Collective Risk Game (EMERGIA)

A trade-off between personal gain and collective success

When the group wins, you win too. But contributing less can bring you more personal benefit. Still, if everyone does this, the group fails, and you share in the loss.

Maximum of 90,000 tokens per participant to reach the 3,000 community.

Contents

1   Introduction

This project, Collective Risk Game, is inspired by [1] and has been adapted in our implementation for deployment on the blockchain, with additional new features incorporated. The native token used in the game is called EMERGIA. The main goal of the Collective Risk Game is to examine how collective risks shape the emergence of social norms and cooperation among unfamiliar participants within a blockchain environment. Collective risk happens when a group faces a problem that only gets better if everyone works together. If most people don't cooperate, the whole group can suffer. Everyone's choices affect the group's success or failure. Pursuing self-interest can lead to positive outcomes if others are cooperating and involved.

To be implemented on the blockchain and to provide greater flexibility while incorporating new ideas, our team has added several new features beyond the original design. The main features to be implemented include running the game indefinitely on the blockchain platform rather than for a fixed period; enabling the creation of societies with different risk characteristics; allowing token burning to reduce the total token supply, reflecting the scarcity of resources in the real world; introducing a decision-making process for ending the game; managing reserve tokens within the society; and incorporating an associated reward mechanism.

This project consists of three main components. The first is the Collective Risk Game, where users can participate by contributing tokens. The second is the Data Collection section, which makes data from completed games, including contributions and outcomes, publicly available to everyone. The third component is the AI and Machine Learning section, which aims to engage researchers in these fields. Researchers can use the provided data to develop and share their predictions about future game outcomes. Token-based rewards will be distributed based on the accuracy of these predictions. These components are explained in detail in the following section.

2   Project Overview

The project consists of three core components: the Collective Risk Game, Data Collection, and AI/Machine Learning.

Project Main Components and Workflow

3 Collective Risk Game

3.1 Variables

The main variables of the game include the following:

- **Disaster Probability:** The probability that a disaster occurs when the group's total contribution does not reach the predefined threshold. Even if the group fails to contribute sufficiently, a disaster may still be avoided. This variable reflects the strictness of the society or environment regarding individual social participation. A higher disaster probability increases the likelihood of collective punishment, as the entire group is penalized in cases of insufficient contribution.

- **Threshold:** The minimum total contribution required from the group. For example, if there are 6 people in a group and each person can contribute up to 100 tokens, a threshold of 300 means each person contributes half of their tokens. Meeting or exceeding the threshold ensures that a disaster does not occur.

- **Empirical Expectation (EE):** The individual's expectation of what others will contribute, based on past observations or personal experience.

- **Normative Expectation (NE):** The belief about how much others expect the individual to contribute.

- **Personal Normative Belief (PNB):** The individual's own judgment of what constitutes an appropriate or reasonable level of contribution in the game.

- **Contribution:** The actual amount an individual decides to contribute, representing their level of involvement in the collective effort.

3.2   Game Setup at Each Round

At the beginning of each game round, each player is asked three questions corresponding to their **Empirical Expectation (EE)**, **Normative Expectation (NE)**, and **Personal Normative Belief (PNB)**. Then, the player specifies the amount they wish to contribute. The total contributions of each group are compared against the threshold, and depending on the disaster probability, the group may or may not face collective penalties.

A round ends when either:

- The number of players reaches 120 (there may be multiple rounds per day), or

- No round has finished in the past 24 hours, in which case the round ends at midnight UTC.

Players are randomly grouped into teams of six. If the total number of players is not a multiple of six, the remaining players are distributed among the existing groups so that everyone is assigned to a group. If any group ends up with more than six members, for example seven, the threshold for that group is increased proportionally:

$$\text{Threshold} = 50 \times \text{Group Size}.$$

In the initial stages, it is crucial that players are not aware of others' contribution amounts before the results of each round are revealed. Therefore, for simplicity and to provide a smooth user experience, contributions are temporarily stored centrally. As the project progresses, and prior to the launch of the EMERGIA token, a **Zero-Knowledge Proof (ZKP)** mechanism will be implemented to ensure the confidentiality of individual contributions until the results are announced.

