DAO Treasury and Balance Sheet Management

Yuan Han Li

Table of Contents:

BACKGROUND AND MOTIVATION

Introduction

The purpose of any protocol DAO is to manage and govern its protocol in perpetuity. One of the most important functions of the DAO, then, is naturally to capitalize itself in such a way as to not only ensure its ongoing operations can continue but also to invest in the future growth and success of the protocol. This is not dissimilar to how traditional corporations think about capitalizing themselves.

A traditional corporation has a number of options to finance its ongoing operations and invest in its future. Corporations can sell newly issued equity, take on debt, and also utilize its retained earnings. Similarly, the universe of options available to protocol DAO Treasuries can also be classified into analogous categories:
- **Using Retained Earnings:**
  - Revenue: DAOs can choose to reserve a portion of all fees taken by the protocol and have it flow into the protocol Treasury
  - Non-Operating Income: DAOs can choose to yield farm, stake, invest, or lend out different assets held in its treasury
- **Issuing/selling native tokens:** DAOs can sell existing tokens held by the treasury to other entities
- **Taking on debt:**
  - Secured debt: Given most DAOs do not have any assets to collateralize other than their native token, this would entail taking out an overcollateralized loans against native tokens held in the DAO's Treasury
  - Unsecured debt (or undercollateralized debt): Though this space is currently immature in DeFi and no options really exist, it might develop further in the future

Overview of Different DeFi DAO Treasuries

Not all DeFi protocol DAOs are structured similarly, however. The idiosyncrasies in the tokenomics of different protocols means that not all DAO Treasuries have the flexibility to freely utilize the aforementioned options. For instance, certain DAOs currently do not generate any revenue that flows to the DAO Treasury, and therefore are perhaps better thought of as a foundation or an endowment rather than being analogous to a corporation, since any income earned is unrelated to its Protocol's core operations.

"Corporation" DAOs

These DAOs all have DAO-level revenue, since a portion of all fees paid to the protocol flow directly into the protocol's treasury.

v2 yVaults charge all depositors a 2/20 fee. The 2% management fee flows directly into the protocol treasury, while the 20% performance fee is split 50:50 between the strategist/creator of the vault and the protocol treasury. All fees earned are paid in kind (i.e., fees are paid out in each vault's own token)

Yearn

$147.6mm, 88.51%   11.49% $0.9mm

$14.6mm

$3.7mm

■ Native Token   ■ Other Assets   ■ Stablecoins (and Equivalents)   ■ ETH or BTC (and Equivalents)
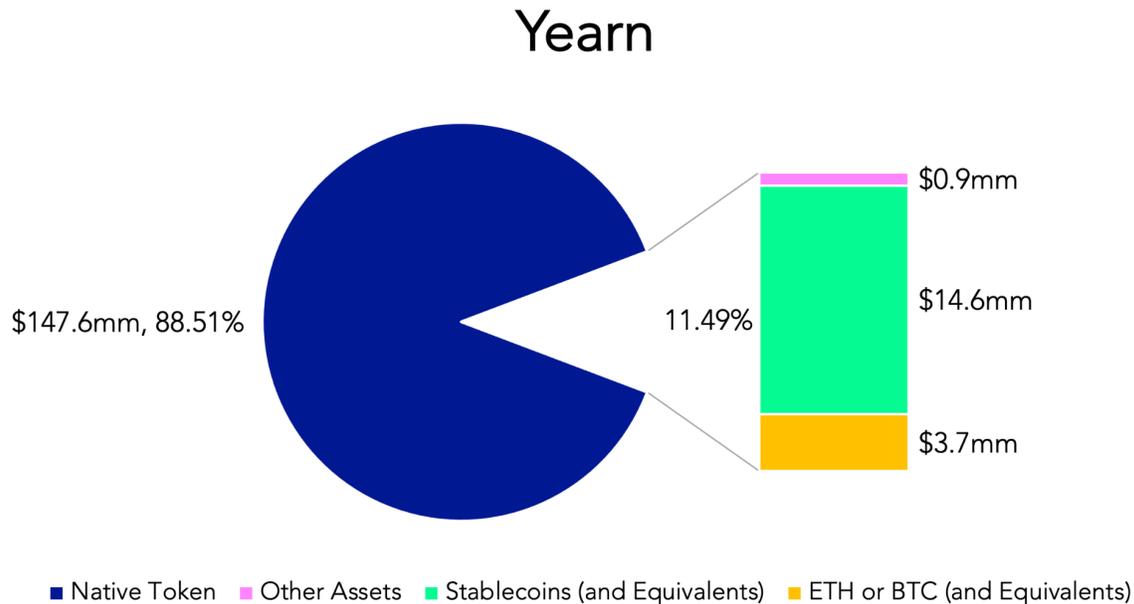
("and equivalents" here simply means synths, wrapped forms, tokenized interest bearing forms, LP positions, and vault deposits denominated in the base asset—stablecoin, ETH or BTC)

Treasury: 0x93a62da5a14c80f265dabc077fcee437b1a0efde
Operations Multisig (WC): 0xfeb4acf3df3cdea7399794d0869ef76a6efaff52

It should also be noted that Yearn also has approximately 11.6mm of stablecoin debt backed by 4201 YFI, which represents 98.87% of all YFI owned by the treasury and an LTV ratio of roughly 6.42%/collateralization ratio of ~1557%. The debt is spread across Maker CDPs and also on Cronje's Unit protocol. As such, Yearn has a significant amount of borrowed reserve assets it can utilize to earn a return/generate non-operating income with to slowly diversify its treasury. Moreover, given most of Yearn's vaults are denominated in stablecoins/yield-bearing stablecoins, the DAO's revenue is also denominated in these assets and so given the high collateralization ratio on its debt, Yearn's balance sheet is in a relatively healthy position.

Index Coop

The streaming (i.e. management) fees on Index's ETF-like products are generally split between the DAO treasury and the "methodologist" (creator of the product), where the specific amount is negotiated on a case-by-case basis. The fees earned are paid in/denominated in the product it is earned from (i.e., the streaming fee on DPI is paid out in DPI).

Index Coop

Native Token   Other Assets   Stablecoins (and Equivalents)
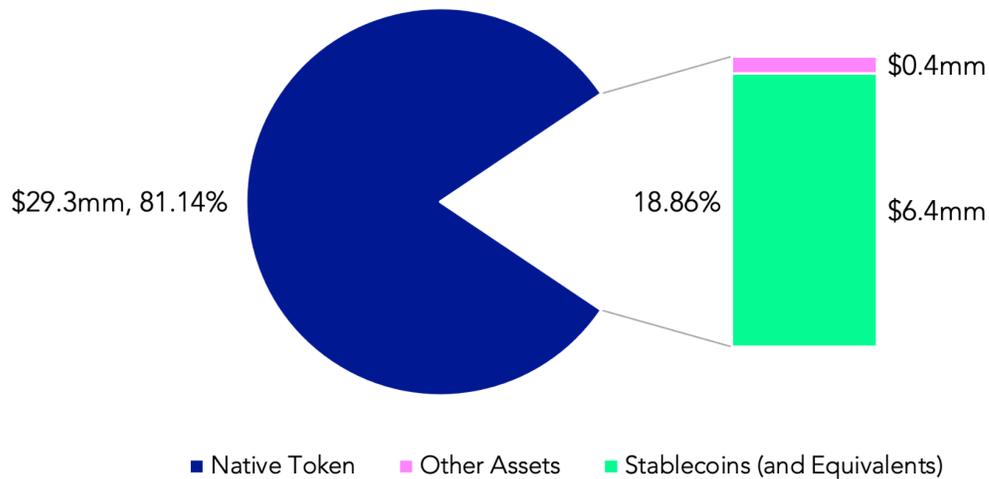
Treasury: 0x9467cfADC9DE245010dF95Ec6a585A506A8ad5FC

Though Index Coop does generate DAO-level revenue, most of it is not denominated in reserve assets (stablecoin/ETH/BTC); however, Index Coop is likely to launch a money market fund (see below) fairly soon, which if successful, will enable the DAO to earn income denominated in stablecoin equivalents. Even so, the Coop should still take steps to capitalize itself with reserve assets by conducting a token sale/utilizing debt to (the DAO announced a $200k ETH purchase in February 2021 but this is yet to materialize).

Aave

A small portion (proportion is specific to pools) of all interest paid by borrowers is reserved by the protocol and goes to the protocol fund. These fees earned are denominated in the pool the fees are earned from (i.e. a borrower who repays their aDAI debt will have a portion of the interest they pay sent to the Treasury as aDAI).

Aave

$788.5mm, 98.93%   1.07% $0.7mm $6.7mm $1.1mm
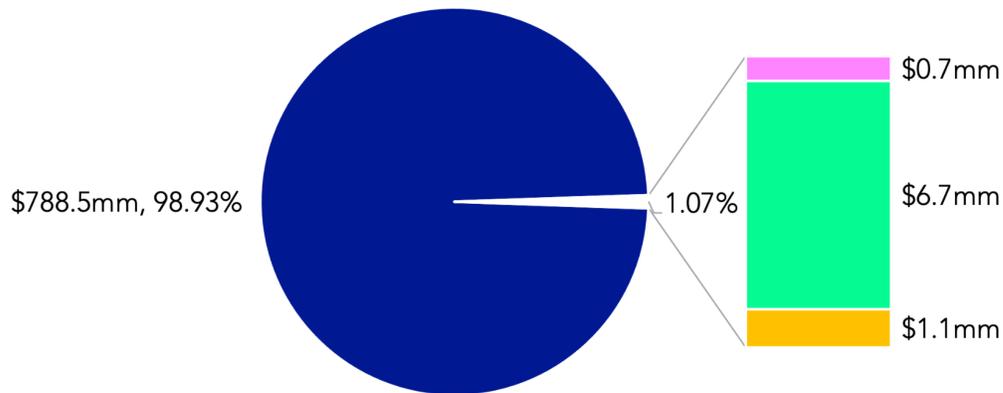
■ Native Token   ■ Other Assets   ■ Stablecoins (and Equivalents)   ■ ETH or BTC (and Equivalents)

Protocol Reserve (Treasury with a portion of tokens allocated to incentives):
0x25f2226b597e8f9514b3f68f00f494cf4f286491
Aave v2 Protocol Fund (Where protocol revenue/retained earnings flows to):
0x464c71f6c2f760dda6093dcb91c24c39e5d6e18c
Aave v1 Protocol Fund (Where protocol revenue/retained earnings flows to):
0xe3d9988f676457123c5fd01297605efdd0cba1ae
Aave Matic Protocol Fund: 0x7734280A4337F37Fbf4651073Db7c28C80B339e9
Aave Grants Multi-Sig: 0x89c51828427f70d77875c6747759fb17ba10ceb0

Given a large amount of borrow volume on Aave is denominated in reserve assets, most of Aave's DAO-level revenue has been in yield-bearing stablecoin. Though reserve assets make up only a small portion of its Treasury, the ~$4mm earned so far was in the last 6 months (before May 2021), and given Aave's growth towards the tail end of this period, Aave is likely to generate far more revenue going forward. In addition, given revenue is in aTokens, revenue earned is essentially automatically deposited back into Aave itself to earn yield. Thus, although Aave might consider conducting a small token sale/raising a small amount of debt just to better cushion its Treasury with reserve assets, Aave already has one of the healthiest income streams (both operating and non-operating) in all of DeFi.

