Whitepaper

Bringing uncollateralized Lending to DeFi

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Abstract: This document describes the definition and theory behind the Atlendis Protocol V1.

Contents

1 Introduction

A recent development within DeFi is the emergence of protocols that facilitate programmatic borrowing and saving. Such protocols represent a significant advancement for DeFi due to the importance of these operations to an economy. Access to loans enables a borrower to consume more than their income would permit today, and to pay back the loan when their income is higher. However, in the context of DeFi, this does not hold. Current DeFi lending protocols only offer secured lending, where agents can only borrow an amount provided they can front at least the same amount as collateral. Therefore, the extent to which lending protocols facilitate true borrowing where an agent gets into a position of net debt is limited, creating a gap with CeFi offerings [1]. The Atlendis protocol is here to help close this gap.

DeFi lending platforms such as Compound, Aave, and Maker have created a solid foundation that allows cryptocurrency holders to earn high interest rates in a permissionless manner. However, there is a massive opportunity for uncollateralized loans to yield even higher interest rates than existing collateralized lending protocols. These rates should be higher than what is currently available in DeFi, primarily because DeFi today almost exclusively addresses collateralized lending that comes with a lower risk.

Over-collateralization of loans significantly reduces borrower's default risk. Aave, Compound, and Maker have proved their robustness to default even in situations of price turmoil. In the case of uncollateralized loans, the risk of default increases significantly. Some protocols are building sophisticated tools to analyze individuals' behavior in order to compute their credit score. The best starting point for uncollateralized loans would then be to start with renowned and audited organizations evolving in the crypto space. Having their reputation at stake considerably lowers the risk of default.

2 Atlendis Protocol

Atlendis is a capital-efficient DeFi lending protocol where organizations evolving in the crypto space such as protocols, DEXes or DAOs can get access to uncollateralized lines of credit. Atlendis is targeting entities with regular and short term liquidity needs. Similarly to a **revolving line of credit**, the Atlendis protocol allows entities to borrow i.e. issue bonds as many times as they need, up to a preset borrowing limit, without any collateral. The borrowing rate is discovered via a limit order book specific to each borrower. The rate is fixed at borrowing time and does not change throughout the duration of the bond, however, it can differ from one bond issuance to the next. The funds are not shared among borrowers and liquidity providers choose their own lending rates, therefore, liquidity providers are only exposed to their chosen borrowers and keep ownership over their investment profile.

2.1 Atlendis' Pools

2.1.1 Set of Ticks

Atlendis' **liquidity pools** are split into multiple ticks. A **tick** is a sub-pool of funds within the borrower's pool that corresponds to a specific lending rate. When adding liquidity to the pool, **liquidity providers** are able to choose their lending rate and their funds are then placed into the corresponding tick. For instance, if a liquidity provider is willing to lend to a borrower at 5%, their funds will be placed in the 5% tick.

Here is a visual representation of a borrower specific pool:

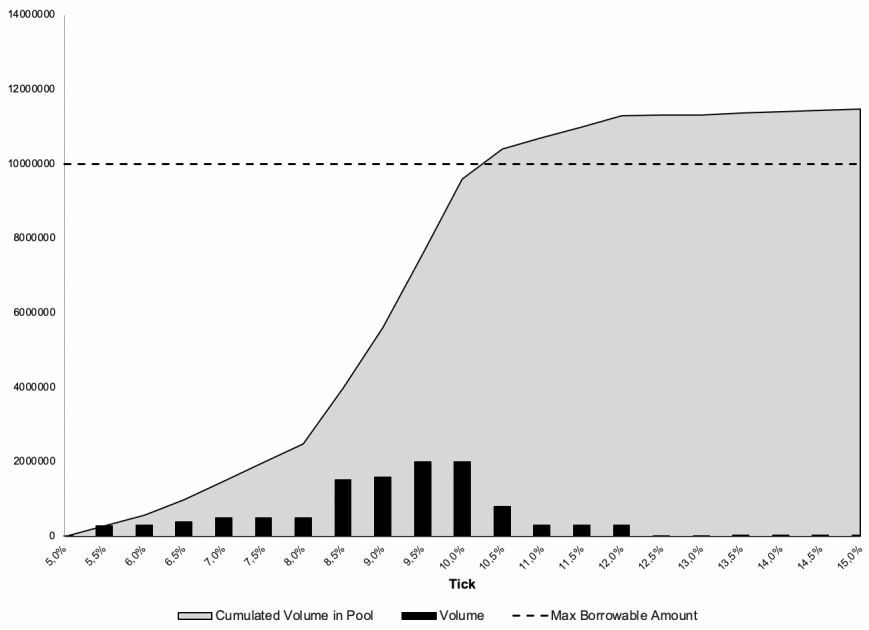

Figure 1: Borrower's Pool and Composing Ticks

The pools are not limited in size, therefore, any lender can add liquidity to the pools and challenge the lending rates. The purpose of these pools is to offer revolving lines of credit to borrowers, meaning that they can repeatedly borrow digital assets from their pool up to a preset limit. As soon as the debt is repaid, the borrower can borrow up to their credit limit again without going through another whitelisting process. Some specificities of the Atlendis protocol's line of credit versus a traditional line of credit, are that the borrower issues bonds, the repayment time is fixed at borrowing time, and the full borrowed amount plus interest is repaid at maturity.

2.1.2 Pool Specificities

Each pool has its own specificities fixed in accordance with the borrower. The choice of these parameters influence the liquidity providers' behavior with the pool.

Borrower Specific Pools

The pools are borrower specific meaning that the funds are not shared between multiple borrowers. However, the borrowers are entitled to open multiple pools to satisfy multiple liquidity needs.

Assets in the Pool

Each pool is composed of only one type of asset, for instance ETH, or USDC. If a borrower wants to borrow two different types of assets, they will have to open two separate pools.

Bond Maturity

Borrowers are able to borrow multiple times from their pool, but are only able to issue bonds with a preset maturity. For instance, a borrower can only issue bonds with maturity of one month. The maturity is fixed by the borrower at the pool's creation, and it is different for each borrower.

Maximum Borrowable Amount

The maximum borrowable amount corresponds to the maximum amount of funds that the borrower is allowed to borrow from their pool. Note that the pools are not limited in size, and are not capped at the maximum borrowable amount, to allow any liquidity provider to challenge the best lending rates of the pool.

Minimum, Maximum Tick and Rate Spacing

The lending rates selected by liquidity providers when depositing into the pool must remain within a preset range. A specific rate spacing between two ticks is implemented. A low rate spacing gives more flexibility to the lenders, but increases the amount of gas costs paid by the borrower when borrowing from their pool.

Liquidity Rewards

The **liquidity rewards** (also called **liquidity fees**) reward liquidity providers for providing borrowable liquidity. They are paid by the borrower and are distributed to liquidity providers when their capital is not actively loaned out. The liquidity fees are fixed with each borrower and correspond to a $\%$ liquidity fee rate applied on the maximum borrowable amount.

The liquidity fees are only paid on unused capital, meaning that if the borrower borrows the totality of their authorized capacity, they will not pay liquidity fees until repayment.

The liquidity fees are paid upfront at the pool's creation time and are distributed to liquidity providers in a trustless manner while the amount of liquidity rewards last. The first upfront payment is mandatory at pool creation time, but additional top ups remain optional and are a way for borrowers to incentivize liquidity in their pool.

The liquidity rewards are distributed among liquidity providers proportionately to the amount of liquidity provided. The payment and distribution of liquidity rewards are further detailed in section 3.1.

Cool Down Period

To be able to borrow again, the borrower must respect a cool down period between two successive borrowings, enabling liquidity providers to withdraw without obligation to be involved in the next loan. The length of the cool down period is a characteristic of the pool.

Late Repayment Fee

In the event of late repayment, a penalty fee will be paid by the borrower to discourage late repayment.

2.2 Providing Liquidity on the Atlendis protocol

Funds are not shared among borrowers, pools are borrower specific, thus liquidity providers select the borrowers they are willing to lend to. Lending to n borrowers requires lenders to deposit n times. A lender's **position** in the pool is represented by an NFT with original art work.

While depositing, the liquidity providers fix the rate at which they are willing to lend at. Depending on the chosen lending rate, the funds will be placed in the corresponding tick. The rate chosen by the liquidity provider must remain in a range between r_{low} and r_{high}. The range of rates are borrower specific.

Until the funds are used by the borrower, idle capital is placed on **Aave** which constitutes a third-party liquidity protocol. The lenders can benefit from Aave's APY and simultaneously earn additional liquidity rewards from the Atlendis

protocol. Once funds are borrowed by the borrower, the liquidity providers then get their chosen lending rate on their used capital.

As liquidity providers individually select their borrowers and set their lending rate, they are able to choose the amount of risk they are willing to take for the level of potential return. Lenders have granular control over their portfolio and keep ownership of their investment profile.

