by making sustainable funding possible (Karp and Melbardis, 2017: 12). The sustainability goal of ensuring the sustainability of the entire fund entails managing the organization's financial resources and assets in line with sustainability principles. This approach aims to enhance the organization's long-term resilience and societal impact. The growth objective may involve setting insurance premiums in line with sustainability principles to integrate sustainability with financial performance because insurance companies typically seek to support long-term growth by combining risk management and sustainability principles. Additionally, in terms of membership growth, insurance companies aim to expand their customer base and attract new members. A sustainable premium policy and ethical investments can be appealing to potential customers and increase customer attraction by demonstrating the organization's societal impact.

Nexus Mutual requires users to pledge a certain amount of assets as collateral to meet the Minimum Capital Requirement (MCR) for them to be eligible for insurance coverage. The determination of the MCR is based on price data provided by oracles. Additionally, a request evaluation process, where users vote, is conducted to determine whether the insurance claim is accepted or not. If the claim is accepted, payment is made within a specified limit of compensation. This process is designed to ensure the security of DeFi users and to conduct the insurance process transparently and fairly (Zhao et al., 2022: 60916). Insurers must make a series of decisions before conducting their operations. Insurance companies decide how to manage premium payments from customers, how customer funds will be handled and invested, and which insurance risks will be covered in this process. Insurance companies invest the funds collected from customers to generate returns. This affects the overall financial health of the company and its ability to sustain the services provided to customers. However, the returns and risks of these investments can negatively impact customers if the insurance company goes bankrupt. Evaluating the reliability of an insurance company is often a challenging task due to information asymmetry problems (Karp and Melbardis, 2017: 1). Information asymmetry refers to an imbalance in the sharing of information about the internal operations, financial condition, and risk management practices of the insurance company generally held by customers and the outside world.



**Figure 1:** Nexus Mutual Flow Model

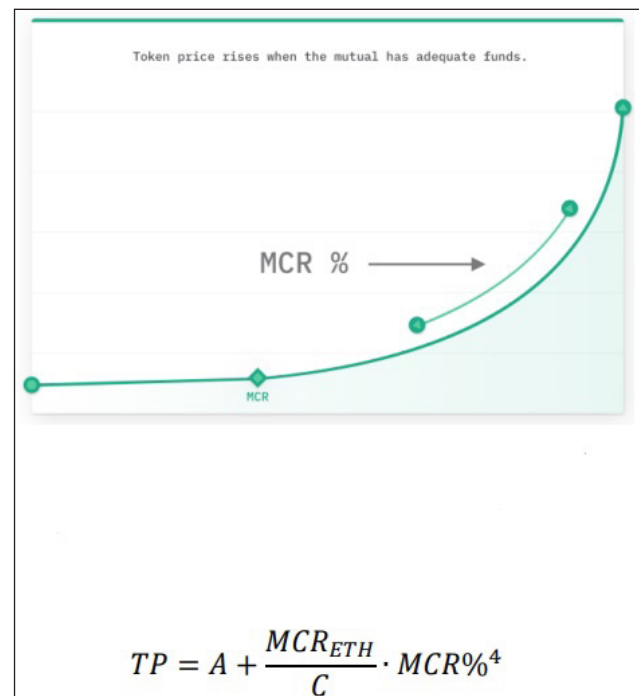
**Source:** Karp, H., & Melbardis, R. (2017).

The operational structure of Nexus Mutual can be better understood by examining its workflow model, which illustrates the key steps in creating insurance policies, managing capital, pricing products, and handling claims. This process is summarized in Figure 1.

The following items outline the key operational components depicted in Figure 1. They provide a detailed explanation of each step in the Nexus Mutual workflow, clarifying how the protocol creates and manages insurance products, allocates capital, and administers claims.

1. Insurance Creation: The business creates and offers insurance policies to customers based on their requests.
2. Capital Provision: The business allocates or secures sufficient capital to cover potential losses.
3. Pricing Expertise: The business conducts analyses requiring expertise to price insurance products and determines appropriate pricing strategies.
4. Product Development: The business develops new insurance products or services based on demand assessments.
5. Demand Assessment: The business analyzes market needs and demands.
6. Management: The business manages general operations, addresses personnel matters, and makes strategic decisions.
7. Investment Management: The business effectively manages the capital obtained and evaluates investments.

Figure 2 illustrates the financing structure and capital adequacy calculation mechanism used by Nexus Mutual. It Figurely represents the relationship between token price, capital requirements, and available funds, which is critical for understanding the platform’s financial sustainability.



**Figure 2:** Nexus Mutual Financing Level Diagram

**Source:** Karp, H., & Melbardis, R. (2017).

TP: Token Price in Ether

MCRETH: Minimum Capital Requirement in Ether needed to support existing covers

MCR%: Ratio of Capital Pool funds to Minimum Capital Requirement

A and C: Constants. Initially calibrated based on the prevailing Ether price before launch.

The formula provided above is used to calculate the Token Price (TP). It consists of the following elements:

1. A: A constant value. It is a predetermined constant that contributes to the Token Price formula.
2. MCRETH: Minimum Capital Requirement. It represents the minimum amount of capital required to support existing covers.
3. C: Another constant value. It is a predetermined constant that contributes to dividing MCRETH in the formula.
4. MCR%: The ratio of Capital Pool funds to Minimum Capital Requirement. This ratio indicates the relationship between the Capital Pool funds and the Minimum Capital Requirement.

