SmartMoney & Enigma Research Note

October 13, 2021

Aave Finance ($AAVE)

- TYPE: B&L
- CHAIN(S): ETH (L1, MATIC), AVAX
- CIRCULATING SUPPLY: 13bn
- MAX SUPPLY: 16bn
- TVL: $14.1bn
- MARKET CAP: $3.84bn
- CONTRACT ADDRESS: 0x7fc66500c84a76ad7e9c93437bfc5ac33e2ddae9

Protocol Overview

By total assets deposited, Aave is the top DeFi Lending protocol across a growing array of blockchain networks. Aave's rapid growth since its launch in 2020 demonstrates the value market participants place on variety and stability of money markets. As a fully decentralized protocol, Aave's users govern and develop the protocol. In just over one year, they have facilitated permissionless money markets for a multi-chain industry.

Aave's model makes key deviations from the competition. Aave offers a wider variety of assets for decentralized borrowing and lending than any other top protocol. Its development and governance community uses an active risk management framework to stabilize these markets in the face of significant asset volatility. Aave's stability is built on the AAVE governance token model. The protocol uses AAVE issuance to align users, builders, governance participants, and investors for rapid and sustainable growth. As DeFi across blockchains comes to fruition, Aave is positioned to facilitate the most active markets wherever it operates.

Why it's interesting

Product

The Aave protocol is a set of smart contracts that operate open-source money markets. The protocol started on Ethereum and has launched parallel protocols on numerous Layer 2 and other Layer 1 networks. Borrowers and lenders can use Aave via any user interface application, such as the Aave app site. Developers can access Aave via API or directly through the smart contracts. Direct access allows other projects to build Aave money markets into their applications that require native leverage or liquidity functionality.

Lenders deposit assets in Aave smart contracts called Lending Pools. In exchange, they receive aTokens that represent their deposited position. Lenders can use aTokens like other Ethereum-based ERC-20 assets to transfer and trade their lending position. Borrower debt is also represented in ERC-20 tokens, however, borrow positions are non-transferrable and do not enable most ERC-20 functions.

Approved assets can be used by Lenders as collateral to borrow other tokens. Aave's current V2 iteration allows borrowers to repay debt with collateral. An integrated asset swap function exchanges their collateral asset to their borrowed asset. In one click, repayment can occur that both swaps and liquidates the collateral amount needed to repay the loan. Once the loan is repaid, the Borrower can keep or withdraw any remaining collateral on Aave.

Aave's Lending Pools use interest rates to optimize the Utilization Rate, or liquidity in a pool. Abundant liquidity lowers interest rates to incentivize borrowing while scarce liquidity raises rates to incentivize lending. The Utilization Rate reflects the ratio of borrowed to available assets. Each Aave market features an optimal Utilization Rate based on the protocol's risk assessment of each asset.

Both Stable and Variable Rate Loans require Borrowers to maintain at least a 2:1 Health Ratio of collateral to debt value in USD. At a Health Ratio below 1, the loan's collateral is liquidated to repay up to 50% of the borrowed value, plus a liquidation fee paid to the protocol treasury. Liquidators are community developers that assist the Aave protocol to maintain efficient and fair liquidation procedures for each asset Lending Pool. Liquidators earn liquidation fees for their service. With ample competition, liquidators are incentivized to deploy fast, cost effective, and minimally disruptive liquidation code to execute more liquidations than other participants.

Borrowers can choose either Stable Rate or Variable Rate Loans for most assets on Aave. Stable Rate Loans are determined by supply and demand but fixed to the rate selected at the date the debt is issued. Variable Rate Loans also fluctuate by asset supply and demand that continuously update through the life of the loan. Variable Rate Loans do not expire.

Borrow rates adjust linearly according to the Utilization Rate as a ratio to the pool's optimal Utilization Rate. Variable Rates adjust slowly when Utilization is less than optimal and rapidly when Utilization exceeds the optimal rate. Stable rates are only changed under rebalancing conditions, or when Utilization exceeds 95%. All borrow rates are paid to aToken holders, with a reserve of interest revenue accrued to the protocol's treasury.

