

# Fixed Interest Rate Protocols (FIRPs)

FIRPs are becoming a DeFi staple. Read on to explore what they are and how different FIRPs operate.

**Benjamin Hor, Market Research Analyst**

24 February 2021

## Introduction

If we look at Traditional Finance (TradFi), where most financial consumers reside, globalization has led to an increased demand for stable financial ecosystems. Indeed, it has been over 20 years since the European Parliament first acknowledged the need for more price stability in their working paper entitled “[The Determination of Interest Rates](#)”:

*“The integration of the world’s financial markets is increasing the pressure of external factors in the determination of domestic monetary policies. In addition, though the approaches of the world’s major central banks towards the conduct of monetary policy differ in detail, there is broad agreement on fundamentals: the **pursuit of price stability and the stability of financial markets.**”*

The key point here is integration. The growth of DeFi applications in recent years have seen blockchain protocols integrate ever more tightly. Often referred to as financial Legos, blockchain technology has allowed DeFi developers to integrate blockchain protocols and build innovative financial products. However, such progress does not change the fact that the crypto industry is unpredictable and highly volatile.

Stable interest rates are an essential facet of every financial ecosystem. Although there are many lending protocols and yield aggregators that offer interest rates to lenders/stakers in the crypto industry, there are relatively few protocols that set out to offer ‘fixed’ interest rates.

With the growing popularity of yield farming, as well as the demand for more stable lending/borrowing rates, several DeFi protocols have been trying to address the increasing demand for stable interest rates and become the hallmark for reliability. This has bred a new class of protocols known as Fixed-Interest Rate Protocols (FIRPs).

## Understanding FIRPs

Lending is the biggest DeFi category in the industry. As of 24 February 2021, the Total Value Locked (TVL) for lending protocols is \$16.72 billion, which is 45% of the entire [DeFi market](#). If we look at the most popular protocols, the top 3 are [Maker](#), [Aave](#), and [Compound](#). Although there have been some iterations of fixed interest rates from these protocols, the rates offered are still subject to change whether through active governance voting to realign interest rates

(Maker's Dai Savings Rate) or having a stable floating rate (Aave's Stable Rate). For borrowers/lenders who desire true stability, interest rates must be immutable.

Compared to TradFi, where fixed interest rates come in the form of fixed-deposits (or bonds), FIRPs leverage their underlying tokenomics structure and offer different incentives to maintain fixed interest rates. Furthermore, yield aggregators are also tapping into the fixed interest rate domain. Some FIRPs offer a 'fixed interest rate' (FIR) or a 'fixed interest-earning ratio' (FIER). Others do not provide fixed interest rates but create an environment that facilitates fixed interest rates.

We will be going through the different FIRPs in this essay to highlight the main mechanisms in achieving interest rate stability.

## A) Bond-Based FIRPs

Bonds are fixed-income instruments that represent a loan made by an investor to a borrower. The borrower receives upfront capital and will pay a premium to the investor once the bond matures. In DeFi, FIRPs apply bond-based principles to offer innovative products centered around 'fixed interest rates'.

To fix the floating interest rate issue, Yield and Notional offer a zero-coupon bond mechanism with several structural variations.

### 1. Yield

[Yield](#) is a decentralized lending system that offers fixed-rate lending and interest rate markets using a new kind of token called "fyTokens". The current iteration (Version 1) will include fyTokens for the Dai stablecoin. Called "fyDai", this new class of tokens are fully integrated with the MakerDao system and will enable fully collateralized fixed-rate borrowing and lending in Dai.