The formula combines constant values like A and C with variable values such as MCRETH and MCR% to calculate the Token Price. This calculation is used in creating the economic models of the insurance platform and determining the Token Price.

Nexus Mutual, the largest DeFi insurance provider, offers a member-based service that constitutes approximately 70% of locked funds in crypto-native insurance protocols. Nexus Mutual has made approximately \$5 million in compensation payments due to the insolvency of FTX and crypto provider BlockFi. These payments demonstrate the effectiveness of Nexus Mutual's security and risk management (Shukla, 2023). While Nexus Mutual provides a solution to security challenges in the DeFi ecosystem, significant losses in this area highlight the potential risks of DeFi and how insurance providers mitigate these risks.

### Cover Protocol

Cover Protocol is a decentralized insurance protocol operating within the decentralized finance (DeFi) ecosystem. It aims to provide protection against errors in smart contracts, security vulnerabilities, or similar events. The protocol enables users to initiate, purchase, and manage insurance policies.

In Cover Protocol, the process begins with market makers (MMs) depositing collateral to cover a product. MMs receive two types of tradable collateral tokens using

their deposits, which provide them with an opportunity to earn premiums. MMs can choose from various strategies, such as selling tradable tokens or providing liquidity in their balance pools with these tokens and earning fees in return.

Those covered by insurance can then purchase the necessary collateral when needed. Cover Protocol ensures protection against smart contract risks for DeFi users, fostering trust and confidence within the ecosystem. By contributing to increased trust and confidence, the protocol strengthens relationships between users and protocols within the DeFi ecosystem (Cover Protocol Product Paper, 2020).

Cover Protocol fills the gap between decentralized finance (DeFi) and traditional finance, thereby enhancing the potential of DeFi. This expands access to DeFi and enables all investors to participate. By bringing stability to the highly volatile decentralized finance ecosystem, Cover Protocol offers users the opportunity to manage risks and transact securely. Operating under a Decentralized Autonomous Organization (DAO), Cover Protocol allows users to participate in decision-making processes regarding the protocol's management. Users can assess the risk levels of smart contracts and create custom insurance policies tailored to their needs. This provides users with personalized insurance solutions. Additionally, Cover Protocol offers users the opportunity to earn rewards through various activities such as yield farming and staking. This incentivizes users to engage with the protocol and provide liquidity.

### ArmorFI

ArmorFi aims to make investing in DeFi as safe as possible with its crypto-specific dynamic smart coverage aggregation feature. As a decentralized smart brokerage, Armor's innovations provide on-demand, real-time coverage and unsupervised security solutions for user assets. The focus of Armor is to create an ecosystem of protocols and products that can work together to ensure mass adoption of DeFi by both institutions and individuals and to scale it (About Armor Finance, 2021). Armor operates as a decentralized smart brokerage. With its dynamic smart coverage aggregation feature, it provides flexibility for users to insure their assets against specific risks and offers on-demand coverage. Crypto asset holders have the ability to provide coverage in real-time, allowing them to quickly adapt to changing market conditions and protect their assets. Targeting a broad user base, Armor Finance aims to expand and strengthen the DeFi ecosystem by targeting both institutions and

individuals. Its primary focus is to ensure the mass adoption of DeFi by both institutional and individual users and to create an ecosystem of protocols and products that work together to scale it. These approaches demonstrate that Armor Finance is a platform aiming to provide a secure and innovative insurance solution in the DeFi space.

### **InsurAce**

The InsurAce Protocol, commonly known as “InsurAce.io,” stands out as a pioneering decentralized multi-chain protocol in the rapidly evolving environment of decentralized finance (DeFi). Essentially, InsurAce.io is designed to provide DeFi users with a reliable, resilient, and secure framework, allowing them to protect their investment funds against various risks. First emerging in April 2021, InsurAce.io plays a significant role in blockchain and decentralized finance. The platform has developed a comprehensive cross-chain product range covering over 140 protocols on various blockchain networks. Specifically, InsurAce.io operates on three centralized exchanges (CEX) and seamlessly functions on multiple blockchain networks such as Ethereum, Solana, BNB Smart Chain, Polygon, Fantom, Gnosis, Arbitrum, Avalanche, Harmony, Celo, Cronos, Boba, ICON, Ontology, Moonriver, among others. The versatility of InsurAce.io is further highlighted by its live product deployment on leading blockchain networks like Ethereum and BNB Smart Chain. This strategic expansion enables users from different blockchain ecosystems to access robust insurance solutions provided by InsurAce.io and benefit from them (Welcome to InsurAce.io). With its primary goal of pioneering in the DeFi space, InsurAce.io prioritizes providing reliable risk protection services, promising to safeguard users in the constantly changing crypto ecosystem against potential threats and uncertainties. The protocol’s seamless operation across various blockchain networks demonstrates its commitment to inclusivity and adaptability within the broad blockchain ecosystem. This platform, which could be a preferred choice for financial innovation, not only serves as a cornerstone for DeFi users but also presents a robust alternative for users seeking a reliable environment in the DeFi ecosystem.