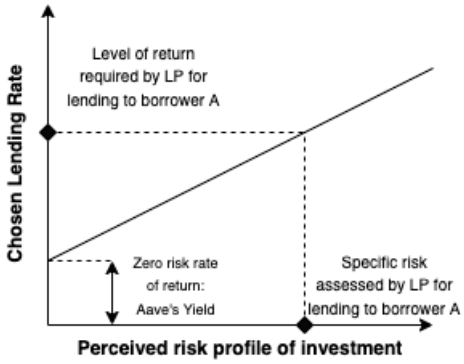

Figure 2: Risk Assessment

2.3 Borrowing on the Atlendis protocol

2.3.1 Bond Issuance

At any moment in time, the borrower can use their line of credit and borrow funds from the pool up to the preset credit limit (i.e. maximum borrowable amount). The **bond issuance time** is defined as the moment when the borrower uses their line of credit, i.e. borrows from their pool. The **bond maturity** of the bond is set at the pool's creation time, and cannot be changed from one bond issuance to the next.

2.3.2 Zero-Coupon Bonds

The borrower pays back the borrowed amount plus interest at maturity, and does not pay interest during the life of the bonds. Hence, the borrower issues **zero-coupon bonds**. The amount paid at maturity is called the face value of the bond. The amount borrowed corresponds to the face value discounted with the borrowing rate.

For instance, if a borrower borrowed 100 at $t = 0$ and paid back 106 at $t = 1$ year, the borrower sold a zero-coupon bond with a **face value** of 106 at a 6% discount. The bond holder realizes their 6% profit at maturity when the face value 106 is paid back.

2.3.3 Successive Bond Issuance

For each pool, the borrower can only borrow once at a time and has to pay back the total amount at maturity. Similarly to a revolving line of credit, once repaid, the borrower is able to borrow again from their pool as many times as they need. However, the borrower must respect a short cool down period between the issuance of two bonds to allow **matched liquidity providers** to exit the pool.

2.3.4 Fixed Borrowing Rate

The borrower is the price taker and the borrowing rate depends on the order book, but it is fixed at bond issuance time. The borrower knows upfront how much they will have to pay back at maturity. The borrowing rate is thus fixed. The rate discovery is further detailed in section 2.5.

2.4 Transposing Ticks into a Limit Order Book

Each borrower has their own limit order book that is used at bond issuance time to determine the borrowing rate, enabling a fair rate discovery. The limit order book on the Atlendis protocol is just on the bid side. Borrowers are the price takers.

2.4.1 Derived Bid Prices

The limit order book on the Atlendis protocol is a transposition of the pool's ticks. It is not constructed by stating a bid price, but instead by stating a lending rate. As the borrower only issues zero-coupon bonds with fixed maturity, the chosen rate can be used to compute implied bid prices and the amount of deposit divided by the derived price determines the buyable quantity. The price of a zero-coupon bond can be calculated as:

$$\text{Price} = F/(1+r)^n$$

where:

$$\begin{cases} \text{F is the face value of the bond} \\ \text{r is the required rate of interest} \\ \text{n is the number of years until maturity} \end{cases} \tag{1}$$

2.4.2 Order Book

Depositing into a pool can be perceived as placing a pending buy limit order to buy future bonds. For instance, a liquidity provider who deposits in the 5% tick wishes to make a return of 5% on their investment. They are thus willing to buy a zero-coupon bond with a face value of 105 expiring in 1 year at a price of 100 today.

The implied bid prices and quantities are automatically computed at bond issuance time depending on the set maturity.

Considering the following borrower's pool and composing ticks:

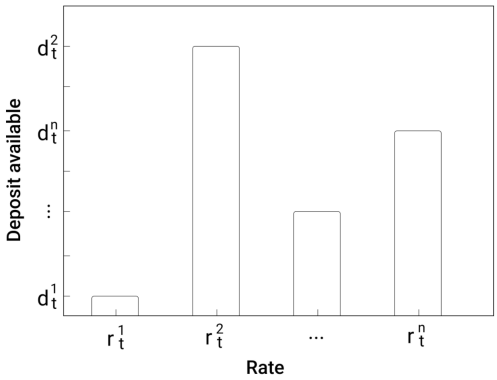

Figure 3: Borrower's Pool and Composing Ticks

The following bid order book can then be derived for bonds with maturity T:

Side	Rate	Deposit Available	Derived Price	Derived Buyable Quantity
bid	r_t^n	d_t^n	p_t^1	q_t^1
bid	$\vdots$	$\vdots$	$\vdots$	$\vdots$
$\vdots$	r_t^i	d_t^i	p_t^i	q_t^i
$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$
bid	r_t^1	d_t^1	p_t^n	q_t^n

where:

- $p_t^i = 1/(1+r_t^i)^T$ is the derived price, and T is the maturity
- $q_t^i = d_t^i/p_t^i$ is the derived quantity,
- $0 \leq r_t^1 \leq r_t^i \leq r_t^n$,
- $p_t^1 \geq p_t^i \geq p_t^n \geq 0$,
- and $d_t^i \geq 0 \; \forall$ i in $[0, n]$.