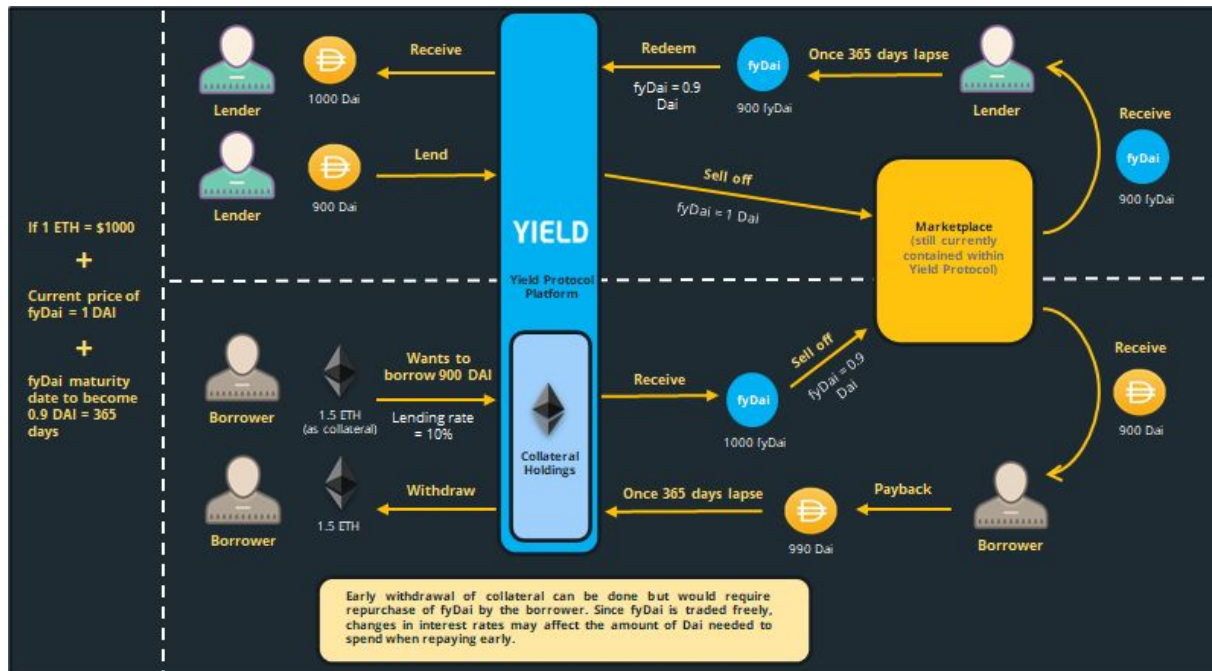
fyDai tokens are Ethereum-based tokens (ERC20) that may be redeemed for Dai after a predetermined maturity date. fyDai are analogous to zero-coupon or discount bonds.

To mint/sell fyDai, borrowers will have to put collateral that currently follows the same rate as MakerDao (150%). Lenders buy fyDai, which will typically be priced at a discount to Dai. The difference between the discounted value and 1 Dai (the maturity value) represents the lender's lending rate or the borrower's borrowing rate.

Although the value of fyDai reflects the borrowing/lending interest rate, it could also be traded in the market as a bond instrument on its own. This is possible because there are several "series" of fyDai, each with a different maturity date.

The system is tightly integrated and complementary to Maker. Maker users will be able to "migrate" their Dai vaults into fyDai vaults, locking in a fixed interest rate for a period and converting back to a Maker vault after maturity.

Interest rates are determined by the market's valuation of fyDai (with each series having its own maturity date). For lenders, a higher valuation of fyDai will lower the interest rates earned once it reaches maturity. Conversely, a higher valuation of fyDai will lower the borrowing rate for borrowers as it would be sold off to purchase the respective stablecoin (e.g. Dai). This means that depending on the time of purchase of fyDai tokens, both borrowers and lenders can determine their borrowing/lending interest rate.



*\*Illustration uses Yield as an example but can equally apply for Notional*

Using the illustration above, assume that a borrower deposits 1.5 Ethereum as collateral and intends to borrow 900 Dai at an annual lending rate of 10%. Once executed, the borrower will receive 1000 fyDai which has a value of 900 Dai - this will be automatically sold off in the marketplace by the protocol and the borrower will receive 900 Dai. At the end of the 1 year maturity period, the borrower will have to repay 990 Dai if they wish to withdraw their collateral.

For lenders, assume that a lender lends 900 Dai. In return, the lender receives 900 fyDai which will accrue value as it approaches maturity. Initially, 1 fyDai received be worth 1 Dai but after 1 year has lapsed, 1 fyDai will be worth 0.9 Dai. The lender may then redeem 900 fyDai for 1000 Dai which effectively puts the lending interest rate at 11%.

In practice, users can only select fyDai series that have been pre-programmed by Yield. This is similar to how regular bond instruments function where there are different bond rates and maturity periods.

