The STAB Protocol

Proposing a new stability paradigm

octopus

2024-08-16

Abstract

The STAB protocol introduces a novel approach to stablecoin design, leveraging a variable peg mechanism governed by an algorithmically determined interest rate. This innovative framework addresses the limitations of traditional collateralized debt positions (CDPs) and fixed-peg stablecoins by offering a dynamic and self-regulating solution to price stability. Utilizing principles from control theory, specifically the Proportional-Integral-Derivative (PID) controller, STAB maintains its target price by algorithmically adjusting interest rates in response to market deviations. Complemented by additional stability measures such as redemption functionality and forced minting, the protocol is designed to handle various market conditions effectively. The whitepaper explores STAB's advantages, including its flexibility, the ability to use LSUs as collateral, and its wide range of potential applications, from decentralized finance (DeFi) collateral to Portfolio diversification. It also addresses the associated risks, such as smart contract vulnerabilities and oracle failures. STAB represents a significant advancement in stablecoin technology, and finally poses the question: why should a stablecoin be 1:1 pegged?

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1 Introduction

Money has long been a cornerstone of human society, enabling coordination, trade, and growth across civilizations. Traditionally, the power to control the money supply has rested with central authorities, who have shaped economies through policies often opaque to the public. However, the rise of decentralized finance (DeFi) offers a new paradigm—one where financial instruments operate on transparent, permissionless platforms, accessible to anyone with an internet connection. Stablecoins have emerged as essential tools within this decentralized landscape, providing the stability needed for everyday transactions and complex financial operations alike. Yet, the current approaches to maintaining stability, particularly through collateralized debt positions (CDPs), face significant challenges. These systems struggle to balance the forces of supply and demand, especially during periods of market volatility, leading to the very instability they were designed to prevent.

In this paper, we introduce the STAB protocol — a new approach to stablecoins that challenges conventional wisdom. STAB employs a variable peg, governed by an interest rate that dynamically adjusts to market conditions. This innovative design aims to create a more resilient and adaptable stablecoin, capable of maintaining stability even in the face of market turbulence. By rethinking the very foundation of what it means to be stable, STAB sets the stage for a new generation of decentralized financial systems.

2 Contemporary stablecoins

The advent of stablecoins has played a transformative role in decentralized finance, offering a much-needed bridge between the volatility inherent in cryptocurrencies and the stability required for practical, everyday use. Among the foundational mechanisms for creating these stable assets is the CDP (Collateralized Debt Position), a structure that allows users to lock up assets as collateral in order to mint stablecoins. One of the pioneering implementations of this approach is DAI (Maker, 2017), a decentralized stablecoin operating on the Ethereum blockchain.

In the DAI system, users deposit Ether (ETH) or other accepted assets into a smart contract, which then issues DAI tokens against this collateral. The system is designed to be over-collateralized, meaning the value of the collateral exceeds the value of the stablecoins minted. This over-collateralization provides a buffer against market volatility, helping to maintain DAI's peg to the US dollar.

To ensure system stability, if the value of the collateral falls below a certain threshold, a process known as Liquidation can take place. During liquidation, a portion of the collateral is sold off to repay the outstanding debt, ensuring that the stablecoin remains fully backed and the protocol remains solvent.

However, the CDP model is not without its challenges. It assumes that supply and demand will naturally stabilize the stablecoin's value at its target peg, but real-world market conditions often deviate from this ideal. When market forces push the stablecoin away from its peg, the system's vulnerabilities become apparent.

During bull markets, when asset prices are high and the demand for stablecoins is low, maintaining the peg can be difficult. With fewer users wanting to hold stablecoins, the stablecoin's value may fall below its target. To address this, some systems, like Liquity, have implemented a redemption mechanism. In Liquity's model, users can pay off the debt of the least collateralized CDP, receiving collateral in return that is worth slightly less than the debt they cover. This mechanism creates a powerful arbitrage opportunity: as long as the stablecoin's market price falls below this threshold, there is effectively infinite demand to buy the stablecoin and redeem it for collateral, which helps to stabilize the lower peg. However, this method also reduces effective liquidity, as it incentivizes users to redeem rather than hold or trade the stablecoin.