BadgerDAO

Like Yearn, Badger's vaults also charge depositors a 2/20 fee, with 50% of the performance fee going to strategists. The rest of the fees all accrue to the protocol treasury. All fees earned are paid in kind (i.e., fees are paid out in each vault's own token). Badger's other Sett products, namely Sushi LP positions/Harvest-based setts, similarly send xSUSHI and FARM tokens into the treasury.

BadgerDAO

Legend: Native Token · Other Assets · Stablecoins (and Equivalents) · ETH or BTC (and Equivalents)

$99.7mm, 83.09% · 16.91% · $3.2mm · $13.3mm · $3.8mm
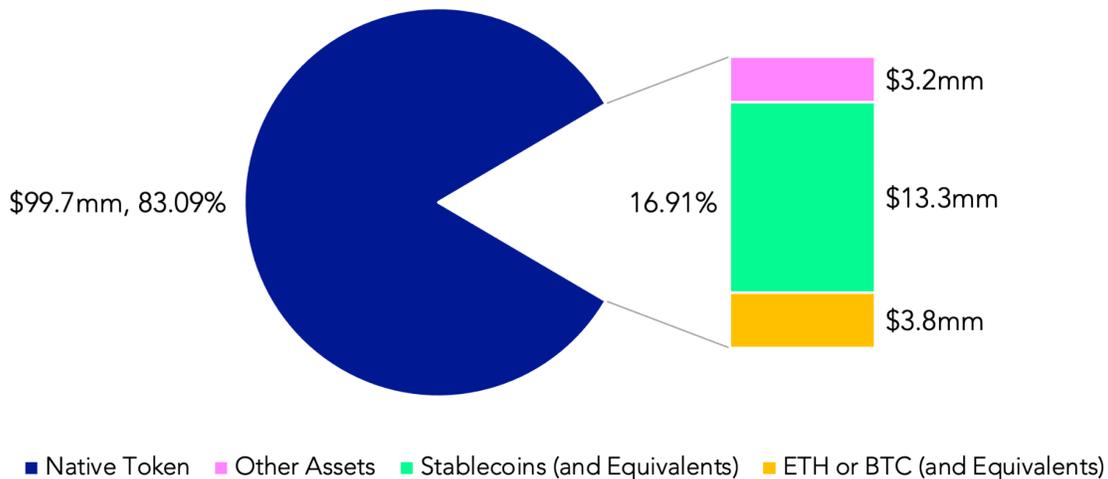
Treasury: 0x4441776e6a5d61fa024a5117bfc26b953ad1f425
Retained Earnings (The wallet is occasionally cleared into the Ops Multisig below):
0x8de82c4c968663a0284b01069dde6ef231d0ef9b
Operations Multisig (WC): 0xb65cef03b9b89f99517643226d76e286ee999e77

Similar to Yearn, Badger also has a significant portion of their treasury denominated in reserve assets. Unlike Yearn, however, Badger obtained these funds by conducting an OTC token sale to strategic investors and is now investing its reserve assets in a variety of DeFi products to earn a return. Moreover, given most of Badger's vaults are ultimately denominated in a BTC-equivalent, Badger also has a healthy revenue stream denominated in reserve assets. As such of all major DAOs, Badger has one of the healthiest balance sheets.

"Endowment/Foundation" DAOs

The DAOs outlined in this subsection do not have any revenue under the current structure of the protocol, and so their operations have to be financed solely by the returns generated on the treasury's holdings and through treasury asset sales. Moreover, their Treasuries are also relatively unhealthy, often holding only the protocol's native token.

MakerDAO

The Maker protocol has an internal "Buffer" which accrues revenue in DAI from stability fees (i.e. interest) paid by borrowers as well as liquidation fees (of debtor collateral). Though any balance of DAI in the "Buffer" can be spent by governance as it pleases (e.g. on operational expenses), the "Buffer" also has the function of providing additional security to the protocol in the event of bad debt, where the DAI in it can be destroyed (thereby helping to reduce the frequency of having to mint MKR). There is also a governance-set threshold for which all DAI accrued to the buffer above the threshold is used to burn MKR. Thus, since this overflow threshold should be

set in a way that is directly correlated to the risk profile of the CDP portfolio in existence rather than the budget requirements of the DAO itself, DAI accrued to the "Buffer" should not be thought of as operating income. Instead, only if/when DAI is transferred from the "Buffer" to the actual DAO Treasury should it be treated as revenue—of which there is currently no systematic mechanism for.

MakerDAO

$250.0mm

■ Native Token
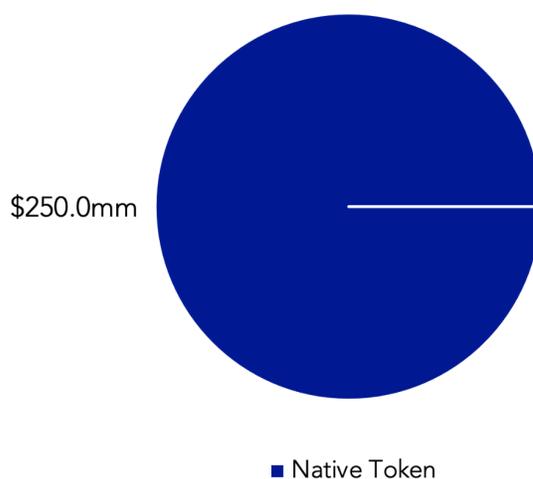
Treasury: [0xBE8E3e3618f7474F8cB1d074A26afFef007E98FB](#)

Compound

[A small portion (proportion is specific to pools) of all borrower interest paid by borrowers accrues as reserves](#). Currently each reserve is used to protect depositors in a given pool against defaults/liquidation malfunctions, with none of it accruing to the protocol (unlike with Aave). Despite this, Compound's treasury will continue to accrue a portion of all new COMP emissions until the supply cap of 10mn COMP is reached. [Of the 0.5 COMP/block sent to the treasury, 0.352/block is distributed to liquidity miners, with the remaining 0.148/block retained by the treasury.](#)

Compound

$96.7mm

■ Native Token
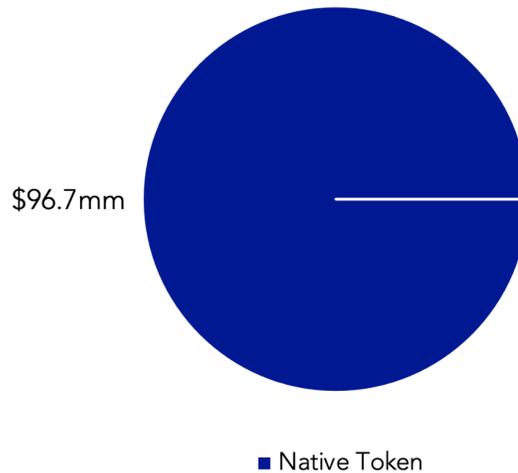
Comptroller: [0x3d9819210A31b4961b30EF54bE2aeD79B9c9Cd3B](0x3d9819210A31b4961b30EF54bE2aeD79B9c9Cd3B)
(The reservoir holds the remaining un-emitted COMP supply, and as such cannot be considered a part of the treasury)

Uniswap

Uniswap v3 will charge traders either 5bps, 30bps, or 100bps on every trade. Although its fee switch is currently turned-off, governance can choose to allocate between 10-25% of these fees to tokenholders; it is also unclear exactly how fees will be distributed to tokenholders, if at all (it could simply flow directly into the treasury as revenue). Given the fee switch is not turned on yet, all fees generated by the protocol go to liquidity providers; moreover, even if it were turned on, there is currently no mechanism to allow the Treasury to accrue any of it as revenue. Despite this, in 4 years when UNI supply begins inflating at a rate of 2% yearly, all new UNI emission will accrue to the treasury. Thus, other than this yearly inflation income, Uniswap's DAO Treasury currently has no other revenue.

Uniswap

Native Token **Other Assets**
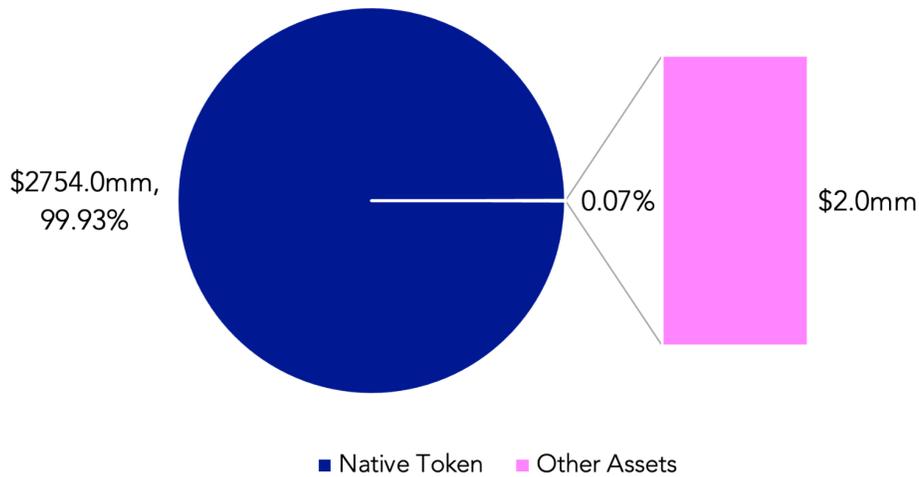
Treasury: 0x1a9c8182c09f50c8318d769245bea52c32be35bc

Sushi

Sushi charges a 30bps fee on all trades, with 5bps of this fee flowing directly to token holders who stake their SUSHI into xSUSHI through a token-buyback-and-distribute model (i.e. staker income is denominated in Sushi). Given the protocol itself is not staking the SUSHI held in it, the DAO's treasury has no revenue (until token emissions end in November 2023, however, the treasury will also accrue 10% of all new SUSHI emissions/inflation). Sushi's DAO therefore can only finance itself through non-operating income and token sales.

