

# IPOR: an Inter-protocol Offered Rate for Decentralized Finance

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March 12, 2021

**Abstract:** An inter-protocol offered rate (IPOR) for blockchain based decentralized finance (DeFi) protocols would provide a robust foundation on which to build interest rate derivatives (IRDs). Current DeFi credit markets rely on crude mechanisms such as overcollateralized lending to mitigate default risk which is effective, but capital inefficient. The market is also immature, lacking a proper yield curve with interest rates by maturity, which is adamant for the valuation of fixed income instruments and pricing of its derivatives. IRDs could be used by investors to hedge or speculate on the interest rate risk, which would make markets more efficient by increasing the breadth of instruments while reducing the costs of financing. We borrow from the popularity and market function of decentralized liquidity pools to allow passive actors to contribute capital and earn yield as a reward for participation in market stabilization. While traditional IRDs require multiple parties<sup>2</sup> IPOR will leverage liquidity pools (pool) to build a liquid market requiring only one contract participant where the pool of decentralized liquidity providers (LP) acts as a collective counterpart. Assuming stablecoin issuance growth, a stable, predictable, and high-yielding DeFi credit market could allow traditional players access to this market, growing it by orders of magnitude from the current tens of billions to challenge traditional credit markets in the trillions.

## 1. Introduction

With more than a decade of development on blockchain protocols, consumer usage has increased significantly in recent years. In 2020 the Ethereum network surpassed Bitcoin in terms of on-chain fees earned by miners, a proxy for user adoption of smart contract technologies. The primary driver for on-chain transactions was DeFi which broadly describes financial applications built on a decentralized blockchain infrastructure. Often described as “money legos,” it consists of independent software modules that can be pieced together to form financial products such as asset exchange, lending, and other fintech applications.

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<sup>2</sup> example: an interest rate swap requires two borrowing parties to swap floating and fixed rates

DeFi lending and exchange applications in particular exploded in 2020 in both transaction volume and Total Value Locked (TVL) which refers to liquidity available across different platforms. TVL grew from approximately \$660 million USD at the start of 2020 and grew over 2,300% to \$15.39 billion by the start of 2021<sup>3</sup> and at time of writing sits at \$42.39 billion. TVL growth was primarily due to two factors: 1.) the appreciating price of the underlying tokens used for debt and exchange transactions, and 2.) the maturity and usability of consumer ready applications.

The usability of browser based wallets as well as gamified UI and UX likely contributed to the onboarding of non-technical users who could easily interact with blockchain applications for the first time with little technical know-how. The explosion of popularity of DEXes such as Uniswap and Sushiswap challenged centralized crypto exchanges for trading volume. The industry also grew due to new concepts such as yield farming, which has a broad range of applications from crude money market funds, to simple speculation on the price of the farmed asset. For the purpose of this paper, however, we will focus specifically on credit markets as they form the base of the financial system enabling economic growth by providing sources of liquidity for the borrower and income generation for the lender.

## **2. DeFi Credit Markets Overview**

### **2.1 Market Immaturity: Interest Rate Volatility and Unpredictable Liquidity**

While current DeFi markets have proved functional, they are still immature. At time of writing credit applications accounted for 44.7% of TVL of all DeFi (\$18.96 of \$42.39 billion), with the top three lending applications Maker, AAVE, and Compound comprising 94.7% of total lending TVL. Despite the market size, DeFi loans have much room for improvement as they currently have a very short floating rate, which is quite volatile, and lacks a traditional risk-free yield curve (a cornerstone of traditional finance) which is broadly used to discount future cash flows. Essentially lenders must guess what the effective rate for the loan would be.

In a single day APR can range unpredictably, leading to inability to calculate the true cost of borrowing in the short term, and infeasibility of predicting long term borrowing costs. The market currently lacks a credit yield curve to

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<sup>3</sup> <https://defipulse.com/>

predict short term rates (less than one year), and most DeFi loans are extremely short term compared to their traditional counterparts.

Future liquidity can also be difficult to predict, with utilization rates (the main factor in algorithmic interest rates) rising or falling with major market activities. Current DeFi lending markets rely on overcollateralization of loans where lenders typically post a crypto asset such as Ethereum (ETH) as collateral to borrow other assets such as USD stablecoins. When the market value of the collateral instrument increases, so does the borrowing liquidity which can in turn be used to speculate on rising asset prices. However, borrowers may not always have access to their desired liquidity. The free flow nature of blockchain systems enables lenders to move assets seamlessly between protocols seeking highest yield at the expense of borrowers who may not have guaranteed access to future liquidity on a specific platform or asset.