Conversely, in bear markets, demand for stablecoins increases as investors seek stability (see Harper, 2020 for example), but this can lead to the stablecoin's value exceeding its peg. The CDP model struggles in such scenarios because the risks associated with locking up more collateral to mint additional stablecoins become pronounced. Although the price of the stablecoin won't surpass the price set by the minimum collateralization ratio, the upward deviation from the peg is problematic. DAI addressed this by incorporating centralized assets like USDC as collateral, which, while effective, compromises the decentralized nature of the system.

These examples highlight the limitations of the CDP-based approach to stablecoin design. The reliance on collateralization and market interventions to maintain the peg exposes the system to inefficiencies and risks, particularly under extreme market conditions. The need for a more adaptable and resilient solution is evident—one that can maintain stability without sacrificing decentralization or liquidity.

3 STAB's paradigm shift: variable peg

To address the challenges inherent in contemporary stablecoin designs, we propose a paradigm shift centered around a variable peg. Instead of rigidly adhering to a fixed exchange rate with fiat currency, this approach utilizes an adaptive target price governed by an algorithmically determined interest rate. This interest rate, crucially, serves as the primary lever to influence market dynamics, guiding the stablecoin's price back to its desired range.

The core idea behind this mechanism is straightforward: the interest rate directly affects the cost of borrowing and holding the stablecoin, which in turn influences its supply and demand in the market. When the stablecoin's market price deviates from the target price—whether above or below—the interest rate adjusts to create economic incentives that drive the price back toward equilibrium.

When the stablecoin's market price rises above the target price, indicating a surplus in demand or a shortage of supply, the system responds by decreasing the interest rate. For borrowers, the cost of maintaining debt in the stablecoin becomes progressively lower as the interest rate decreases, incentivizing more borrowing. A negative interest rate can even result in debts diminishing over time, effectively rewarding borrowers for holding their positions. Conversely, it becomes more expensive over time to hold the stablecoin. Incentivizing borrowing and disincentivizing holding leads to an increase in STAB supply, and a decrease in STAB demand, pushing the market price back to the target price.

On the other hand, when the market price of the stablecoin falls below the target price, the system increases the interest rate. In this scenario, the cost of borrowing increases, making this less attractive, reducing the STAB supply. Furthermore, holding STAB becomes more attractive, which increases demand.

Important in both of these examples is to understand that it is assumed borrowers sell their STAB on the open market after borrowing it, in turn increasing STAB's supply. A borrower could of course also hold their borrowed STAB, but this would be a net-zero action: it is not interesting for the borrower, and more importantly, it does not influence STAB's supply and demand.

This dynamic interplay between the interest rate and the stablecoin's market price is what makes the variable peg so effective. It allows the stablecoin to self-correct without the need for external intervention, maintaining stability in a decentralized and algorithmically governed manner. RAI (Ionescu and Soleimani, 2020), a precursor to our design, has demonstrated the viability of this approach. However, while RAI successfully introduced the concept of a variable peg, it faced certain limitations. RAI does not support the use of liquid staking units (LSUs) as collateral, and its detachment from a 1:1 peg to the U.S. dollar has been met with resistance by users who prefer the familiarity of traditional stablecoins.

STAB addresses these challenges by incorporating an intuitive interest rate mechanism that is easy for users to understand and interact with. Moreover, STAB expands collateral options to include LSUs, broadening its utility within the decentralized finance ecosystem. While STAB may not be 1:1 pegged to the U.S. dollar, this detachment is not necessarily a flaw. In fact, it prompts us to question why a decentralized, DLT-based currency should mimic its real-world counterpart so closely. Perhaps, with STAB, we can set in motion a paradigm shift that redefines what stability means in the context of decentralized finance.

