DELPHI DIGITAL

Synthetic Asset Protocols
Thematic Insights

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Preface

In traditional markets, if you want exposure to an asset you would generally purchase it directly. If you're a sophisticated investor, such as a hedge fund, you could also create a synthetic position which, through the use of derivatives, replicates exposure to an asset without the need to actually own it.

While the idea of tokenizing assets is nothing new to Ethereum, a DeFi sector that's recently started to gain traction is that of synthetic asset protocols ("SAPs"). MakerDAO was the first to garner adoption with its creation of DAI, a synthetic asset with a soft-peg to the US dollar. However, newer applications have emerged, as seen to the right, that simulate exposure to a much broader array of assets.

In theory, these protocols can create ERC-20 tokens that replicate exposure, both long and short, to any type of asset in the world without the need for a user to hold the underlying. As we'll address on the following slide, the value proposition these protocols offer could be significant.

The purpose of this report will be to compare and contrast the mechanics behind Synthetix, UMA Protocol and MARKET Protocol. While these protocols have a good degree in common, there are nuances to the design of each which a user should be aware of. We will also draw attention to the inherent risks that exist.

Synthetic Asset Protocols ("SAPs"):

SYNTHETIX

UMA

MARKETPROTOCOL

Value Proposition

For decentralized applications to gain widespread adoption, they need to provide value for their end users by offering an improvement over existing solutions. Below, we have highlighted the use cases for synthetic asset protocols and the benefits they can offer relative to existing methods.

Use Cases

1. Long & Short Exposure to Any Asset: SAPs make it possible to create and trade synthetic asset tokens, which mirror the exposure of an underlying asset, without the need to actually own it. As long as there is a reliable price feed, it's possible to create a synthetic token for any type of asset such as a cryptocurrency, commodity, equity, etc. Indices can also be created as evidenced by Synthetix's index token which tracks a basket of <u>centralized exchange tokens</u>.

2. Leverage: SAPs can facilitate levered exposure for traders depending on the level of collateralization that is required to back the synthetic asset (e.g. UMA). In the case of Synthetix, when stakers mint synthetic assets they're opening a debt position with the network. This effectively allows them to gain more than their initial 100% exposure level.

Key Benefits

1. Financial Inclusion: Anyone in the world can now have exposure to financial markets. For example, a retail trader in Indonesia can get exposure to the S&P 500, without needing a brokerage account, or permission, by holding its synthetic token.

2. Composable: Synthetic asset tokens can be combined in other DeFi applications. For example, a TokenSet could be created that is long ETH and short the S&P 500.

3. Always Liquidity Available (Synthetix): There is always liquidity for synthetic asset tokens on Synthetix Exchange because it doesn't need to match buyers with sellers. Trading is done directly against a smart contract and really represents a repricing of debt.

4. Unique & Exotic Trading Pairs: Traders will be able to access a mix of assets not readily available elsewhere.

5. Collateralized & Transparent: SAPs are usually overcollateralized, with the exception of MARKET Protocol. The assets backing the value of synthetic tokens are held in auditable smart contracts.

Protocol Comparison

Built on ethereum

DeFi Network

Synthetix, UMA and MARKET share certain aspects of their design in common but there are nuanced differences behind the mechanics of each. In terms of similarities, they are all built on Ethereum and create synthetic asset tokens by minting them against some level of collateral value. With regards to their differences, we've provided a high-level summary to the right covering certain key criteria.

Synthetix is the most unique of the three. All collateral is pooled into a single smart contract, it uses its own token as collateral and enables the creation of perpetual synthetic assets. In the following slides, we'll delve into how these protocols operate in greater detail.