## 2. Notional

[Notional](#) is a protocol on Ethereum that facilitates fixed-rate, fixed-term lending and borrowing of crypto-assets. Much like Yield Protocol, both protocols have very similar functionalities as Notional creates a zero-coupon bond system by introducing a novel financial primitive called fCash. There are, however, some key differences discussed in detail below.

### Key Differences between Yield and Notional

#### Token makeup

Unlike Yield, Notional implements the ERC1155 token standard for transferring fCash. Notional operates an independent platform and is not integrated with Maker. ERC1155 IDs encode an identifier that represents assets that are fungible with each other. For example, two fCash tokens that trade in the same market and mature simultaneously are fungible with each other and therefore will have the same ID.

#### Automated Market Maker (AMM)

In order to manage slippage and maintain stable interest rates, both protocols maintain their own form of AMMs. Yield uses its own AMM (YieldSpace), whereas Notional uses a logit curve.

#### Assets

Yield is integrated with MakerDao and can accept only Dai, whereas Notional is an independent platform and can accept other assets such as USDC.

#### Liquidation

The collateral ratio for Yield is 150%, whereas, for Notional, it is 140%. Moreover, Yield's liquidation process will only liquidate collateral, whereas Notional may liquidate assets (on top of collateral) if undercollateralized.

#### Types of Collateral

Yield only accepts Ethereum as collateral. On the other hand, Notional accepts other types of collateral such as USDC and WBTC, on top of Ethereum.

## 3. 88mph

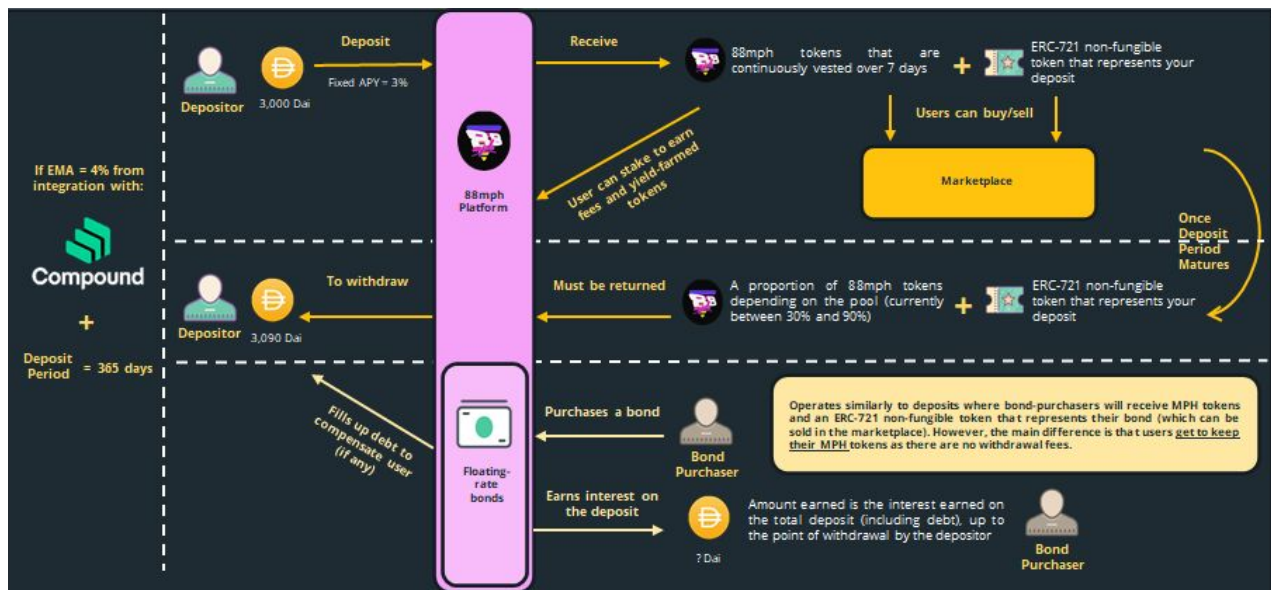
[88mph](#) acts as an intermediary between liquidity providers and lending protocols such as Compound. Liquidity providers may supply 88mph's liquidity pools at any given time and need to lock liquidity for at least seven days. Liquidity providers may lock liquidity for up to a year.