4 Monetary policy mechanism

4.1 Control theory

Imagine driving a car on a highway with the goal of maintaining a specific speed. As you drive, you notice that you're going faster than intended, so you ease off the gas. But now you're slowing down too much, so you gently press the accelerator again. Through these repeated adjustments, you eventually settle into a stable speed that matches your target. This continuous process of making small corrections based on real-time feedback is a simple example of control theory in action.

Control theory is a field of engineering and mathematics that deals with the behavior of dynamic systems and how to influence them to achieve desired outcomes. This concept is pervasive in many areas of technology and everyday life. For instance, a thermostat controlling the temperature of a room operates on similar principles: it constantly measures the room's temperature and adjusts the heating or cooling to maintain the desired set point. Similarly, cruise control in a car uses feedback from the vehicle's speed to adjust the throttle, keeping the car moving at a constant speed even when road conditions change.

At the heart of many control systems is the Proportional-Integral-Derivative (PID) controller (see figure 1), one of the most widely used algorithmic controllers in various industries. The PID-controller works by continuously calculating an error value as the difference between a desired setpoint (the target) and a measured process variable (the current state). The controller then applies a corrective action based on three terms:

1. **Proportional (P):** The controller reacts proportionally to the current error. If the system is far from the target, it applies a large correction; if it's close, the correction is smaller.

2. **Integral (I):** The controller also considers the accumulation of past errors. If a small error persists over time, the integral term increases, applying more force to bring the system to the target.

3. **Derivative (D):** Finally, the controller looks at the rate of change of the error. If the error is changing quickly, the derivative term moderates the correction to avoid overshooting the target.

These three terms are combined to determine the controller's output, which adjusts the system in real-time. In formulaic terms:

$$\text{Contr. Output} = K_p \cdot \text{Proportional Term} + K_i \cdot \text{Integral Term} + K_d \cdot \text{Derivative Term} \quad (1)$$

Where K_p, K_i, K_d are constants that determine the weight of each term in the overall control effort.

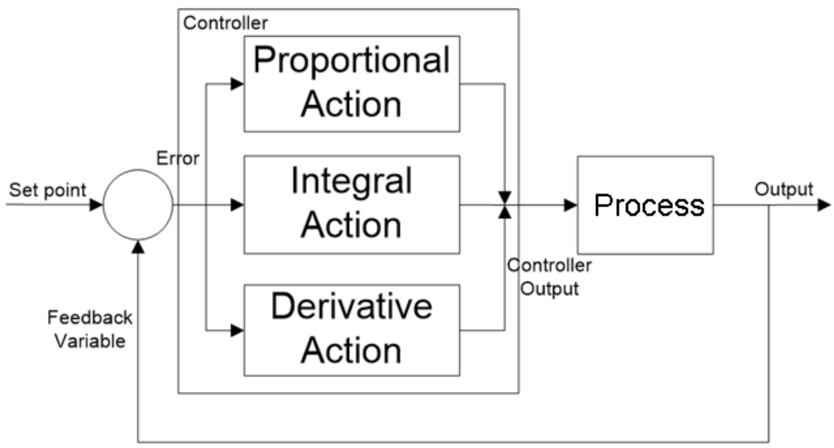

Figure 1: A schematic overview of a PID-controller in action.

4.2 Controlling the market price

In STAB's context, the desired setpoint is STAB's target price, and the measured process variable is the current STAB market price. As long as we have a way to influence the market price, a PID-controller can be used to stabilize the process variable (market price), and effectively peg STAB to its target price. In the previous section, we have seen that there indeed exists a way to alter STAB's market price: the interest rate.

