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Bitcoin (Via Wbtc) As Collateral In Overcollateralized Defi Lending On Aave: Risk Metrics, Liquidation Dynamics, And A Maqasid Al-Shariah Evaluation

Muhammad Dzulhilmi Yazid
University of Muhammadiyah Kudus
muhammaddzulhilmiyazid@gmail.com

Muhammad Adhitya Whardana
University of Muhammadiyah Kudus
adhityawardhana@umkudus.ac.id

Nurani Puspa Ningrum
University of Muhammadiyah Kudus
nuranipuspa@umkudus.ac.id

Abstract

This study examines the use of Bitcoin exposure, represented by Wrapped Bitcoin (WBTC), as collateral in overcollateralized borrowing on the Aave decentralized finance (DeFi) lending protocol. Using qualitative document analysis of protocol documentation, governance materials, and risk-parameter methodologies, the paper (i) maps Aave's collateralized-debt mechanics, (ii) reconstructs the core risk metrics that govern leverage and liquidation (loan-to-value, liquidation threshold, and health factor), and (iii) evaluates the arrangement through a Maqasid al-Shariah and fiqh mu'amalah lens. A scenario-based calculation illustrates how a borrower posting 1 WBTC faces rapid liquidation risk under plausible price declines, even when the position initially respects the maximum LTV. At the system level, explicit parameters, transparency, and overcollateralization can be interpreted as protective features for pool solvency and collective wealth. However, at the individual level the combination of interest-bearing debt, high volatility, automatic liquidation, and liquidation incentives can concentrate risk on borrowers, raising substantive concerns related to riba-like returns, severe gharar from uncertain total obligations, maysir-like behavior in leveraged speculation, and distributive justice. The paper concludes that Aave's WBTC-collateralized borrowing achieves wealth protection only partially and tends to privilege structurally stronger parties, while proposing maqasid-oriented design directions for more risk-sharing and ethically aligned DeFi models.

Keywords: *Aave; decentralized finance; WBTC; overcollateralized lending; Maqasid al-Shariah; liquidation risk*

1. Introduction

Decentralized finance (DeFi) refers to a family of financial services implemented through smart contracts on public blockchains. Instead of relying on licensed intermediaries, DeFi protocols coordinate lending, borrowing, trading, and asset management through open-source code and on-chain incentives (Schär, 2021). In lending markets, the absence of identity-based credit scoring and legal enforcement is typically replaced by overcollateralization and automated liquidation: a borrower must post collateral worth more than the borrowed amount, and the protocol allows third parties to repay part of the debt and seize collateral once the position falls below a safety threshold.

Aave is one of the leading pooled lending protocols in the Ethereum ecosystem. In Aave's pooled design, liquidity suppliers deposit assets into pools and receive interest-bearing tokens, while borrowers draw liquidity against posted collateral and pay a variable or stable borrowing

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rate. The protocol internalizes risk management through explicit parameters such as maximum loan-to-value (LTV), liquidation threshold (LT), liquidation bonus, reserve factor, and the health factor (HF) metric that continuously evaluates whether a position is safe. These parameters are updated via governance and supported by oracle price feeds and liquidation mechanisms (Aave, 2025).

Although Aave is deployed on Ethereum and other chains, many users seek exposure to Bitcoin (BTC) while still participating in Ethereum-based DeFi. A common approach is to use Wrapped Bitcoin (WBTC), an ERC-20 token designed to represent BTC on a 1:1 basis. WBTC is backed by BTC held in custody and can be verified through proof-of-reserves, but it also introduces additional trust and governance assumptions compared to native BTC (Caldarelli, 2021; WBTC, 2019). This interoperability layer is economically important because it allows BTC holders to borrow stablecoins, access liquidity, and implement strategies such as hedging, yield enhancement, and leverage.

From an Islamic economics perspective, DeFi lending is not merely a technical innovation. It re-raises classical questions of riba (unjustified increase tied to debt), gharar (excessive uncertainty), maysir (gambling and zero-sum speculation), and justice in the distribution of risk and reward. Maqasid al-Shariah, understood as the objectives of the Shariah in realizing benefit (maslahah) and preventing harm (*mafsadah*), offers a framework to evaluate whether a novel contract structure advances or undermines human well-being. In finance, maqasid considerations typically emphasize protection of wealth (*hifz al-mal*), fairness, transparency, and the avoidance of exploitative or destabilizing arrangements.