In order to establish a robust credit market, borrowers and lenders must be able to accurately calculate interest rates over the maturity of their desired loan. As the market matures and a yield curve can be established the industry could see longer loan duration, greater available liquidity, and reduced volatility.

## **2.2 Lack of Reference Market Interest Rate**

DeFi also lacks a reference interest rate. Borrowing rates are primarily determined algorithmically, where interest rates are calculated based on available liquidity and utilization rates within smart contracts and lending protocols. While algorithmic interest rates have been effective to bootstrap liquidity and provide base functionality to mimic market condition changes, the algorithms are limited by their own design parameters. Centralized crypto lenders match borrower and lender demand using a two sided market, however no such free market mechanism currently exists in DeFi lending.

## **2.3 IPOR: an Inter-protocol Offered Rate for Decentralized Finance**

We propose the creation of an Inter-protocol Offered Rate (IPOR) that reflects the true cost of borrowing across predominant DeFi lending protocols. The IPOR would be calculated in real-time from the smart contracts of prevailing credit protocols as a weighted average (with capped weights) as its own index to establish a transparent reference market rate. The IPOR will also be used to structure Interest Rate Derivatives (IRDs) which can be used by market participants to stabilize the cost of borrowing for debtors and fixed future income for creditors.

We believe the IPOR would serve as a reference risk-free rate ( $R_f$ ), reduce interest rate volatility, and increase market efficiency. With lower volatility, the cost of a loan or the return on a deposit could be predictable, able to meet expectations, making DeFi markets safer and attracting more participants. The possibility of locking rates using IRDs is another step towards market maturity, attracting institutional investors who need to be able to forecast yearly expected returns. In a world where banks no longer pay for depositors due to the negative rates policy established by Central Banks, a large amount of assets could migrate to DeFi once it could offer a more predictable rate backdrop and much higher returns than conventional bank deposits.

## **2.4 IPOR and the Stabilization of DeFi Credit Markets**

### **2.4.1 Market Transparency for all Actors**

The IPOR could act as a stabilizing factor for DeFi credit markets. Through rate transparency borrowers and lenders would be able to make informed assessments of credit terms between lending protocols. If borrowers were to converge on platforms with the most competitive rates it could align liquidity provision with credit demand providing better predictable liquidity on these platforms.

### **2.4.2 Fixed Income, Fixed Borrowing Cost**

A transparent reference rate should lower volatility for all protocols, and we believe fixed-rate instruments with a defined maturity would naturally emerge from the fact that investors are more confident of the path and volatility of interest rates. We believe that initially terms no longer than a week would be used, and as investors embrace the concept maturities would naturally stretch into a proper yield curve. This process would also enable the valuation of IRDs, enable market participants to switch between floating and fixed rates when desired, lock a range of interest rates using a collar, and multiple other uses.

### **2.4.3 Interest Rate Derivatives**

The IPOR will be a driver for the decrease in interest rate volatility, which will naturally unfold into a yield curve that will become longer as it becomes more broadly accepted. The existence of the short-term IPOR with a fixed maturity (will develop further on the incentives to fulfill the contract term) will allow the existence of properly valued IRDs. The counterpart to the contract would be a decentralized liquidity pool which will be the counterparty for derivatives instruments such as interest rate swaps.

### 3. Interest Rates in Traditional Credit Markets

#### 3.1 History of Debt Markets and Interest Rates

Debt is the oldest form of financing, and is still the most important one today. Historical evidence shows that collateralized loans in pawn shops existed in China in the year 650 B.C., while the earliest evidence of joint stock companies dates almost two thousand years after that in France and Sweden<sup>4</sup>. Fast forward to present times and global debt across all sectors (households, corporates, government and financial institutions) summed to \$255 trillion at the end of 2019, over 3x the Global GDP in constant USD<sup>5</sup>.

Interest rates quantify the counterparty credit risk, i.e. the ability that the borrower has to fulfill their commitment and pay back the money to the lender plus the agreed upon interest. The riskier the borrower, the higher the rates, as the odds are also higher that the borrower wouldn't be able to pay and will try to restructure the agreement in less convenient terms for the lender.

By defining the terms of the contract and by assessing the creditworthiness of the counterpart (the role of rating agencies), generally the lender can expect fixed income during the term of the contract in the form of coupons and the repayment of the principal at maturity. This predictability of debt and coupons makes credit one of the most important instruments in global financial markets, as stocks don't have such characteristics (you don't sign an agreement to fix the price of the share and the dividends you will receive 2 years from now, for instance). Hence, financial institutions such as pension funds, insurance companies, and financial institutions rely on fixed income instruments for Asset-Liability Management, i.e., to match their future inflows against the expected outflows. E.g., if the actuarial calculations of a pension fund estimates that it will need \$10m to pay to pensioners in a given month, they will manage their credit asset book in order to receive that same amount in that same period.