To use a PID-controller to influence STAB's market price, the three terms from equation 1 must be calculated. Currently, they are calculated as such:

$$\text{Proportional Term} = \frac{\text{Market Price} - \text{Target Price}}{\text{Target Price}} \tag{2}$$

$$\text{Integral Term} = \int_{t_{now-49}}^{t_{now}} \frac{1}{50} \frac{\text{Market Price(t)} - \text{Target Price(t)}}{\text{Target Price(t)}} \, dt \tag{3}$$

$$\text{Derivative Term} = \frac{d(\text{Market Price})}{dt} \tag{4}$$

Combined with equation 1, the calculated values in equations 2, 3, 4 and properly chosen K_p, K_i, K_d result in an output that can be used to influence the interest rate, in turn stabalizing the market price of STAB. The following sub-sections should make clear why this works in practice.

4.2.1 Correcting a depeg upwards

Suppose the market price of STAB rises above its target (upwards depeg). This situation indicates a high demand or reduced supply. To counteract this, the controller decreases the interest rate. As the interest rate falls, it becomes more attractive to mint (borrow) new STAB, as the debt associated with borrowing STAB accrues interest more slowly (or in case of negative interest rate, even falls in value). This encourages borrowing, increasing the supply of STAB in the market. As the supply increases, the market price of STAB is pressured downward, moving it closer to the target.

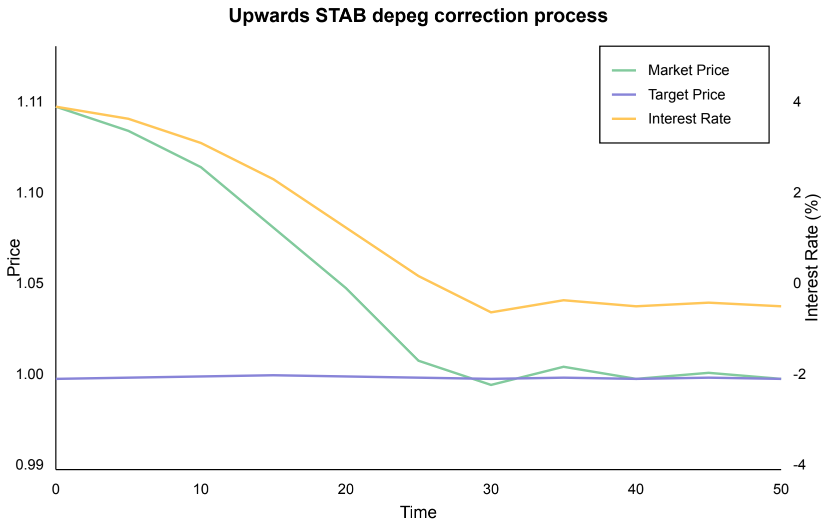

Figure 2: Correcting a hypothetical upwards depeg by altering the interest rate.

4.2.2 Correcting a depeg downwards

Conversely, if the market price of STAB falls below its target, the controller increases the interest rate. This increase makes borrowing less attractive, encouraging users to pay off their loans. As demand for STAB increases, the market price is pushed back up toward the target.

