GAIB: A Mathematical Framework for a Rupiah-Pegged CDP Stablecoin with Volatility-Adjusted Collateralization

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Abstract

This whitepaper introduces GAIB, a stablecoin pegged to the Indonesian Rupiah (IDR) and backed by a collateralized debt position (CDP) mechanism. GAIB aims to provide a decentralized, transparent, and mathematically robust digital asset for the Indonesian market. The system utilizes mathematical models for loan-to-value ratios, fee adjustments, and a debt ceiling to maintain the peg and ensure system stability. Importantly, the Open Collateralization Rate (OCR) is dynamically adjusted based on the volatility of the collateral asset, and the liquidation bonus rate is linked to the OCR to enhance risk management. Additionally, GAIB integrates multiple oracle solutions to ensure accurate and reliable exchange rate data.

1 Introduction

The stablecoin landscape has predominantly focused on major global currencies, leaving emerging markets like Indonesia underserved. GAIB addresses this gap by introducing a stablecoin pegged to the Indonesian Rupiah (IDR), leveraging mathematical models and robust oracle integrations to ensure stability, decentralization, and resilience.

2 Need for a Decentralized Rupiah Stablecoin

2.1 Problems Addressed by GAIB

GAIB aims to tackle several key challenges within the Indonesian financial ecosystem by introducing a **decentralized Rupiah-pegged stablecoin**. Here's how GAIB addresses each identified problem:

1. **Enhancing Financial Inclusion:** By leveraging blockchain technology, GAIB provides an accessible financial instrument that can be utilized by anyone with internet access, bypassing traditional banking barriers. This democratizes access to financial services, enabling individuals and businesses to participate more fully in the economy.

2. **Ensuring Currency Stability:** Pegging GAIB to the IDR offers a stable digital asset that mitigates the volatility associated with cryptocurrencies. This provides users with a reliable medium of exchange and store of value, protecting them from the erratic price swings typical of many digital assets.

3. **Streamlining Cross-Border Transactions:** GAIB facilitates faster and more cost-effective international transfers by reducing reliance on intermediaries and minimizing transaction fees. This enhances the efficiency of remittances and international trade, benefiting both individuals and businesses engaged in cross-border activities.

4. **Building Trust through Decentralization:** By eliminating the need for centralized authorities, GAIB enhances transparency and security. All transactions are recorded on a public ledger, fostering greater trust among users and reducing the potential for fraud and manipulation.

5. **Reducing Borrowing Costs:** GAIB's CDP mechanism allows users to borrow GAIB at potentially lower interest rates compared to traditional lending systems. Decentralized platforms often have lower operational costs, enabling them to offer loans at reduced rates, making credit more accessible to a broader audience.

6. **Increasing Access to Credit:** With more flexible collateral requirements and decentralized governance, GAIB enables a broader demographic to access credit facilities. This supports entrepreneurship and small business growth by providing essential capital without the stringent requirements of traditional financial institutions.

7. **Facilitating Hedging and Trading:** GAIB provides a stable digital asset that enables users to hedge against currency and asset volatility. By offering a reliable medium of exchange, traders can take long and short positions on various assets without exposure to the volatility inherent in other cryptocurrencies or fiat currencies. This creates a more stable trading environment and allows for sophisticated financial strategies, aligning individual incentives with overall market stability.

8. **Enabling Arbitrage Opportunities:** The introduction of GAIB facilitates arbitrage between different markets, particularly between the decentralized and traditional financial systems. Traders can exploit price discrepancies between GAIB and other stablecoins or fiat currencies, enhancing market efficiency. By incentivizing arbitrageurs, GAIB ensures that its price remains closely pegged to the IDR through continuous market balancing.

9. **Providing Leverage within Safe Parameters:** GAIB's CDP mechanism allows users to borrow against their collateral, effectively providing leverage. By dynamically adjusting collateralization ratios based on asset volatility, GAIB ensures that leveraged positions are maintained within safe risk parameters, preventing systemic risk and fostering a sustainable lending ecosystem.

10. **Programmable Financial Instruments:** Utilizing smart contracts, GAIB enables the creation of programmable financial instruments that can automate complex financial operations. This reduces the need for intermediaries, lowers transaction costs, and increases the speed of financial transactions, aligning with economic principles of efficiency and reducing friction in financial markets.

2.2 Advantages of Decentralization

Choosing a decentralized approach for GAIB offers several benefits over traditional centralized financial systems:

- **Transparency:** All transactions are recorded on a public ledger, ensuring accountability and reducing the potential for fraud. Users can independently verify transactions, fostering an environment of trust and integrity.