Sushi

Native Token **Stablecoins (and Equivalents)** **ETH or BTC (and Equivalents)**
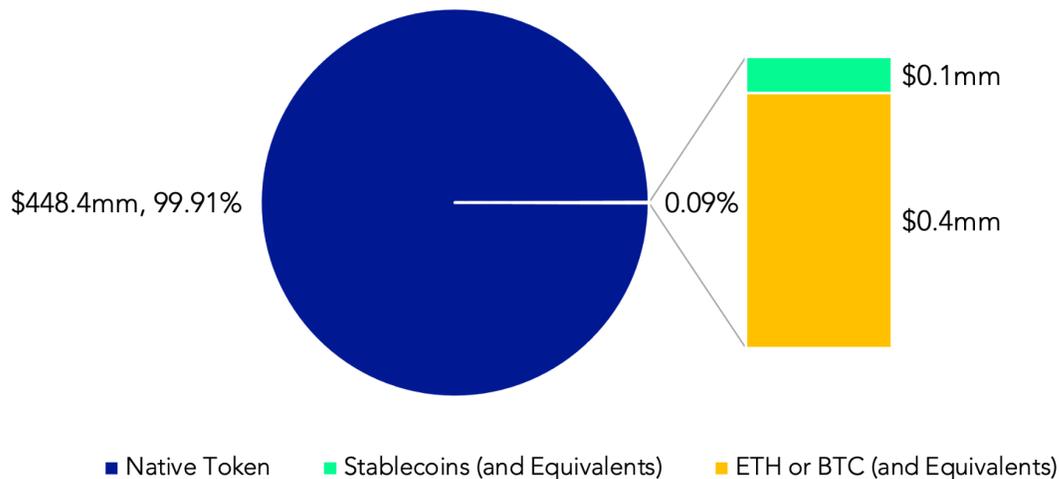
Treasury: 0xe94b5eec1fa96ceecbd33ef5baa8d00e4493f4f3

Operations Multisig (WC): <u>0x19b3eb3af5d93b77a5619b047de0eed7115a19e7</u>

The Need for Treasury Management

As seen above (and below), many DeFi DAOs hold nearly all its treasury assets in the protocol's native token. Given the operating expenses of all DAOs are often denominated in fiat/USD, if another multi-year crypto winter were to arrive, DAOs might be forced to sell treasury assets at "fire-sale" prices to meet their current obligations—which could lead to a further downward spiral in the native token's price. Consequently, careful treasury management by shrewdly generating multiple income streams (operating and non-operating) and financing the DAO using token sales/debt in addition to any retained earnings is paramount for DAOs hoping to adequately support their protocols through multi-year bear markets and in perpetuity.

Major DeFi DAO Treasuries
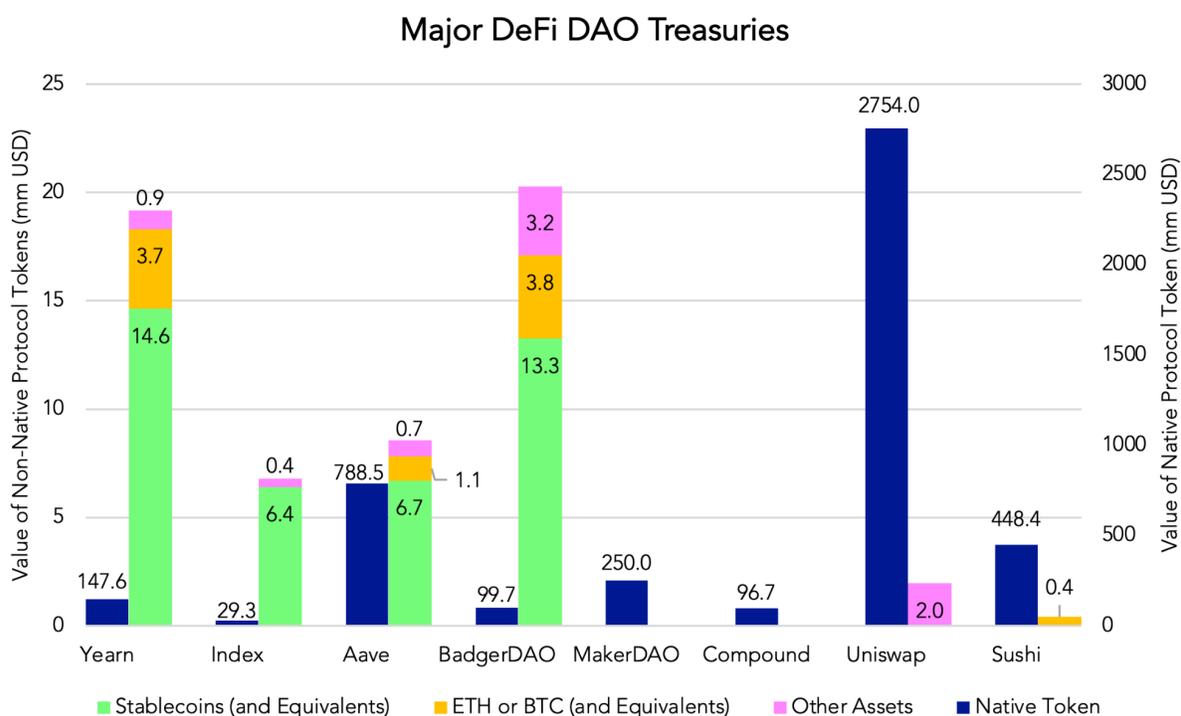
TREASURY MANAGEMENT—INCOME DIVERSIFICATION

As with traditional corporations, DAOs primarily have two broad "avenues" through which income is generated: revenue and non-operating income. Specifically, DAOs can choose to extract fees/income from its protocol's/its own core operations, or choose to utilize its existing asset-base to generate yield/investment returns. Moreover, with multiple potential income streams, DAOs have the further opportunity to diversify their income streams so that total Treasury income can consistently cover and exceed operational expenses.

Diversifying Revenue

Though most DeFi projects have begun to appreciate the importance of embedding some kind of value accrual mechanism within the protocol to give their tokens value, a number of DAOs have not realized the importance of generating DAO-level revenue that can be kept as "retained earnings" in its Treasury/on its balance sheet. Just as it would be unwise for any growing company to distribute all earnings (usually operating income) as dividends and retain none of it, DeFi protocols, still in their "early" stages, need to ensure that their DAOs are able to adequately support the protocol's growth and maintenance by "retaining" some of its revenue/operating income too.

Given most DeFi protocols charge fees in some way or another, for Treasuries who currently do not receive a portion of these fees as revenue (SushiSwap, Compound, Uniswap, MakerDAO), the easiest way for these Treasuries to de-risk their balance sheets would be to allocate a percentage of protocol fees to flow into the DAO Treasury itself. For instance, SushiSwap's DAO could simply choose to retain a small portion of fees the protocol distributes to xSUSHI stakers. Similarly, Compound governance could elect to have a small portion of cTokens paid by borrowers into pool reserves accrue directly to the treasury. Not only will doing so help bring additional income to DAO treasuries, but protocol revenue is also often even uncorrelated/negatively correlated with the broader price action of the market—e.g. trading volumes on SushiSwap/Uniswap, and therefore fees, often spike during periods of high volatility—thereby helping to diversify Treasury income even further.

Moreover, for all protocols, it might be beneficial to consider changing the denomination/token any revenue is paid out/received in. For instance, governance might wish to elect that revenue flowing to the Treasury of Uniswap/Sushiswap be paid out in stablecoin/ETH rather than in SUSHI/UNI (as it does to stakers). While such a decision might reduce the Treasury's upside, given raising financing (tokesales/debt) in bear markets might be inopportune/difficult, using protocol revenue to assist in building a 'buffer' in the Treasury is likely to make the trade-offs worth it. Doing so would also help match income with expenses more closely.

Diversifying Non-Operating Income

Due to the size of DAO Treasuries and the fact that they hold so much of their own native token, it is quite likely that a sizeable portion of the income DAOs can generate will be non-operating income generated from the return earned on Treasury assets/investments—that is, at least until these protocols reach a mature stage of growth.

Traditional corporations make several different kinds of investments in non-operating assets that are held on their balance sheets. These range from risk-free assets such as T-Bills, through to lower-risk investments in longer-term highly rated debt, through to higher risk investments like pursuing M&A or providing venture capital. Likewise, DAOs should look for analogous categories of on-chain assets to diversify their treasury into:

"Risk-Free"	- Staked ETH - DAI Savings Rate - Stablecoin Liquidity Pools on AMMs
Low Risk	- Lending on money markets (Aave/Compound) - Senior debt in Risk-tranching protocols - Fixed rate lending protocols - Money market funds
Medium Risk	- Yield aggregators
High-Risk	- M&A - Venture Capital/Early Stage Investments

We will now survey these various options to generate non-operating income, and highlight some of the risks associated with each option.

Overview of "Risk-Free" Diversification Options

Staking ETH[1]

If ETH is the reserve asset of the internet-native financial system, then staking ETH is analogous to lending ETH to the Ethereum protocol for Ethereum's security, therefore making it an agreement between the "bond issuer" (the Ethereum protocol) and the "bondholder." Tokenized representations of staked ETH are then a claim on the staked ETH and all rewards accruing in the smart contract. As such, once the ETH2 merge happens and staking ETH reaches a mature state, the yield earned on staked ETH might be considered the "risk-free" rate of the Web3 economy (at least as the opportunity cost of capital, if not for pricing on-chain derivatives).

Although in its current state, the ETH validator set is highly fragmented, it is quite likely that as the staking ecosystem matures, staking pools will come to dominate the space due to the benefits they offer to those with and without the ability to solo-stake:

1. The 32 ETH requirement for running a solo validator puts the prospect of staking out of reach of most ETH users. Since staking pools pool together ETH from many different stakers, this makes staking pools (or centralized providers) one of the only options for retail ETH holders to participate in staking.
2. Many staking pools insure stakers against slashing through some mechanism
3. Given the low risks of incurring a slashing event if a validator is well run, many solo stakers will likely transition to staking pools due to the strictly superior economics of doing so:

---

[1] Much of the thinking in this section was heavily inspired by (i.e., shamelessly borrowed from) Georgios & Hasu @ Paradigm

a. Becoming an infrastructure provider earns would-be-solo-stakers a portion of fees the protocol charges other ETH stakers/its customers

b. Becoming an infrastructure provider also allows would-be-solo-stakers to benefit from MEV and ETH transactions fees—staking pools help to socialize MEV and fee revenue due to the low probability of being assigned a block as a solo-staker.