2.4.3 Approximation

To avoid high gas fees, the bid prices are approximated using a First Order Taylor Series:

$$\frac{1}{(1+r)^T} = \frac{1}{(1+T\times r)}$$

where r is the rate per second and T is the number of seconds until maturity.

2.5 Borrowing Rate

2.5.1 Fixing Face Value

When a borrower issues a bond with a face value F, the borrower sells a quantity F of bonds. The bond issuance is a sell market order. The borrower is the price taker, they do not fix the price at which the bond is issued. It depends on the asked rates, the derived bid prices, and derived bid quantities of the order book.

Looking at the order book, it is sold at the highest price (thus corresponding to the lowest rate). The borrowing rate cannot change during the life of the bond. Any deposit or withdraw does not affect the borrowing rate. The borrower always repays the face value at maturity. The amount received by the borrower depends on the selling price.

Let t_0 be the bond issuance time, T the bond's maturity, F the face value of the bond and $q_b = F$ the quantity of bonds sold, the borrowing rate r_b set at bond issuance is the following:

$$r_b = min_{q_b^i} \sum r_t^i \times q_b^i$$

such that $0 \leq q_b^i \leq q_t^i$ and $\sum q_b^i = q_b$.

The borrower will have to repay F at maturity and receives:

$$\sum p_{t_0}^i \times q_b^i$$

at bond issuance.

Regarding the repartition of the quantity of bonds bought by liquidity providers within a tick, it is proportional to the amount provided to the tick at bond issuance. The quantity of bonds held by each liquidity provider is reflected in their position's NFT. Owning a quantity q of bonds they are entitled to receive q at maturity.

2.5.2 Fixing Borrowed Amount

Rather than stating their face value, most borrowers will want to state their borrowed amount K instead. The borrowing rate is simply the lowest volume-weighed rate that corresponds to the amount borrowed. In this case, the face value of the bond, i.e. the amount that should be repaid at maturity and the quantity of bonds sold is:

$$F = K \times (1 + r_b)^T.$$

To avoid high gas fees, the above formula is approximated using a First Order Taylor Series:

$$F = \mathrm{K} \times (1 + T \times r_b)$$

where r_b is the rate per second and T is the number of seconds until maturity.

2.5.3 Illustration

For illustration purposes, coming back to the example of a borrower with a maximum borrowable amount of $10,000,000$, if the borrower wants to borrow $4,000,000$, they will sell their bonds to the liquidity providers who deposited in the ticks inside the dotted rectangle. The other liquidity providers will continue accumulating liquidity rewards and simultaneously benefiting from Aave's APY.