Synthetix

- **Protocol Token:** Yes (SNX)
- **Token Economics:** In return for staking SNX in the collateral pool, holders earn a weekly reward from i) Synthetix Exchange trading fees and 2) new SNX issuance.
- **Accepted Collateral:** SNX currently & possibly ETH in the future
- **Pooled or Siloed Collateral:** Pooled
- **Live on Mainnet:** Yes
- **Perpetual or Expiration Date:** Perpetual
- **Price Cap or Floor:** Yes, but only for inverse (short) synthetic tokens
- **Overcollateralized:** Yes

UMA Protocol

- **Protocol Token:** No
- **Token Economics:** N/A
- **Accepted Collateral:** DAI
- **Pooled or Siloed Collateral:** Siloed
- **Live on Mainnet:** No, but UMA's "Synthetic Token Builder" has been live on Rinkeby testnet since September 11th, 2019.
- **Perpetual or Expiration Date:** Expiration Date
- **Price Cap or Floor:** No
- **Overcollateralized:** Yes

MARKET Protocol

- **Protocol Token:** Yes (MKT)
- **Token Economics:** MKT tokens offer users a discount on the origination fee for synthetic assets if paid using the token. New features may be added in the future.
- **Accepted Collateral:** DAI currently & possibly ETH in the future
- **Pooled or Siloed Collateral:** Siloed
- **Live on Mainnet:** Yes
- **Perpetual or Expiration Date:** Expiration Date
- **Price Cap or Floor:** Yes for both
- **Overcollateralized:** No

Synthetix Mechanics

Synthetix has a unique and innovative design which is crucial to understand before using. To create synthetic asset tokens, a user stakes SNX as collateral and mints sUSD (synthetic dollars) against the collateral value. The amount of sUSD minted is based on the target collateralization ratio, which is currently 750%. It's important to understand that when a user stakes their SNX and mints sUSD, what they're really doing is creating a debt to the platform. It may not feel like debt due to the fact there's no interest rate being charged but that is exactly what it is. In order for a user to unlock their SNX later on, this debt needs to be repaid. However, the value of this debt is not static but rather changes over time. In addition, Synthetix Exchange is a zero-sum game. When traders earn a profit that money is not created out of thin air but rather comes at the expense of either another trader or SNX stakers. The design can be difficult to grasp at first but we've provided examples below and on the following slide to further demonstrate how these mechanics work. It's important to emphasize the following dynamics only apply to users who stake SNX and trade on Synthetix Exchange. For Synthetix to reach its full potential it will need to attract users solely interested in trading.

Example 1

		Medio	Yan	Total Debt
Step 1	Starting sUSD	50,000	50,000	100,000
Step 2	sBTC	50,000		100,000
	sUSD		50,000	
Step 3	sBTC	75,000		125,000
	sUSD		50,000	
Step 4	Final	75,000	50,000	
	Debt Owed	62,500	62,500	125,000
	Net Profit	12,500	-12,500	

- **Step 1:** Medio & Yan both start with $50k sUSD. Combined this equates to a total network debt of $100k, with Medio and Yan each responsible for 50% of it.

- **Step 2:** Medio purchases sBTC with his $50k while Yan continues to hold sUSD.

- **Step 3:** The price of BTC rises +50% meaning that Medio's position is now worth $75k. That $25k of profit increases the total network debt to $125k.

- **Step 4:** Medio & Yan are still responsible for 50% of the total network debt, which now corresponds to each of them owing $62.5k. When the value of Medio's sBTC position is netted against his debt owed, it results in a $12.5k profit. Even though the value of Yan's position stayed flat at $50k, the amount of debt he owes increased by $12.5k resulting in an equivalent $12.5k loss.

Example 2

		Medio	Yan	Total Debt
Step 1	Starting sUSD	50,000	50,000	100,000
Step 2	sBTC	50,000		100,000
	iBTC		50,000	
Step 3	sBTC	75,000		100,000
	iBTC		25,000	
Step 4	Final	75,000	25,000	
	Debt Owed	50,000	50,000	100,000
	Net Profit	25,000	-25,000	

- **Step 1:** Medio & Yan both start with $50k sUSD. Combined this equates to a total network debt of $100k, with Medio and Yan each responsible for 50% of it.

- **Step 2:** Medio purchases sBTC with his $50k while Yan shorts Bitcoin by purchasing $50k of iBTC ("Inverse Bitcoin").

- **Step 3:** The price of BTC rises +50% meaning that Medio's long position is now worth $75k, while Yan's short position falls to $25k. The total debt stays flat at $100k.