IRDs are used to fine tune credit markets and are the bulk of the Global Derivatives Markets. A Portfolio Manager can use IRDs to swap interest rates from floating to fixed, which could adapt the characteristics of the credit to their needs. The portfolio manager, or anyone willing to bet that rates will go down, could enter an agreement to pay floating rates and receive fixed rates, making a profit out of it. IRDs are \$11.7trn out of the \$15.5trn global

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<sup>4</sup> Understanding the role of debt in the financial system. BIS <https://www.bis.org/publ/work479.pdf>

<sup>5</sup> Global Debt Monitor, IIF [https://www.iif.com/Portals/0/Files/content/Research/Global%20Debt%20Monitor\\_April2020.pdf](https://www.iif.com/Portals/0/Files/content/Research/Global%20Debt%20Monitor_April2020.pdf)

derivatives gross market value, and Interest Rate Swaps (IRS) are almost 90% of the IRDs. IRS sums up 2/3 of the global derivatives market value.

### **3.2 Benchmark Rates Overview**

Benchmark interest rates take different forms, but the most popular are Interbank Offered Rates (IBORs) and Overnight Financing Rates (OFRs). These benchmark rates are designed to reflect the fair market cost of borrowing capital over certain durations between a set of banks for specific assets (normally currency) and durations. Where a central bank may increase or decrease its interest rates to stimulate or slow economic growth, interbank rates are considered to be a fair market gauge of actual borrowing rates between financial institutions.

Risk-free rate ( $R_f$ ) for a specific currency is the rate offered by its respective government for lenders, so for USD it would be the Treasury rates offered to investors.  $R_f$  is everywhere in finance; it is the reference rate over which counterparty credit risk is priced on top of (credit spread), derivative payoffs are calculated, and an integral part of the cost of equity via the Capital Asset Pricing Model. The  $R_f$  is needed to discount future cash flows for valuation purposes and to gauge the time value of money and opportunity cost. For practical purposes, LIBOR is usually used as an approximation of that  $R_f$ , and it represents the interest rate a bank is willing to make a short-term deposit with other banks. These banks usually have the highest credit ratings possible for financial institutions, but it is an approximation, as there is a very small chance that for instance a bank with an “AA+” rating defaults, but nonetheless they represent the best creditworthiness.

### **3.3 LIBOR Calculation**

The LIBOR is a self reported rate calculated and published in a four step process conducted by the Intercontinental Exchange (ICE). 1.) The LIBOR is constructed from the survey of member banks self reporting lending rates across multiple short term durations from one day to one year for USD, EUR, GBP, JPY, CHF. 2.) The survey’s high and low figures are discarded, and 3.) the remainders are used to calculate the index using a volume weighted average price (VWAP), transaction based data, and expert judgement. 4.) The result is published at 11am BST during working days and is used as a benchmark to set interest rates for credit products ranging from retail mortgages and student loans to corporate fundraising and IRDs<sup>6</sup>. While LIBOR is used for short term durations less than 1 year, the products which reference it such as mortgage rates can span significantly longer durations.

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<sup>6</sup> <https://www.theice.com/iba/libor>

### 3.4 LIBOR scandal and fallout

The LIBOR is currently being phased out and will cease to be published on December 31, 2021. The rate was found to be manipulated from inside the reporting institutions, and is regarded as the largest rate fixing scandal in history by several orders of magnitude. The LIBOR came under fire in 2012 when the Financial Times reported that the rate had been manipulated likely since as early as 1991 by traders within the very reporting banks who understated the cost of borrowing and profit from taking a derivatives position which could net the trader millions of dollars for each basis point<sup>7</sup>. However, its importance can be seen as the transition away from the benchmark has lasted nearly a decade and has strong complications and negative consequences.

There are many replacements being discussed, and it is likely that a multitude of IPORs or OFRs will be used rather than a single rate. The current leading candidates vary by market, but the result of losing a central benchmark will have strong impacts. The hundreds of trillions of structured products that relied on the LIBOR must be unwound. New derivatives instruments are being structured across the likes of SOFR, SONIA, or STR<sup>8</sup>, however, the multiple benchmarks will lead to fragmentation of rates will be launched resulting in fragmentation of rates and fractured liquidity<sup>9</sup>.

## 4. IPOR Construction

### 4.1 Differences Between Traditional Benchmarks and IPOR

DeFi has many structural advantages which benefit the construction of the IPOR free from the collusion that was present in LIBOR. As interest rates are defined in the logic of the smart contracts for lending protocols the interbank lending market is replaced with protocol to protocol interactions. The interest rates can be sourced in real-time to periodically update the IPOR and would need to be constantly recalculated to reflect the changing market conditions.