The protocol automatically deploys its liquidity pools to the highest-yielding lending protocol at any given interval. As it relies on lending protocols that offer variable interest rates, the interest rate that it receives is also variable.

88mph uses a linear model for determining the fixed interest rate offered to depositors. 88mph keeps track of the Exponential Moving Average (EMA) of the underlying yield protocol's APY over a one month period and offers 75% of the EMA as the fixed rate.

As the variable interest rate that 88mph receives may decrease significantly after a user “locks” in a high-yielding fixed interest rate, 88mph may become insolvent. To mitigate this risk, 88mph offers floating-rate bonds that immediately fill up the debt of one or more of the deposits.

Floating-rate bonds act as a supporting tool to guarantee the interest rates by paying lenders if the EMA drops significantly. This underlying mechanic allows bond-purchasers to earn interest if the floating rate's EMA stays above 25% because the fixed rate 88mph offers is 75% of the initial floating rate. Bond-purchasers would receive the yield generated by deposits from 88mph's liquidity pool up to the point of withdrawal - this effectively becomes a longing mechanism for interest rates where the bond purchaser will only lose out if the average floating rate drops by more than 25% of the EMA.



Notably, because of how the system is structured, MPH tokens could be shorted (albeit over a 7-day vesting period) to take advantage of the MPH tokens given when depositing.

## B) Tranche-Based FIRPs

Tranches are segments created from liquidity pools that are divided up by risk, time to maturity, or other characteristics to be marketable to different investors. Although this form of financial instrument is common in TradFi, DeFi has yet to introduce this method until Q4 2020.

In November 2020, [BarnBridge](#) became the first protocol to announce their intention to build a tranche-based DeFi product. They issued their governance token (BOND) to bootstrap their project and expect to release it on the main net in Q1 2021.

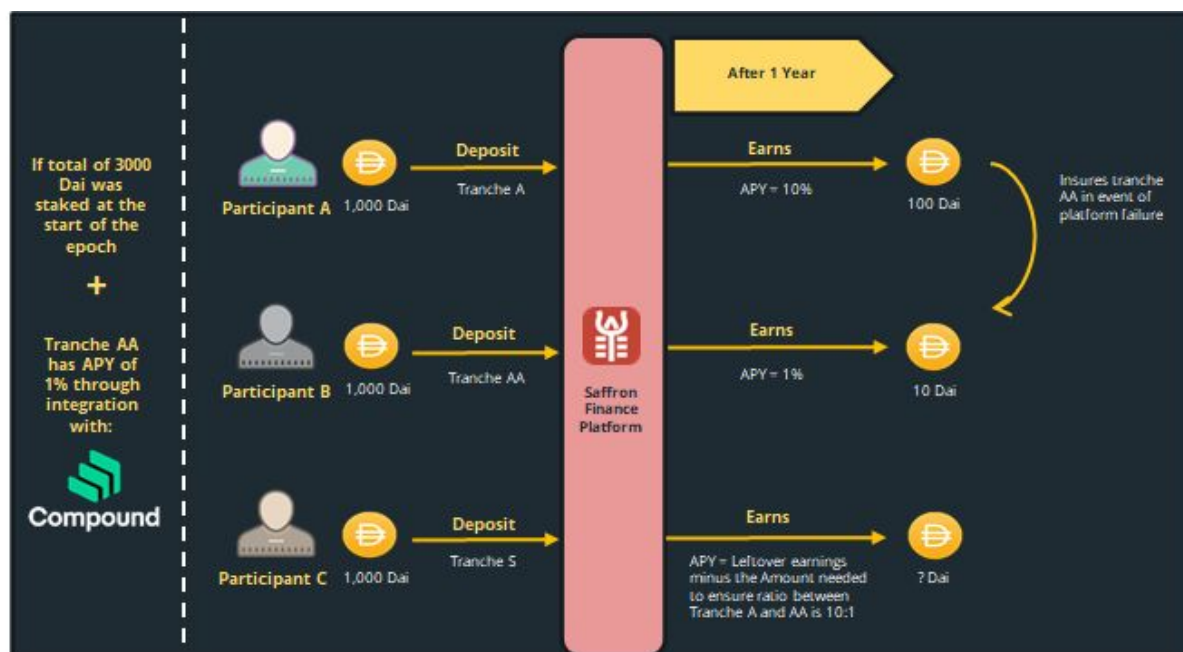
However, two weeks after BarnBridge announced their plans, another project, [Saffron.Finance \(SFI\)](#) subtly published a Medium article about their plans and released their protocol on mainnet the next day.