- **Step 4:** Medio & Yan are each responsible for 50% of the total network debt, which still corresponds to each of them owing $50k. When the value of Medio's sBTC position is netted against his debt owed, it results in a $25k profit. For Yan, this equates to a $25k loss.

Synthetix Mechanics

Example 3

		Medio	Yan	Kevin	Total Debt
Step 1	Starting sUSD	50,000	50,000	25,000	**125,000**
Step 2	sBTC	50,000			
	iBTC		50,000		**125,000**
	sUSD			25,000	
Step 3	sBTC	75,000			
	iBTC		25,000		**125,000**
	sUSD			25,000	
Step 4	Final	75,000	25,000	25,000	
	Debt Owed	50,000	50,000	25,000	**125,000**
	Net Profit	**25,000**	**-25,000**	**-**	

- **Step 1:** Medio & Yan both start with $50k sUSD, while Kevin starts with $25k sUSD. Combined this equates to a total network debt of $125k, with Medio and Yan each responsible for 40% of it and Kevin responsible for 20%.

- **Step 2:** Medio purchases sBTC with his $50k while Yan shorts Bitcoin by purchasing $50k of iBTC ("Inverse Bitcoin"). Kevin continues to hold sUSD.

- **Step 3:** The price of BTC rises +50% meaning that Medio's long position is now worth $75k, while Yan's short position falls to $25k. The value of Kevin's position stays at $25k. The total debt remains flat at $125k.

- **Step 4:** Medio & Yan are each responsible for 40% of the total network debt, which still corresponds to each of them owing $50k. Kevin is still responsible for 20% of total debt and owes his original $25k. When the value of Medio's sBTC position is netted against his debt owed, it results in a $25k profit. For Yan, this equates to a $25k loss. Kevin's position and total debt owed remained flat throughout this leading to no gain or loss.

Example 4

		Medio	Yan	Kevin	Total Debt
Step 1	Starting sUSD	50,000	50,000	25,000	**125,000**
Step 2	sBTC	50,000			
	iBTC		50,000		**125,000**
	sETH			25,000	
Step 3	sBTC	75,000			
	iBTC		25,000		**127,500**
	sETH			27,500	
Step 4	Final	75,000	25,000	27,500	
	Debt Owed	51,000	51,000	25,500	**127,500**
	Net Profit	**24,000**	**-26,000**	**2,000**	

- **Step 1:** Medio & Yan both start with $50k sUSD, while Kevin starts with $25k sUSD. Combined this equates to a total network debt of $125k, with Medio and Yan each responsible for 40% of it and Kevin responsible for 20%.

- **Step 2:** Medio purchases sBTC with his $50k while Yan shorts Bitcoin by purchasing $50k of iBTC ("Inverse Bitcoin"). Kevin goes long ETH by purchasing sETH.

- **Step 3:** The price of BTC rises +50% meaning that Medio's long position is now worth $75k, while Yan's short position falls to $25k. The price of ETH rises +10% meaning that Kevin's position is now worth $27,500. Combined these price moves increase the total debt to $127.5k.

- **Step 4:** Medio & Yan are each responsible for 40% of the total network debt, which now corresponds to each of them owing $51k. Kevin is still responsible for 20% of total debt and now owes $25.5k. When the value of Medio's sBTC position is netted against his debt owed, it results in a $24k profit. For Yan, this equates to a $26k loss. Kevin's net profit is $2k.

UMA Protocol Mechanics

Total Return Swap

Total Return Receiver ← Δ Underlying asset price at swap settlement ← Total Return Payer

Total Return Receiver → r = fixed "interest rate" cost → Total Return Payer

Underlying Reference Asset

vs.

Traditional Exposure

Return Receiver → Total cost of asset → Asset Seller

Underlying Reference Asset ← Assume custody

Now that we've walked through a few examples that demonstrate Synthetix's pooled collateral model, let's dive into UMA Protocol which uses an entirely different approach. Rather than aggregating collateral and issuing all synthetic tokens against the same commingled pool, UMA silos the collateral per synthetic asset token.

UMA's Synthetic Token Builder is structured similar to a total return swap, a commonly used instrument in traditional finance. This design choice results in a major difference between UMA and Synthetix. The synthetic tokens created through UMA have an expiration date, just as a total return swap would, while the synthetic tokens issued through Synthetix are perpetual.