### **BarnBridge**

BarnBridge is a platform that plays a significant role in the decentralized finance (DeFi) ecosystem. It is an impressive protocol aimed at distributing risk against yield sensitivity and price fluctuations in DeFi. In particular, its initial application, SMART Yield, provides

users with the opportunity to choose from risk profiles when lending money in DeFi protocols like Aave and Compound (Coinbase, About BarnBridge). The platform offers a range of innovative financial products aimed at enhancing risk management and optimizing asset allocation through the creation of liquidity pools. One of BarnBridge’s main focuses is on managing the risk of decentralized finance protocols and users. Among the financial products offered by BarnBridge are smart contracts that assist users in creating diversified portfolios tailored to their risk profiles and objectives.

On March 15, 2021, BarnBridge took a significant step by launching its risk tokenization application called SMART Yield, allowing users to create customized investment positions based on their preferred risk appetite (BarnBridge V2, 2022). The innovative protocol enables users to operate on DeFi platforms through smart contracts tailored to various risk tolerances. SMART Yield, in particular, offers a solution for users seeking to generate returns by providing liquidity on major DeFi protocols like Aave and Compound. Users can select smart contracts designed for specific risk levels through SMART Yield, thereby enhancing potential returns while staying within a defined risk profile. The fundamental aim of protocols engaging in insurance activities within the decentralized finance ecosystem is to minimize and mitigate risks to the greatest extent possible. As BarnBridge’s core focus is on determining risks based on users’ risk appetite, it operates on a similar logic to protocols providing insurance services. Therefore, the BarnBridge protocol is included in our study due to its alignment with this principle.

### **Saffron Finance**

Saffron Finance is a significant protocol in the blockchain world that focuses on tokenizing off-chain assets. Introduced in October 2020 by a mysterious founder known as Psykeeper, Saffron Finance is a peer-to-peer risk swapping protocol (Saffron Finance, Introduction, 2021). The primary use case of the protocol is to act as a bridge between liquidity providers and lending protocols. Liquidity providers have the ability to supply liquidity to lending protocols through various SFI tranches (slices). The native token of the protocol, SFI, is used for staking to access specific tranches and to govern the protocol (Saffron Finance, Introduction, 2021). This tokenization is used across a wide range, particularly encompassing contracts that impede capital access. Tokenized ownership of cross-chain assets offers liquidity providers greater flexibility and provides uninterrupted access to underlying assets. This protocol stands out with

unique features such as leveraged staking and order risk management (Kriptokoin, Saffron Finance Nedir?, 2022). Liquidity providers can diversify their portfolios and also take advantage of leverage opportunities using tokenized assets. Additionally, Saffron Finance adopts a different approach from centralized tokenization and yield platforms. This unique approach positions the project uniquely and innovatively within the sector.

**Compensation Claim Evaluation Process in Nexus Mutual Protocol**

Nexus Mutual is an online platform with an easy-to-use interface that provides insurance services. There are 64 protocols on the platform. As of the time of the study, 10 of these protocols do not have sufficient liquidity, so there is currently no capacity for insurance transactions on these protocols. However, with the participation of liquidity providers in the future, these protocols will be able to carry out insurance activities.

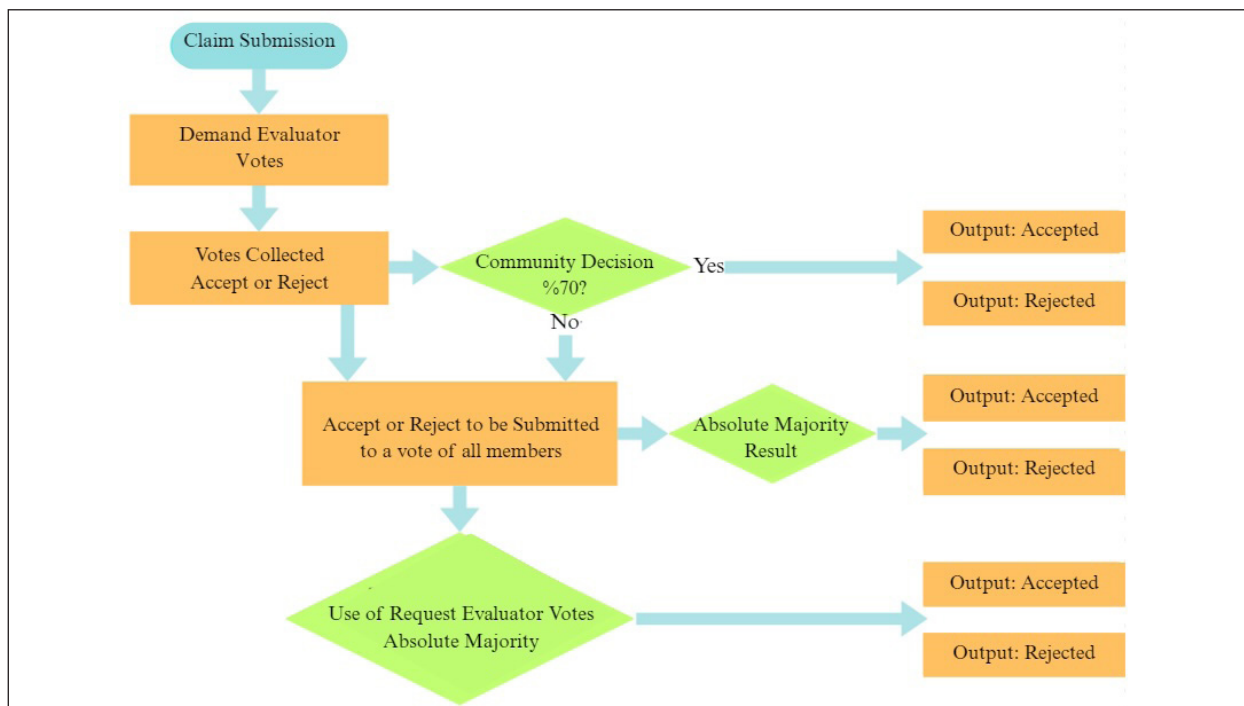
Users can make their choices by evaluating factors such as annual insurance costs, protocol reliability, and liquidity capacity. The platform allows two financial assets for insurance coverage: Ethereum and the DAI stablecoin. For example, users with assets in other financial assets than the two offered by the platform need to convert their financial assets to Ethereum or DAI in order to benefit from the insurance service on the platform. To transact on the platform, users need to have cold wallets or hardware wallets such as Ledger, Trezor, Trust Wallet, or MetaMask.