- **Security:** Decentralized networks are inherently resistant to single points of failure, enhancing the security of user funds. The distributed nature of blockchain technology makes it difficult for malicious actors to compromise the system.

- **Censorship Resistance:** Users can transact freely without fear of arbitrary restrictions or controls imposed by centralized entities. This ensures that financial activities remain accessible and unimpeded, promoting economic freedom.

- **Global Accessibility:** GAIB can be accessed by anyone globally, promoting financial inclusion beyond geographical boundaries. This is particularly beneficial for individuals in regions with limited access to traditional banking services.

2.3 Borrowing Rates: Competitive and Flexible

One of the significant advantages of GAIB is its potential to offer **more competitive borrowing rates** compared to traditional financial systems:

- **Lower Interest Rates:** Decentralized platforms generally have lower overhead costs, allowing them to offer loans at reduced interest rates. This makes borrowing more affordable for users, encouraging responsible financial behavior and economic participation.
- **Dynamic Rate Adjustments:** GAIB's borrowing rates are dynamically adjusted based on collateral volatility and market conditions. This ensures fairness and responsiveness, allowing the system to adapt to changing economic environments and maintain stability.
- **Transparent Fee Structures:** All fees and interest rates are transparently encoded in smart contracts, eliminating hidden charges and fostering trust. Users have a clear understanding of the costs associated with borrowing, enabling informed decision-making.
- **Flexibility for Borrowers:** Users can select from various collateral types and borrowing terms, tailoring loans to their specific needs. This flexibility enhances user experience and accommodates a diverse range of financial requirements.

3 System Overview

GAIB operates on a CDP mechanism where users deposit collateral to mint GAIB tokens. Mathematical models and reliable oracle integrations govern the system's key parameters, including volatility-adjusted collateralization ratios, dynamic liquidation bonus rates, fee structures, and debt ceilings to maintain the peg and manage risks.

3.1 Key Components

- **Collateral**: Digital assets accepted as collateral, valued based on real-time exchange rates.
- **GAIB Token**: A stablecoin pegged to 1 IDR.
- **Oracles**: Provide real-time exchange rates for accurate collateral valuation.
- **Interest Rate Model**: Controlled via a debt ceiling to manage total supply.
- **Pegging Mechanism**: Adjusts borrowing fees to maintain the peg.
- **Debt Ceiling**: Sets an upper limit on the total amount of GAIB that can be minted.

3.2 Oracles

GAIB relies on a dual-oracle system to obtain accurate and reliable exchange rate data essential for collateral valuation and maintaining the peg.

3.2.1 USD/IDR Rate Oracle (Medianizer)

The USD/IDR exchange rate is sourced from a Medianizer oracle. The Medianizer aggregates data from multiple reliable sources and applies a weighted median based on the quality of each price feed to provide a robust and tamper-proof USD/IDR rate. This rate is crucial for converting collateral denominated in ASSET to its value in IDR.

Weighted Median Implementation To enhance the reliability of the USD/IDR exchange rate, GAIB employs a weighted median approach within the Medianizer oracle. Each price feed contributing to the Medianizer is assigned a weight based on its historical reliability, accuracy, and latency. The weights ensure that higher-quality price feeds have a more significant impact on the final median rate.

1. **Price Feed Quality Assessment**: Each USD/IDR price feed is evaluated based on criteria such as uptime, accuracy, and response time. A quality score Q_i is assigned to each feed i.

2. **Weight Calculation**: The weight w_i for each price feed is determined by normalizing its quality score:

$$w_i = \frac{Q_i}{\sum_{j=1}^{N} Q_j} \tag{1}$$

where N is the total number of price feeds.

3. **Weighted Median Determination**: The Medianizer sorts the USD/IDR rates from all price feeds in ascending order. It then calculates the cumulative weights and selects the rate where the cumulative weight reaches or exceeds 50%.

4. **Final Exchange Rate**: The weighted median rate is used as the official USD/IDR exchange rate for collateral valuation.

This weighted median approach mitigates the influence of outliers and ensures that the most reliable price feeds predominantly determine the exchange rate, enhancing the overall stability and security of the GAIB system.

3.2.2 ASSET/USD Rate Oracle (Chainlink)

GAIB utilizes Chainlink's decentralized oracle network to fetch the current exchange rate between the collateral asset (ASSET) and USD. Chainlink ensures that the ASSET/USD rate is secure, up-to-date, and resistant to manipulation, providing a reliable foundation for collateral valuation.