Drawing a parallel to traditional finance, we look for the best proxy for  $R_f$  in DeFi, although this time it will not be defined by monetary policy or a weighted average of the best financial institutions. We see the existing overcollateralized loans as adequate proxies for  $R_f$ , as the probability of the

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<sup>7</sup> <https://www.economicshelp.org/blog/5499/economics/how-manipulation-of-libor-increases-profits/>

<sup>8</sup> <https://www.pwc.com/gx/en/industries/financial-services/publications/libor-reference-rate-reform.html>

<sup>9</sup>

[https://www.garp.org/?j=325062&sfmc\\_sub=4199679&l=309\\_HTML&u=8356002&mid=100026644&jb=240#!/risk-intelligence/market/metrics/a1Z1W000005k2a4UAA](https://www.garp.org/?j=325062&sfmc_sub=4199679&l=309_HTML&u=8356002&mid=100026644&jb=240#!/risk-intelligence/market/metrics/a1Z1W000005k2a4UAA)

lender not being made whole are small (e.g. lending stablecoin to a borrower who is 150% ETH-collateralized, the risk of not being paid 100% of your stablecoins is only if ETH drops in an eye blink by more than 33% and the smart contract gets terminated at such levels). We find this to be currently the most adequate Rf proxy in DeFi, and the IPOR would use supply and demand dynamics (available liquidity and utilization) across protocols to approximate the fair value of the Rf. This should reduce interest rate volatility and arbitrage opportunities across protocols as market participants would have a reference rate to look at before they make a decision.

## **4.2 Constant Liquidity**

DeFi markets are not restricted by geography or time. Rather than publishing the IPOR during business days using British Standard Time, the IPOR will be persistently available. The concept of overnight financing rates with off-market hours is replaced with uninterrupted transparent data, facilitating round the clock trading for greater risk management and new economic opportunities.

## **4.3 Modularity and Adaptability**

Where traditional finance functions around well established institutions and is slow to incorporate new players into a benchmark rate, the DeFi market is constantly changing and evolving with new protocols gaining in popularity and TVL. The underlying rate calculation could also be updated on the smart contracts of the different lending platforms which comprise the IPOR index. This constant flux requires the IPOR mechanism itself to be modular, able to account for market changes such as new protocols to be considered for inclusion or removal, changes in weighting due to market dominance, changes to third party code base, or other potential significant changes.

As such, this modularity of IPOR allows the protocol to be easily expandable to other lending markets. While we will focus first on USD stablecoin lending markets as they are currently the most utilized and liquid credit markets, one could imagine the protocol accounting for lending markets in ETH, BTC, or other assets. Similarly, in the same way as EURO LIBOR is the average interest rate between banks willing to lend and borrow against EURO, ETH IPOR would be the average interest rate between protocols willing to lend in ETH. This process could be used to create a lending market for subsets of assets for new structured products.

## **4.4 IPOR Parameters and Weighting**

#### 4.4.1 Calculation of the IPOR Index

The IPOR is constructed as a weighted average of the floating interest rates from multiple protocols. See formula below:

$$IPOR = \frac{1}{C \cdot |N|} \sum_{i \in N} c_i \cdot r_i$$

Where:

$N$  = Number of protocols under consideration

$$C = \sum_{i \in N} c_i$$

$r_i$  = The interest rate of protocol  $i$

The number of protocols under consideration ( $N$ ) will be re-evaluated from time to time allowing protocols to be added or removed from the calculation as they gain or lose relevance.