It also means that UMA requires a counterparty to take the other side of "the swap". With Synthetix, this isn't necessary because the SNX stakers always take the other side.

Each synthetic asset is minted by a unique Token Facility (total return swap) against its underlying collateral. The mechanics work as follows:

1. A user creates a Token Facility by launching a smart contract and depositing DAI as margin.
2. Once DAI has been added, a user can mint synthetic assets that are fully backed by DAI. These facilities are overcollateralized.
3. If the collateralization level falls below the required minimum, the smart contract freezes all of the collateral and assesses a penalty, which is paid to the synthetic token holders.
4. Before expiry, only the owner of the Token Facility can redeem synthetic tokens against the underlying collateral. However, if the facility becomes undercollateralized a token holder can redeem their pro-rata share of collateral value + a penalty fee.
5. At expiry, anyone who holds the synthetic tokens minted by this facility can redeem them for a pro-rata share of collateral value.

For a synthetic token that mirrors the price of an underlying asset, a user can go long by purchasing the synthetic tokens or short by creating the Token Facility.
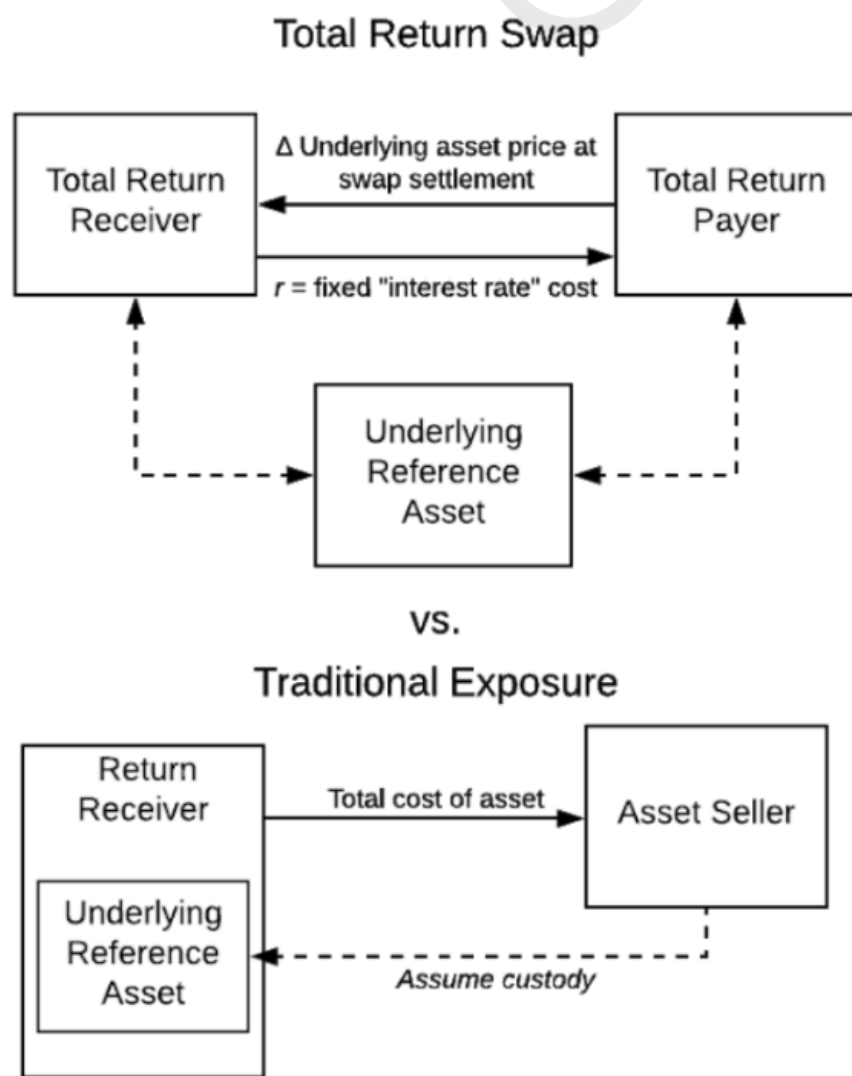
MARKET Protocol Mechanics

MARKET Protocol operates similarly to UMA Protocol but with two major differences. To start, with UMA users can post margin at a fraction of the positions total value allowing for leverage. For example, a long position with 5x leverage would require that ~20% of the value be posted upfront as collateral. However, if the underlying asset took a sudden 15% dip then the owner of the long position would need to add additional margin or risk defaulting if the price drop exceeded 20%. This default would also limit profit for the trader on the other side.