Aave Lending and Borrowing Assets

Asset Name Name	Asset Symbol	Used as Collateral	Loan to Value	Liquidation Threshold	Liquidation Bonus	Reserve Factor	30d Deposit Rate	30d Var Borrow Rate	Total Liquidity	Available Liquidity
Stablecoins										
Ampleforth	AMPL	N				10%	1.00%	30.50%	$2,901,369	$1,888,595
Binance USD	BUSD	N				10%	4.95%	7.95%	$10,093,955	$2,175,776
DAI	DAI	Y	75%	80%	5%	10%	4.83%	5.88%	$1,974,387,564	$378,263,336
Fei	FEI	N				20%	12.32%	0.00%	$38,703,504	$8,477,098
Frax	FRAX	N				10%	1.35%	2.21%	$9,573,032	$4,281,694
Gemini Dollars	GUSD	N				10%	4.07%	5.87%	$18,988,777	$3,541,983
Paxos Standard	PAX	N				10%	2.78%	3.44%	$16,619,739	$1,632,765
RAI	RAI	N				20%	2.36%	4.00%	$37,503,181	$15,449,852
Synthetix USD	SUSD	N				20%	5.88%	6.03%	$65,017,409	$12,873,052
True USD	TUSD	Y	75%	80%	5%	10%	3.13%	3.94%	$107,216,210	$20,703,429
USDC	USDC	Y	80%	85%	4%	10%	5.85%	6.09%	$4,688,897,076	$439,254,820
Tether	USDT	N				10%	4.62%	6.41%	$1,235,262,928	$115,842,463
Risk Assets										
Aave	AAVE	Y	60%	70%	8%	0%	0.00%	0.00%	$468,961,937	$468,961,937
Balancer	BAL	Y	65%	70%	10%	20%	0.26%	2.35%	$13,666,009	$11,731,812
Basic Attention Token	BAT	Y	70%	75%	8%	20%	0.91%	2.24%	$3,567,893	$2,584,697
Curve DAO	CRV	Y	35%	55%	10%	20%	8.80%	22.85%	$39,986,882	$19,895,630
DeFi Pulse Index	DPI	Y	60%	70%	10%	20%	0.00%	0.01%	$55,955,144	$55,809,773
Enjin	ENJ	Y	55%	65%	5%	20%	0.01%	0.51%	$15,737,966	$15,184,788
Kyber Network	KNC	Y	60%	70%	10%	20%	0.57%	3.22%	$1,672,719	$1,272,838
Chainlink	LINK	Y	70%	75%	10%	20%	0.00%	0.11%	$486,824,555	$482,353,471
Decentraland	MANA	Y	65%	70%	8%	35%	9.51%	18.99%	$12,756,328	$6,622,823
Maker	MKR	Y	65%	70%	8%	20%	0.00%	0.18%	$108,242,729	$106,126,347
Republic Protocol	REN	Y	55%	60%	8%	20%	0.07%	0.97%	$46,503,561	$44,942,568
Ren Filecoin	RenFIL	N				35%	0.11%	0.71%	$4,498,219	$4,115,158
Synthetix	SNX	Y	20%	45%	8%	35%	3.73%	9.40%	$10,446,322	$4,196,436
Uniswap	UNI	Y	50%	70%	10%	20%	0.04%	1.01%	$107,265,255	$101,298,248
Wrapped BTC	WBTC	Y	70%	75%	8%	20%	0.11%	0.89%	$1,371,073,002	$1,249,370,801
Wrapped ETH	WETH	Y	80%	85%	5%	10%	0.01%	0.31%	$6,506,359,596	$6,394,143,701
Sushi Bar	XSUSHI	Y	30%	60%	10%	35%	0.01%	0.25%	$151,925,161	$148,572,634
Yearn YFI	YFI	Y	50%	65%	8%	20%	0.04%	0.87%	$71,878,312	$68,200,586
0x	ZRX	Y	65%	70%	8%	20%	0.14%	0.80%	$5,401,011	$5,106,919
Total									$17,687,887,345	$10,194,876,030