This paper builds on a thesis-level investigation of WBTC-collateralized borrowing on Aave and aims to produce a journal-ready account that is technically explicit and normatively sharp. The research question is: to what extent is the use of Bitcoin exposure (via WBTC) as collateral in Aave's overcollateralized lending compatible with Maqasid al-Shariah and core principles of fiqh mu'amalah? To answer it, the paper contributes three elements. First, it reconstructs the operational mechanism of Aave's collateralized borrowing and liquidation in a step-by-step, verifiable manner. Second, it presents a worked numerical illustration using LTV, LT, and HF that demonstrates how volatility and interest interact to produce liquidation risk. Third, it evaluates the arrangement across maqasid dimensions, distinguishing between protocol-level solvency protections and borrower-level wealth vulnerability, and proposes design directions that could make DeFi lending more ethically aligned.

Two boundaries are important. This study does not issue a definitive legal ruling (hukm) on cryptocurrency or DeFi lending. Instead, it offers a maqasid-based evaluation and identifies normative risk zones that call for strong prudence (ihtiyat) among Muslim users. Furthermore, the paper uses illustrative parameters and examples to explain mechanisms; specific on-chain parameters can change via governance, so empirical verification is required for any real position.

2. Literature Review

DeFi scholarship commonly describes lending protocols as on-chain money markets that replace credit evaluation with collateral and algorithmic liquidation. Schär (2021) highlights the composability and transparency of DeFi, but also warns about smart-contract bugs, oracle manipulation, and economic design vulnerabilities. Systematizations of knowledge on DeFi further emphasize that pooled lending contracts have identifiable design patterns and recurring failure modes, including oracle problems and economic exploits (Zhou et al., 2023). From a legal and regulatory perspective, Zetzsche et al. (2020) argue that decentralization can shift, rather than eliminate, points of reconcentration and accountability, which is relevant when assessing where risk and control reside in systems that are marketed as 'decentralized'.

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Empirical studies of liquidation and borrower behavior have begun to clarify how these systems behave under stress. Gadzinski & Liuzzi (2025) analyze Aave liquidation events and report that liquidation does not necessarily end users' engagement with the protocol; instead, post-liquidation activity can persist, with heterogeneous responses between large and small wallets. Moallemi & Patange (2025) model liquidation with a fixed-spread incentive and show that monitoring frequency and financing cost jointly shape the optimal safety buffer, supporting the view that liquidation is not a rare edge case but a structural feature that shapes user incentives and wealth outcomes.

At the parameter-design level, risk service providers have published methodologies for choosing LTV, liquidation threshold, liquidation bonus, and other controls with the goal of limiting bad debt and systemic cascades. Chaos Labs, for instance, provides a risk parameter methodology describing how volatility, liquidity depth, and oracle robustness should inform parameter calibration for Aave markets (Chaos Labs, 2026). Such work emphasizes that protocol-level safety can be improved through quantitative governance, yet it also implicitly confirms that borrowers must internalize asset volatility and liquidation dynamics.

Related discussions of risk management and institutional safeguards also appear in Islamic Business and Management Journal. Although not focused on DeFi, Shahab (2025) illustrates how formal risk management systems are assessed in organizational practice, which reinforces the broader point that governance, monitoring, and accountability structures matter when evaluating financial and operational risk.

Another relevant literature concerns the trust assumptions of wrapped tokens and cross-chain representations. Caldarelli (2021) argues that wrapped tokens reintroduce forms of third-party trust similar to oracles, because an issuer or custodian must hold the underlying asset and maintain the peg. The WBTC model is explicitly custodial: BTC is held by custodians and minted as WBTC under a multi-signature arrangement with merchants, with proof-of-reserves intended to enhance transparency (WBTC, 2019). From a risk perspective, the peg introduces custodial, governance, and jurisdictional dependencies that differ from native BTC's bearer-asset properties.

With respect to cryptocurrency, the literature is diverse and contested. Some works interpret crypto assets as commodities or investment assets under certain constraints, while others emphasize volatility, speculative dominance, fraud risk, and potential harm to retail users. From a maqasid perspective, this divergence implies that assessment should pay attention to the dominant use case and observable outcomes: whether the asset primarily facilitates productive exchange and hedging, or whether it mainly amplifies speculation, leverage, and wealth transfers under extreme uncertainty.