3.2.3 Exchange Rate Calculation

The collateral value in IDR is determined by combining the two exchange rates obtained from the oracles:

$$V_{\text{collateral}} = C \times \left(\frac{\text{ASSET}}{\text{IDR}}\right) = C \times \left(\frac{\text{ASSET}}{\text{USD}} \times \frac{\text{USD}}{\text{IDR}}\right) \tag{2}$$

Where:

- C is the amount of collateral deposited.
- $\frac{\text{ASSET}}{\text{USD}}$ is the exchange rate from Chainlink.
- $\frac{\text{USD}}{\text{IDR}}$ is the exchange rate from the Medianizer.

This method ensures that the collateral value is accurately reflected in IDR, enabling precise Loan-to-Value (LTV) calculations and risk assessments.

4 Mathematical Framework

4.1 Volatility-Adjusted Collateralization

The Open Collateralization Rate (OCR) depends on the volatility of the collateral asset. This approach ensures that assets with higher volatility require higher collateralization to mitigate risk.

4.1.1 Calculating Volatility

Volatility σ is measured using the standard deviation of the collateral asset's returns over a specified time window. Let r_i be the log returns over n periods:

$$r_i = \ln\left(\frac{P_i}{P_{i-1}}\right) \tag{3}$$

The volatility σ is calculated as:

$$\sigma = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(r_i - \bar{r})^2} \tag{4}$$

where $\bar{r}$ is the mean of the returns.

4.1.2 Determining OCR

$$\mathrm{OCR}(\sigma) = \mathrm{MinOCR} + (\mathrm{MaxOCR} - \mathrm{MinOCR}) \times \left(\frac{\sigma - \sigma_{\min}}{\sigma_{\max} - \sigma_{\min}}\right)^{\beta} \tag{5}$$

where:

- MinOCR: Minimum collateralization rate (e.g., 110%)
- MaxOCR: Maximum collateralization rate (e.g., 200%)
- $\sigma_{\min}$: Minimum expected volatility
- $\sigma_{\max}$: Maximum expected volatility
- β: Exponent to adjust sensitivity (e.g., $\beta = 1$ for linear)

The OCR is capped between MinOCR and MaxOCR to prevent extreme values.

4.1.3 Loan-to-Value (LTV) Ratio

The Loan-to-Value ratio is the inverse of the OCR:

$$\mathrm{LTV}(\sigma) = \frac{1}{\mathrm{OCR}(\sigma)} \tag{6}$$

A higher volatility σ results in a lower LTV, meaning users can borrow less against the same amount of collateral.

4.2 Dynamic Liquidation Bonus Rate

The liquidation bonus rate γ is adjusted based on the OCR to balance incentives between borrowers and liquidators.

4.2.1 Liquidation Bonus Rate Function

$$\gamma(\mathrm{OCR}) = \gamma_{\max} - \left(\frac{\mathrm{OCR} - \mathrm{MinOCR}}{\mathrm{MaxOCR} - \mathrm{MinOCR}}\right) \times (\gamma_{\max} - \gamma_{\min}) \tag{7}$$

where:

- $\gamma_{\min}$ is the minimum liquidation bonus rate (e.g., 5%).
- $\gamma_{\max}$ is the maximum liquidation bonus rate (e.g., 15%).
- MinOCR and MaxOCR are the minimum and maximum collateralization rates, respectively.

4.2.2 Interpretation

- **Higher OCR (Lower Risk):** When the OCR is higher, indicating lower leverage and risk, the liquidation bonus rate is lower. This reduces the penalty on borrowers in low-risk positions, making the system more attractive for responsible borrowers.
- **Lower OCR (Higher Risk):** When the OCR is lower, allowing higher leverage, the liquidation bonus rate is higher. This incentivizes liquidators to act promptly on riskier positions, ensuring the system remains stable by addressing undercollateralized loans efficiently.

4.3 Implications

- **Borrower Perspective:** A lower liquidation bonus rate reduces the penalty during liquidation, making the system more attractive for borrowers with highly collateralized positions. This encourages responsible borrowing and enhances user trust in the stability of GAIB.
- **Liquidator Perspective:** The bonus provides sufficient incentive to liquidate risky positions, especially when the OCR is low. This ensures that the system remains resilient by efficiently managing and mitigating risks associated with undercollateralized loans.
- **System Stability:** Dynamic adjustments help maintain the peg by balancing supply and demand, preventing excessive issuance or liquidation. This adaptability ensures that GAIB can respond to market fluctuations and maintain its value stability.
- **User Incentives:** Encourages responsible borrowing and collateral management, reducing the likelihood of defaults and enhancing overall system health. Users are motivated to maintain adequate collateral levels to avoid liquidation, fostering a healthy ecosystem.