3.3   Game Outcome

Total Contribution Reaches the Threshold: If the total contribution of a group meets or exceeds the threshold, no disaster occurs. A portion of the tokens that the user did not contribute is considered their saving. For example, if a user contributes 20 tokens, they retain a saving of 80 tokens.

Total Contribution Below the Threshold: If the total contribution of a group falls below the threshold, some or all members have accepted the risk of contributing less in pursuit of greater personal gain. In this case, a disaster does not necessarily occur. A random number $r \in [0, 1]$ is generated. If $r <$ Disaster Probability, a disaster occurs; otherwise, the group is spared.

Disaster Consequences: In the event of a disaster, all 100 tokens per user—including both the contributed and unplayed portion—are lost, meaning there is no saving for that user.

No Disaster: If no disaster occurs, the tokens contributed by each user are added to the society's treasury, while the remaining tokens (100 minus the contribution) are considered the user's saving for that round. In other words, contributing less results in more personal saving, while contributing more to support the society results in less saving.

3.4 Reward and Loss After Each Round

Disaster: Ninety percent of the tokens from the losing groups are redistributed among the members of the winning groups according to the following formula, so that those who contributed less receive more tokens. The remaining ten percent of the tokens are burned due to the damage caused to the community or environment and are permanently removed from circulation:

$$\text{Share}_i = \frac{\dfrac{1}{c_i}}{\sum_{j=1}^{n} \dfrac{1}{c_j}} \times T \tag{1}$$

No Disaster: The tokens contributed (out of 100) by individuals in the winning groups are added to the community or environmental treasury, while the remaining tokens that were not played remain in their wallets as saving. This treasury is used to determine the golden reward.

3.5 Golden Reward

Players who have played at least 30 times within 30 days are eligible for the golden reward. Their average saving is calculated, and they are prioritized based on participation, meaning those who saved more receive higher priority. The treasury tokens are then distributed among them according to the following method:
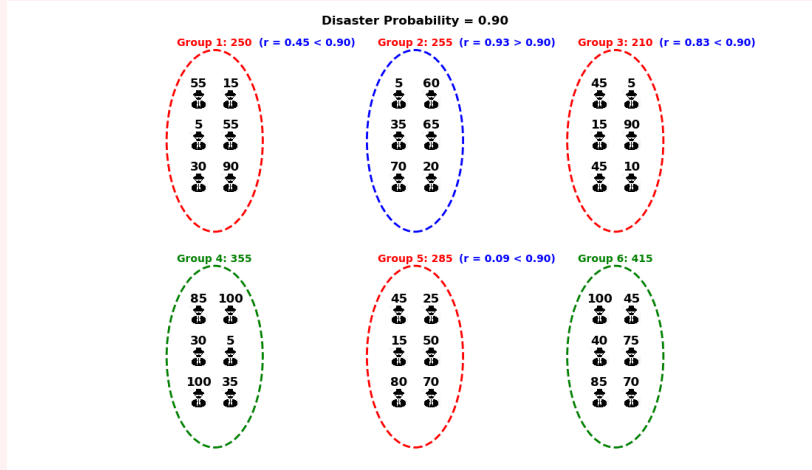
$$\text{Share}_i = T \times \frac{\omega_i}{\sum_{j=1}^{n} \omega_j}, \quad \text{where} \quad \omega_i = s_i^{\beta} \tag{2}$$