Some works interpret crypto assets as commodities or investment assets under certain constraints, while others emphasize volatility, speculative dominance, and harm to retail users. Wartoyo & Haerisma (2022) explicitly analyze cryptocurrency through maqasid and argue that mafsadah can dominate in current market practice due to extreme volatility and speculation. Other maqasid-based discussions interpret crypto as a form of wealth (mal) but stress restrictions that prevent harm, fraud, and unjust enrichment. Overall, the literature suggests that a maqasid evaluation should pay attention to (i) the economic substance of returns, (ii) the distribution of risk and benefit across parties, and (iii) the social consequences of speculative market behavior.

This paper locates itself at the intersection of these literatures by combining an explicit reconstruction of DeFi lending mechanics with a maqasid and fiqh evaluation. Instead of treating DeFi lending as simply 'interest-bearing borrowing', the paper shows how interest accrual, liquidation thresholds, oracle pricing, and liquidation incentives interact to produce a particular distribution of wealth outcomes. The maqasid assessment then tests whether these outcomes support or undermine protection of wealth, justice, and the avoidance of riba, gharar, and maysir.

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3. Research Methods

This study adopts a qualitative document analysis design. The primary data consist of protocol-level documents (Aave documentation on borrowing, health factor, and liquidation), governance and risk-parameter methodology materials, and WBTC documentation describing the custodial wrapping model. The unit of analysis is the contract-mechanism structure of WBTC-collateralized borrowing on Aave, including its risk metrics, cash-flow structure, and liquidation process.

Data collection emphasizes publicly verifiable sources that define how the system works 'as coded' and 'as governed'. Since parameters can change, documents are treated as both descriptive and normative artifacts: they not only explain mechanics but also express design objectives and risk priorities. In qualitative terms, these documents function as a traceable audit trail for how key variables (e.g., LTV and liquidation threshold) are defined, justified, and implemented.

Analysis follows standard qualitative steps of data reduction, data display, and conclusion drawing. First, relevant passages were extracted and coded into categories: collateral posting and borrowing flow; risk parameters and formulas; interest and yield distribution; liquidation trigger and incentive structure; and additional risks (oracle, custodial, governance, and smart contract risk). Second, the coded content was organized into a mechanism map and a set of technical definitions. Third, these outputs were evaluated against a maqasid framework that emphasizes hifz al-mal and justice while considering riba, gharar, and maysir as major sources of mafsadah in exchange and finance.

To strengthen credibility, the analysis focuses on internal consistency and traceability: each major claim about mechanics is expressed in terms of definitional relationships (such as the health factor formula) and can be checked against protocol documentation. The normative analysis is performed in two layers. The first layer evaluates protocol-level objectives such as pool solvency and transparency. The second layer evaluates user-level outcomes such as wealth vulnerability, uncertainty of obligations, and the incentive to engage in leveraged speculation.

Because this is a document-based study, it does not estimate causal effects from transaction-level data. Instead, it provides a structured, mechanism-based interpretation, supported by a scenario calculation that demonstrates how the risk parameters work in practice. This approach is suitable for maqasid analysis because it clarifies the economic substance and the distribution of risk and return, which are essential for evaluating maslahah and mafsadah.

4. Results and Technical Analysis

Aave Protocol Mechanism and Risk Parameters

This section reconstructs Aave's overcollateralized borrowing flow when WBTC is used as collateral, and then explains the core risk parameters through a worked numerical illustration. The goal is to make the liquidation mechanism concrete rather than abstract, because the maqasid evaluation depends on how risk and obligations materialize for each party.

Mechanism overview. A user who intends to borrow must first supply collateral to the Aave pool by interacting with the protocol's smart contracts. The supplied collateral is tracked on-chain, and its value is continuously marked to market using an oracle price feed. Once collateral is supplied, the user may borrow another asset from the pool (for example, a stablecoin). Borrowing creates a debt position that grows over time through interest accrual, while the collateral value can move with market price changes. The protocol computes a position-level safety indicator, the health factor, that compares risk-adjusted collateral value against total debt. If the health factor falls below 1, the position becomes eligible for liquidation (Aave, 2023).