## 1. Saffron Finance

In the SFI ecosystem, pools are divided into tranches, each with its unique properties. There are three user-facing tranches for liquidity providers (LPs) to add liquidity into (AA, A, and S) and two backend tranches that exist only at the smart contract level to provide LPs with additional options when adding liquidity.

The idea is that SFI users can select different portfolios based on their preferred risk appetites. The SFI ecosystem creates a positive feedback loop because investors on higher-risk tranches insure investors on the lower-risk tranches, thereby creating an internal insurance system.

In its current version, SFI's native token must be staked in order to access tranche A, the higher-earning tranche. However, subsequent updates will also introduce governance elements to SFI tokens.



## 2. BarnBridge

BarnBridge plans to employ a tranche system similar to SFI.

The first product, SMART Yield Bonds, operates very much like SFI, where yield from different protocols is aggregated and divided up into various tranches. This makes SMART Yield Bonds a product that directly competes with SFI. However, the type of tranches offered has not been revealed yet.

The second product, SMART Alpha Bonds, is a novel product that aims to utilize the tranche system to offer different levels of market price exposure. Once released, this makes SMART Alpha Bonds a new and unique product that allows users to 'leverage up or leverage down' without any collateral.

### How interest rates are 'fixed' for both protocols

A tranche system allows one to divide up the earnings and create different earning rates for different pools. In SFI's case, the A tranche earns 10x the earnings of tranche AA. Tranche S offers a variable interest rate as it balances the A and AA tranches such that they are always in perfect equilibrium to maintain the fixed-interest earning ratio of 10:1 between tranche A and tranche AA.

As for BarnBridge, their tranche system has not yet been revealed but is likely to be similar to SFI's system, albeit with different tranche apportionments.

### Key Differences between Saffron Finance and BarnBridge

#### Tokenomics

SFI's tokenomics create an incentive for users to accumulate SFI tokens as SFI tokens have to be staked before users can participate in the high-risk, high-yield A tranche. This creates a long-term positive feedback loop for SFI's economy, where holding SFI tokens will have an inert monetary value beyond governance.

In contrast, BarnBridge's token only has a governance function.

#### Types of Products

SFI's protocol is remarkably similar to BarnBridge's SMART Yield Bonds. However, information on BarnBridge's interest rates and how the tranches will be structured has yet to be disclosed.

On the other hand, BarnBridge's SMART Alpha Bonds product appears to be novel in the DeFi scene. By taking advantage of the tranche system, users can leverage up or down on market products without any collateral.

## Market Positioning

Both protocols are clear competitors. BarnBridge is the first to announce a tranche-based fixed interest rate system, which correlates with its initial high popularity. This has been further supported by an aggressive marketing campaign, which includes webinars, forum discussions, etc.

Contrast this with SFI, which appeared out of the blue and till today, remains completely anonymous. Although SFI has the first-mover advantage and a working product, BarnBridge will have more products available and can learn from SFI's strengths and weaknesses (second-mover advantage).

## C) Game Theory-based FIRPs

Game theory envisions an environment where there are only rational actors. In such a hypothetical situation, buyers and sellers will make optimal decisions based on the available information.

In DeFi, utilizing game theory has become more and more common to influence market behavior. Thus, it is interesting to see Horizon using the same principles as a yield aggregator to offer 'fixed' interest rates.