4. The staking pool can offer a tokenized claim on the underlying staked ETH and rewards accrued. This allows stakers to rehypothecate their principal in DeFi and Web3 while still earning staking rewards.

Moreover, due to the provision of tokenized staked ETH, the ETH validator set is likely to be far more concentrated amongst staking pools relative to in PoW mining:

- The issuer of the tokenized form of staked ETH with the most market share will likely have the token with the most liquidity. This heavily incentivizes new stakers to stake with the dominant staking pool too, creating a powerful network effect and therefore a strong moat for the dominant staking pool.

- The more liquid tokenized staked ETH is, the lower the opportunity cost is to stake one's ETH. This thereby incentivizes more ETH to be staked and creates a virtuous circle.

As a result, due to the risk-free and (likely to be) highly liquid nature of tokenized forms of staked ETH, it might be considered to be essentially analogous to short-term sovereign debt in the off-chain world, such as T-Bills (albeit rates are variable and the "tenor" is perpetual). This perhaps makes staking ETH one of the best ways for a DAO Treasury to diversify their income stream—especially considering that MEV and Ethereum transaction fee revenue, which are likely to be income streams uncorrelated to most other income sources, can also be earned by stakers.

We now provide a brief comparison between a few of the major decentralized staking protocols/pools:

	Ankr (ankrETH)	Lido (stETH)	RocketPool (rETH, Mainnet launch in 2Q21)
Fees	15% of staking rewards	10% of staking rewards	Market (Validator Supply vs Demand)
Requirements	≥ 0.5ETH	Any	≥ 0.01ETH
Management	DAO (Governance token is ANKR)+Company	DAO (Governance token is LIDO)	DAO (Governance token is RPL)
Backers	?	Paradigm ParaFi	Consensys Kryptonite1 milliwatt

Validator Infrastructure	Solo-stakers can participate with their own infrastructure. Others can pay Ankr a monthly subscription to use Ankr provided nodes	DAO chooses a diverse basket of centralized infrastructure providers who can apply to the DAO to join. Genesis includes: Certus One, P2P, Stake.Fish, Staking Facilities, Chorus One. Also recently onboarded: Blockscape, DSRV, Everstake, SkillZ	Completely decentralized, the protocol heavily incentivizes solo-stakers with their own infrastructure to join and uses quadratic leakage to deter highly centralized providers like AWS/other cloud computing instances.
Number of Stakers	2,687	5,866	0
Total Staked	48,267.5ETH (1.05% of all ETH staked)	346,829ETH (7.55% of all ETH staked)	0
Slashing Protection	Staking providers' own stake (≥ 2 ETH) insures stakers. Alternatively stakers can also post ≥ 2 ETH worth of ANKR as collateral. If slashing occurs these funds are used to reimburse depositors. Depositors are then moved to a different provider since a slashed validator will see a drop in rewards (due to a lower principal base to earn rewards from)	Staking providers are not required to have skin in the game. In a DAO-to-DAO transaction, the Lido DAO purchased slashing cover for ~197k ETH from Unslashed.Finance, protecting users against up to 5% in slashing penalties; however, if a large slashing event occurs, the Lido DAO will have to intervene.	Providers must stake as much ETH as they are assigned (16ETH). Providers must also stake RPL as collateral, and can earn additional RPL staking rewards too if they perform well. If slashing occurs, depositors are guaranteed by the provider's own stake.

Risks:
- Variability in returns
  - Stakers' returns (denominated in dollar terms) are determined by the USD price of ETH
  - Stakers' base return fluctuates based on the total amount of ETH staked, and the fee charged by the staking pool (either set by supply/demand or the staking pool's governance)
    - However, the base APR for staking follows a known curve that can be easily computed, allowing stakers to confidently project a "floor" APR they can earn
- Risks associated with staking ETH

- - - Slashing (due to malicious behavior), resulting in principal loss
      - Occurs only if a validator acts maliciously (basically impossible to occur unintentionally)
        - Mitigated by staking pools which are sufficiently decentralized and provide slashing protection guarantees
    - Missing attestations/block proposals (due to validators being offline when they have assigned duties), resulting in foregone income and a tiny penalty
      - It generally occurs if electricity/internet connection is down, or if system maintenance is being performed on the validator
        - Mitigated by staking pools that are sufficiently decentralized
      - Can also occur if a period of block non-finality occurs with Ethereum itself
        - Unlikely due to the economic incentives of running validators, and will be harder as more and more ETH is staked
      - Can also occur if the ETH2/validator client is buggy
        - Mitigated by client performance in numerous testnets and the beacon chain, but also because the major clients have all been rigorously audited
- Withdrawal key risk before ETH2 merge
    - Though especially once ETH2 withdrawals are enabled (after the beacon chain merge with ETH 1.0's mainnet), withdrawal keys will likely be trustlessly managed by a smart contract, until then, different staking pools are managing withdrawal keys in different ways
      - Lido, for instance, currently uses a 6/11 multisig.
- Smart contract risk with the staking pool's client, and with withdrawal keys
    - Staking pool client's smart contract:
      - Mitigated by client performance in numerous testnets and the beacon chain, but also because the major clients have all been rigorously audited
      - Can also buy insurance
    - Withdrawal key management smart contract
      - This smart contract should have no excess functionality, namely anything administrative other than to trustlessly enable withdrawals
      - Given these smart contracts will essentially be a "honey pot," staking pools are likely to dedicate a large amount of attention to ensuring they are robust
      - They will almost certainly be rigorously audited
      - Buying insurance to hedge against this risk is likely to be prudent

DAI Savings Rate

Maker governance uses the Stability Fee and the DAI Savings Rate as monetary policy tools to control DAI supply/demand and maintain its 1 USD peg (where the Stability Fee is the the interest rate to open up a CDP and mint DAI for a given type and amount of collateral asset, i.e. borrowing interest rate; and the DSR is the interest rate paid to depositors of DAI into the DAI Savings Rate smart contract). To increase demand for DAI and therefore increase DAI's USD price, Maker governance might choose to lower Stability Fees and/or raise the DAI Savings

Rate. Conversely, if DAI is consistently trading above its peg, demand for DAI can be lowered by raising Stability Fees and/or lowering the DAI Savings Rate.

The DAI Savings Rate is therefore one of the most risk-free ways DAO Treasuries can earn a yield on stablecoin. This is because all DAI deposited into the smart contract will accrue interest paid out by the protocol itself without being subject to much credit risk (though the DSR is ultimately backed by stability fees, which is subject to credit risk, MKR holders will be diluted in the event of default before DSR depositors' return is lowered—i.e., DSR depositors have seniority over MKR holders in any event of default).

It should also be noted, however, that DAI deposited into the DSR contract is (currently) not tokenized and so cannot be re-used elsewhere in DeFi.

Risks:
- Interest Rate Risk, which can reduce any returns earned
  - Though the DSR is a fixed rather than floating rate, it is not possible to guarantee a fixed rate return for some prespecified term like a bond might be. This means that the DAI Savings Rate is entirely determined by Maker governance, and any changes to it will immediately bear effect on all depositors, existing and new
  - For instance, as of May 2021, the DSR is currently set to 0%, which makes the DSR an unusable instrument for diversification of non-operating income
- DAI devaluation risk, which can result in principal loss
  - However, the DAI has maintained its peg through a number of major black swan events
  - Furthermore, DAI holders have seniority over MKR holders, i.e., DAI's peg is guaranteed by MKR holders, since MKR holders will be wiped out before DAI will ever fall off its peg in the event the Maker protocol itself approaches insolvency
- Smart Contract Risk, which can result in principal loss
  - However, the Maker protocol is one of the largest DeFi protocols and has been around since the beginnings of DeFi and there have not been any major smart contract vulnerabilities that have affected DAI
    - Arguably the $0 ETH auctions during Black Wednesday might be viewed as an exploit, but this affected MKR holders, not DAI holders
  - The protocol has also been rigorously audited
  - Even so, given the system's complexity, another economic attack could always happen; but in these cases DAI's peg will likely always be guaranteed at the expense of MKR holders
  - This means DAI holders, relative to MKR holders or CDP owners, are the economic stakeholders exposed to the fewest risks across the Maker protocol
  - Insurance covering economic attacks and bugs can also always be bought

Stablecoin Liquidity Pools on AMMs

The yield generated from trading fees earned by LPs on certain stablecoin pools on AMM can be another near risk-free way DAOs might be able to earn yield and diversify their non-operating

income. For instance, USDC-DAI pools on Uniswap and other AMMs do not expose DAOs to any credit risk or impermanent losses, while allowing them to earn a portion of trading fees generated by the protocol.

In addition to the risks outlined below, it will also be important for DAO treasuries to consider the work that will be involved when providing liquidity in certain cases (e.g., in Uniswap v3, though UIs and "active management strategies" will probably appear), and therefore the costs/opportunity costs in time this might entail.

Risks:
- Smart contract risk, which may result in principal loss
  - This can be mitigated by becoming an LP only on major AMMs that have large amounts of TVL, have been "battle-tested" significantly, and that have been rigorously audited
  - Protocol cover insurance can also be bought
- Stablecoin depreciation/devaluation risk, which may result in principal loss
  - This can be mitigated by only providing liquidity to stablecoin liquidity pools where the underlying stablecoins have a low risk of depreciating/devaluing, e.g. DAOs might choose to start with USDC-DAI pairs and other pools/pairs exposed only to low-risk stablecoins
    - Stablecoins other than USDC-DAI are generally riskier (though this is not always necessarily true, PAX and GUSD are probably about as risky as USDC). As an example, despite the ubiquity of USDT—moreso on centralized exchanges than in DeFi—the recent breakdown (as of 1Q21) of their reserves shows that USDT holders are exposed to a lot of credit risk: Tether's reserves held 49.60% of its assets in commercial paper of unknown quality, another 12.55% in secured term loans to borrowers of unknown quality/backed by collateral of unknown liquidity in unknown legal jurisdictions, and a significant amount of corporate bonds with unknown ratings/quality/liquidity as well (up to 9.96%). This means that >63% of Tether's reserves are not being held in cash/T-bills/money-market funds that only invest in highly liquid government securities.
- Variability in liquidity mining returns
  - Some AMMs (e.g. Curve) have liquidity mining programs, and so though there will be the potential to earn an additional return above the base return from LP fees, the price of the AMMs native protocol token will significantly affect the amount of returns that can be earned
- Variability in trading volumes, which may lower returns
  - Though trading volumes for stablecoin pairs on AMMs are less volatile than with some other assets,
- Fee rate changes by AMM governance, which may lower returns
  - AMM governance might choose to lower the fees charged on certain stablecoin trading pairs, which would correspondingly lead to LP income decreasing

■ For instance, in the move from Uniswap v2 to v3, stablecoin pools saw the fees earned by LPs drop from 30bps to 5bps, and this could drop even further if/when Uniswap's fee switch is turned on

Overview of Low-Risk Diversification Options

Lending on Money Markets

One low-risk option DAO Treasuries can use to diversify their non-operating income would be to diversify a portion of their balance sheet into stablecoins and then to utilize major decentralized money-markets (e.g. Aave, Compound, Cream) to lend out their Treasury assets and earn interest.