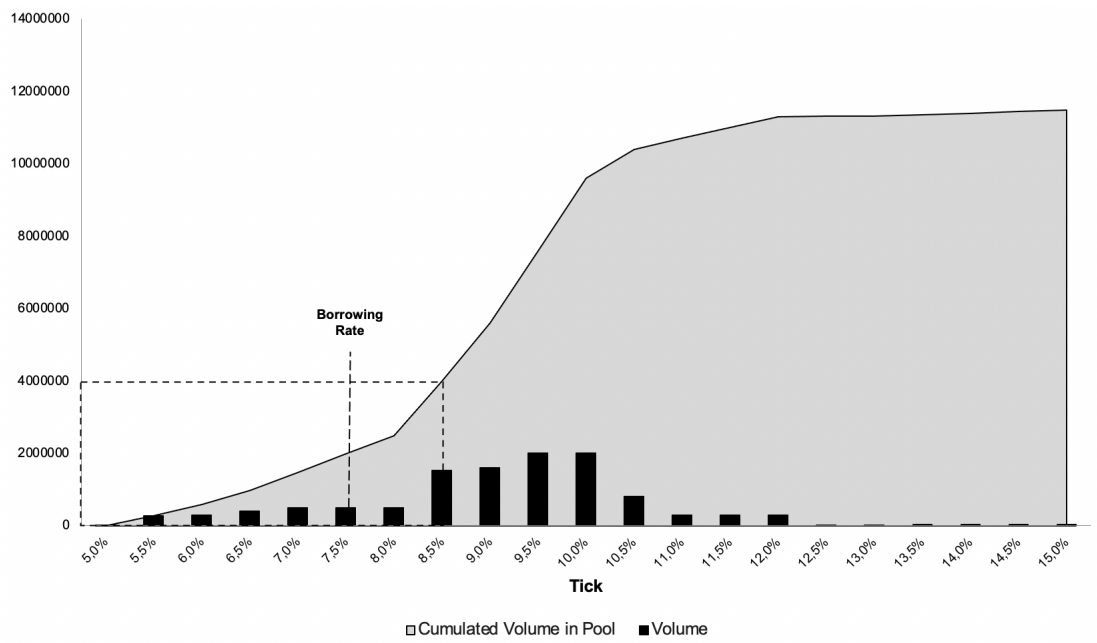

Figure 4: Representation of matched liquidity providers at bond issuance

2.5.4 Fair Rate Discovery

As the Atlendis protocol is meant for uncollateralized borrowing and different types of borrowers with various use cases and levels of risk, setting rates in an algorithmic manner based on liquidity only would not properly reflect the level of risk that the lenders are taking. This is the reason why liquidity providers have the possibility to set their own rate, i.e. to be able to choose the amount of risk they are willing to take for the level of potential return. Therefore, lenders are able to make their own risk assessment and select the rate at which they are willing to lend for the level of risk that they have evaluated.

Since the pool is open, any liquidity provider can deposit into the pool and compete to provide the best rates, creating market dynamics and giving access to a fair **rate discovery** for borrowers. In the long run, the pool should converge to its optimal state in terms of both volume and rates.

2.6 Repayment

Let's consider a borrower that issues a bond at 12:00 AM on day 0 with a maturity of T = 90 days. The bond expiration date is *Day T at 12:00 AM*. The repayment period and recovery period are flexible parameters and are characteristics of the pool. For the purpose of this example, we will consider a repayment period of 24 hours and a recovery period of 10 days.

The repayment is structured in three distinct phases:

Repayment Period - *From day T at 12:00 AM to day (T+1) day at 12:00 AM.*

The borrower has 24 hours to repay the totality of the bond.

Recovery Period - *From day (T+1) 12:00 AM to day (T+10) 12:00 AM*

- Initialization of the recovery procedure
- Bond can be repaid, but late payment fees will be applied
- Borrower is considered as delinquent and this will be marked in their Atlendis credit history

Default Declaration and Loss Recovery - *From Day (T+10) 12:00 AM and onwards*

In the absence of repayment after 10 days, The default will be publicly shared on Atlendis' website and via a press release. The borrower will not be able to interact with their pool, and the liquidity providers with unused capital will be able to withdraw their funds.

Note that the different parameters such as length of repayment and recovery period, depend on the bonds' maturity.

2.7 Liquidity Provider's Positions

2.7.1 States of Liquidity Provider's Funds

By depositing into a borrower's pool, the liquidity provider is providing potential liquidity to the borrower, thus the lender is entitled to earn liquidity rewards on their capital even while it is not borrowed. Once the borrower uses their line of credit and borrows from their pool, the amount borrowed and the liquidity provider's chosen rate will determine the quantity of bonds that the liquidity provider is able to purchase at bond issuance time.

The liquidity provider's funds can be:

- Fully loaned out, thus benefiting from the chosen lending rate.
- Partially loaned out, thus realizing the desired rate on the loaned out capital and benefiting from Aave's yield, as well as the liquidity rewards distributed by the borrower on the unused funds.
- Not loaned out, benefiting from both Aave's yield and from the liquidity rewards paid by the borrower.

As the capital that is not being loaned out is used to provide liquidity on Aave and can earn additional liquidity rewards, the lowest yield on the Atlendis protocol is strictly higher than Aave's yield, even if the funds are not currently being used by the borrower (provided that there is no sudden jump in rates and that the order book's minimum rate remains higher than Aave's current APY). The choice of Aave as a third-party yield provider is based on its established reputation as an audited, high-interest rate and low risk protocol.

2.7.2 NFT Position Description

Each liquidity provider's deposit on the Atlendis protocol is characterized by a position. The positions are represented by an NFT with original artwork.