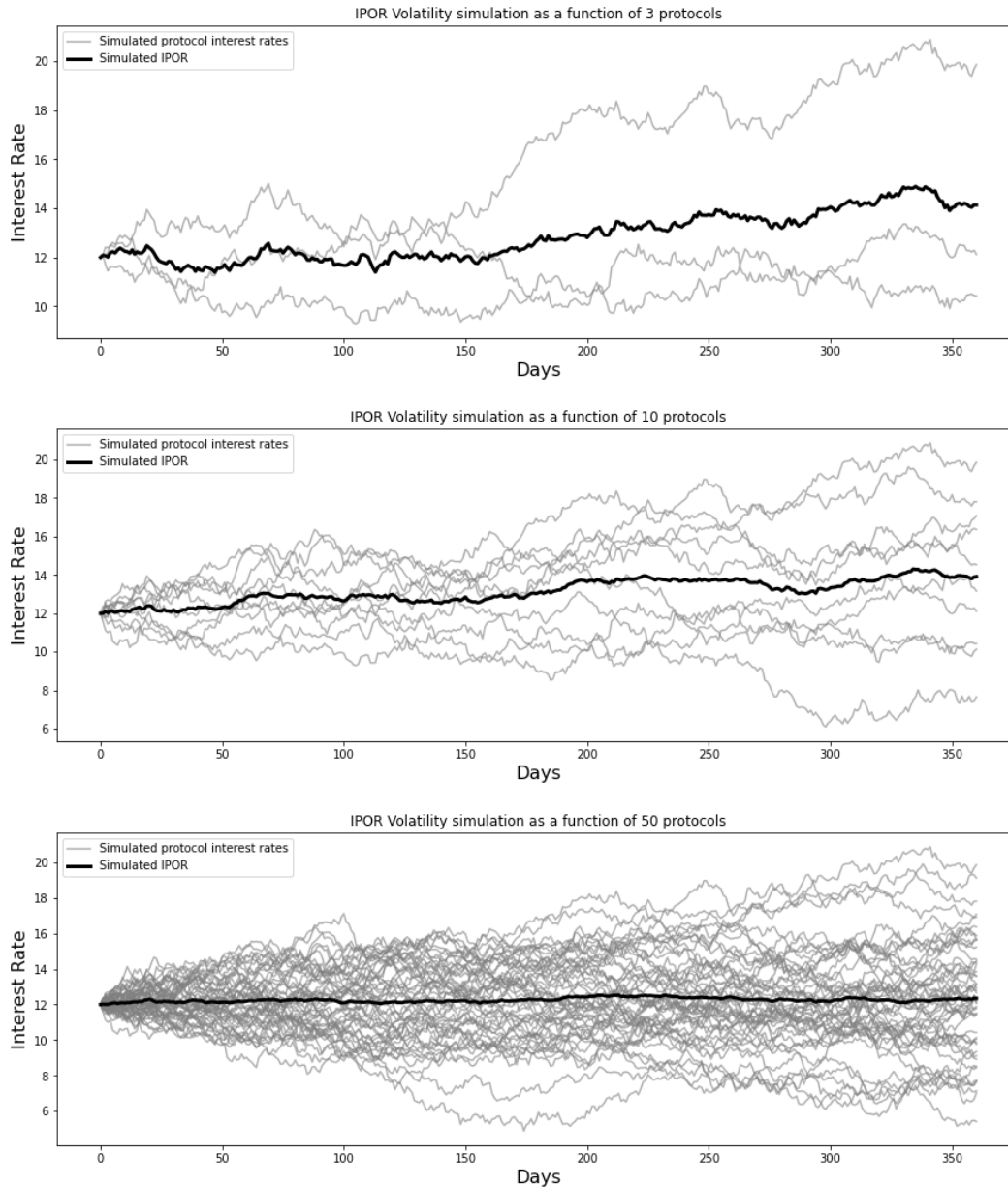
The capping factors (and their sum  $C$ ) are designed to limit the impact of any particular protocol in the calculation of IPOR. This feature allows IPOR designers to smooth the effect from less liquid protocols without completely ignoring their relevance, at the same time softening the effect of any single particular protocol, preventing manipulation of IPOR due to any particular misbehaving protocol.

The calculation of each capping factor ( $c_i$ ) takes into consideration each protocol's balance sheet, utilization rate and relevance. These values are also recalculated from time to time to closely follow the dynamic market.

#### 4.4.2 Averaging Multiple Protocols Yields Lower Volatility

The IPOR averages multiple protocols' interest rates in order to decrease volatility, leading to a more stable measurement of the DeFi market.

In the figures below<sup>10</sup> you can see the impact of adding multiple interest rate protocols has in decreasing the volatility of IPOR:



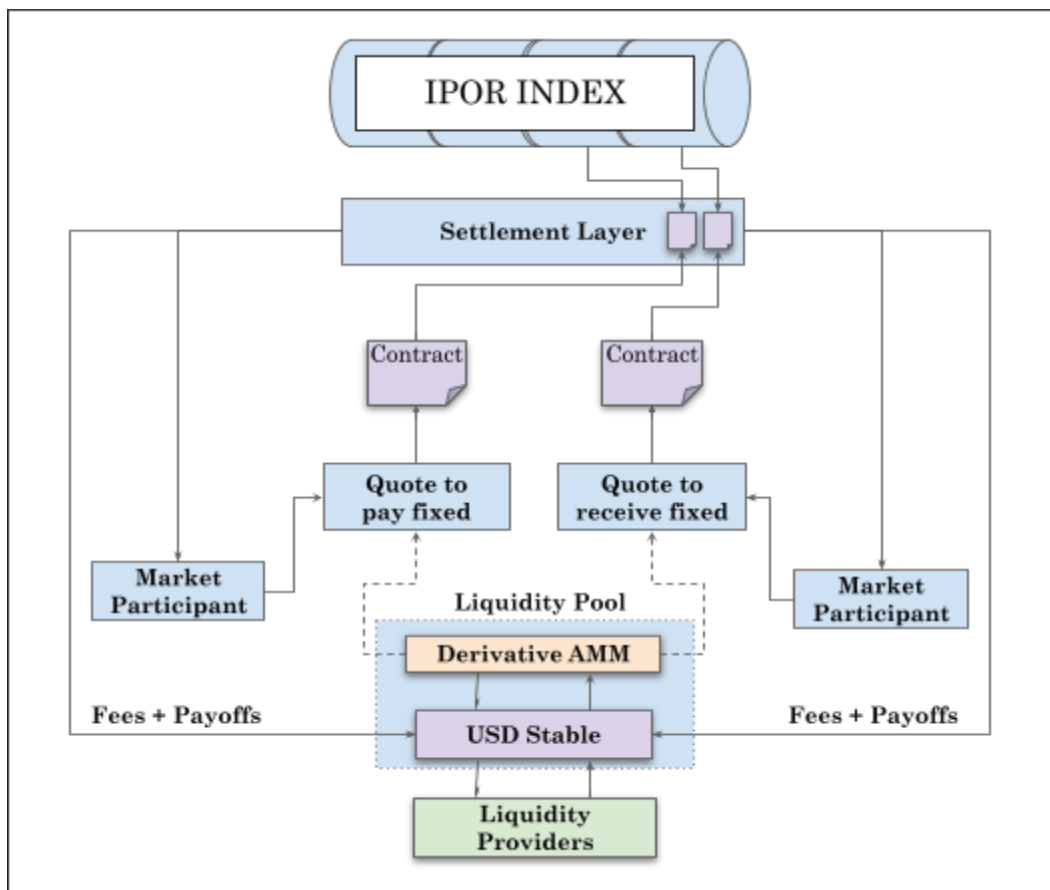
In the figures above, one can see that the changes in the interest rates of IPOR over time when it has only 3 components is much more dynamic than when adding 10 or even 50 components. In plot form, this is the key value that IPOR wants to bring as a benchmark of inter-protocol interest rate.

<sup>10</sup> The figures above were simulated with Wiener processes (stochastic process), one process per protocol interest rate (light gray lines), while IPOR was computed as the average of all values (darker line).

#### 4.5 IPOR Based Derivatives: Automated Market Maker and Other Components

IPOR products are traded using its rate published on-chain and a series of components that come together in what we call Market which secures the matching, trading, and settlement between the parties. We will use the example of an IRS described further in the following section to introduce the Market. The Market is composed entirely of smart contracts.

The main components of the Market are as follows:



**IPOR Index:** The IPOR is published on-chain between each settlement period. This component is the cornerstone of the market, but it suffers no impact from the events in the IPOR market as it is a 'read only' component from the point of the view of the market.

**Settlement Layer:** This component holds all contracts entered into by the payers and receivers of IPOR interest rates derivatives. Each settlement

period this layer enforces contract closing/roll over and margin calls, making funds available to the relevant party.

**Contract:** This component is the contract entered into by payers and receivers. Each contract has terms and parameters agreed by both parties that are enforced by the settlement layer at settlement (maturity or other market events).

**Market Participant:** A user that chooses to enter the contract as a payer or receiver. In the case of an interest rate a market participant may be a payer or a receiver where a payer is the party that *pays* a fixed interest rate, while the receiver is the party that *receives* the fixed interest rate. Effectively the receiver is paying floating interest rate (paying IPOR) while the payer is receiving floating interest rate (receiving IPOR).

**Liquidity Pool:** The liquidity pool is split into two components, the Automated Market Maker and the Liquidity Providers. The main role of the liquidity pool in the market is to serve as a counterparty to contracts at quotes offered in a system similar to a request for quote (RFQ) system. The Liquidity Pool charges a fee for its service, offering quotes based on the current interest on its contracts.

**Automated Market Maker (AMM):** The AMM, like an RFQ system, offers quotes for contracts of fixed and floating interest rates (IPOR) for payers and receivers at competitive premiums from the current IPOR value. The rates are calculated at a premium from the IPOR value.

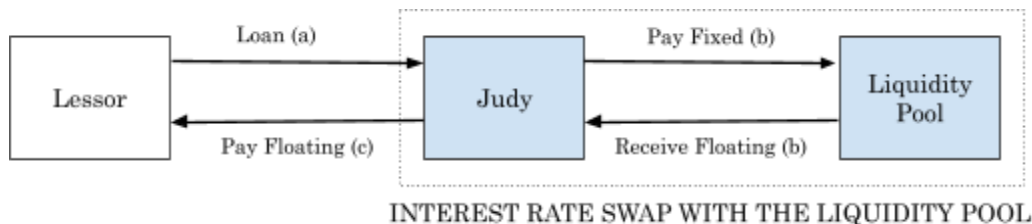
**Liquidity Providers (LPs):** LPs are decentralized service providers that allocate funds to power the liquidity pool's AMM in order to turn the wheels of the market. LPs receive the fees and the sum of the payoffs for all the contracts entered into by the AMM in proportion to their allocation and time of service.