Risks:
- Interest rate risk (i.e. variability in floating yields), which can affect the income generated
  - Can use risk-tranching protocols to hedge against this risk (see below)
  - Can also potentially hedge by engaging with exchange trading desks/other CeFi institutional participants to enter into OTC interest rate swaps/forwards.
  - Can use interest rate minimization protocols, such as Greenwood, to mitigate this risk
  - Can also work with derivative/synthetics DeFi protocols to create interest rate forwards that can be used to hedge against interest rate fluctuations
    - The yet to be launched Swivel Finance (backed by Multicoin, Defi Alliance, CMS, Stani Kulechov and others, and currently deployed on the Kovan testnet) will be a protocol that allows for interest rate derivatives such as fixed-for-floating rate swaps
    - Opium can also be used together with UMA's optimistic oracle to create interest rate derivatives such as fixed-for-floating rate swaps
- Credit Risk, which can lead to principal loss
  - Mitigated by liquidation mechanisms and overcollateralization, but also mitigated by reserves on the platform or through other mechanisms like Aave's Safety Module that protect lenders/depositors from principal loss
  - Even so, given credit risk is not isolated to the tokens being lent, lending protocols need to be evaluated individually on the riskiness of the assets available on the protocol (e.g. stablecoin depositors are exposed to the risk of a debtor borrowing against large amounts of an illiquid asset posted as collateral, since liquidators might be unwilling to liquidate illiquid collateral during market dislocations if that asset cannot be traded at low slippages)
  - Diversifying lending positions across different money-markets can also help to mitigate credit/counterparty risk
- Risk of stablecoin being lent depreciating/de-pegging, which can lead to principal loss
  - Mitigate by only lending out/depositing low-risk stablecoins (e.g. USDC/DAI)
- Smart Contract Risk, which can lead to principal loss

- - Mitigated by the fact that major DeFi money market protocols have been rigorously audited and have been "battle-tested" with billions of dollars in loan originations and TVL[2]
  - Can also hedge this risk by buying insurance on Nexus etc.

Fixed-rate Lending Protocols

As their name suggests, fixed rate lending protocols utilize what are essentially bonds to allow users to lend and borrow at a fixed rate for a fixed maturity. As such, for DAO Treasuries, they present an interesting way to earn a guaranteed yield on Treasury assets, similar to how traditional corporations might invest in highly rated debt-securities.

Similar to the variable rate money market protocols, most of the fixed rate lending protocols currently require overcollateralization; however, whereas formulas are commonly used to determine interest rates on floating-rate money markets, interest rates are generally determined based on market supply/demand on fixed rate lending protocols. As such, though fixed-rate protocols currently have less traction relative to their floating-rate counterparts, fixed-rate protocol debt products with different maturities might one day serve to help construct a yield curve in DeFi.

Currently, all major fixed rate lending protocols (Notional.Finance, Yield Protocol) implement their products as a zero-coupon bond. Like in the TradFi world, this simply means that the lender will receive an instrument/token priced at a discount to the face/par value of the bond, e.g. lending DAI on yield protocol might involve buying 0.95 fyDAI, which might be redeemable for 1 DAI at maturity one year later. Moreover, similar to how bondholders see bond prices trade down when yields rise, lenders to fixed rate protocols similarly see their token prices trade down when the prevailing rate charged by the protocol rises; and similar to how bondholders are guaranteed a fixed return at the price/yield they purchase the bond at, lenders to fixed rate protocol also earn a fixed return (unless they sell their bond when prices fall, or if there is a default).

Relative to lending directly through floating rate protocols, fixed-rate protocols bear similar levels of credit risk while eliminating any risk from fluctuations in interest rates. However, given they have significantly less traction, they might have heightened smart contract risk and potentially also suffer from lower amounts of liquidity if a lending position has to be exited early before it matures.

Risks:
- Credit risk, which can lead to principal loss
  - As with floating-rate money markets, overcollateralization and incentives for liquidators serve to mitigate credit risk

---

[2] Aave currently has $8.95bn in TVL and has originated $10.1bn in loans
Compound currently has $8.08bn in TVL and has originated $45.5bn in loans

- - Current fixed rate protocols also only accept very few collateral types (ETH and Stablecoin), and so the collateral available to creditors in the event of default is arguably much less risky than current major money markets
- Liquidity risk, which might result in slippage/taking undesirable haircuts if a bond needs to be liquidated before maturity
  - Due to comparatively low TVL numbers for fixed-rate lending protocols, a DAO Treasury seeking to liquidate their zero-coupon bond-token holdings early might be forced to take a haircut due to insufficient liquidity and therefore slippage on trades
- Risk of stablecoin being lent depreciating/de-pegging, which can lead to principal loss
  - Mitigate by only lending out/depositing low-risk stablecoins (e.g. USDC/DAI)
- Smart contract risk, which can lead to principal loss
  - Unlike floating-rate money markets, fixed rate protocols currently have accumulated significantly less TVL, and as such might be considered more risky due to their relatively "untested" nature
  - This risk can still be hedged using insurance

Senior Debt in Risk Tranching Protocols

In traditional finance, "tranches" refers to different collections of securities (generally debt) that are grouped according to their risk. Similarly, risk-tranching protocols in DeFi also slice up debt instruments into varying levels of risk. Specifically, risk tranching protocols such as BarnBridge and Saffron.Finance allow users to specify the risk they are comfortable with when using their protocols to deposit into floating-rate money market stablecoin pools (Currently just Compound; Aave etc. are coming soon).

Saffron pools liquidity from lenders and deposits them into Compound in [2 week cycles, where at the end of each cycle the principal and yield is wound down and returned to depositors](). When making a deposit, lenders have 3 tranches to choose from: a AA tranche, a yield-enhanced A tranche, and also an S tranche. Similar to waterfall payment structures in TradFi, in the case where there are any losses that result from platform/default risk, depositors/lenders to the AA tranche will see full recovery of their principal and accrued interest before A tranche depositors see any recovery. To compensate A tranche lenders for this, A tranche depositors earn interest according to their principal contribution into the pool multiplied by a tranche interest multiplier M (defaulted to 10). By comparison, depositors into the AA tranche earn 1/M the interest they would earn without Saffron. The S tranche simply exists so that the AA:A ratio in a given pool is always M:1 (i.e. depositors into the S tranche deposit into both the AA and A tranches, which is essentially equivalent to depositing into the underlying money market directly—as such, they receive most of the liquidity mining emissions of SFI). Moreover, unlike in other tranches, A tranche lenders must also stake SFI before depositing; all the SFI staked on Saffron is another instrument used to insure the AA tranche against capital loss (while also earning platform fees on Saffron once fees are turned on in the future). [In the future (with v2), Saffron also plans on providing AA tranche depositors a guaranteed fixed-rate yield as well as beginning to offer multi-protocol pools (pools that deposit in multiple protocols that themselves have a senior and a junior tranche).]()

BarnBridge's SMART Yield Bonds are a similar product to Saffron, but unlike Saffron.Finance, lenders into the Bond's senior tranche Senior Pool are not exposed to interest rate risk (variability) since Senior lenders essentially buy into a bond with a guaranteed interest rate that matures after some fixed term (current average maturity is ~10 months). By comparison, Junior lenders bear all the interest rate risk since when the interest rates on Compound fall below the Senior tranche's guaranteed yield, their principal is at risk. Likewise, when the interest rates on Compound are above that of the Senior tranche's guaranteed yield the additional income generated with Senior bondholder's principal all flow to Junior lenders. Furthermore, unlike Senior lenders, Junior lenders are not locked into a fixed term and have the freedom to withdraw some portion of their deposits whenever they wish (with the specific portion they can withdraw contingent upon the waterfall payment structure). Concretely, this means that Junior lenders will always be able to withdraw/deposit funds instantly but at a rate that is determined by what the underlying lending protocol's yields are relative to that guaranteed to Senior lenders. Alternatively, if they are dissatisfied with their withdrawal rate, Junior lenders can mint a bond with an identical maturity with Senior lenders; then if interest rates rise again their debt will no longer "trade below par."
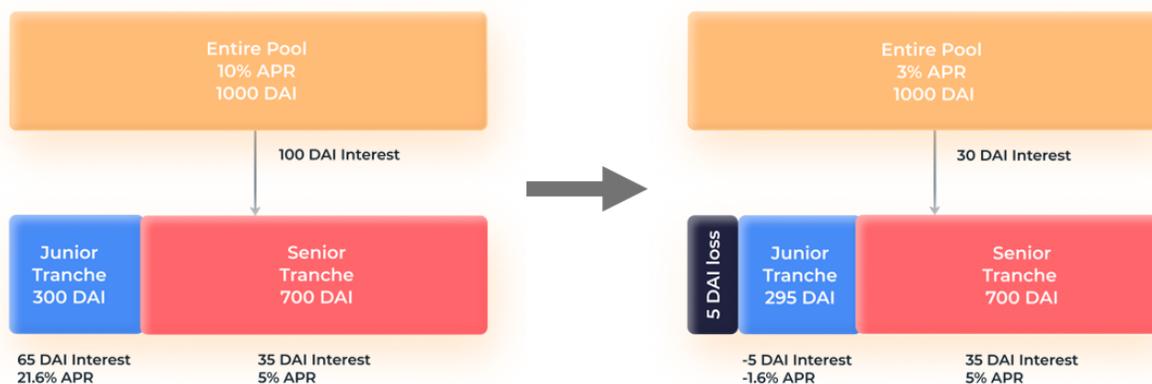
BarnBridge juniors withdraw at a haircut if prevailing interest rates fall below the rate guaranteed to senior tranche depositors

Source: BarnBridge

Relative to lending directly on money markets, utilizing risk-tranching protocols to become senior creditors compounds another layer of smart contract risk but significantly mitigates the credit risk associated with lending directly in money-market protocols. As such, assuming the additional smart contract risk is sufficiently low, depositing into the Senior pools of these risk-tranching protocols could arguably be a very good option in diversifying DAO Treasury non-operating income.