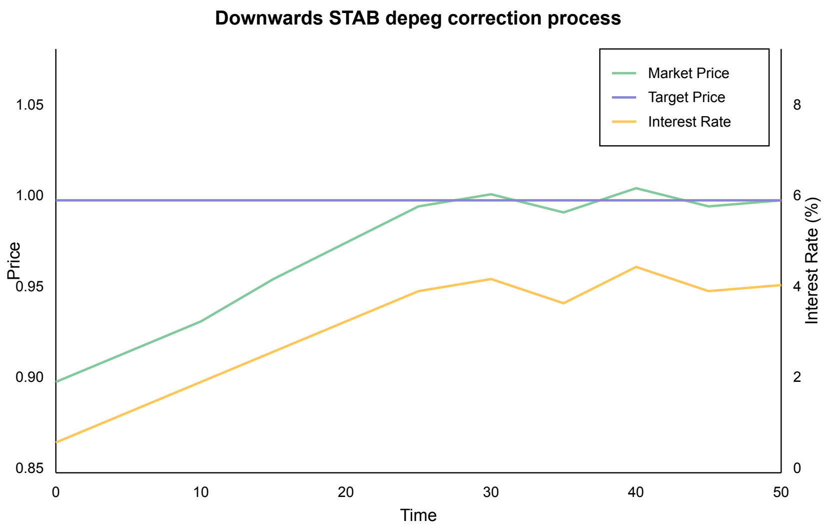

Figure 3: Correcting a hypothetical downwards depeg by altering the interest rate.

4.3 Conclusion

The interest rate mechanism within the STAB protocol is a pivotal innovation. It provides a flexible framework for achieving stability without requiring manual intervention. By leveraging the principles of control theory, STAB ensures that its monetary policy is dynamic and responsive, capable of maintaining equilibrium in a constantly shifting market environment. This approach distinguishes STAB from other stablecoins, offering a robust and adaptive solution to the challenges of decentralized finance.

5 Extra stability measures

While the STAB protocol's primary mechanism for maintaining stability relies on its algorithmically controlled interest rate, additional measures are integrated to further enhance the system's resilience. These measures provide essential safeguards that help maintain the stablecoin's peg in extreme market conditions where the primary interest rate mechanism might face challenges. Two key features in this regard are the Redemption Mechanism and the Forced Minting Mechanism.

5.1 Redemption Mechanism

The Redemption Functionality in the STAB protocol is inspired by the system used in Liquity (Lauko and Pardoe, 2021). It provides a robust mechanism to help maintain the lower peg of the stablecoin, especially during periods of low demand or excessive supply.

In this system, any user can forcibly liquidate the Collateralized Debt Position (CDP) with the lowest collateralization ratio. To do this, the user pays off the debt associated with the CDP, and in return, they receive a portion of the collateral that is worth $100-n\%$ of the paid-off debt. This discount, denoted by a constant n, makes the liquidation process attractive to potential arbitrageurs, who can profit from the difference between the debt value and the collateral received, but ensures that redemption is not profitable when STAB is tightly pegged.

The result of this mechanism is twofold:

1. **Downwards depeg protection:** The redemption mechanism creates a hard lower bound for STAB to trade at.
2. **Reduction of protocol risk:** By removing the least collateralized positions from the system, the overall risk of the protocol is reduced.

5.2 Forced Minting Mechanism

In addition to redemption, the STAB protocol includes a Forced Minting Functionality designed to address situations where the stablecoin is significantly above its target price due to high demand. This mechanism helps to increase the supply of STAB and bring its market price back down to the peg.

Through this functionality, users are allowed to forcibly mint new STAB from the CDP with the highest collateralization ratio. The user must provide additional collateral worth $100+n\%$ of the value of the newly minted STAB, where n is a constant set by the protocol to ensure the minting process remains economically attractive, but not attractive when STAB is tightly pegged. By minting additional STAB, the overall supply in the market increases, which helps to alleviate upward pressure on the price.

5.3 Integration

The integration of these additional stability measures with the core interest rate mechanism creates a multifaceted approach to maintaining the STAB peg. While the PID-controlled interest rate dynamically adjusts to real-time market conditions, the Redemption and Forced Minting functionalities provide powerful tools to correct extreme deviations. These measures ensure that the STAB protocol remains resilient across various market scenarios, from sudden demand shocks to prolonged periods of low market activity. By empowering users to actively participate in maintaining stability, STAB not only secures its value but also fosters a more decentralized and robust ecosystem.

6 Addressable markets

The STAB protocol introduces a stablecoin with unique properties, making it suitable for a wide range of applications in the decentralized finance (DeFi) ecosystem. Its innovative approach to stability, utilizing a variable peg and algorithmically controlled interest rate, positions it to address several critical needs in the market.