Figure 3 presents the demand assessment algorithm used by Nexus Mutual to evaluate insurance applications. It shows the decision-making process from initial risk evaluation to the approval or rejection of a coverage request, helping to clarify how user applications are processed within the protocol.

After a user insures their financial assets through Nexus Mutual, they can file a compensation claim in case of any issues with the insured financial asset. As seen in the algorithm above, there is an evaluation process upon the user's compensation claim. Initially, the user initiates the insurance process by paying the fee for risk and premium evaluation through the selected protocol for eligibility. If there is an adverse event such as hacking or smart contract errors with the insured financial asset, the user can file a compensation claim with the Nexus Mutual platform. Along with the compensation claim, the operational mechanism seen in the algorithm above will come into play.

The evaluation process for the compensation claim involves voting on the claim. The claim evaluation process (Karp and Melbardis, 2017: 6) consists of the following steps:

1. The outcome of the vote is determined by consensus, and a fee pool is created to pay the claims assessors. Fees are paid using additional member tokens and a fixed percentage of the collateral cost.



**Figure 3:** Nexus Mutual Demand Assessment Algorithm

**Source:** Karp ve Melbardis, 2017

2. A bond is locked to vote against the settlement outcome, and this bond remains locked for an extended period. The evaluation process typically involves challenging and automatically burning high values of member tokens, aiming to reveal genuine differences in opinion.
3. Voting power is determined when the collateral amount of member tokens used in the vote exceeds five times the collateral amount. In case of lack of consensus, the fee pool for claims assessors decreases, and then all members are subjected to another vote.
4. Member tokens contributing to claims evaluation voting cannot participate in another claim for 12 hours after becoming "inactive."
5. Voting power must reach a certain threshold to prevent fraudulent claims. In case of approval of fraudulent claims, the Advisory Board intervenes to prevent members who burned their member tokens from benefiting before approving fraudulent claims.
6. There is a need for better adjustment of incentive mechanisms.

### Application for Underwriting Financial Assets on the Nexus Mutual Platform

The application process for underwriting financial assets on the Nexus Mutual platform follows a series of steps that ensure proper risk assessment and transparent coverage conditions. The process is outlined below for clarity:

**Step 1:** Connect a supported wallet (e.g., Trust Wallet, MetaMask, Ledger) to the Nexus Mutual platform

**Step 2:** Select an available insurance pool from the list, considering liquidity capacity and pricing advantages.

**Step 3:** Complete the Know Your Customer (KYC) process, which includes providing personal information and undergoing verification (usually within 24 hours).

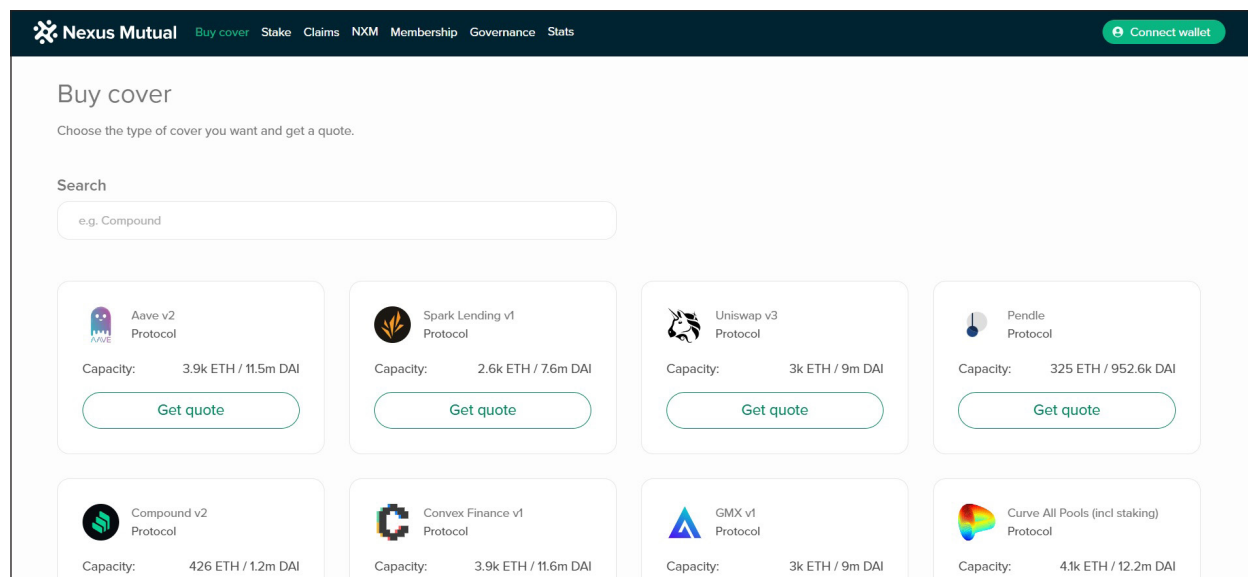
**Step 4:** Pay the required membership fee to gain full access to the platform.