Risks:
● Credit risk, which can lead to principal loss

- - Relative to depositing or lending directly on floating-rate or fixed-rate lending protocols, credit risk is significantly reduced.
    - In addition to overcollateralization and incentives for liquidators in the underlying protocols, risk-tranching protocols provide additional security to senior depositors through its waterfall payment structure that ensures senior depositors are made whole before junior depositors see any recovery in the event of a default event.
- Liquidity risk, which might result in slippage/taking undesirable haircuts if the senior debt bond needs to be liquidated before maturity
  - Due to comparatively low TVL numbers for risk-tranching protocols, a DAO Treasury seeking to liquidate the bond representing their holdings might be forced to take a haircut due to insufficient liquidity and therefore slippage on trades
    - This is especially the case with BarnBridge Seniors given they are represented using NFTs
- Risk of stablecoin being lent depreciating/de-pegging, which can lead to principal loss
  - Mitigate by only lending out/depositing low-risk stablecoins (e.g. USDC/DAI)
- Smart contract risk, which can lead to principal loss
  - Unlike lending directly in the underlying protocols, lending through a risk-tranching protocol compounds another layer of smart contract risk and adds another point of failure
    - Increased smart contract risk should therefore be carefully evaluated against reduced credit risk—whereas smart contract failures/hacks are likely to result in total loss of principal, Events of Default in underlying lending protocols are still likely to provide high levels of recovery for lenders (especially if the debt was overcollateralized)
  - This risk is not insignificant given risk-tranching protocols remain unaudited and are yet to amass more than $100mm in TVL
  - This risk can still be hedged using insurance

"Money Market" Funds

Just as in the off-chain TradFi world, on-chain money market funds seek to invest in a diversified basket of low-risk and highly liquid yield-generating assets. Though the current market for on-chain money market funds is immature and underdeveloped relative to the traditional off-chain world, there are several different protocols/projects developing these products.

One such money market fund in development is [Index Coop's Stable Yield Index](#). While the SYI is currently just a proposed product that is still being developed, it is likely to invest in 3-4 tranches of 3-4 different products each, totalling 9-16 different assets. The different tranches are all grouped together based on risk (e.g. a high, medium, and low risk tranche), and the individual products within each tranche will also be allocated based on risk. For instance, one possible allocation to 9 products might look something like:

$$Tranches \times Allocation = Portfolio$$

$$\begin{bmatrix} 45\% \\ 33\% \\ 22\% \end{bmatrix} \times \begin{bmatrix} 45\% & 33\% & 22\% \end{bmatrix} = \begin{bmatrix} 20.25\% \text{ cUSDC} & 14.85\% \text{ cDAI} & 9.9\% \text{ yCRV} \\ 14.85\% \text{ aUSDC} & 10.89\% \text{ aUSDT} & 7.26\% \text{ Rari Stable Pool} \\ 9.9\% \text{ yDAI} & 7.26\% \text{ ycrvUSDP} & 4.84\% \text{ Barnbridge Junior Debt} \end{bmatrix}$$

In this example, the low-risk tranche contains cUSDC, aUSDC, and cDAI; the medium-risk tranche contains yDAI, yCRV, and aUSDT; and the high-risk tranche contains Rar's Stablecoin Pool, ycrvUSDP, and Barnbridge Junior Tranche Debt.

While the actual products/protocols that are allocated to are under discussion, the important thing is that such an allocation strategy that carefully considers common points of failure/correlations and minimizes risks across different protocols, stablecoins, and interest-rate volatility provides an incredibly useful product for DAO Treasuries. Assuming Index Coop can manage such a product well, it provides a very low risk product that also saves DAOs from having to do any significant active management.

Though there are currently other yield-generating Index Fund products, such as PowerPool's Lazy Ape Index, the methodology utilized by other products are often less sophisticated and therefore do not come with the proper diversification benefits that Index's SYI would have. For instance, the Lazy Ape Index has 100% exposure to Yearn's v1 vaults and a significant portion (~42%) of the fund's ~13.5% returns depends not on the underlying products' yields but on PowerPool token incentives. By comparison, though a portion of Index's SYI is allocated to products decidedly more risky than v1 Yearn Vaults, carefully considered allocation provides diversification which mitigates these risks while also allowing SYI to generate yields that will be higher than the Lazy Ape Index without token incentives.

Risks:
- Variance in Returns
  - Given any money market fund will likely be exposed to a number of floating-rate lending protocols, as well as a number of liquidity pools on AMMs, the returns of the fund will also correlate correspondingly with DeFi interest rates and AMM volumes
  - However, given interest rates and trading volumes are not necessarily correlated (and are arguably even negatively correlated), the volatility in the returns of the fund should be reduced
- Liquidity risk, which might result in slippage/taking undesirable haircuts
  - Money market funds need to have their liquidity carefully assessed before they are added to the Treasury
  - Most implementations of funds/vaults in DeFi currently also reinvest all dividends/yield, and so liquidity becomes much more important if earnings need to be used to meet expenses.
- Smart contract risk, which can lead to principal loss

- ○ The main smart contract risk associated with using such an Index lies in the smart contract risks associated with the asset management platform the index is built on
    - ■ In the case of the SYI, this would be TokenSets—but the smart contract risk of TokenSets is mitigated by the fact that the platform already has many products built upon it, and that it has been rigorously audited
- All the risks inherent in the underlying products (e.g. stablecoin depreciation/de-pegging, credit risk…)
    - ○ However, using an Index to gain exposure to a number of products spreads risk out across the underlying products, and therefore, all else being equal, greatly helps to reduce overall risk

Overview of Medium-Risk Diversification Options

Yield aggregators

Another class of options that are available to DAO Treasuries to diversify their non-operational income would be to deposit stablecoin into yield aggregators such as Yearn vaults, which themselves fall across a pretty large risk spectrum.

The vast majority of stablecoin-exposed Yearn strategies pursue some variant of a strategy of e.g. depositing stablecoin into a liquidity/lending pool on e.g. Curve, PoolTogether, Compound; then selling or staking liquidity mining rewards to repeat the strategy or earn protocol fees; then possibly borrowing the base asset the vault is denominated in to lever up the strategy (e.g. through Iron Bank, Compound, or Flash Loans). This means that most Yearn strategies' risks can be quantified along a few of the following dimensions:
- Smart contract risk (from the Yearn vault itself and any underlying protocols such as Curve/Compound/PoolTogether)
- Liquidity mining reward price risk (since some strategies' returns rely on selling e.g. CRV or COMP)
- Risk of underlying stablecoins depreciating/de-pegging
    - ○ If the strategy involves depositing into a Curve pool, consider that most stablecoin pools on Curve include DAI, USDT, and USDC, and differ only in the 4th asset (e.g. Synthetix USD, True USD...) supplied, or in that the Curve pool's underlying assets are yield bearing versions from one of the variable rate money markets (e.g. cUSDC, aDAI, iron bank USDT). Thus, this risk is probably concentrated around USDT devaluation due to its assets holding lots of debt of unknown quality, and possibly also in the 4th stablecoin in the pool (rather than USDC/DAI)
    - ○ Otherwise, if a vault/strategy is only exposed to one stablecoin then devaluation risks are isolated to the stablecoin the vault is denominated in
- Interest rate risk (since some strategies rely on lending in lending protocols, or involved becoming an LP to a Curve pool containing yield-bearing stablecoins)

- Credit risk (since some Curve pools containing yield bearing assets bear the risk of the underlying lending protocol experiencing defaults that don't result in full recovery)
- Trading volume risk (since some strategies become AMM LPs, and trading volumes are what determines LP income)
- LP-position fee rate risk (the AMM's governance might choose to lower the fee rate for a given liquidity pool)
- Platform fee-capture risk (since this affects fees flowing to e.g., yveCRV/Aave stakers)

As such, though the base asset/strategy a Yearn vault might be exposed to could be diversified, Yearn vault strategies strictly compound/multiply potentially many layers of risks on top of it. Thus, though Yearn vaults can be lucrative, returns can be quite variable and depending on its strategy, they can be a much riskier option relative to some of the other options presented earlier.

Though there are yield aggregators other than Yearn (that might even provide higher returns), they generally pursue analogous strategies that compound a multitude of risks together and should be evaluated in a similar way on a vault-by-vault basis.

Overview of High-Risk Diversification Options

A higher-risk and potentially higher-reward approach to generating non-operating income by increasing DAO Treasury returns might be to pursue a more risky capital allocation strategy by investing in other DAOs. Similar to in the traditional corporate world, this would probably either take the form of M&A or through taking minority stakes in other, probably early-stage, DAOs.

Protocol M&A/Partnerships

Pursuing M&A/Partnerships with other protocols, similar to in the traditional corporate world, can yield a number of benefits. Not only can it improve a protocol's strategic positioning, it might also be thought of as an "acqui-hire" that can result in quality developers joining the team, or a way to efficiently add new functionality to a protocol or to realize valuable synergies—all of which can ultimately prove to be accretive to tokenholders by increasing the DAO Treasury's income.

On-chain Protocol M&A "transactions" that result in another protocol's tokens being "bought out" (as would happen with the target company's equity in corporate M&A) are yet to occur. It might also just be the case that M&A in the on-chain DAO world will look more like an informal but ongoing "symbiotic partnership" rather than something like its analogue in the corporate world (or perhaps it would be something in between). Though the definition is unclear, all of the on-chain examples of M&A/Partnership events so far have required a strategic alignment between core teams, communities, and also a significant reworking in the code and operational hierarchy of protocols.

One example of Protocol M&A that would be Yearn's "acquisition" of Pickle. Given Pickle began as Yearn fork, the two protocols were already extremely similar. Pickle's technical architecture was near-identical and Pickle's developers/team was already working on similar problems to Yearn's developers. The acquisition was therefore relatively straightforward and essentially

resulted in Yearn absorbing Pickle's entire team and also in the integration of Pickle's code/products into Yearn (Pickle jars became Yearn v2 vaults, and all of Pickle's features became additional features that Yearn users could benefit from too). As a result of the merger, the Yearn team absorbed some talented developers and users of both protocols saw boosted vault returns from the integration of Pickle features into Yearn—both of which is likely to/has already increased TVL (and therefore protocol revenue) and is thus ultimately accretive to Yearn's tokenholders. Notably, unlike traditional M&A, there was no sale, swap, or any purchase of DAO assets, nor was there any creation in liabilities/debt, during this "transaction."