where s_i is the average saving of user i, $\beta = 5$ is the weighting exponent, T is the total tokens to distribute from the treasury, n is the number of eligible users, and Share_i is the number of tokens received by user i.
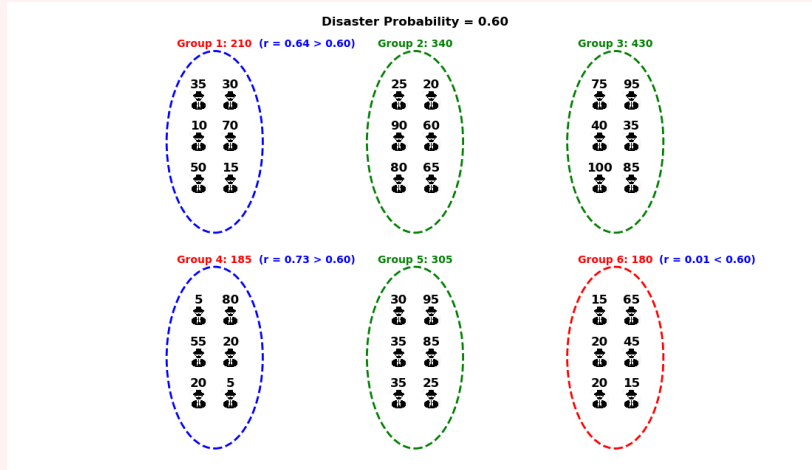
3.6 Example

In this section, we explain what happens during a game with an example. Consider two societies where the disaster probability is 0.9 for one and 0.6 for the other. Users have participated and have been divided into groups of six.

Society with disaster probability 0.9

Disaster Probability = 0.90

Group 1: 250 (r = 0.45 < 0.90)   Group 2: 255 (r = 0.93 > 0.90)   Group 3: 210 (r = 0.83 < 0.90)

Group 4: 355   Group 5: 285 (r = 0.09 < 0.90)   Group 6: 415

Society with disaster probability 0.6

Disaster Probability = 0.60

Group 1: 210 (r = 0.64 > 0.60)   Group 2: 340   Group 3: 430

Group 4: 185 (r = 0.73 > 0.60)   Group 5: 305   Group 6: 180 (r = 0.01 < 0.60)

4   Data Collection

After each round of the game, the game data is recorded, including the following fields: date, user index, wallet address, disaster probability of the society at that time (which may vary across societies), user's opinion about empirical expectation (EE), normative expectation (NE), and personal normative belief (PNB), the user's contribution amount, the contribution amounts of other members in the same group, the threshold value, the total group contributions, a random value (if total group contributions are below the threshold), and whether a disaster occurred (yes/no), etc. All data are stored in a CSV file and will be made publicly available (see roadmap). The dataset will encompass all rounds conducted up to that time.

5 AI and Machine Learning

One of the most intriguing aspects of this game is the potential for users to adapt and learn over time. As the game progresses, their behaviors, perceptions of others' actions, expectations, and understanding of what constitutes appropriate behavior may evolve. Predicting these dynamic variables is of great interest to researchers in the fields of artificial intelligence and machine learning. Accordingly, once data collection is complete, the dataset will be made publicly available. Researchers will be able to use this data to model and predict the aforementioned variables. Predictions will be evaluated based on the collective average, and participants whose forecasts are closest to the actual outcomes will be rewarded with tokens.

6 Tokenomics

A total of **900,000,000 tokens** are allocated as follows:

Token Allocation Distribution

Category	Percentage	Tokens
Presale	30%	270,000,000
Credit	30%	270,000,000
Marketing	20%	180,000,000
Reward	13%	117,000,000
Liquidity	4.5%	40,500,000
Team	2.5%	22,500,000

To reach 3,000 participants as part of our motivated community, we have limited the total number of tokens each participant can purchase to 90,000 tokens. This is enforced both via the smart contract and on the frontend.