**Step 5:** Choose the amount and duration of coverage for the financial asset you wish to insure, then confirm the transaction.

**Step 6:** Upon confirmation, your asset is insured for the selected period, and the coverage details are recorded on the blockchain.

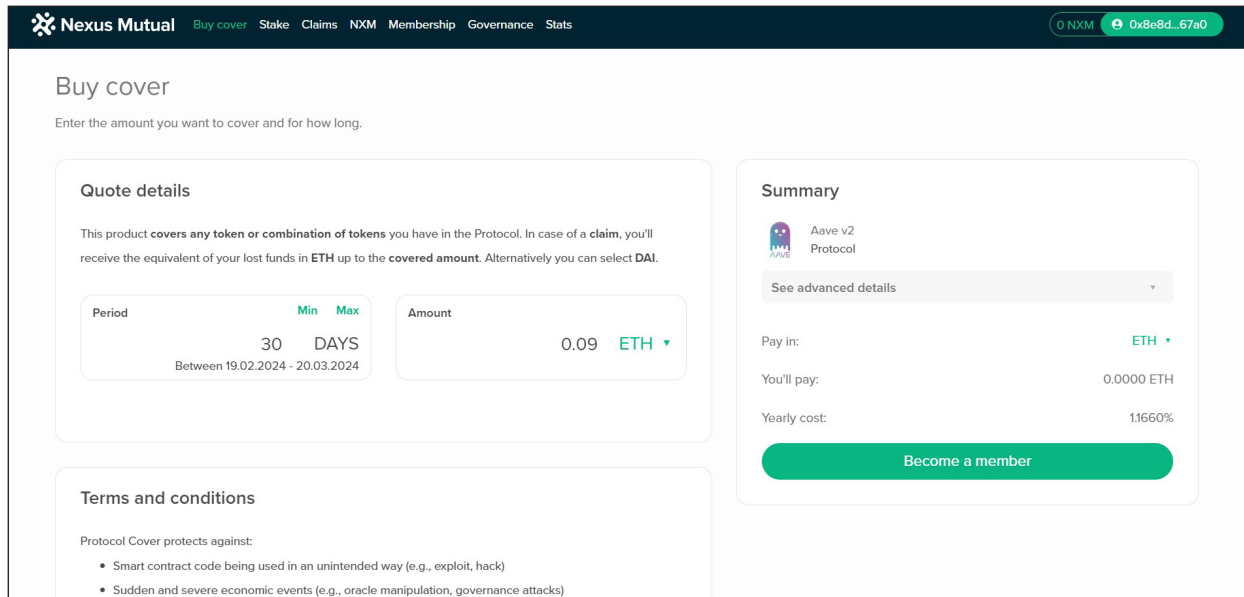
Figure 4 displays the Nexus Mutual platform interface, where users can connect their wallets, browse available insurance pools, and initiate the underwriting process. It Figurely supports the step-by-step description provided above by showing the actual user interface.

In the Nexus Mutual platform, there are 64 insurance pools available for users to choose from based on their preferences. However, as of January 2024, 10 of these pools are currently inactive due to insufficient capacity. Upon examining the pools, it is generally observed that pools with high liquidity offer users more advantageous pricing.



**Figure 4:** Nexus Mutual Platform Interface

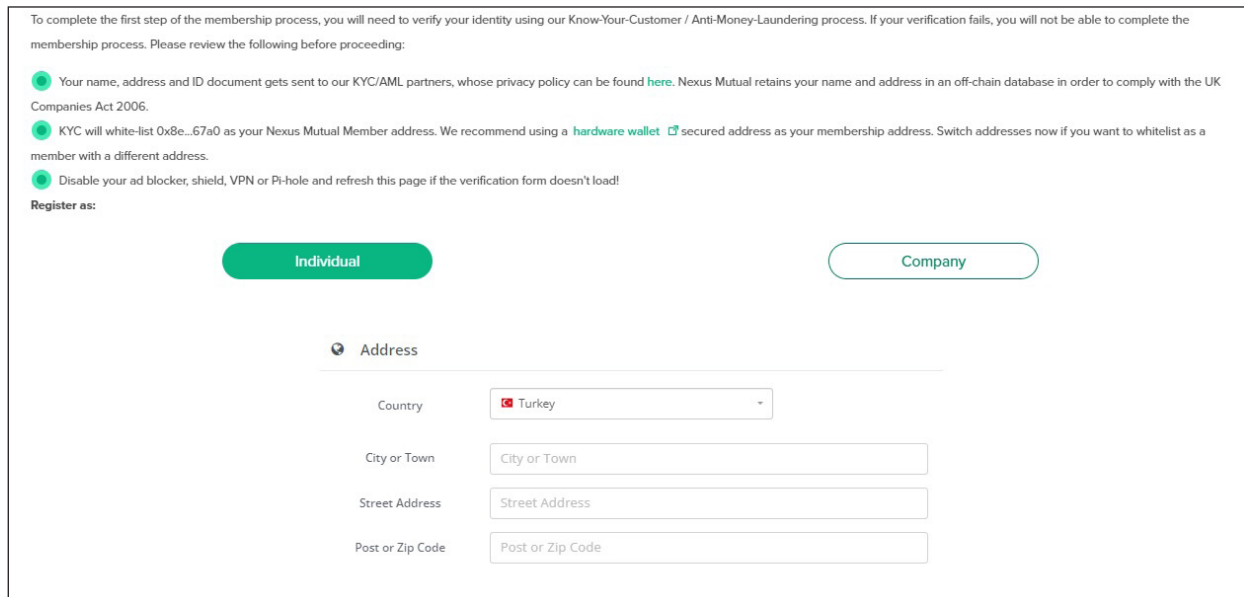
**Source:** <https://app.nexusmutual.io/cover>