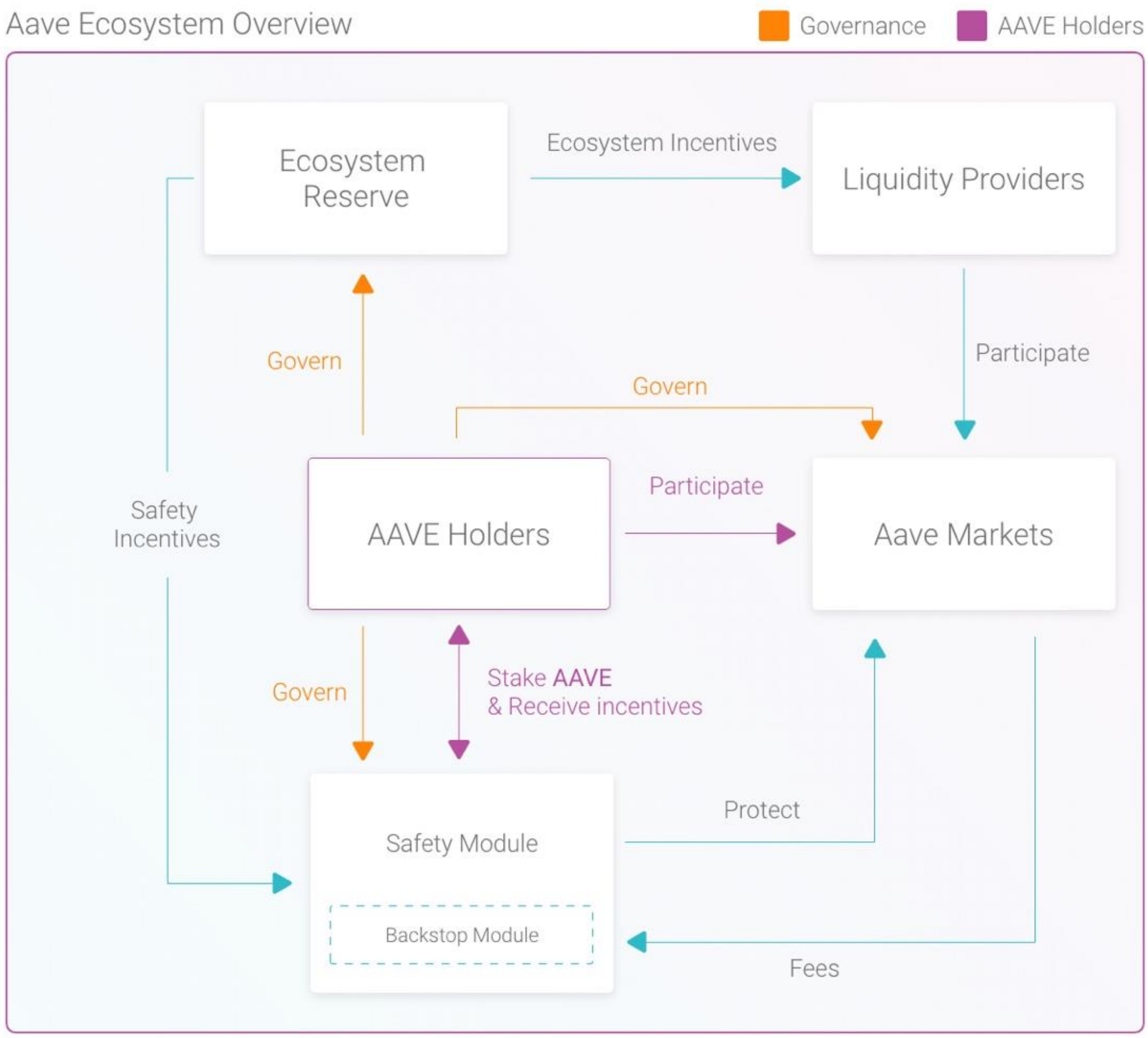
Source: Aave V2 Dashboard Beta: https://docs.google.com/spreadsheets/d/1TY_ai7vapncY66HUdkFp8G8W7owIQOS2lqTsdvqm6PY/edit#gid=0