### 1. Horizon

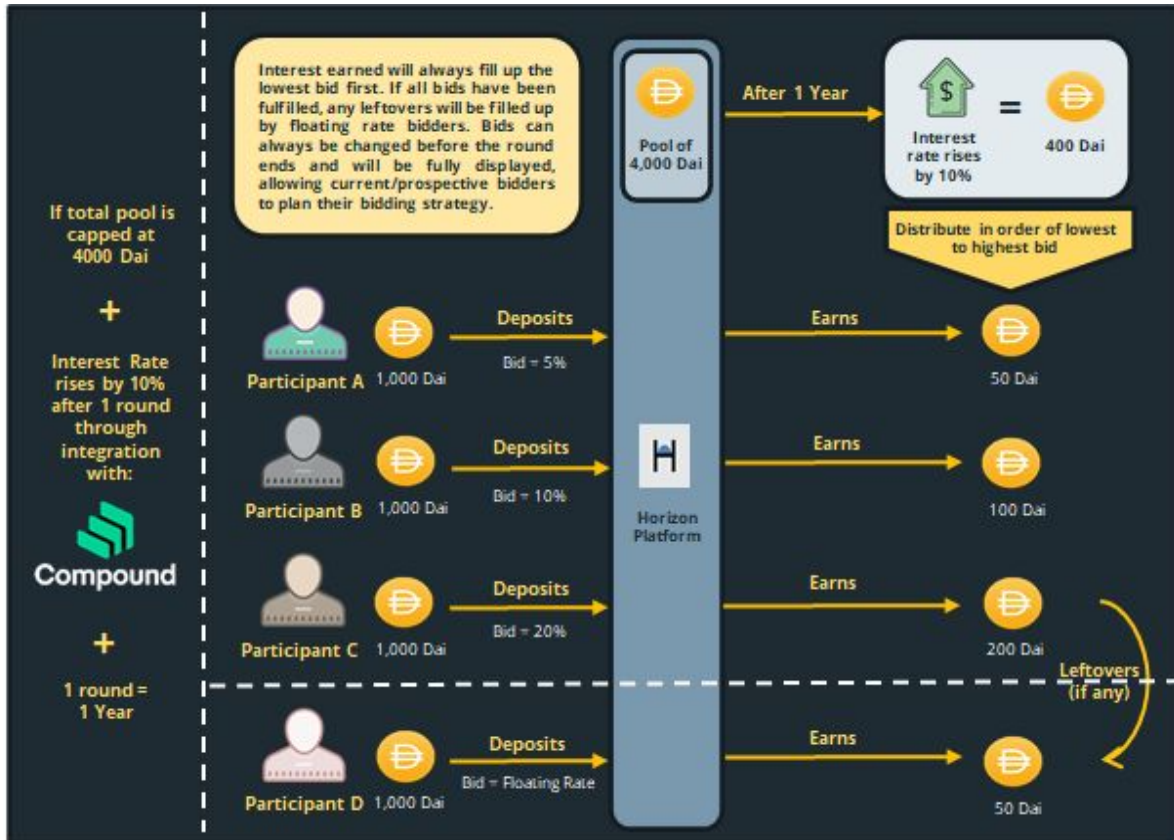
Horizon has yet to release a working product. However, based on their whitepaper, the anticipated release is likely to cause stirs in the market. Unlike conventional yield aggregators, Horizon will allow users to create their own markets.

Horizon allows users to submit their collateral into a liquidity pool, which is then lent to a lending protocol such as Compound. To provide fixed interest rates to users, Horizon invites users to submit their sealed bids for fixed interest rates (which act as yield caps) or floating interest rates in each round. After each round, the bids are revealed, thus creating an order book of bids. The protocol will rank the bids from the lowest interest rate to the highest interest rate. The lending protocol's variable earnings are then distributed from the lowest interest rate bids to the highest interest rate bids, with any excess income spilling over into the floating pool.

One notable feature is that all bids will be displayed on Horizon's website. The displayed bids allow users to actively compete and ascertain which interest rates are the most popular. On top of that, users can freely amend their bids, including switching to the floating rate. Horizon essentially doubles up as a price prediction protocol.

Horizon also plans to introduce a native token (HRZ) but has not specified how it would function within the platform.










How interest rates are 'fixed'

Technically, interest rates are not fixed. However, the system rewards users who can accurately gauge the amount of interest they should earn from their bids. This incentivizes users to conform to a 'safe' bid if they are uncertain about the amount they could earn. Bidding too high or bidding the floating rate could result in lesser gains or none at all. Thus 'safe' bids effectively become the 'de facto' fixed interest rate over time.