**Figure 5:** Choosing an Insurance Pool

Figure 5 shows the process of selecting an insurance pool on the Nexus Mutual platform. It illustrates how users can compare different pools based on liquidity levels and pricing before proceeding with their insurance purchase.

Figure 6 illustrates the Know Your Customer (KYC) stage on the Nexus Mutual platform, where users provide personal information and complete identity verification before gaining full access to insurance services.



**Figure 6:** Nexus Mutual Know Your Customer (KYC) Step

To conduct transactions, it is necessary to have a cold or hardware wallet. Trust Wallet was used by us during the application. After connecting the wallet to the platform, the Aave V2 protocol was selected for transactions due to its lowest cost and high liquidity.

The next stage on the platform is the Know Your Customer (KYC) process, which involves providing necessary personal information and undergoing a security check that typically takes around 24 hours. After completing the security step, there is a membership fee that needs to be paid to access the platform.

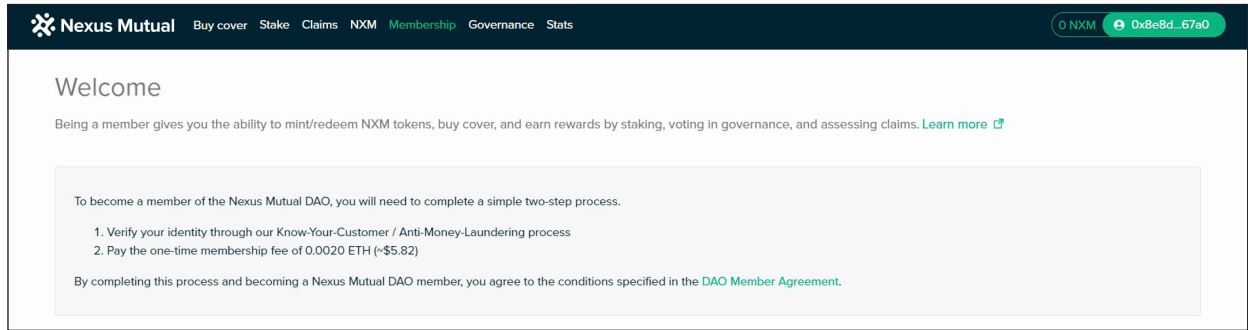


Figure 7: Nexus Mutual Membership Fee Paying Stage

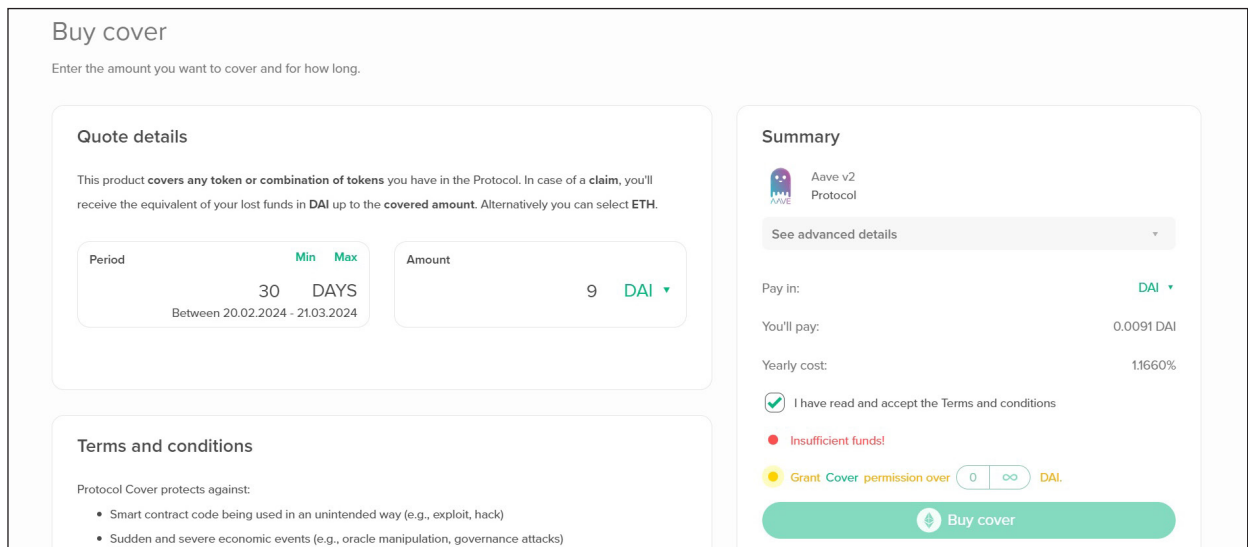


Figure 8: Terms and Conditions of the Insurance Transaction

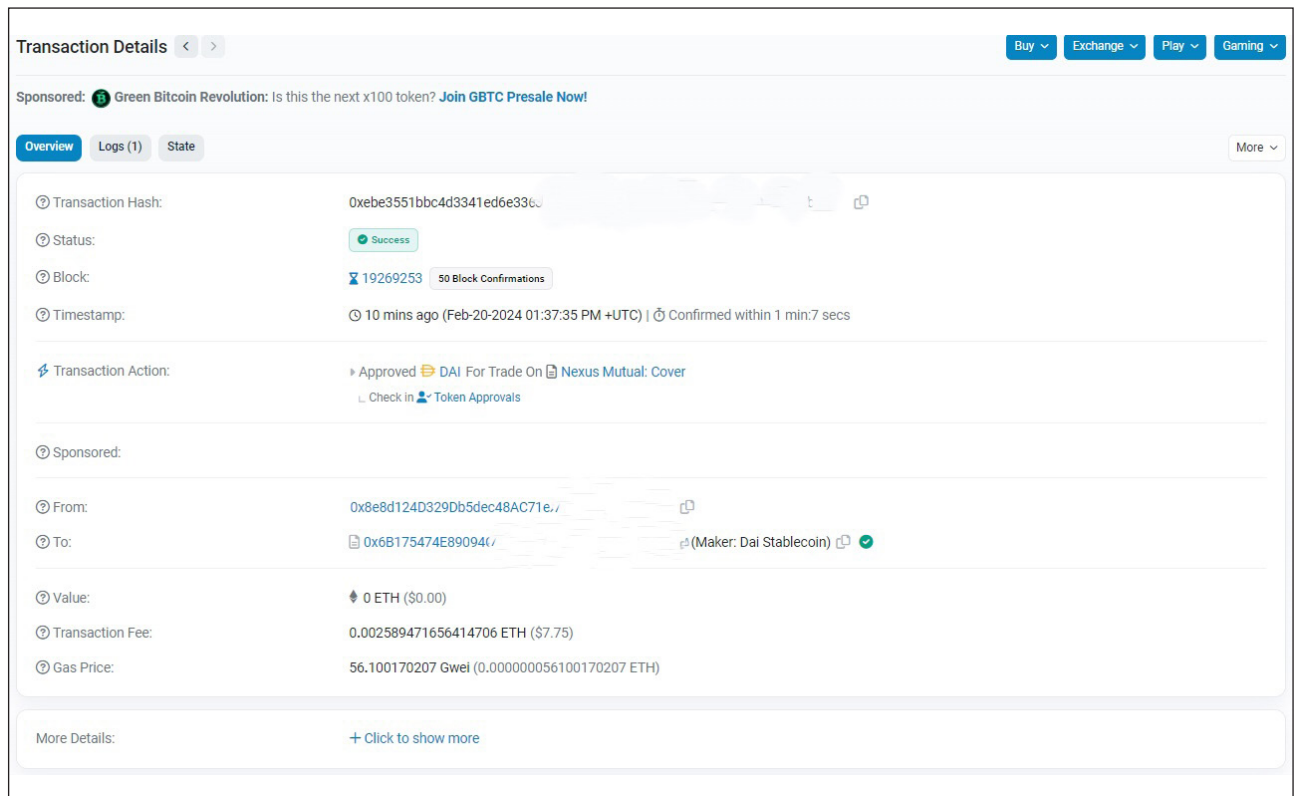


Figure 9: Records Related to the Insurance Process

Figure 7 shows the membership fee payment stage on the Nexus Mutual platform, where users complete the required payment after KYC verification to activate their membership and proceed with purchasing coverage.

After paying the membership fee, the next step is to set the slippage tolerance and then click on "BUY COVER" to submit a request to insure the DAI (Stablecoin) coins in your wallet through the Aave V2 protocol.

Figure 8 presents the terms and conditions screen for the insurance transaction on the Nexus Mutual platform, where users review and confirm the policy details before finalizing their purchase.

After submitting the request, our DAI coins are insured for a specified monthly period.

Figure 9 shows the records generated during the insurance process on the Nexus Mutual platform, providing evidence of coverage activation and transaction completion.

Figure 10 provides additional records related to the insurance process on the Nexus Mutual platform, documenting the final confirmation of coverage and associated blockchain transaction details.

## CONCLUSIONS and RECOMMENDATIONS

Decentralized finance (DeFi) insurance is still a developing field within the DeFi ecosystem. When we look at the developments in insurance services in the DeFi ecosystem, many of them resemble traditional insurance activities in the traditional finance ecosystem. By leveraging many innovative solutions brought about by technology, it is possible to elevate insurance services by combining them with blockchain technology.