The liquidity provider's positions are characterized by:

- Chosen lending rate
- Amount of bonds held, for instance, owning a quantity 100 of bonds entitles the lender to receive 100 at maturity.
- Unused deposit amount, represents the amount of deposit placed on Aave and earning additional liquidity rewards paid by the borrower. There are actually two types of unused deposit, this is further detailed in section 2.8.2. Unused deposits can be withdrawn at any time.

The positions are ERC-721 and possess all the functionalities inherent to this standard.

2.8 Earning Interest on the Atlendis protocol

Liquidity providers on the Atlendis protocol are able to earn interest from three sources:

- Aave's yield.
- Liquidity rewards paid by the borrower.
- Actively lending to borrowers at the chosen lending rate.

2.8.1 Aave's Yield

Idle capital is placed on Aave. The earned interest on Aave is integrated into the liquidity provider's position on the Atlendis protocol, enabling them to increase their exposure and earn additional interest.

2.8.2 Liquidity Rewards Earnings

The liquidity provider accumulates liquidity rewards paid by the borrower on their capital that is not actively loaned out. To come back to the example represented in Figure 4, only the liquidity providers who deposited outside the dotted-rectangle accumulate liquidity rewards on top of Aave's APY.

Liquidity providers start to accumulate liquidity rewards paid by the borrower once their funds have been exposed to being borrowed. Therefore, liquidity providers who deposit while the borrower is not currently borrowing from the pool, accumulate liquidity rewards from day one. However, in case liquidity providers deposit while the borrower is currently borrowing from their pool, lenders will only start to accumulate liquidity rewards once the bonds have been repaid.

This is to prevent liquidity providers from providing liquidity only when their funds cannot be borrowed, in order to accumulate liquidity rewards by retrieving their funds right after repayment. This would create artificial liquidity that would be detrimental to the pool's dynamics.

We can thus differentiate two types of unused deposits:

- **Remaining deposit** represents the amount of deposit placed on Aave and earning additional liquidity rewards from the Atlendis protocol.
- **Pending deposit** represents the amount of deposit placed on Aave but not earning additional liquidity rewards from the Atlendis protocol as it has not yet been exposed to any potential borrowing. Once exposed to a potential borrowing, the pending deposit becomes remaining deposit.

The NFT positions can thus be in four states as they can be composed of:

1. Only a certain quantity of bonds, i.e. fully loaned out
2. A certain quantity of bonds and remaining deposit
3. Only remaining deposit
4. Only pending deposit

2.8.3 Realized Interest on One Bond Issuance

A liquidity provider who deposited at a rate r and bought q bonds realized the following PnL at bond maturity:

$$\text{PnL}_{0\to T} = q \times (1 - \frac{1}{(1+r)^T})$$

Bond holders are thus able to realize exactly their desired return on their loaned out capital. Coming back to figure 4, the liquidity providers who are **bond holders** correspond to the ones who deposited in the dotted rectangle.

Note that the existing bond holders are not diluted by new liquidity providers depositing into the pool. The new liquidity providers will have to wait for new bonds to be issued in order to acquire bonds, even if they deposit in the dotted rectangle. They could however, purchase some NFT positions if they are for sale on other NFT marketplaces, such as OpenSea.

2.8.4 Compounded Interest on the Atlendis protocol

Interest on the Atlendis protocol is in fact **compounded interest** as interest earned on one bond at bond repayment, interest earned on the third-party yield provider, as well as the earned liquidity rewards, are added to the lender's deposit and thus are available for the next borrowing.

If a liquidity provider deposited a quantity M at time $t = 0$ in a pool and chose a lending rate r, their retrievable deposit at time $t = N$ corresponds to:

$$M_N = \int_0^N M \times exp((\lambda_{\text{t,loaned}} \times r + \lambda_{\text{t,unused}} \times r_{\text{t,Aave}} + \lambda_{\text{t,unused}} \times r_{\text{t,liquidity rewards}}) \times t)dt$$

where:

$$\begin{cases} r_{\text{t,Aave}} \text{is the rate on Aave at time t} \\ r_{\text{t,liquidity reward}} \text{is the return coming from liquidity rewards at time t} \\ \lambda_{\text{t,loaned}} \text{ is the portion of deposit actively loaned out at time t} \\ \lambda_{\text{t,unused}} \text{ is the portion of unused deposit placed on Aave and benefiting from the liquidity rewards at time t} \end{cases} \tag{2}$$

3 Risk Framework

3.1 Liquidity Risk

As any DeFi protocol, the Atlendis protocol faces liquidity risk. A lack of liquidity on the Atlendis protocol would restrict borrowers in their borrowing capacity, limiting the possibility for lenders to effectively lend their funds. Two components will allow the mitigation of liquidity risk.