Tokenomics Overview
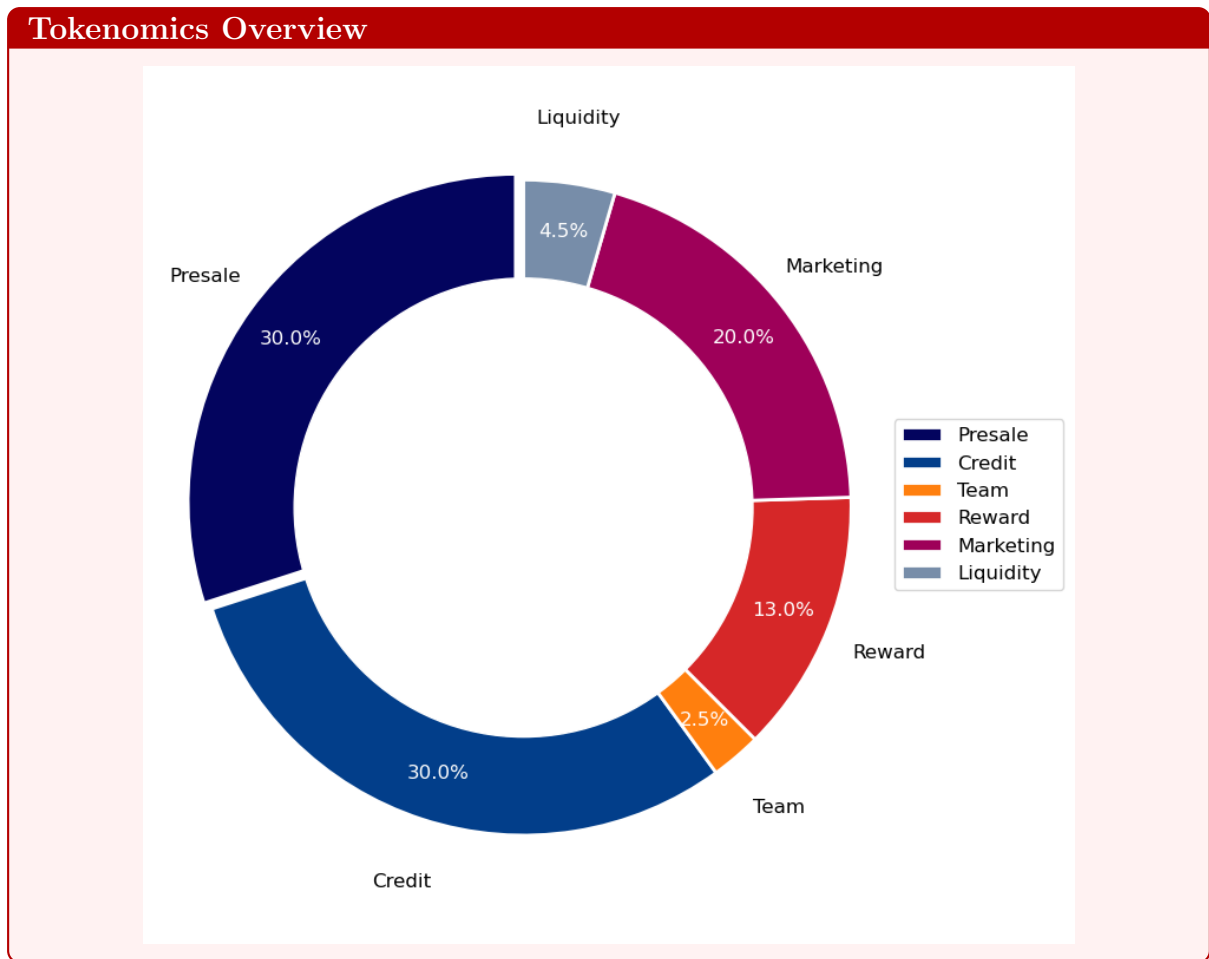
7 Presale

The presale is structured into 15 phases with gradually increasing prices. The initial price is set at \$0.0005 per token, with prices increasing progressively by approximately 20% in each subsequent phase. This dynamic pricing model ensures a total allocation of 270,000,000 tokens for the presale. The portion of the funds raised allocated to the team will be used, at the team's discretion, to support future developments, marketing efforts, liquidity injection, and team engagement in the presale as well.

Presale Token Phases

Phase	Tokens Allocated	Price (USD)
1	8,497,920	0.0005
2	9,347,712	0.0006
3	10,282,483	0.00072
4	11,310,731	0.00086
5	12,441,804	0.00103
6	13,685,985	0.00123
7	15,054,583	0.00147
8	16,560,042	0.00176
9	18,216,046	0.00211
10	20,037,650	0.00253
11	22,041,415	0.00304
12	24,245,557	0.00365
13	26,670,113	0.00438
14	29,337,124	0.00526
15	32,270,835	0.00631

8 Credit

A total of 30% of the token supply, amounting to 270,000,000 tokens, is allocated to the Credit and Reward system. This aims to incentivize active participation and engagement with our project by rewarding users who purchase tokens during the presale.