MARKET Protocol, however, sets a price cap and floor (price band) from the start to avoid situations of under collateralization and default. Continuing the same example from above, this cap and floor would be 20% in either direction. As a result, an owner of a long position that put 20% down as collateral could only ever lose that amount if the market moved against them.

Another major difference is how a user can go long or short. As we described on the previous slide, the two components of UMA are 1) a synthetic token and 2) the Token Facility that creates it. To go long a user would buy the synthetic token and to go short they would create the Token Facility. MARKET Protocol differs from this by creating both a long and short "position token" (synthetic asset). The economics end up being similar.

The long and short position tokens can be used to redeem the collateral backing them. Due to the price cap and floor, the collateral in the pool always covers the maximum gain and loss for both positions. This removes counterparty risk and limits the downside of a position but also the upside.

Price oracles are used to determine if the price band has been exceeded or if the expiration date has been reached. If either of these criteria are met, the position tokens enter an expired state and the settlement process automatically begins, allocating profits and losses to position token holders.

Sources: MARKET Protocol FAQ, MARKET Protocol Whitepaper, Anthony Lee Zhang Github

Risks & Concerns

Now that we've walked through the varying mechanics behind these protocols, it's important to highlight risks which a potential user should be aware of. The examples provided below are not exhaustive but reflect some of the more prevalent risks.

Price Oracles

- Synthetic assets merely reflect the economics of the underlying asset. If the price of the synthetic asset token differed or the payout was incorrect then users would lose confidence in the protocol. As a result, having quality price feeds which are accurate and resistant to manipulation is vital for success.

Liquidity & Collateral Redemption

- On the open market, synthetic asset tokens will need strong liquidity. Without liquidity and a direct redemption feature for collateral (Synthetix), they may trade at discount to the assets they're supposed to track.
- For Synthetix Exchange, traders will also need on & off ramps with robust liquidity to realize profit (e.g. sETH/ETH Uniswap Arbitrage Pool).

Price Risk to Collateral

- Because these synthetic asset tokens are minted against the value of collateral, they're at risk of price declines in said collateral.
- For UMA & MARKET this is less of a concern since they use DAI, a stablecoin, as collateral. Since Synthetix uses their own token, SNX, it is a much greater concern, especially considering its illiquidity.

The Need For Opposite Exposure

- These protocols are zero-sum games. If a trader earns a profit going long a synthetic asset, then this is either at the expense of an opposing short or potentially a staker (as is the case with Synthetix).

Leader Commentary

Below, we've included exclusive commentary regarding synthetic asset protocols from each project's leadership. We asked - "How does your protocol differentiate itself from its peers?"

Kain Warwick
Founder of Synthetix

"Synthetix uses a pooled liquidity model that enables each new asset to have deep liquidity from the instant it is created. This model is far better for users than the siloed liquidity of other synthetic asset platforms."

Hart Lambur
Co-Founder & CEO
of UMA Protocol

"UMA's goal is to create the infrastructure that makes it easy to build financial products on blockchains. We view that infrastructure as two components: financial contract templates, and a decentralized oracle system to power those contracts. The first template we developed is this concept of synthetic tokenization—you can build a token to track anything. We'll be releasing other template designs in the coming months, as well as getting our oracle to mainnet. Our hope is that other teams and projects will find our infrastructure valuable and will build new contracts using our oracle design."

Seth Rubin
Co-Founder of
MARKET Protocol

"We differ in our capital efficiencies and created a system offering decentralized leverage with no need for overcollaterlization or liquidations. We designed an ecosystem that's always solvent while eliminating margin call which means traders can safely get the same exposure with less collateral."

Disclosures

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