4.4 Collateral Valuation

The collateral value is calculated using the latest exchange rates provided by the oracles:

$$V_{\text{collateral}} = C \times \left(\frac{\text{ASSET}}{\text{IDR}} \right) = C \times \left(\frac{\text{ASSET}}{\text{USD}} \times \frac{\text{USD}}{\text{IDR}} \right) \tag{8}$$

Where:

- C is the amount of collateral deposited.
- $\frac{\text{ASSET}}{\text{USD}}$ is the exchange rate obtained from Chainlink.
- $\frac{\text{USD}}{\text{IDR}}$ is the exchange rate obtained from the Medianizer.

This method ensures that the collateral value is accurately reflected in IDR, enabling precise Loan-to-Value (LTV) calculations and risk assessments.

4.5 Debt Ceiling Mechanism

To control the total supply of GAIB and maintain the peg, a debt ceiling $D_{\max}$ is established.

4.5.1 Total Debt Constraint

$$B_{\text{total}} \leq D_{\max} \tag{9}$$

where:

- B_{total} is the total borrowed amount in the system.
- $D_{\max}$ is the maximum allowable debt (debt ceiling).

4.5.2 Debt Ceiling Adjustment

Governance mechanisms adjust the debt ceiling in response to market conditions. Adjustments are made cautiously to prevent abrupt changes in supply, ensuring system stability and responsiveness to demand.

To maintain the peg of 1 GAIB = 1 IDR with a maximum deviation of ±5%, the system adjusts the borrowing opening fee based on the deviation ΔP:

$$\Delta P = P_{\text{GAIB}} - P_{\text{peg}} \tag{10}$$

$$\text{Borrowing Fee} = \beta \times f(\Delta P) \tag{11}$$

where β ranges from 0.5% (minimum) to 5% (maximum), and price deviation is capped at ±5% of peg value.

4.6 Dynamic Borrowing Fee Function

$$f(\Delta P) = \begin{cases} 1 + \alpha \times \left(\frac{|\Delta P|}{P_{\text{peg}}}\right) & \text{if } P_{\text{GAIB}} < P_{\text{peg}} \\ 1 - \alpha \times \left(\frac{|\Delta P|}{P_{\text{peg}}}\right) & \text{if } P_{\text{GAIB}} > P_{\text{peg}} \end{cases} \tag{12}$$

where $\alpha = 9$ (increased from 4.5 to provide stronger price correction near the boundaries).

4.7 Example Calculations

4.7.1 Scenario 1: GAIB Trading at Lower Bound

- **Assumptions:**
  - Current Price of GAIB, $P_{\text{GAIB}} = 0.95$ IDR
  - Peg Price, $P_{\text{peg}} = 1$ IDR
  - Sensitivity Coefficient, $\alpha = 9$
  - Base Borrowing Fee, $\beta = 0.5\%$
- **Calculation:**

$$\Delta P = 0.95 \text{ IDR} - 1 \text{ IDR} = -0.05 \text{ IDR} \tag{13}$$

Since $P_{\text{GAIB}} < P_{\text{peg}}$:

$$f(\Delta P) = 1 + 9 \times \left(\frac{0.05}{1}\right) = 1 + 9 \times 0.05 = 1 + 0.45 = 1.45 \tag{14}$$

$$\text{Borrowing Fee} = 0.5\% \times 1.45 = 5\% \tag{15}$$

4.7.2 Scenario 2: GAIB Trading at Upper Bound

- **Assumptions:**
  - Current Price of GAIB, $P_{\text{GAIB}} = 1.05$ IDR
  - Peg Price, $P_{\text{peg}} = 1$ IDR
  - Sensitivity Coefficient, $\alpha = 9$
  - Base Borrowing Fee, $\beta = 0.5\%$
- **Calculation:**

$$\Delta P = 1.05 \text{ IDR} - 1 \text{ IDR} = 0.05 \text{ IDR} \tag{16}$$

Since $P_{\text{GAIB}} > P_{\text{peg}}$:

$$f(\Delta P) = 1 - 9 \times \left(\frac{0.05}{1}\right) = 1 - 9 \times 0.05 = 1 - 0.45 = 0.55 \tag{17}$$

$$\text{Borrowing Fee} = 0.5\% \times 0.55 = 0.275\% \tag{18}$$

4.8 System Safeguards

4.8.1 Price Deviation Limits

- Maximum allowed deviation: ±5% from peg
- If $P_{\text{GAIB}} < 0.95$ IDR: System enforces maximum borrowing fee (5%)
- If $P_{\text{GAIB}} > 1.05$ IDR: System enforces minimum borrowing fee (0.5%)