Credit tokens are awarded to participants when other participants make purchases via their referral links. However, the amount of credit tokens a participant receives cannot exceed the number of tokens they have personally purchased.

These credit tokens are intended to be used for playing the game, and any tokens remaining from game results will be tradable and purchasable after the project launch.

9 Marketing

A total of 20% (180,000,000 tokens) is allocated to marketing efforts, ensuring widespread project awareness and community growth through strategic campaigns and outreach.

10 Reward

13% (117,000,000 tokens) is considered as a reward, where any user who participates in all game processes during a period will receive a certain number of tokens as a reward. The exact amount will be determined by the team in the future and credited to the user's

account. This reward is also considered during the presale stage but will not be tradable or transferable until the project launch.

11 Liquidity

4.5% (40,500,000 tokens) is dedicated to ensuring market liquidity, providing stability and facilitating seamless token trading on exchanges.

12 Team

The team receives 2.5% (22,500,000 tokens) as recognition for their contributions, ensuring alignment with the project's success and long-term vision.

13 Roadmap

We are currently in the process of implementing the game, which will be added to our project website in January 2026 (Alpha version). At that time, users will be able to participate using their credit tokens, and any remaining credits after participation will remain available as tradable tokens. For the first version, to ensure simplicity, a smooth user experience, and the confidentiality of contributions, the system will operate on a temporary database before being deployed on the blockchain.

In February 2026, the data and AI modules will be ready for use. In March 2026, we will implement a zero-knowledge proof (ZKP) system to protect the confidentiality of played amounts, ensuring they remain hidden until the end of each game round and are fully executed on-chain (Beta version).

Additional features are also planned, such as the ability to create custom communities where the game rules are defined by the owner. This feature will be completed and added to the project by April 2026.

14 Disclaimer

This project, including all associated materials, content, activities, smart contracts, and blockchain interactions, is strictly for entertainment, educational, and experimental purposes. It aims to explore concepts related to social norms, cooperation, collective-risk scenarios, and decentralized systems.

The *Alpha version* stores data centrally for simplicity; however, all data will be made publicly available after each round decision.

The platform, tokenomics, and gameplay mechanics are intended to provide an engaging

and educational experience for participants and should not be interpreted as a financial product, investment opportunity, or any form of financial advice.

Important Notes

- **Not a Financial Investment:** Tokens used within this platform do not represent securities, shares, or any other form of financial instrument. They hold no monetary value outside the game ecosystem and should not be considered for speculation or investment purposes.

- **Smart Contract Limitations:** Smart contracts are offered without warranties of any kind. Participants acknowledge that smart contracts may contain bugs, vulnerabilities, or unforeseen issues.

- **Network Risks:** This project operates on a blockchain network that may experience congestion, transaction failures, variable gas fees, and potential downtime. Participants are responsible for these risks.

- **Wallet Security:** Participants must secure their wallets and never share private keys. The creators are not responsible for any losses due to wallet mismanagement or security breaches.

- **Game-Based Activation:** Certain tokens distributed through Credit and Reward programs are non-tradeable until participants engage in the game. Participation does not guarantee financial returns.

- **Educational and Experimental Nature:** The project emphasizes collective action, cooperation, and the emergence of social norms. Rewards are tied to meaningful participation.

- **Launch & Project Continuity:** The team reserves the right to launch the game before presale completion. If discontinued, participants will be reimbursed in USD value excluding fees.

- **Fractional Token Purchases:** Small fractional remainders may occur; these are not refunded.

- Residents or citizens of the following countries are prohibited from participating: United States, United Kingdom, France, Iran, North Korea, Cuba, Venezuela, Belarus, Myanmar, Russia, Australia and Sudan.

By participating, users acknowledge they have read, understood, and agreed to the terms outlined above. The creators are not liable for misunderstandings, misinterpretations, or misuse of information or technical issues.

References

[1] A. Szekely, F. Lipari, A. Antonioni, et al. Evidence from a long-term experiment that collective risks change social norms and promote cooperation. *Nature Communications*, 12:5452, 2021.