6.1 Collateral in other protocols

One of the primary use cases for STAB is as collateral in other DeFi protocols. Due to its stability, STAB can serve as a reliable asset for backing various financial products, including synthetic assets, lending platforms, and derivatives. In these scenarios, STAB's predictable value and robust stabilization mechanisms make it an attractive choice for users seeking to minimize risks associated with collateral volatility.

Given the proliferation of DeFi protocols, there is a significant demand for stable and reliable collateral. STAB's unique properties, particularly its ability to maintain stability without relying on centralized assets, make it particularly suited for this role. By avoiding centralized collateral like USDC, STAB aligns with the ethos of decentralization, which is increasingly valued in the DeFi community.

6.2 Portfolio diversification

Investors and users in the cryptocurrency space often seek to diversify their portfolios to mitigate risks associated with market volatility. STAB offers a novel option for diversification, combining the benefits of a stable asset with the potential for decentralized finance yields. Unlike traditional stablecoins, which are typically pegged to fiat currencies like the USD, STAB's variable peg provides an opportunity for users to hold a stable asset that is not directly tied to traditional financial systems.

This aspect of STAB is particularly appealing to those looking to diversify away from assets that may be subject to regulatory risks or centralization concerns. Additionally, STAB can serve as a hedge within a broader cryptocurrency portfolio, offering stability in times of market turbulence.

6.3 Integration with cross-chain ecosystems

As the DeFi landscape continues to evolve, cross-chain interoperability is becoming increasingly important. STAB's decentralized nature and robust stability mechanisms make it an ideal candidate for integration into cross-chain ecosystems. By providing a stable asset that can be used across different DLTs, STAB can facilitate more seamless and efficient decentralized finance operations.

For example, STAB could be utilized in cross-chain lending and borrowing platforms, decentralized exchanges, and yield farming protocols that span multiple DLTs. Its presence in these ecosystems would enhance liquidity and provide users with a stable and reliable asset that can be used across various platforms.

6.4 Use in payment systems

While DeFi remains the primary focus, STAB's stability and decentralization make it a viable option for broader payment systems as well. Its ability to maintain a stable value, coupled with the benefits of decentralized governance, could make it attractive for merchants and users seeking a censorship-resistant and reliable medium of exchange.

As adoption of DLT technology expands beyond the DeFi space, STAB could play a role in facilitating payments for goods and services, particularly in regions where traditional financial systems are less accessible or more prone to instability.

6.5 Government-independent store of value

Lastly, STAB can serve as a government-independent store of value, appealing to users who are concerned about the risks associated with centralized stablecoins or traditional fiat currencies. In regions with unstable national currencies or restrictive financial regulations, STAB provides an alternative that is both stable and decentralized, offering a safe haven for preserving value.

This use case is particularly relevant in emerging markets where inflation and currency devaluation are common issues. By offering a stable, decentralized asset that is not directly tied to any national currency, STAB could become a preferred option for individuals and businesses seeking to protect their wealth from local economic turmoil.

7 Risks

While the STAB protocol offers a robust and innovative approach to creating a stablecoin, it is not without its risks. Understanding and mitigating these risks is crucial to the protocol's long-term success and stability. Below, we outline the primary risks associated with the STAB protocol and how they might impact its operation and adoption.

7.1 Smart contract bugs

Smart contracts are the backbone of the STAB protocol, automating crucial functions such as collateral management, interest rate adjustments, and liquidation processes. However, smart contracts are also vulnerable to bugs and vulnerabilities. If there are flaws in the code, they could be exploited by malicious actors, potentially leading to loss of funds, incorrect interest rate adjustments, or failures in the liquidation process.

Mitigation Strategies:

- Formal Verification: Where feasible, formal methods should be used to mathematically verify the correctness of critical smart contract components.

- Bug Bounty Programs: Implementing a bug bounty program can incentivize the community to identify and report vulnerabilities before they can be exploited.