## Comparing the Different FIRPs

	 YIELD Yield	 Notional	 88mph	 Saffron.Finance	 BarnBridge	 Horizon
<b>Underlying Interest Rate Model</b>	Bond-based	Bond-based	Bond-based	Tranche-based	Tranche-based	Game Theory-based
<b>Interest Rate Structure</b>	Fixed Interest Rate	Fixed Interest Rate	Fixed Interest Rate	Fixed Interest Earning Ratio	Fixed Interest Earning Ratio	Fixed Interest Rate
<b>Use-case</b>	Borrowing/Lending	Borrowing/Lending	Yield Aggregator	Yield Aggregator	Yield Aggregator	Yield Aggregator
<b>Fully Diluted Valuation</b>	N/A	N/A	\$34,903,884	\$218,741,876	\$588,083,950	Not yet released
<b>Market Cap</b>	N/A	N/A	\$44,751,560	\$191,388,534	\$89,874,629	Not yet released
<b>Price of Token</b>	No plans to release token	No plans to release token	\$106	\$2,220	\$59	Not yet released

*\*Figures were collected as of 24 February 2021*

If we look at each protocol's underlying mechanisms, bond-based FIRPs have the most reliable fixed-interest rates. The reason is simple - bonds are attested fixed-income instruments.

In 88mph's case, the use of floating-rate bonds allows the protocol to guarantee interest rates because if there is a deficit, the debt becomes immediately filled up by the bond. The risk with such a mechanism is that if there are no bond buyers, this will threaten the system's fiscal stability.

On the other hand, both Yield and Notional have tokenized zero-coupon bonds that effectively offer fixed-interest loans. However, like 88mph, there must be 'bond purchasers (i.e. fyDai or fyCash purchasers) for the system to work. Therefore, the key to success for such protocols relies on having proper incentives for bond-purchasers.

88mph tries to achieve this by creating value for their MPH tokens that bond purchasers will receive. Aside from acting as a 'compliance-based tool' (requirement to withdraw funds), 88mph allows holders to stake into the protocol and earn rewards (100% APY is rewarded to users).

As for Yield and Notional, the only way to attract bond-purchasers (lenders) is to offer lucrative interest rates – this boils down to the type of maturity dates provided, transaction costs, and level of slippage.

If we compare this with tranche-based FIRPs like SFI and Banbridge, interest rates are not fixed, but rather interest-earning ratios are fixed. That is not to say that these types of protocols could not implement fixed interest rate tranches.

Technically speaking, it would be possible to introduce a tranche system that offers guaranteed earnings based on a fixed interest rate. However, the larger problem would be covering debt (if any) if there are insufficient earnings for that tranche. Horizon does not have that issue because they leave it up to users to create their own ‘tranches’ and risk earning nothing.

## Closing thoughts

FIRPs are a new suite of protocols that are bound to become a staple in DeFi. Three types of categories have been identified based on their underlying mechanisms, but this is likely to develop even further. The central force behind all FIRPs is, in essence, the type of promises they make. And when it comes to promises, a lot of work needs to be put in to maintain them. If we were to break down how FIRPs operate, there are essentially three defining characteristics:

### **1. What kind of promises are they making?**

Different protocols make different promises. For example, 88mph promises that you will earn a fixed amount after a certain period whereas SFI promises that you will earn 10x more than Tranche AA by participating in Tranche A. Horizon does not make any promises as to how much you would earn. Understanding the type of promises made will allow users to decide which protocol offers their preferred product.

### **2. How do they intend to maintain that promise?**

Each type of promise requires a different methodology. For example, SFI offers insurance to Tranche AA users by giving them the earnings first if there is a deficit. Understanding how each promise is maintained allows users to determine which protocol is more reliable.

### **3. How dependent are they on external agents to maintain that promise?**

Developing protocol mechanisms that influence user behavior are essential to all FIRPs. Both Yield and Notional require relatively even ratios of lenders and borrowers to maintain fixed interest rates. 88mph meanwhile requires users to purchase their bonds. Identifying such traits allows users to determine how exposed the protocol’s promise is to factors outside their direct control.

Each protocol offers their own take on how interest rates could be ‘fixed’ but it is difficult to say which is the ‘best one’. However, by considering these three factors, it becomes easier for users to decide which protocol to use. Ultimately, it boils down to each individual’s preferred risk appetite, the type of financial instrument required, and the belief in the underlying protocol’s mechanisms.