In this study, insurance transactions were conducted through the Nexus Mutual platform. Since Nexus Mutual utilizes the Ethereum blockchain, transaction fees are particularly notable in the application. To insure a financial asset through Nexus Mutual, users are required to pay a membership fee to the platform. While the membership fee is 0.002 ETH, the transaction (transfer) fee during this membership process is approximately 0.009 ETH. The transaction fee alone is roughly 4 times the membership fee. Similarly, when insuring our financial asset worth 9 DAI, we encounter a transaction fee of approximately 0.0051 ETH.

Users may find it less appealing to purchase insurance due to high transaction fees on insurance platforms using the Ethereum blockchain. Therefore, some proposals have been made to provide advantages to users, address shortcomings in the ecosystem, and foster the development of insurance services.

DeFi insurance redefines traditional risk management principles within a decentralized framework, initiating a significant transformation in the insurance sector. The findings of this study indicate that Nexus Mutual possesses a strong community structure; however, its user base may remain limited due to high transaction fees.

In the future, the following strategic steps stand out:

- Adoption of blockchain networks with lower transaction costs (e.g., Layer2 solutions)
- Enhancement of investor confidence through the clarification of the regulatory framework
- Expansion of the user base through increased product diversification
- Development of incentive models to attract new users

**Ethereum Token Approval**  
Review and revoke your token approvals for any dApp. For more information, check out our Knowledge Base article.

0x8e8d124d329c

Connect to Web3 \$0.00 at risk

ERC-20 ERC-721 ERC-1155

A total of 1 Token Approvals found

Txn Hash	Last Updated (Local)	Assets	Approved Spender	Original Allowance
0xebe3551bbc4d3341...	2024-02-20 13:37:35	Dai Stablecoin	Nexus Mutual: Cover	0.009198608920534124 DAI

Show rows: 25

The Token Approvals page lists contracts that have been approved to spend an address's tokens. The at risk amount shows what is vulnerable if the contracts were hacked. Learn more about this page in our Knowledge Base.

**Figure 10:** Records Related to the Insurance Process

Firstly, insurance services could be offered on centralized cryptocurrency exchanges to protect users' assets against certain risks. Exchanges and third-party insurance providers can offer insurance products to safeguard users' funds under terms and conditions agreed upon by both parties.

Secondly, insurance platforms utilizing different blockchains instead of Ethereum could provide several advantages. Lower transaction fees are among the most significant benefits. Some alternative blockchains may offer lower transaction fees compared to Ethereum. This could result in users encountering lower costs when conducting insurance transactions. Another advantage is that Ethereum's blockchain experiences delays in transaction confirmations due to high usage. Some alternative blockchains can provide faster transaction confirmations, enabling users to execute insurance transactions more quickly.

We believe that there is a need for the development and proliferation of specialized insurance protocols in the DeFi ecosystem to address risks effectively. These protocols can offer various insurance products to protect users' assets, such as credit risk insurance and insurance for liquidity pools.

Smart contracts can automate the processing of insurance claims and distribute compensation automatically. This can streamline insurance processes, making them faster and more efficient.

Existing DeFi protocols can integrate insurance products to facilitate easy access to insurance for users. For example, a DeFi lending protocol can allow users to purchase insurance products to collateralize their debts.

Security is paramount for insurance products in the DeFi ecosystem. Therefore, efforts should be made to audit and ensure the security of smart contracts. This can instill confidence in users to purchase insurance safely.

DeFi insurance protocols and products should incentivize community participation and seek community approval. This can foster greater trust among users and encourage more active usage of the platform.

Our final recommendation concerns the use of cross-chain protocols in blockchain technology. Cross-chain protocols are utilized to facilitate effective interaction between assets across different blockchains. These protocols are designed to ensure security and compatibility when transferring assets from one blockchain to another. However, cross-chain

transactions often come with inherent risks. One such risk is the inability to recover lost assets due to an error or attack on one chain. Therefore, cross-chain protocols can collaborate with insurance protocols or establish compensation funds to mitigate risk. These funds can be used to compensate users for asset losses. For example, in the event of an error or security breach during a cross-chain transaction, these funds can be used to compensate for asset loss.

Additionally, cross-chain protocols may include insurance fees to attract users to the platform or reduce transaction costs. This enables users to encounter lower costs while transacting and can increase interest in the platform. For example, when a user conducts a cross-chain transaction, they can mitigate the risk of asset loss by paying an insurance fee, making the transaction more appealing. In this regard, by collaborating, cross-chain protocols and insurance protocols can assist users in managing their assets more securely and maximizing the benefits of cross-chain transactions. This can bring more trust and adoption to the blockchain ecosystem.

In addition to the above recommendations, several strategic considerations are crucial for shaping the future of DeFi insurance:

- **Regulatory Frameworks:** Establishing clear and adaptive regulations will be essential to enhance trust among institutional and retail investors and to ensure compliance with international standards.
- **Sustainability:** Protocols should develop resilient business models with diversified revenue streams, robust liquidity reserves, and transparent governance to survive market volatility.
- **Investor Protection:** Introducing standardized risk disclosures, independent smart contract audits, and on-chain claim verification mechanisms can strengthen investor confidence.
- **User Acquisition and Education:** Partnerships with centralized exchanges, wallet providers, and DeFi platforms, along with targeted educational initiatives, can accelerate adoption and demystify DeFi insurance for new users.

By addressing these strategic areas, DeFi insurance can transition from an emerging niche service to a mainstream financial protection mechanism, delivering lasting value to users, investors, and the broader blockchain ecosystem.

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