3.1.1 Setting Lending Rate Range

A possible issue with the Atlendis protocol would be that lenders do not offer rates that are satisfactory for the borrower or in the same way, borrowers expect rates that are too low. In that case, the pool would be stuck in a status quo, funds would not be used as expected, and ultimately both borrowers and lenders would lose interest for the Atlendis protocol.

To address this potential issue, the upper and lower bounds of the lending rates will be set by the borrower at the pool's creation time.

3.1.2 Liquidity Rewards

Liquidity Rewards Payment

At the pool's creation time, the borrowers define a **liquidity rate** that will determine the amount of liquidity rewards that will be distributed to their liquidity providers. The amount of liquidity fees (also called liquidity rewards) paid by the borrowers corresponds to the liquidity rate applied to the difference between the maximum borrowable amount and the currently borrowed amount. Hence, even if their funds are not actively loaned out, liquidity providers are rewarded for providing borrowable liquidity.

The amount of liquidity rewards distributed per second corresponds to:

$$\text{liquidity rate per second} \times (\text{max borrowable amount - amount borrowed})$$

The liquidity rewards incentivize liquidity when the borrowers might need it the most i.e. when they are not already borrowing from their pool. On the other side, lenders know that either the borrower will borrow their funds, or they will earn liquidity rewards in addition to Aave's yield, so there is no missed opportunity cost for them. This should help align the incentives for both borrowers and lenders on the Atlendis protocol.

Note that the liquidity fees are paid upfront at the pool's creation time and are distributed to liquidity providers in a trustless manner while the amount of liquidity rewards last. The first upfront payment is mandatory, but additional top ups remain optional and are a way for borrowers to incentivize liquidity in their pool.

Liquidity Rewards Distribution

As the amount of distributed liquidity rewards are not a function of the total amount available in the pool, at the liquidity provider's level, they decrease with liquidity. This means that the liquidity rewards earned by liquidity providers are high when liquidity is low, and low when liquidity is high. In the long run, the pool should converge to its optimal state in terms of both volume and rates.

Here is a representation of the distributed liquidity rewards per unit of funds available in the pool, assuming a maximum borrowable amount of $1,000,000$, 2% liquidity fees, and the borrower not currently borrowing from their pool:

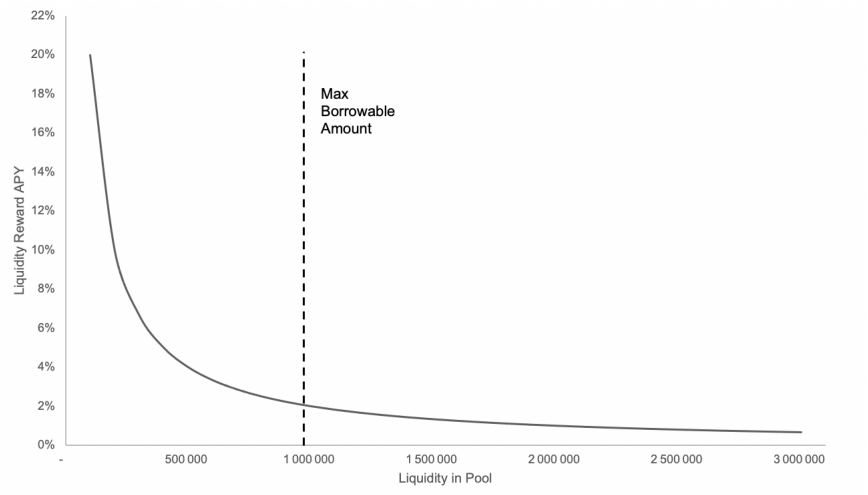

Figure 5: Liquidity Reward APY vs Liquidity in Pool

3.2 Credit Risk

As an uncollateralized lending platform, the Atlendis protocol implies a higher credit risk than its over-collateralized counterparts. Different components allow the mitigation of credit risk on the Atlendis protocol.

3.2.1 Whitelisting of Candidates

Only institutional borrowers will have the ability to be whitelisted on the Atlendis protocol, and having their reputation at stake should lower the risk of default.

3.2.2 Granular Control

On the Atlendis protocol, lenders can individually choose their borrowers. They do not need to expose themselves to undesired risk from defaults, as a result of being outvoted during the loan approval. Lenders can also select their preferred lending rate, based on their own risk assessment and their investment profile. Therefore, lenders keep control over their investment portfolio and risk profile.