4.8.2 Fee Boundaries

- Minimum borrowing fee: 0.5%
- Maximum borrowing fee: 5%
- The system will cap fees at these boundaries regardless of calculated values

4.8.3 Implications of the Pegging Mechanism

The pegging mechanism ensures that GAIB maintains its stability relative to the IDR by dynamically adjusting borrowing fees based on market conditions. This approach aligns with economic and game-theoretic principles by:

- **Market Incentives:** Adjusting borrowing fees creates incentives for users to either increase or decrease their borrowing activities, thereby influencing the supply of GAIB in response to price deviations.
- **Supply-Demand Balance:** By making borrowing more or less attractive, the system can effectively manage the supply of GAIB, helping to stabilize its price.
- **Economic Efficiency:** The sensitivity of the borrowing fee (α) ensures that the system responds proportionally to the degree of price deviation, maintaining economic efficiency without overreacting to minor fluctuations.
- **Risk Management:** The mechanism mitigates risks associated with significant price deviations, safeguarding both the stability of GAIB and the interests of its users.

4.9 Solvency Condition

A user remains solvent if:

$$V_{\text{collateral}} \times \text{LTV}(\sigma) \geq B \tag{19}$$

where:

- $V_{\text{collateral}}$ is the value of the collateral in IDR.
- $\text{LTV}(\sigma)$ is the Loan-to-Value ratio based on the collateral's volatility.
- B is the borrowed amount.

5 Liquidation Mechanism

5.1 Liquidation Condition

A position becomes eligible for liquidation when:

$$V_{\text{collateral}} \times \text{LTV}(\sigma) < B \tag{20}$$

5.2 Liquidation Process

During liquidation:

- The liquidator repays a portion or all of the user's debt B_{liq}.
- The liquidator receives collateral C_{liq} calculated as:

$$C_{\text{liq}} = B_{\text{liq}} \times \frac{1}{E} \times (1 + \gamma(\text{OCR})) \tag{21}$$

where:

- E is the combined exchange rate $\frac{\text{ASSET}}{\text{IDR}}$.
- $\gamma(\text{OCR})$ is the dynamic liquidation bonus rate based on the OCR.

6 Risk Parameters and Constants

Parameter	**Symbol**	**Value**
Minimum Collateralization Rate	MinOCR	110%
Maximum Collateralization Rate	MaxOCR	200%
Minimum Expected Volatility	σ_{min}	Variable
Maximum Expected Volatility	σ_{max}	Variable
Fee Sensitivity Coefficient	α	Variable
Minimum Liquidation Bonus Rate	γ_{min}	5%
Maximum Liquidation Bonus Rate	γ_{max}	15%
Debt Ceiling	D_{max}	Variable

Table 1: Risk Parameters and Constants

7 Dynamic Liquidation Bonus Model

7.1 Example Calculation

Assuming:

- $\text{MinOCR} = 110\%$
- $\text{MaxOCR} = 200\%$
- $\gamma_{\text{min}} = 5\%$
- $\gamma_{\text{max}} = 15\%$
- Current $\text{OCR} = 155\%$

Calculating $\gamma(\text{OCR})$:

$$\gamma(155\%) = 15\% - \left(\frac{155\% - 110\%}{200\% - 110\%}\right) \times (15\% - 5\%) = 10\% \tag{22}$$

7.2 Implications

- **Borrower Perspective:** A lower liquidation bonus rate reduces the penalty during liquidation, making the system more attractive for borrowers with highly collateralized positions. This encourages responsible borrowing and enhances user trust in the stability of GAIB.
- **Liquidator Perspective:** The bonus provides sufficient incentive to liquidate risky positions, especially when the OCR is low. This ensures that the system remains resilient by efficiently managing and mitigating risks associated with undercollateralized loans.
- **System Stability:** Dynamic adjustments help maintain the peg by balancing supply and demand, preventing excessive issuance or liquidation. This adaptability ensures that GAIB can respond to market fluctuations and maintain its value stability.
- **User Incentives:** Encourages responsible borrowing and collateral management, reducing the likelihood of defaults and enhancing overall system health. Users are motivated to maintain adequate collateral levels to avoid liquidation, fostering a healthy ecosystem.