Collateralization and liquidation are fundamental because the protocol cannot pursue borrowers off-chain. In traditional finance, a borrower can be subject to legal claims, credit scoring penalties, or bankruptcy rules. In DeFi, the protocol's only practical way to protect the pool is to ensure that the debt is always covered by on-chain collateral, and to sell collateral quickly when

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coverage deteriorates. Liquidation therefore functions as an automated, permissionless margin call executed by third parties who are incentivized by a liquidation bonus.

Key parameters. Aave defines a maximum loan-to-value ratio (LTV) for each collateral asset. In simplified terms, LTV sets the maximum debt a user can draw relative to the collateral's market value at the time of borrowing. Aave also defines a liquidation threshold (LT), which is typically higher than the LTV. LT determines how much collateral value is considered 'safe' before liquidation is permitted. The relationship between LTV and LT is critical: LTV limits initial leverage, while LT defines the liquidation boundary. A third parameter, the liquidation bonus, defines how much collateral a liquidator can seize beyond the debt repaid, creating an incentive to perform liquidations promptly Chaos Labs (2026).

Risk metric formulas. Let Vc denote the current market value of the collateral, expressed in the borrowing asset unit (e.g., USDC). Let D denote total outstanding debt including accumulated interest. Let LT be the liquidation threshold expressed as a fraction (for example, 0.75). Then a standard health factor representation is HF = (Vc × LT) / D. A position is considered safe when HF > 1 and eligible for liquidation when HF < 1. In the same setting, the instantaneous loan-to-value is LTV_current = D / Vc. The liquidation condition HF < 1 is equivalent to LTV_current > LT. This equivalence clarifies that liquidation is triggered when debt grows too large relative to collateral value and the liquidation threshold.

Illustrative parameter set for WBTC. Parameters can differ across Aave deployments and can be changed through governance. However, to illustrate the mechanics in a transparent way, the thesis on which this paper is based uses a common WBTC-like parameter configuration: maximum LTV approximately 0.70, liquidation threshold approximately 0.75, and a liquidation bonus around 0.075 (7.5 percent). These values are used only for explanation and should not be treated as the current on-chain truth for any specific market.

Table 1. Illustrative Risk Parameters for WBTC Collateral on Aave (for explanation only)

Parameter	Meaning	Illustrative Value
Max LTV	Maximum initial borrowing capacity relative to collateral value.	0.70
Liquidation threshold (LT)	Threshold used to determine liquidation eligibility; typically higher than max LTV.	0.75
Health factor (HF)	Safety indicator defined as (collateral value × LT) / debt; liquidation eligible if < 1.	HF < 1 triggers
Liquidation bonus	Extra collateral seized by liquidator as incentive when repaying borrower debt.	7.5%
Reserve factor	Share of interest routed to protocol reserves (market-dependent).	Varies

Scenario calculation. Consider a borrower who supplies 1 WBTC as collateral. Suppose the oracle price at deposit is 100,000 USDC per WBTC, so the collateral value is Vc = 100,000 USDC. With a maximum LTV of 0.70, the maximum initial debt the borrower can draw is 70,000 USDC. If

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the borrower borrows exactly 70,000 USDC, the initial health factor is HF0 = (100,000 × 0.75) / 70,000 = 1.0714. The position is technically safe (HF > 1) but only by a narrow buffer.

This narrow buffer has important implications. First, a price decline of the collateral reduces Vc and therefore reduces the numerator of HF. Second, interest accrual increases D over time, raising the denominator. Both forces push HF downward. When HF crosses below 1, any liquidator can repay part of the debt and seize collateral with the liquidation bonus. The borrower then experiences a direct wealth loss relative to holding the collateral without borrowing.

Liquidation price. Using the HF formula, the price at which liquidation becomes permissible can be solved directly. With collateral amount Q = 1 WBTC, debt D = 70,000, and LT = 0.75, liquidation occurs when (Q × P × LT) / D = 1. Solving for P yields P_liq = D / (Q × LT) = 70,000 / 0.75 = 93,333.33. Therefore, if the price of WBTC falls below about 93,333 USDC, the position becomes liquidation-eligible even without considering interest accrual. If interest accumulates or if fees increase D, the liquidation price rises further, meaning liquidation can occur at a higher market price than this static estimate.

Table 2 summarizes the health factor under several price points, holding debt constant for simplicity. The result illustrates why borrowers who operate near the maximum LTV are exposed to rapid liquidation under realistic price movements, and why rational borrowers often choose a higher initial health factor by borrowing less than the maximum.