Lenders and other aToken holders receive a variable interest rate. Each pool's Utilization Rate scales the sum of Stable and Variable rates. Then, the total interest is paid to aTokens at a ratio of 1 less the Reserve Factor. All aTokens accrue interest over the course of a deposit. Because they are transferrable, aTokens can be priced according to their expected interest over time. According to the Aave V2 Risk Assessment, aTokens should reflect both market and intrinsic value relative to their underlying assets. The study demonstrated that aDAI maintained an average 1% premium to DAI from August to November 2020.

Aave offers Flash Loans, or uncollateralized instantaneous loans that are borrowed and repaid within one block transaction, or roughly 15 minutes on Ethereum. Most Flash Loans are executed via smart contract or bot that automatically calls and repays the loan to support high-frequency or algorithmic trading strategy. Repayment includes all interest and fees accrued during the loan term in one transaction.

Governance

Users of Aave govern the protocol with the AAVE token and a decentralized process. Governance participants make decisions for Aave's Insurance Pool, Money Markets, and Ecosystem Reserves. Governance controls these funds, which maintain the protocol's autonomy and operational functions over the long term. This governance model was proposed and passed as "Aavenomics," to include all incentives, structures, and procedures in one decentralized framework. At its center, AAVE holders, "bear the risk of the protocol," and are rewarded for their efforts to, "ensure the safety of the Aave Protocol, cost-efficient usage by the market participants, and proper ecosystem incentives to drive innovation and long-term growth of the ecosystem." Governance and AAVE incentives align participant interest to perpetuate the protocol without intermediaries or managers.



Governance participants must stake AAVE to vote on proposals. Votes require stkAAVE, or the redemption token that represents the participant's principal staked AAVE. Any stkAAVE holder can vote, and stkAAVE is fully transferrable. This means that stakers can transfer or delegate their stkAAVE, and voting power, to other participants without sending them their principal AAVE.

Tokenomics

Token utility

Besides creating and voting for Aave Improvement Proposals, AAVE tokens mitigate Money Market risks. Investors are rewarded for locking AAVE into the protocol's Safety Module smart contract. In the event of rapid or persistent asset shortfalls in any Aave Money Market, the Safety Module systematically auctions locked AAVE in exchange for the required digital asset. Like liquidations, the Safety Module only auctions the necessary AAVE amount to cover the shortfall. Recovery Issuance can be triggered by an emergency governance process to mint and liquidate new AAVE if the Safety Module auction is insufficient to cover a shortfall. A staker must exchange their stkAAVE to withdraw their principal, however, they can withdraw AAVE rewards at any time. This means that stkAAVE does not accrue rewards and only represents staked AAVE.

Token supply and distribution

Upon release, AAVE was allocated to secure both short- and long-term protocol objectives. The entire 16 million AAVE supply was minted at launch, with three million saved in the AAVE reserve for protocol development and growth. The remaining 13 million will be distributed to participants for providing liquidity, participating in governance, and securing the protocol's financial health. The issuance rate was initially set at 550 AAVE daily to all AAVE stakers and is adjusted quarterly by governance, if necessary. At any time, stakers can withdraw their AAVE rewards, however, unstaking requires a seven-day cool-down period before unstaked AAVE principal is released. By distributing AAVE to participants, the protocol primarily incentivizes users to participate in governance.

Value accrual

Currently, Aave investors have two staking options for additional AAVE yield. Token holders can deposit and stake AAVE in the Safety Module for 6.4% annualized return. Also, they can stake AAVE in the Balancer Safety Module Pool, then deposit the Balancer Pool Tokens, or BPT, back into the Aave Safety Module smart contract for a total 14.2% yield.