Another good example of Protocol M&A, but one closer to a merger than an acquisition, would be Yearn's partnership with Sushi. Unlike the Pickle deal, Yearn and Sushi operate in different verticals: Yearn is a yield aggregator/asset manager, and Sushi is an AMM/DEX ecosystem; however, the two protocols saw that there were many synergies that could be realized in a partnership and as such decided to align themselves more closely strategically. Specifically, Yearn needed an AMM it could work closely with to develop its increasingly specialized strategies/vaults/products and Sushi's product pipeline that complements its core AMM product move was inching closer towards Yearn's core competencies in yield generation and money markets. As a result of the partnership, all of Yearn's non-stablecoin strategies/vaults now trade using Sushi, generating large amounts of fees for Sushi holders, proving to be immediately accretive to Sushi holders. Likewise, Yearn will create new vaults for xSUSHI and merge development resources with Sushi on certain joint efforts (this will result in the creation of "Deriswap" as well as a number of other unspecified stealth projects down the line). Notably, there was also a governance vote for a YFI-SUSHI token swap between the two protocols, though this was ultimately shot down by Sushi holders (the Sushi proposal was bundled together with other initiatives which would have diversified 40% of the treasury into other assets through market sells and so was likely to have a big impact on SUSHI price).

Partnering and pursuing M&A with other protocols is therefore a higher risk way to increase and diversify the non-operating income/returns earned on treasury assets. Though there have been no examples of M&A where any asset sales or token swaps occurred yet (it almost happened with the Yearn-Sushi merger/partnership, and could still happen down the line as the two protocols integrate more closely), it is quite likely that any long term strategic partnership between protocols will have to involve some kind of a token swap to seriously and better align their communities (in addition to aligning the core developer teams).

Risks:
- Similar to M&A in the traditional corporate landscape, Protocol-to-Protocol M&A has the potential to go very wrong.
  - If a token swap between the protocols occurred, this could result in a loss in each protocol's investment
    - Certain on-chain primitives can be used instead to mitigate this risk, for instance, tying a token swap to UMA KPI options could allow protocols to conduct token swaps contingent on the success of any synergies being realized.

- - There is also the opportunity cost of the time and capital spent on collaborating and merging, and given the scarcity of developer-time/resources in Web3/DeFi, this is a significant opportunity cost
  - Traditional corporate M&A often sees the issuance of *new* equity or the issuance of *new* debt/liabilities to buyout the target company's shareholders. If this occurs in on-chain M&A, transactions could have many additional risks since tokenholders might either suffer from dilution or may be burdened with large interest payments
    - It is probably quite unlikely that Protocols will ever retroactively issue new tokens for the purposes of M&A, given in crypto details around token supply are usually specified at launch and do not change after that
      - The opposition to the Yearn Mint proposal also shows how even with well articulated and reasoned arguments, communities are often still heavily opposed to token dilution
    - It is also unclear how token buyouts might logistically even occur

Early-Stage Investments

Protocol DAOs are in an excellent position to be making investments in early-stage projects, especially ones building on top of their ecosystems. Protocols can leverage the use of grants to allow new projects to experiment and build proof of concepts, and if they succeed, the Protocols would then be in the perfect position to utilize their treasury to make a larger "seed" investment with a token swap down the line. If these projects then proceed to gain large amounts of traction, the investment that was made could prove to be highly accretive to tokenholders.

There are already examples of protocols beginning to do this. A number of the blue chip DeFi projects such as Compound, Uniswap, and Aave have launched grants programs to disburse funding to a range of initiatives that are aligned with their protocols. Though these grants programs are still in their early stages and have not resulted in the direct incubation of any successful new projects, it is not unlikely that this could happen soon.

Another example of a protocol that has begun to write early stage checks to promising projects that are aligned with them is Badger, albeit without a formal grants program (instead funds from the Treasury itself is disbursed, with the whole DAO voting on a deal-by-deal basis). In late March/early April of 2021, [BadgerDAO agreed to make a $1mm investment into 0confirmation](#) and agreed to help the project with launching, transitioning into a DAO, and executing later stages of its roadmap. Given Badger's mission is on bringing Bitcoin into the Ethereum DeFi ecosystem, it is greatly aligned with 0confirmation's own focus on transferring confirmation risk when users move BTC into WBTC/renBTC on Ethereum (0confirmation's current implementation is a BTC-DAI swap protocol where a renBTC liquidity pool offer users short term loans for the duration of those 6 blocks). As such, not only does this investment help kickstart a project that could potentially offer a very valuable service that synergizes with the Badger ecosystem and make many Badger users' lives easier, the investment can also prove to be highly accretive.

Risks:

- Similar to any kind of early stage investing, the deal could go very wrong
  - If a token swap between the protocols occurred, this could result in a loss on the investment
  - There is also potentially an opportunity cost on the time and capital spent on assisting the "Portfolio DAO/Protocol"
  - Even if the return on investment is low in monetary terms, the new protocol might still be a valuable piece of the ecosystem, maybe just one that is not particularly well suited to or good at capturing value

Some Comments on Portfolio Allocation:

Every protocol should aim to be able to cover all their operational expenses first with protocol revenue and if that is insufficient, then also with non-operating income—and only if absolutely necessary, should additional debt issuance/token sales be conducted to meet expenses. Thinking about portfolio allocation with this goal in mind can therefore be helpful. After conservatively projecting what yearly operational expenses and protocol revenue might look like, if there is a deficit between the revenue that can be generated and the expenses that are projected, DAOs ought to think about using non-operating income to bridge this gap. Specifically, DAOs should assume an easy to achieve ROI (e.g. 4-6%), then use this ROI and the aforementioned deficit to decide on an appropriate "principal" amount of capital to raise via token sales/debt (see below). DAOs can then think about diversifying their "principal" across the options mentioned above to achieve their target ROI.

In achieving this target ROI, proper diversification is of paramount importance for DAOs (perhaps even more so than in the off-chain TradFi world). This is largely because of the fact that returns in crypto experience severe fat-tails (e.g. black swan events such as smart contract hacks/exploits are decidedly not 3 s.d. events). Thus, by diversifying, even if a certain asset/products associated with certain protocols experience close to 100% drawdowns (more likely with lower TVL products), given yields across DeFi can be quite high (5%+), at the portfolio level returns/non-operating income might still net out to be positive.

Treasuries should therefore consider evaluating a number of products based on their risks (primarily protocol/smart contract risk, and volatility/variance in returns), then decide on a carefully designed allocation strategy that minimizes exposure to any particular protocol/asset/point-of-failure and minimizes correlations between assets. A particularly good example of this method can be seen with Index Coop's proposed Stable Yield Index, which utilizes an allocation model that places different products/protocols into different risk buckets and allocates accordingly.

TREASURY MANAGEMENT—FINANCING THROUGH TOKEN SALES AND DEBT

Given even the largest protocols might be unable to generate enough revenue to cover expenses ([Yearn, for instance, currently operates at a loss even after accounting for non-operating income](#)), it is clear that relying on the retention of income alone might still be insufficient for DAOs to finance themselves (especially given how quickly crypto is growing, and how traditional startups often have to raise multiple rounds of equity financing to sustain its growth). Moreover, having a large enough asset base that can generate meaningful amounts of non-operating income (e.g. staking ETH or lending stablecoins) entails having a large amount of reserve assets on the balance sheet, which would be hard to accumulate quickly by retaining operating income alone. As such, it is almost certainly the case that DAOs will also have to conduct token sales (or financial engineering that is equivalent to a token sale) or take on debt, or do both to have a large enough asset base to generate meaningful amounts of non-operating income.

Token Sales

Generally, in crypto, all the tokens that will ever be issued by a protocol are detailed/outlined at launch, and often a large majority will go to the treasury. If token supply dynamics are ever later modified, it is usually to stop the inflation of tokens (Sushi governance implemented a token supply cap not long after launch) and will almost certainly never be to issue new tokens (the Yearn Mint proposal was heavily opposed by token holders and was only approved after heated discussion). Given this, unlike corporations, DAOs will probably only be able to raise financing through token sales sparingly lest they run out of tokens in the treasury without having the ability to mint new tokens.

When it comes to selling native protocol tokens for raising capital in a proper reserve asset (i.e. stablecoin, ETH, or BTC) DAOs really only have a number of options:
1. Market sales at the spot price; however, this will likely significantly impact token price

2. [OTC sales to strategically aligned investors, with negotiated terms outlining a discount to an X-day TWAP and lock up](#). While this option will not impact token price, a badly negotiated deal could disgruntle retail/other tokenholders (i.e. too large of a discount, or perhaps not long enough of a lockup), and care also needs to be taken to ensure the investors selected are good long term partners to the DAO. A set of carefully-selected investors, however, could prove to add tons of value to the protocol going forward.

3. Some sort of an auction can be conducted. Not only will such an option likely not impact spot prices, DAOs can also elect to have a lock up on buyers. Another option would be to whitelist/pre-screen buyers to ensure they will be long term holders who are appropriately aligned with the project—one way this might be done could be to take a snapshot of existing token holders and see how active they have been in protocol governance, but such complexity might make it harder to market the auction. [One further option could be to use something like UMA's KPI Options backed by native protocol tokens in the Treasury, auction them off, and then the buyers would then be incentivized to increase some sort of KPI to maximize the payout they can get from the option (e.g.](#)

The auction will need to be carefully designed, however, to have guarantees on the amount that can be raised (probably will still be at a slight discount to spot, though).

4. Alternatively, a protocol DAO might choose to engage in financial engineering to unlock some of its native token's value; however, all these approaches ultimately amount to a token sale anyway (covered calls, collars/its variants, going short on futures/forwards/perps etc.) and will still ultimately impact token price, even if it is delayed. Furthermore, most of these financial engineering strategies will likely require interacting with OTC desks (unless/at least until on-chain derivative markets with non-standard contracts emerge), which can result in treasuries paying exorbitant amounts in funding rates/other fees.

DAOs should therefore carefully evaluate their specific needs to decide which approach would be best for them. For instance, a given DAO might ultimately decide to pursue a combination of 2 and 3 to not only bring in a group of helpful value-add investors, but to also further-energize existing token holders and incentivize them to contribute to the protocol more.

Moreover, given most DAOs are yet to reach "maturity," token sales ought to be considered similarly to traditional equity-financing rounds for startups—after accounting for protocol-revenue and after assuming a return that can be generated using non-native token treasury assets (e.g. 8% p.a.), how much of the treasury's native tokens should be sold to provide e.g. 5 years of runway to cover operating expenses?