Table 2. Health Factor Sensitivity to WBTC Price (Debt fixed at 70,000 USDC; LT = 0.75)

WBTC Price (USDC)	Collateral Value Vc	Risk-Adjusted Collateral Vc×LT	Debt D	Health Factor HF
100,000	100,000	75,000	70,000	1.071
95,000	95,000	71,250	70,000	1.018
93,333	93,333	70,000	70,000	1.000
90,000	90,000	67,500	70,000	0.964
85,000	85,000	63,750	70,000	0.911

Interpreting Table 2, the position is safe at 100,000 and 95,000, but it becomes borderline near 93,333 and clearly unsafe at 90,000. At 90,000, HF = (90,000 × 0.75) / 70,000 = 0.964, which is liquidation-eligible. At 85,000 the health factor falls further to 0.911. Because liquidators are rewarded through a liquidation bonus, the liquidation mechanism can rapidly transfer collateral away from the borrower once the threshold is breached.

Interest dynamics. In practice, debt is not constant. Borrow rates on Aave fluctuate according to utilization, and interest accrues continuously. If the borrower holds the position during a period of higher borrow rates, D can increase meaningfully, pushing the liquidation price upward. The combined effect is that a borrower may be liquidated not only due to collateral price decline, but also due to time passing and interest accumulating, even if price remains relatively stable around the boundary.

Distribution of yield and risk. Aave's pooled architecture distributes cash flows and risks asymmetrically across actors. Liquidity suppliers earn interest (net of reserve factor) as long as the market functions and borrowers repay through repayment or liquidation. The protocol accrues reserves and fees, while liquidators are rewarded when borrowers fall below the threshold. Borrowers receive the borrowed asset but bear the joint risk of (i) paying interest, (ii) collateral price volatility, and (iii) liquidation penalties. From a wealth-protection lens, this structure can be

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interpreted as shifting market volatility and monitoring burdens onto borrowers, while designing systemic protections for the pool.

Figure-style schematic (described). The borrower deposits WBTC and receives the ability to borrow. Once the borrower draws USDC, an interest obligation begins. If collateral value falls, a liquidator repays part of the USDC debt and receives WBTC plus a bonus. The pool is protected (debt decreases), but the borrower's wealth is reduced through collateral seizure and the implicit liquidation cost.

Additional risk layers. Beyond price volatility, three risk layers are central in a WBTC-on-Aave position. First, oracle risk: if the oracle price deviates from market reality due to manipulation or outages, liquidations can occur erroneously, harming borrowers. Second, smart contract and governance risk: bugs, upgrades, or parameter changes can alter risk exposure. Third, wrapping and custody risk: WBTC is backed by BTC held by custodians, so legal, operational, or jurisdictional failures could threaten the peg or redemption process, undermining the security of the collateral (Caldarelli, 2022; WBTC DAO, 2019).

Table 3. Simplified Distribution of Returns and Risk in Aave Overcollateralized Borrowing

Actor	Primary Return	Primary Risk Exposure	Notes on Incentives
Liquidity supplier (lender)	Borrow interest (net of reserve factor).	Smart-contract and systemic risk; utilization shocks.	Return resembles a debt-like yield when liquidation keeps pool solvent.
Borrower	Access to borrowed asset; potential strategy benefits.	Price volatility; interest accrual; liquidation penalty; monitoring burden.	Must manage HF buffer; can lose collateral rapidly in downturns.
Liquidator	Liquidation bonus and arbitrage margin.	Execution risk, gas cost, market slippage.	Incentivized to liquidate quickly once HF < 1.
Protocol / reserve	Reserve factor share and fees; governance control.	Reputational and systemic risk; parameter miscalibration.	Design prioritizes pool solvency and continuity of markets.

Maqasid al-Shariah and Fiqh Mu'amalah Discussion

This section evaluates the reconstructed mechanism through Maqasid al-Shariah and fiqh mu'amalah, focusing on how the contract's substance and outcomes relate to maslahah and mafsadah. The analysis intentionally distinguishes between (i) protocol-level safety objectives and (ii) individual-level wealth outcomes, because a design that protects a liquidity pool can still produce ethically problematic burdens on users.