8 Stability Analysis

8.1 Equilibrium Conditions

The system reaches equilibrium when:

$$P_{\text{GAIB}} = P_{\text{peg}}, \quad B_{\text{total}} \leq D_{\max} \tag{23}$$

and the OCR accurately reflects the collateral's volatility.

8.2 Response to Volatility Changes

8.2.1 Increasing Volatility

If the collateral asset's volatility increases, the OCR rises, reducing the LTV and potentially requiring users to deposit more collateral or repay part of their debt to remain solvent.

8.2.2 Decreasing Volatility

Conversely, if volatility decreases, the OCR lowers, allowing users to borrow more against their collateral.

9 Risk Management

9.1 Real-Time Volatility Updates

The system periodically recalculates volatility σ to adjust the OCR. A smoothing factor or rolling window is used to prevent abrupt changes, ensuring stability and reducing the likelihood of sudden collateralization requirement spikes.

9.2 Oracle Reliability

GAIB employs a grace period to handle oracle downtime, ensuring that the system remains secure and prevents manipulation during periods of unreliable data.

$$t_{\text{grace}} = t_{\text{current}} - t_{\text{last\_update}} \tag{24}$$

Operations pause if $t_{\text{grace}} > T_{\max}$, where $T_{\max}$ is the maximum allowable delay for oracle updates.

Weighted Median Price Feed Implementation To further enhance the reliability and accuracy of the USD/IDR exchange rate provided by the Medianizer oracle, GAIB implements a weighted median approach. This method assigns weights to each price feed based on predefined quality metrics, ensuring that more reliable and accurate feeds have a greater influence on the final exchange rate calculation.

1. **Quality Metrics**: Each USD/IDR price feed is evaluated based on criteria such as historical accuracy, response time, and uptime. A quality score Q_i is assigned to each feed i.

2. **Weight Assignment**: The weight w_i for each price feed is calculated by normalizing its quality score:

$$w_i = \frac{Q_i}{\sum_{j=1}^{N} Q_j} \tag{25}$$

   where N is the total number of price feeds.

3. **Weighted Median Calculation**: The Medianizer sorts the USD/IDR rates from all price feeds in ascending order. It then computes the cumulative weights and selects the rate at which the cumulative weight reaches or exceeds 50%.

4. **Final Exchange Rate**: The selected weighted median rate is used as the official USD/IDR exchange rate for collateral valuation.

This weighted median approach mitigates the impact of outliers and ensures that the most reliable price feeds predominantly determine the exchange rate, enhancing the overall stability and security of the GAIB system.

9.3 Debt Ceiling Governance

Adjustments to $D_{\max}$ are made via a decentralized governance process, ensuring that no single entity can unilaterally alter critical system parameters. This mechanism allows the community to respond to changing market conditions and demand for GAIB in a transparent and democratic manner.

10 Conclusion

GAIB provides a mathematically robust framework for a Rupiah-pegged stablecoin, utilizing volatility-adjusted collateralization and a dynamic liquidation bonus rate to enhance risk management. By integrating reliable oracle solutions to obtain accurate exchange rates and adjusting key parameters based on collateral volatility, GAIB ensures system stability and encourages responsible participation. This approach fosters financial inclusion and innovation in the Indonesian market, offering a secure and stable digital asset tailored to the needs of emerging economies.

11 Glossary

GAIB GAIB is the name of the Rupiah-pegged stablecoin introduced in this whitepaper.

CDP Collateralized Debt Position, a mechanism where users deposit collateral to mint stablecoins.

OCR Open Collateralization Rate, a dynamically adjusted collateralization ratio based on asset volatility.

LTV Loan-to-Value ratio, the inverse of OCR, representing the maximum amount a user can borrow against their collateral.

Chainlink A decentralized oracle network used to fetch real-time exchange rates.

Medianizer An oracle mechanism that aggregates multiple price feeds to provide a reliable exchange rate.

σ Volatility of the collateral asset.

α Fee Sensitivity Coefficient determining the sensitivity of borrowing fees to price deviations.

γ Liquidation Bonus Rate, incentivizing liquidators based on OCR.

$D_{\mathbf{max}}$ Debt Ceiling, the maximum allowable debt in the system.