## 4.6 IPOR Interest Rate Swap

Interest Rate Swaps are the most used instrument in global derivatives due to the fact that they allow market participants to manage interest rate risk in credit markets. As shown in section 3, IRSs make up 2/3 of the global derivatives market value and 88% of the total IRD market value. By entering an IRS a borrower who is exposed to floating interest rates on their loan can pay fixed rates to a counterparty, receiving floating rates in exchange, hence minimizing or eliminating their exposure to where floating rates will go. We

elaborate an example below of how an IRS would work with the liquidity pool as counterparty.

#### 4.6.1 Example: How to Fix Borrowing Rates Using an Interest Rate Swap with the Liquidity Pool as Contract Counterparty



##### Fixed Rate Payer Example

a) Judy borrows \$100k. She doesn't know how much she will pay for it and wants to minimize the interest rate risk, so she decides to enter an interest rate swap to do so.

b) Judy enters an interest rate swap with the liquidity pool as a counterparty. The notional amount of the contract is \$100k. In this example we assume she will be paying 5% to the pool and receiving the floating rate from it, which is the compounded IPOR rate from the contract inception until its termination.

c) After 30 days the compounded floating rate<sup>11</sup> (compounded IPOR) for the period is 20%, which is the rate Judy needs to pay to the Lessor on (c). Judy pays:

$$\$100,000 * (1 + 0,2)^{(30/360)} = \$101,531$$

The flipside is that now she made a profit with the IRS contract, as she decided to pay rates at 5% to the Liquidity Pool while receiving the floating rate at 20% from it. The contract payoff is:

Payoff =  $V_{FL} - V_{FX}$ , where:

$$V_{FX} = \text{Value of Fixed Leg} = \$100,000 * (1 + 0,05)^{(30/360)} = \$100,407$$

$$V_{FL} = \text{Value of Floating Leg} = \$100,000 * (1 + 0,2)^{(30/360)} = \$101,531$$

$$\text{Payoff} = \$101,531 - \$100,407 = \$1,123$$

<sup>11</sup> This is the IPOR compounded block by block since the inception of the contract until its termination.

At the end of the day Judy profits \$1,123 from the IRS contract, so if we deduct this from the amount she has to pay, she will effectively pay \$101,531 - \$1,123 = \$100,407, which is what she decided to pay when fixing the rate at 5%.

What would happen if the floating rate for the period goes down? If the case that the rate dropped to 3%, the payoff of the contract is negative as the value of the floating leg she receives is lower than the value of the fixed leg she pays. The important aspect of this is that the IRS enabled her to fix the rates and properly plan her cash flows.

### **Fixed Rate Receiver Example**

If instead of borrowing she deposited money, she would like to receive fixed rates from the liquidity pool instead of paying. In this case she receives fixed, pays the floating rate, and the terms of the Payoff invert, i.e.

$$\text{Payoff} = V_{\text{FX}} - V_{\text{FL}}$$

The opposite happens here. If the IPOR goes up significantly, she is receiving lower rates from the contract with the Liquidity Pool, as she is receiving fixed and paying floating, so the Payoff is negative.

Not every market participant needs to be a borrower or lender, and an IRS can be used as a directional bet on which direction rates will go.

A Margin Deposit is needed upon the inception of the contract, and is the maximum loss a counterparty can assume. In the case that the Payoff value is equal to the Margin Deposit, the smart contract will be settled (unless we decide to add a Margin Call mechanism to top it up) and the winner will receive the pot.

### **4.6.2 Liquidity Pool Optimization**

The function of the Liquidity Pool is crucial for the AMM to have a constant community counterpart with whom market participants can open derivative contracts. In sub-optimized conditions where the pool is not currently being adequately utilized in open contracts, the protocol will allocate reserves to third party lending protocols in order to maximize return to the Liquidity Providers. Given that IPOR has comprehensive interest rate data, the protocol would algorithmically allocate reserves to the highest yielding strategy, which would in turn have a market effect by lowering the destination protocol's utilization rate and in turn the interest rate. The basic function reserves allocation would maximize return to liquidity providers,

allocate funds to highest yielding (and greatest demand) pools, lowering interest rate and volatility in the market.