Staked AAVE Tokens and Returns

Name	Symbol	APY	Amount	USD Price	USD Value
Staked AAVE	stkAAVE	6.37%	3,147,230.77	287.04	903,367,051
Staked AAVE Balancer Pool Token	stkABPT	14.19%	1,171,555,154.87	0.35	405,938,773

Source: Aave V2 API: https://aave-api-v2.aave.com/#/data/get_data_pools

Both strategies increase an investor's AAVE position. No AAVE holders receive dividends or rewards without staking in one of the strategies offered.

Competitive landscape

MakerDAO, Compound, and the Terra protocol, Anchor, all follow Aave in TVL. As noted in our MakerDAO research, the protocol aggregates collateral to issue the DAI algorithmic stablecoin. Because its entire purpose is USD-pegged asset issuance, MakerDAO can be considered infrastructure, or something resembling a central bank. Compound, however, is Aave's direct competitor on Ethereum. Beyond Ethereum, the two protocols occupy different spaces. Compound's multi-chain strategy involves a Compound-specific blockchain without Layer 2 or other Layer 1 development. Compound's goal is to make future Compound markets to interoperable on all networks. Anchor is a new protocol on the Terra blockchain. While fast growth propelled Anchor to the top of the segment, Anchor is still in initial phases. The project accepts only staked LUNA and ETH collateral to issue UST stablecoin debt on Terra. Until Anchor offers more collateral, it's likely to resemble MakerDAO for the long term.

Aave launched on Ethereum Layer 2, Polygon, and the Ethereum-compatible Avalanche blockchain to facilitate demand for leverage across networks. This reflects Aave's strategy to specialize in money markets and let the Layer 1 networks specialize in throughput and security. With a specialization strategy, Aave is positioned to optimize borrowing and lending wherever demand grows.

MC/TVL among Top B&L Protocols

	AAVE					Comparables		
	High	Low	Med	Avg	10/12/21	MKR	COMP	ANC
MC/TVL	1.63x	0.25x	0.56x	0.65x	0.26x	0.16x	0.18x	0.10x

Comps from DeFi Llama, accessed 10/12/21: https://defillama.com/home

Aave's Market Capitalization to TVL ratio aligns with the DeFi Lending segment. Ahead in TVL, Aave's multiple reflects its position atop TVL rankings. Strict focus on DAI is likely responsible for MakerDAO's lower multiple relative to Compound. Anchor's similarities to MakerDAO unproven platform could limit its value into the future.

With a wider variety of asset Money Markets, Aave maintains a comprehensive risk management methodology to protect the protocol. Each market's asset is analyzed for smart contract security and counterparty risk before a market is established or the asset is approved for collateral. Then, risk management analyzes market risk for each asset to determine liquidity and utilization within the protocol. Aave's risk management framework was developed by a third-party firm and is maintained by designated governance participants and developers. A sophisticated risk management framework provides Aave a competitive advantage because it enables more asset markets with higher resiliency than competitors.

Recommendation

As the Lending leader, Aave reached mainstay status in DeFi across viable networks. Like other protocols previously covered, such as Curve and Yearn, Aave's launch on other Layer 1 and Ethereum Layer 2 networks signals a benchmark level of liquidity for that network. Aave's development community demonstrates a successful balance between protocol stability and market variety with strong risk management. Altogether, Aave is the best positioned Lending protocol for future growth and sustainable lender yield across DeFi.

The AAVE token's lack of dividends to holders supports Aave's prospects. The protocol's rewards align user, developer, and investor interests to stabilize the protocol and maintain high valuations relative to peer protocols. The most lucrative AAVE investment strategy is staked in one of two strategies on Aave. Likewise, the best use of AAVE for the protocol is to capitalize the Safety Module for an ample contingent liquidity. Stronger emergency measures bolster a sophisticated risk management, which drives investor confidence over the long term. Aave's model demonstrates sustainable positive feedback.

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