Protocol-level maslahah claims. At the protocol level, several features can be read as serving wealth protection (hifz al-mal) in a collective sense. Overcollateralization and liquidation thresholds aim to prevent bad debt that would harm liquidity suppliers. Explicit risk parameters provide clarity (bayan) about leverage limits. On-chain transparency and auditable code can reduce information asymmetry compared to opaque financial intermediaries. Governance-based parameter updates, when executed responsively, can adapt risk controls to changing market

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volatility. These features align with the idea that financial systems should include safeguards that prevent systemic harm and protect entrusted assets.

However, a maqasid analysis must also examine whether the same system-level safeguards produce unfair harm at the micro level. In Aave, the primary tool for pool protection is liquidation. Liquidation is executed by third parties who profit from liquidation bonuses, and it is triggered mechanically by HF falling below one. In volatile markets, borrowers who use WBTC collateral can therefore be subject to sudden wealth transfer from their collateral to liquidators and pools. The system can remain solvent precisely because the borrower is forced to bear a large share of downside risk.

Riba-like substance. In classical fiqh, a loan (qard) that yields a stipulated increase to the lender is prohibited as riba. Aave borrowing is structured as debt: the borrower receives an asset now and must repay more later due to interest accrual. The lender's return is not tied to productive risk-sharing but to the passage of time and the borrower's obligation. Even though the protocol is mediated by smart contracts and rates are algorithmic, the substantive pattern resembles an interest-bearing debt return. This resemblance does not automatically produce a legal ruling in this paper, but it raises a strong maqasid concern because riba prohibitions aim to prevent exploitation and unjust enrichment through debt-based increase.

Severe gharar and complexity. Gharar refers to excessive uncertainty that undermines informed consent and fairness. In Aave, a borrower's total cost is uncertain because the borrow rate can fluctuate. Moreover, liquidation risk depends on oracle prices, market liquidity, gas conditions, and liquidation competition. For sophisticated users, these can be modeled, but for retail users with limited technological literacy, the uncertainty can be severe. This aligns with a maqasid concern for protecting intellect (hifz al-'aql) and preventing harm from asymmetrical knowledge, where complex systems shift risk onto the less informed party.

Maysir-like behavior in leveraged speculation. Maysir is associated with zero-sum gambling-like transfers where wealth moves based on chance-like outcomes rather than productive activity. Although collateralized borrowing can have legitimate uses (such as liquidity needs or hedging), a dominant use case in DeFi is leveraged trading: users borrow stablecoins against volatile collateral to increase exposure, chase yields, or speculate on short-term price movement. When borrowing is used primarily to amplify price bets, the wealth outcome becomes strongly dependent on volatile price swings and liquidation thresholds, producing maysir-like dynamics. Under such usage patterns, liquidation acts as a mechanism that crystallizes losses and transfers collateral to liquidators and the pool.

Distributive justice and hifz al-mal. The thesis-level findings emphasize that Aave's design can protect collective pool wealth while exposing borrowers to concentrated harm. Lenders are structurally protected by overcollateralization; liquidators are compensated for enforcing solvency; and the protocol accrues reserves. Borrowers, by contrast, must manage the volatility of WBTC, pay interest, and face an asymmetric liquidation penalty. This distribution raises a maqasid-based justice issue: a system that is 'stable' because it can liquidate borrowers quickly may still undermine wealth protection for users who are not structurally advantaged.

WBTC custody and trust as an additional maqasid concern. Unlike native BTC, WBTC relies on custodians and multi-signature governance for minting and redemption. Academic analysis of wrapped tokens highlights that such models reintroduce trust and centralized points of failure similar to oracles (Caldarelli, 2021). The WBTC whitepaper explicitly describes custodians holding the underlying asset and merchants coordinating issuance (WBTC, 2019). These dependencies can be interpreted as a form of hidden gharar: the user may believe they hold 'Bitcoin', but in practice they hold a claim on custodial arrangements. This risk can affect hifz al-mal, especially when governance or jurisdictional changes occur.

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Maqasid mapping. Table 4 summarizes how key features of the WBTC-on-Aave borrowing mechanism map onto maqasid objectives. The goal is not to force a simplistic 'permitted/forbidden' label but to identify where maslahah is plausible and where mafsadah is structurally likely.