Use of Debt

Capitalizing a DAO's treasury using debt could end up being a cheaper/more palatable option for tokenholders to fill the treasury with reserve assets. Unlike with token sales, taking on debt will not put downward pressure on token prices (unless a collateralized loan backed by the native protocol tokens is liquidated). As such, especially for DAOs that can generate enough income to amortize the debt/meet interest payments (if the debt is not paid-in-kind/if there are any payments due), debt could certainly be considered as an alternative to token sales.

Overcollateralized Debt

The cheapest form of debt a protocol will likely be able to access would be overcollateralized loans from a lending protocol; however, this is really only possible for larger DAOs whose native protocol token is highly liquid and accepted as a collateral asset on the major lending protocols.

One example of a major DAO that is currently utilizing debt from lending protocols is Yearn. [Yearn's treasury holds roughly ~4200 YFI, and has opened CDPs using this entire amount into Maker and Unit Protocol to borrow ~$11.6mm in DAI and USDP (roughly a LTV ratio of 6.4%, i.e. a collateralization ratio of ~1560%).](#) To service this debt, Yearn not only has significant

amounts of protocol revenue generated from management and incentive fees on its vault products, but is also yield farming with the borrowed funds and other treasury assets to generate non-operating income. It should be noted, however, the Maker CDP position was not initially created for Treasury Management purposes, but was instead created to make vault depositors whole after an exploit (more YFI has since been deposited and additional DAI has been drawn after the initial opening of the CDP, presumably for Treasury management purposes).

Most other DAOs seeking to borrow funds are not Yearn, however, and would find it very hard to take out a loan from any lending protocol. This is because major lending protocols such as Aave, Compound, and Maker accept only very few tokens as collateral (mainly stablecoin, ETH, WBTC, and a few of the most liquid DeFi blue chips). Even lending protocols that do accept more assets such as CREAM or Unit Protocol still only accept a small subset of the universe of DeFi tokens (and in the case of Unit, does not have much USDP available to borrow for CDPs opened with DeFi tokens further out in the long tail). This means that most DAOs, even major DAOs with a large treasury such as Index Coop, may have a difficult time being able to use their native token as collateral on current lending protocols (they can try to convince governance, but most lending protocols have very strict risk parameters around what tokens are accepted as collateral).

For major DAOs whose tokens are unable to meet the listing requirements of lending protocols, then, an alternative route to using debt to unlock native token liquidity might be to auction off overcollateralized zero-coupon bonds. This might also prove to be an attractive option for major DAOs who wish to borrow at a guaranteed fixed rate. One example of a protocol that could be used to do create these bonds would be UMA:
- The issuing DAO can decide on the maturity and par/face value of the bonds, then deposit collateral on UMA as the token sponsor
- The "price identifier" required by UMA is simply the amount that will be owed at maturity (this value can easily be published on-chain, computed using par/face value of each bond and the number of bonds that will be issued)
- The minimum collateralization ratio can be set to some number ≥100%
- Once created, the token bonds can also be auctioned off, like in traditional finance.
- At maturity, the issuing DAO can once again utilize an auction to buy back all of the outstanding debt. Holders of the bonds who don't participate in the auction will receive the face value on the bond in the underlying collateral, i.e. the native token of the DAO's protocol

A similar alternative would be UMA's range tokens, which is comparable to convertible debt but with an additional short put position embedded. Specifically, buyers of range tokens are essentially buying a: Zero-coupon bond + Call option - put option. For instance, Uniswap governance might choose to issue a range token collateralized by a fixed number of native protocol tokens, e.g. 8 UNI. Thus, if the DAO is able to borrow 100 USDC per range token sold, if the price of UNI drops below 100/8=$12.5, the range token holders will have full exposure to UNI; the opposite happens if UNI price rises above a set conversion price (e.g. $40, giving the

token buyer 100/40=2.5 UNI). In between this range, the range token should simply trade like a zero-coupon bond. This means that for DAOs, although range tokens still involve a sale of native tokens, this occurs at a higher price due to the embedded call option DAOs will write, which is a reasonable trade-off for being able to issue debt without being subject to liquidation (since they are essentially buying puts when selling range tokens). The process for creating these range tokens would be similar to the steps outlined above.

Before debt should even be utilized on DAO balance sheets, however, DAOs need to ensure they have carefully assessed their own financial health to determine if they will be able to repay the debt. In addition to considering the DAO's own financial health and projecting earnings, DAO's should also consider:
- Smart contract risk—smart contract failure/hacks can result in the collateral being stolen
- Liquidation risk, but only with lending protocols/zero-coupon bonds (Declining collateral value can cause the loan/bonds to become undercollateralized and cause the underlying collateral to be liquidated; with lending protocols, compounding loan value can also cause liquidation, but this occurs over longer time periods and so can easily be planned against)
    - This risk can be mitigated if DAOs do a "what-if" analysis and stress test the LTV/collateralization ratio against levels of drawdowns of the collateral asset and ensure that liquidation will not occur even if the collateral drops in value by 50-60%
        - Bigger drawdowns of 80-90% generally do not occur in 24-48 hours, but rather occur over a period of weeks/months, giving protocols valuable time to react and post more collateral or pay down more debt.
            - For instance, during the market volatility caused by Elon's tweets/China's BTC ban in May 2021, Yearn paid down their debt from ~32.3mm to ~11.6mm around the time when YFI fell around 50% from ~$76,500 to ~$40,500 over 16 hours.
- Assuming a lending protocol was used, interest rate risk (fluctuating interest rates can cause the amount owed by the borrower to increase)
    - DAOs can utilize interest rate forward/swap contracts, either OTC or through an on-chain protocol such as Opium or Swivel to hedge against interest rate movements, though this could result in having to put up more collateral (and so could be infeasible)
    - DAOs might choose to use Aave's "stable rate" feature
        - This stable rate, unlike a true fixed rate, can still move significantly against the borrower in major market dislocations (though this is unlikely to persist for long periods of time)
    - This risk can also be mitigated if DAOs perform a "what-if" analysis and stress test the interest coverage ratio (total treasury income/interest owed) against different interest rates/stability fees, and making sure that the coverage ratio is > 1 in each/most of these scenarios
- Assuming zero-coupon bonds or range tokens were issued, ensuring a successful auction

- ○ A protocol such as Gnosis Auction/Sushi's MISO can help by allowing the bond/range token issuer to specify a minimal funding threshold/limit price, which will prevent scenarios where the effective interest rate/yield will be too high (meaning the amount raised is too low).
- ○ Carefully considering the yields currently available in the rest of DeFi (and choosing the coupon rate/face value/maturity accordingly) as well as publicizing the auction sufficiently can help to ensure that there will be sufficient demand at the auction
- ○ For range tokens specifically, choosing a suitable conversion price will be crucial to securing auction participants

Uncollateralized/Undercollateralized Debt

Since any DAO's entire financial performance/history can be queried at every new block (with a few caveats such as knowing which contracts/addresses should be queried etc.), it is likely that with a sufficient amount of operating history, any DAO's financial health can be readily assessed and be assigned some kind of a "credit rating."

Certain lending protocols are already approving protocol-protocol loans with 0 collateral by carefully performing a credit assessment on interested protocols, then whitelisting them to borrow from depositors in a segregated lending pool. One example of this is CREAM's Iron Bank, which currently only counts Yearn and Alpha Homora as clients; even so, the loans have credit limits and are intended to only be short term loans for yield farming purposes rather than longer term loans for DAO-level operational/capital expenses. Alternatively, one could theoretically imagine that established protocols requiring cash might potentially choose to auction off uncollateralized "bonds," promising to airdrop holders interest payments at predetermined intervals and the principal at maturity, and where the amount raised/bond coupon can be freely determined by the market (i.e. whether a discount bond is issued). However, it is unclear how much demand there would be for unsecured bonds, given creditors will have no guarantees about repayment in the event of a default. In both cases, it seems that without any guarantees on creditors being repaid in the event of defaults, it is difficult to imagine uncollateralized/undercollateralized lending to proliferate.

In traditional finance, assuming a distressed company is unable to negotiate a restructuring of its debt obligations or can't obtain fresh debt/equity, creditors can begin foreclosure proceedings against the debtor company. During the bankruptcy proceedings, the debtor company would then be liquidated and have its assets auctioned off or repossessed to make creditors whole again (Chapter 7 in the USA), or instead, the court would help the debtor company renegotiate all its debt and interest to allow the company to survive post-bankruptcy (Chapter 11 in the USA). Given all DAOs are currently unincorporated entities (and therefore outside any legal system), there is currently no established process where creditors who provide undercollateralized/unsecured loans to DAOs can be made whole.

Unless an on-chain bankruptcy process emerges, this means that for undercollateralized/uncollateralized loans to truly gain traction, either DAOs have to incorporate

into legal entities or other workarounds have to be found; for instance, lending protocols might create whitelisted lending pools other DAOs can borrow from, with the understanding that in the event of a default token stakers (of the lending protocols) are wiped out before creditors/depositors see any losses. Moreover, if creditors form a DAO in an event of default to negotiate with the debtor DAO, who will mediate these negotiations? These are all questions that must be answered, and until there is an established process for DAOs to make creditors whole again after defaulting, or a way of guaranteeing tokenholders are wiped out before creditors after any event of default, under/uncollateralized lending to DAOs is unlikely to become commonplace

CONCLUSION

Given DeFi DAOs are charged with supporting its protocol in perpetuity, managing their balance sheets in accordance with their income/expenses is a crucially important activity. Most protocol DAOs currently only hold their native protocol token on their balance sheets. Given the volatile nature of cryptocurrencies, this could mean that DAOs are forced to sell their native tokens during extended bear markets (and therefore at inopportune prices) to finance ongoing operations. Consequently, DAOs should first ensure that they have a revenue stream that is ideally denominated in a reserve asset, and then if the revenue is insufficient to cover operating expenses, DAOs should consider raising additional financing in reserve assets using token sales/debt. Doing so would then provide protocol DAOs with a large reserve asset base on their balance sheets that can be invested to generate additional non-operating income/investment returns to bridge this gap or provide a "buffer". Following such a playbook would put any DAO in a much better financial position to maintain their protocols even during multi-year crypto bear markets.

Special thanks to Derek Hsue, Kinjal Shah, Aleks Larsen, Mason Vollum, 0xMaki, Stani Kulechov, and Hugh Karp for valuable conversations/feedback!

OTHER REFERENCES

https://newsletter.banklesshq.com/p/how-daos-should-approach-treasury

https://helloshreyas.mirror.xyz/H-Rd34MLFO6hrclAsy17PlvLVlswTgfn7ifj90Mht9Y

https://messari.io/article/a-crisis-in-protocol-treasury-management-and-how-to-solve-it

https://research.paradigm.xyz/staking