7.2 Oracle failures

The STAB protocol relies on oracles to provide accurate and timely data regarding asset prices, which are essential for maintaining the correct collateralization ratios and setting the appropriate interest rate. If an oracle fails, or if the data it provides is manipulated, the protocol could make incorrect decisions, leading to unintended depegging or improper liquidations.

Mitigation Strategies:

- Decentralized Oracles: Utilizing multiple decentralized oracles can reduce reliance on a single data source and mitigate the risk of inaccurate data.
- Redundancy and Aggregation: The protocol should aggregate data from several oracles and use redundancy mechanisms to ensure that any single point of failure does not compromise the system.
- Continuous Monitoring: Implementing monitoring systems to detect and respond to unusual oracle activity can help prevent issues before they affect the protocol.

7.3 Incorrectly set up PID-controller

The PID-controller is central to STAB's monetary policy mechanism, adjusting the interest rate to maintain the stablecoin's peg. If the PID-controller is not properly configured, it may react too slowly or too aggressively to market changes, causing instability. An incorrectly tuned controller could lead to persistent depegging or excessive volatility in the interest rate, undermining confidence in the stablecoin.

Mitigation Strategies:

- Testing and Simulation: Extensive simulation and testing in various market conditions are critical to fine-tuning the PID-controller settings.
- Adaptive Mechanisms: Incorporating adaptive mechanisms that allow the PID-controller to be tuned in response to changing market conditions can enhance its

robustness.

7.4 Collateral black-swan events

The STAB protocol relies on the value of collateral to maintain stability. A black-swan event—such as a sudden and severe drop in the value of the collateral assets—could lead to widespread liquidations and loss of confidence in the stablecoin. If the collateral value plummets too quickly, even the protocol's stability mechanisms might not be able to prevent a significant depeg.

Mitigation Strategies:

- Collateral Diversification: Diversifying the types of assets that can be used as collateral can reduce the impact of a black-swan event affecting a single asset class.
- Dynamic Collateral Requirements: Adjusting collateralization ratios based on market volatility can provide an additional buffer against sudden price drops.
- Insurance Pools: Creating insurance pools funded by fees from the protocol could provide a safety net in the event of severe collateral devaluation.

7.5 Insufficient participation

The STAB protocol depends on market participants to actively manage and liquidate under-collateralized positions. If users do not engage in liquidation activities—whether due to lack of incentives, market apathy, or other reasons—the protocol may struggle to maintain its peg, particularly during times of market stress.

Mitigation Strategies:

- Incentivizing Liquidations: The protocol should ensure that liquidators are adequately incentivized through rewards that outweigh the risks and costs associated with liquidation.
- Automated Liquidation Mechanisms: Developing automated liquidation bots that can act quickly to liquidate positions when necessary can reduce reliance on human actors.

- Community Engagement: Educating the community about the importance of liquidations and encouraging active participation can help maintain the protocol's stability.

8 Conclusion

The STAB protocol represents a significant advancement in the design and implementation of stablecoins, addressing some of the most pressing challenges faced by existing solutions. By leveraging a variable peg governed by an algorithmically determined interest rate, STAB introduces a dynamic and flexible approach to maintaining price stability, moving beyond the rigid structures of traditional CDP-based systems.

Throughout this whitepaper, we have outlined the fundamental principles and innovations that make STAB a unique and robust solution. From the paradigm shift of a variable peg to the integration of extra stability measures, STAB has been designed to withstand the volatility and unpredictability inherent in decentralized markets. The use of control theory, particularly the PID-controller, allows for precise adjustments in the interest rate to correct deviations from the target price, providing a self-regulating mechanism that minimizes the need for external interventions. STAB's design also includes essential safety mechanisms, such as the redemption functionality and forced minting, which further reinforce its stability under varying market conditions. These features, combined with the protocol's ability to use LSUs as collateral and the flexible monetary policy it supports, position STAB as a versatile and resilient stablecoin for a wide range of applications.