Table 4. Maqasid-Based Assessment of WBTC-Collateralized Borrowing on Aave (Mechanism-Level)

Maqasid Dimension	Potential Maslahah (Benefits)	Potential Mafsadah (Harms / Concerns)
Hifz al-mal (protection of wealth)	Protocol transparency; explicit leverage limits; pool solvency protection through overcollateralization.	Borrower wealth vulnerability under volatility; liquidation penalty transfers value; interest increases debt burden; custodial risk of WBTC.
Hifz al-'aql (protection of intellect)	On-chain data can, in principle, enable informed decision-making and risk modeling.	High technical complexity; rate variability; oracle and liquidation mechanics can create severe informational asymmetry for retail users.
Hifz al-nafs (protection of life)	Potential access to liquidity in emergencies without discrimination.	Financial losses and leverage can amplify stress and harm; rapid liquidation can destabilize household finances for vulnerable users.
Hifz al-nasl (protection of family)	Limited, disciplined use could support household liquidity management.	Speculative use and extreme volatility can create conflict and instability when losses spill into family obligations.
Hifz al-din (protection of faith)	Innovation can be evaluated and guided toward ethical finance aims.	Riba-like debt increase; gharar and maysir-like behavior under common usage patterns; risk of normalizing prohibited forms of gain.

Implications for design. A maqasid-oriented critique should not stop at diagnosis; it should also point to alternative designs. Several directions emerge from the analysis. First, reducing debt-based interest mechanics and exploring fee-based or risk-sharing models can better align return with participation in risk. Second, risk should be distributed more proportionally: borrowers should not be the sole 'shock absorber' while other parties are protected. Third, protocols can strengthen informed consent by providing default risk buffers, standardized scenario simulations, and clearer disclosures that translate health factor mechanics into user-relevant risks. Fourth, the use of highly volatile collateral such as WBTC could be constrained through more conservative parameters, dynamic risk controls, or requirements for additional stabilization buffers to reduce the likelihood of rapid wealth destruction.

Governance and Shariah oversight. Because parameters can be updated through governance, embedding Shariah governance principles into protocol governance is a plausible pathway. This could include structured review of new collateral listings, risk parameter updates, and incentive

designs, with explicit criteria related to harm prevention, fairness, and transparency. In a hybrid setting, Shariah scholars, economists, and risk specialists could collaborate to define design constraints that mitigate riba-like substance and excessive gharar. The objective is not to import conventional regulation wholesale but to encode ethical constraints that serve maqasid outcomes.

User prudence. For Muslim users, the analysis suggests that WBTC-collateralized borrowing on Aave lies in a high-risk normative zone. If used at all, it should be approached with strict prudence: maintaining a high health factor buffer, avoiding leverage-driven speculation, and limiting exposure to amounts that do not threaten essential needs. This aligns with the thesis conclusion that the mechanism offers partial wealth protection at a systemic level but tends to expose individual borrowers to significant harm.

5. Conclusion

This paper analyzed the use of Bitcoin exposure (via WBTC) as collateral in Aave's overcollateralized DeFi lending through a combined technical and maqasid-based lens. Mechanistically, Aave protects pooled liquidity through explicit risk parameters (LTV, liquidation threshold, and health factor) and through permissionless liquidation. A worked numerical illustration shows that positions opened near the maximum LTV can become liquidation-eligible under realistic collateral price movements, and that interest accrual can further tighten the safety boundary.

From a Maqasid al-Shariah perspective, the arrangement contains features that can be read as protective at the protocol level, including transparency and solvency safeguards. However, when assessed at the level of individual borrowers, the mechanism raises substantial concerns. The interest-bearing debt structure resembles riba in economic substance; the variability of rates, volatility of collateral, and complexity of liquidation introduce severe gharar for less informed users; and prevalent leverage-driven uses can resemble maysir-like speculation. Moreover, the distribution of risk and benefit appears asymmetrical: the borrower absorbs a large share of downside risk, while the protocol, pool, and liquidators are structurally protected by design.

The paper therefore concludes that wealth protection (*hifz al-mal*) is achieved only partially and tends to favor structurally stronger actors. Rather than issuing a final legal ruling, the analysis identifies a high-risk normative zone and recommends strong prudence for Muslim users. For designers and researchers, the findings suggest that a maqasid-aligned DeFi model would require deeper risk-sharing, reduced reliance on interest-bearing debt, improved disclosure, and governance mechanisms that explicitly target harm prevention and distributive justice.

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