## **5. The IPOR DAO**

### **5.1 The Spirit of Decentralization**

DeFi markets are entire financial systems built on open-source software run by decentralized parties. In the spirit of openness, innovation, and transparency the IPOR embraces the ethos of blockchain systems. Over time the protocol will be governed by a community rather than a corporation.

### **5.2 IPOR Token**

The IPOR Token (Token) will be an ERC-20 token<sup>12</sup> that acts as the protocol's governance token. Token holders will be responsible for governing the IPOR protocol, which could include making changes to the parameters and weights in IPOR, as well as adding and removing protocols from the index via IPOR Improvement Proposals (IIPs) submitted to the Decentralized Autonomous Organization (DAO) for voting. Some tokens will also be held within the DAO Treasury (Treasury) and distributed to the community via different incentive programs aimed at bootstrapping liquidity for IPOR derivatives instruments and for promoting participation in the DAO. The distribution of tokens allows the protocol to progressively decentralize and underpins the credibility and transparency of the IPOR index and other products.

### **5.3 IPOR DAO**

The IPOR DAO will utilize the Compound governance module<sup>13</sup>, which is the gold standard in the DeFi industry as one of the most battle tested and well documented governance frameworks to date. Any token holder could initiate an IIP as long as they hold at least 1% of the IPOR tokens or have acquired more than 1% of voting power via delegation.

In order for a proposal to be accepted by the DAO and make changes to the IPOR, an IIP would need to meet a sufficient quorum (a minimum threshold of all tokens in existence must vote YES) and more than 50% of all votes must vote "YES" on a specific proposal to pass.

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<sup>12</sup> The initial product is designed to launch on Ethereum as this blockchain currently has the most mature and liquid DeFi ecosystem, however the infrastructure can and likely will be ported to other blockchains for market, scalability, and diversification purposes

<sup>13</sup>

<https://github.com/compound-finance/compound-protocol/blob/master/contracts/Governance/GovernorAlpha.sol>

The decentralized nature of the IPOR DAO increases the resilience of the IPOR protocol and allows it to evolve into a fully on-chain decentralized financial infrastructure with no identifiable weak points and no reliance on any single team in order to function in perpetuity. In this way, the protocol can continue to scale with the growth of the entire DeFi ecosystem.

#### **5.4 IPOR DAO Launch and Progressive Decentralization**

The path from launch towards a fully on-chain decentralized governance involves 3 steps of progressive decentralization.

##### **Step 1: ~3 months**

At launch, the parameters and weights of IPOR will be set by IPOR Labs which is the team building the core protocol. During this phase IPOR Labs will have signing power of the smart contracts and custody over the tokens allocated to the DAO treasury via a multi-signature (multisig) wallet configuration. IPOR Labs will also retain control over decisions regarding product, token distribution, and various community incentives. Construction of the index and all changes to IPOR products will be presented to the community in a public and transparent manner with appropriate time for feedback and reviews of the changes before they take effect.

##### **Step 2: ~3-6 months**

During the second phase IPOR Labs will create a snapshot voting page and a governance forum where the community can actively participate and make proposals regarding modifications to IPOR and development of new products. The community can also vote to modify IPOR token emission and grants from the treasury to reward active community participants. Once a proposal gathers sufficient community support it will move to a snapshot vote. If successful, IPOR Labs will undertake the implementation of the proposal in a timely manner depending on the current development backlog and priority.

##### **Step 3:**

As IPOR matures towards a fully community driven DAO, IPOR Labs will transfer ownership of the smart contracts as well as the community treasury to the IPOR DAO. At this point governance decisions regarding changes and updates to the IPOR protocol and the usage of the treasury will be in full control of the IPOR token holders. IPOR Labs will continue to actively participate in community discussions and make proposals for development and funding of new products from the treasury. However, the ultimate approval and implementation of such proposals will be handled in a fully decentralized manner via the DAO.

## **6. Conclusion**

The growth of DeFi as a viable alternative to centralized financial institutions creates exciting opportunities for innovation and brings new challenges. Among those opportunities and challenges in the growth of crude yet effective credit markets whose loan books currently count in the tens of billions. For this market to further mature new instruments will need to be introduced which will help attract new market participants who could grow the market by orders of magnitude.

We borrow from new concepts in decentralized finance such as DAOs, Liquidity Pools, and Automated Market Makers, and combine these with well established mechanisms such as reference rates and interest rate derivatives to create a stable base on which to build the fixed income and credit markets of the future. Through IPOR enabled tools the market should see reduced volatility, greater available liquidity, longer loan durations, and the establishment of a yield curve for DeFi. We welcome any feedback, comments, or suggestions in our pursuit to reimagine smart contract based financial market infrastructure one block at a time.