The addressable market for STAB is vast, encompassing uses as collateral in other protocols, portfolio diversification, and potentially serving as a foundation for new financial products within the decentralized ecosystem. However, as with any financial innovation, STAB is not without risks. Smart contract bugs, oracle failures, and the challenges of correctly tuning the PID-controller are all potential pitfalls that must be carefully managed.

In conclusion, the STAB protocol offers a forward-looking solution to the stablecoin challenge, blending innovative monetary policy mechanisms with practical stability measures. By acknowledging the risks and preparing for them, STAB has the potential to become a cornerstone of the decentralized finance landscape, offering a stable, decentralized, and scalable alternative to both existing stablecoins and traditional financial systems. As the protocol evolves and adapts to market dynamics, STAB is poised to lead the next generation of decentralized stable assets, fostering greater confidence and adoption in the DeFi space.

Glossary

Black-Swan Event A rare and unpredictable event with severe consequences, such as an extreme market crash. In the context of the STAB protocol, a black-swan event could lead to significant challenges in maintaining the stablecoin's stability, requiring robust mechanisms to mitigate its impact. 13

CDP (Collateralized Debt Position) A financial position that involves locking up collateral to issue a debt token, typically used in the creation of stablecoins. If the value of the collateral falls too much, it can lead to liquidation. 1

Depeg An event where the stablecoin's market price deviates significantly from its intended target price, either upwards or downwards. 6

Forced Minting Mechanism A mechanism in the STAB protocol allowing users to forcibly mint new stablecoins from the CDP with the highest collateralization ratio when the market price is above the target price. This newly minted stablecoin increases supply, pushing the price back toward the target. 8

Interest Rate Mechanism The core component of the STAB protocol that adjusts borrowing costs (interest rates) in response to market price deviations from the target price. By making borrowing more or less expensive, the protocol can influence supply and demand to bring the market price back in line with the target price. 3

Liquidation A process that occurs when the value of collateral in a CDP falls below a certain threshold, prompting the protocol to automatically sell off the collateral to repay the outstanding debt. This mechanism ensures that the system remains solvent and that the stablecoin maintains its stability. 2

Minimum Collateralization Ratio The minimum required ratio of collateral to the value of the borrowed stablecoin to avoid liquidation. This ratio ensures that the value of collateral remains sufficient to cover the debt, preventing the stablecoin from falling below its target price due to inadequate backing. 2

Minting The process of creating new stablecoins within the STAB protocol, typically by providing collateral to back the newly issued tokens. 1

Oracle A third-party service that provides external data to smart contracts on the blockchain, such as asset prices or exchange rates. Oracles are crucial for ensuring that the STAB protocol can accurately determine the value of collateral and adjust its mechanisms accordingly. 12

PID-controller A control loop mechanism employing Proportional, Integral, and Derivative terms to automatically adjust a system's output. In the context of STAB, it is used to regulate the interest rate to maintain the stablecoin's market price near its target price. 4

Redemption Mechanism A mechanism in which users can liquidate the CDP with the lowest collateralization ratio to restore the stablecoin's peg, receiving collateral in exchange for settling debt. 8

Smart Contract Self-executing contracts with the terms of the agreement directly written into code. Smart contracts run on blockchain networks and are integral to the functioning of decentralized applications (dApps) and DeFi protocols, including the STAB protocol. 1

Stablecoin A type of cryptocurrency that is designed to maintain a stable value relative to a reference currency, asset, or algorithmic standard, minimizing price volatility. 1

Target Price The desired price level that the STAB stablecoin aims to maintain. This target can fluctuate based on the protocol's algorithm to manage supply and demand effectively. 3

Variable Peg A mechanism where the target price of a stablecoin can fluctuate within a predefined range rather than being fixed to a single value, like $1. The variable peg allows the stablecoin to respond to market dynamics more effectively, ensuring better stability over time. 3

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