3.2.3 Diversified Portfolio

By enabling liquidity providers to lend to a multitude of borrowers, the Atlendis protocol allows the mitigation of credit risk, giving liquidity providers access to diversified exposure.

3.2.4 Terms of Use

In order to be able to use the Atlendis protocol, all users (both borrowers and lenders) must agree to the terms of use of the Atlendis protocol.

The terms of use define who is legally permitted to use the services provided by the platform and how these services can and cannot be used. For example, it is prohibited to use the Atlendis protocol in order to pay for, support, or otherwise engage in any illegal activities including, but not limited to, fraud, illegal gambling, money laundering, or terrorist activities.

The terms of use also include a code of conduct for borrowers that prohibit them from, among other things, engaging in abusive lending practices (fraudulent, manipulative, or deceptive) in order to execute transactions that otherwise would be prohibited.

These terms of use are thus meant to reduce the risk of malicious use of the Atlendis protocol by borrowers and the credit risk associated with it.

3.2.5 Loan agreement

Peer-to-peer loans of digital assets through the Atlendis smart contract are subject to a loan agreement between the lender and the borrower.

The loan agreement shall comply with the standards of the Atlendis protocol specified in the terms of use of the platform.

In the event of default by the borrower to comply with their repayment obligations under the loan agreement, the lender shall be entitled to all legal recourses provided for by the law applicable to this agreement.

3.3 Market Risk

As unused capital is placed on Aave, any event on Aave will directly affect the Atlendis protocol. Decentralized lending platforms face a number of risks that are more complex than those faced by their centralized counterparts. Aave enumerates the primary sources of market risk within its protocol [2]:

- Shocks to market prices of collateral that cause the contract to become insolvent due to under-collateralization.
- Loss of liquidity in an external marketplace, leading to a liquidator being disincentivized to liquidate defaulted collateral.
- Cascades of liquidations impacting external market prices which in turn lead to further liquidations (i.e. a deflationary spiral).
- Insolvency of the safety module due to extreme events where multiple collateral types concurrently fail to be liquidated.

Aave's sources of risk are direct sources of risk for the Atlendis protocol and the same applies to other affiliated protocols.

Glossary

Aave third-party yield provider where not actively loaned out funds are deposited. 6

bond holders liquidity providers who are currently holding a quantity q of bonds and entitled to receive $q\times$Face Value at maturity, also called matched liquidity providers. 12

bond issuance time date at which the borrower borrows from their pool. 7

bond maturity the maturity date is the date on which the bond will mature and the bond issuer will pay the bondholder the face value of the bond. 7

compounded interest compound interest (or compounding interest) is the interest on a deposit calculated based on both the initial principal and the accumulated interest from previous periods. 12

face value amount repaid by the borrower at maturity. 7

liquidity fee also called liquidity reward, potential additional reward paid by the borrowers and earned by the liquidity providers to reward them for providing borrowable liquidity. It is a way for borrowers to incentivize liquidity in their pool(s). 6

liquidity pool each borrower has access to a dedicated pool that they can withdraw from. The liquidity providers willing to lend on the Atlendis protocol deposit into these pools. 5

liquidity provider lender on the Atlendis protocol who deposits funds into the borrower's pools, also referred as LPs or lenders. 5

liquidity rate fixed percentage applied on the difference between the maximum borrowable amount and the current borrowed amount that enables to compute the amount of payable liquidity rewards. 13

liquidity reward also called liquidity fee, potential additional reward paid by the borrowers and earned by the liquidity providers to reward them for providing borrowable liquidity. It is a way for borrowers to incentivize liquidity in their pool(s). 6

matched liquidity providers also called bond holders, liquidity providers who are currently bond holders. 7

pending deposit represents the amount of deposit placed on Aave but not earning additional liquidity rewards from the Atlendis protocol, as has not yet been exposed to any potential borrowing. 12

position result of a deposit action initiated by a lender, representing the liquidity provided to the order book. It can consist of deposited capital on the underlying yield provider and/or bonds issued during a borrowing period. 6

rate discovery process to determine the fair borrowing rate. 10

remaining deposit represents the amount of deposit placed on Aave and earning additional liquidity rewards from the Atlendis protocol. 12

revolving line of credit on the Atlendis protocol, borrowers are able to borrow as many times as they want from their pool up to the pre-set credit limit. They must, however, repay the totality of their debt before being able to borrow again. 5

tick a sub-pool of funds within the borrower's pool that corresponds to a specific lending rate. 5

zero-coupon bonds bond that does not pay interest, but instead trades at a deep discount, rendering a profit at maturity. 7

References

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