Chain Theory: Aggregating On-Chain Data in a Single Comprehensive Platform

A variant of game theory: The science of strategy targeting users' best interests

***Abstract* — There exists an exhaustive number of Ethereum on-chain data due to the massive size of the chain itself. The careful aggregation, and further refinement, of such data could, however, revolutionize the on-chain trading game. Analyzing projects' tokenomics, generating a leaderboard of most profitable wallets, and exploiting Machine Learning and Artificial Intelligence trading algorithms would transform the user to 'the knight on the chessboard'. That being said, Chain Theory is a not-for-profit protocol that aims to do exactly this by publicly disclosing and maintaining on-chain analytical and research products, time-sensitive execution tools, and alpha revenue services. Available tools would serve to easily search for highly successful wallets, run thorough analysis of each single trade taken by such wallets, simulate anticipated launches offline, automate trade and take profits execution, and generate consistent passive income from a basket of minimal risk trading strategies. Chain Theory would also serve as users' hub to innovate, improve, suggest ideas, and give back to a supportive community. Chain Theory is a lifetime mission that aims to establish foundations for years to come through regularly researching chain data and fine-tuning execution/trading tools.**

***Index Terms* — Ethereum, Decentralized Finance, Quantitative Trading, On-chain Analytics, Machine Learning, Artificial Intelligence**

I. Introduction

Following the concept of decentralized digital currency (1980s) and Nakamoto's radical development of Bitcoin (2008-2009), Ethereum came into existence in 2015 to provide a blockchain with a built-in fully fledged Turing-complete programming language [1]. This was a paradigm shift whereby "smart contracts" were born and can be used to encode arbitrary state transition functions, allowing users to easily create systems and decentralized applications (dApps) using user-friendly coding languages, such as solidity.

The ease of creating such dApps has led to the development of numerous novel protocols, among which are decentralized exchanges (DEXES) and algorithmic trading bots. You can think of DEXES, which users of Ethereum are most definitely familiar with, as the decentralized representation of Binance and Coinbase. Users can be market makers by providing liquidity to a specific token and, in turn, users can swap one asset to another according to available liquidity [2]. Such boom in the ease-of-use has led to a wave of daily creation of assets (liquid and illiquid), which in turn led to developing and testing numerous algorithmic trading strategies.

Ethereum is a public decentralized ledger; that is, data is publicly available for anyone to extract and act upon. This has always motivated skillful algorithmic traders to formulate trading strategies centered around available on-chain data. Perhaps one of the most well-known, albeit controversial, examples is frontrunning bots [3], which are at the heart of monitoring such on-chain public data to make quick gains by sandwiching specific profitable trades for example (Figure 1). The availability of a protocol that publishes critical on-chain analytics for the average user to analyze, filter, and act upon would be a breakthrough in algorithmic trading, copy-trading, launch sniping, and day-trading live assets on Ethereum in general. There are numerous useful data that, if aggregated properly, would provide a significant profitable edge for the average user such as, but not limited to, holder count, liquidity pool size, supply distribution, rate of return (ROI) of top wallets, maximum drawdown to copy-trade a specific wallet, and many more.

It is extremely frustrating to realize that there is a significant lack in user-friendly tools that aggregate and allow to visualize such on-chain data, despite the public decentralized ledger environment of Ethereum. The real question is why is it the case?

Well, it is simply because Ethereum is massive to handle and iterate through; it has arguably proven to be the most sustainable and traded chain with $Billions of daily volume. To comprehend how difficult it is to keep track of all cutting-edge on-chain analytics, every 12 seconds a block is validated on Ethereum [4]. That adds up to 7200 blocks per day, each storing hundreds of transactions. With 8 years of historical data, there exists, at the time of writing, 246,000,000 unique addresses to monitor and assess their profitability [5].

In addition, perhaps of how insanely difficult it is to collect, filter, and maintain a parametric database of useful on-chain analytics, there is a lack of fast, easy, and reliable execution tools for the average user to utilize in order to execute and act upon trading edges that such a database would offer, especially in the fast paced realm of altcoins, and newly created tokens, trading.

In a nutshell, there is a ton of public on-chain data that has proven to be extremely helpful in high-frequency trading decision making. Whether a user would like to investigate the tokenomics of a specific project, find highly profitable wallets,

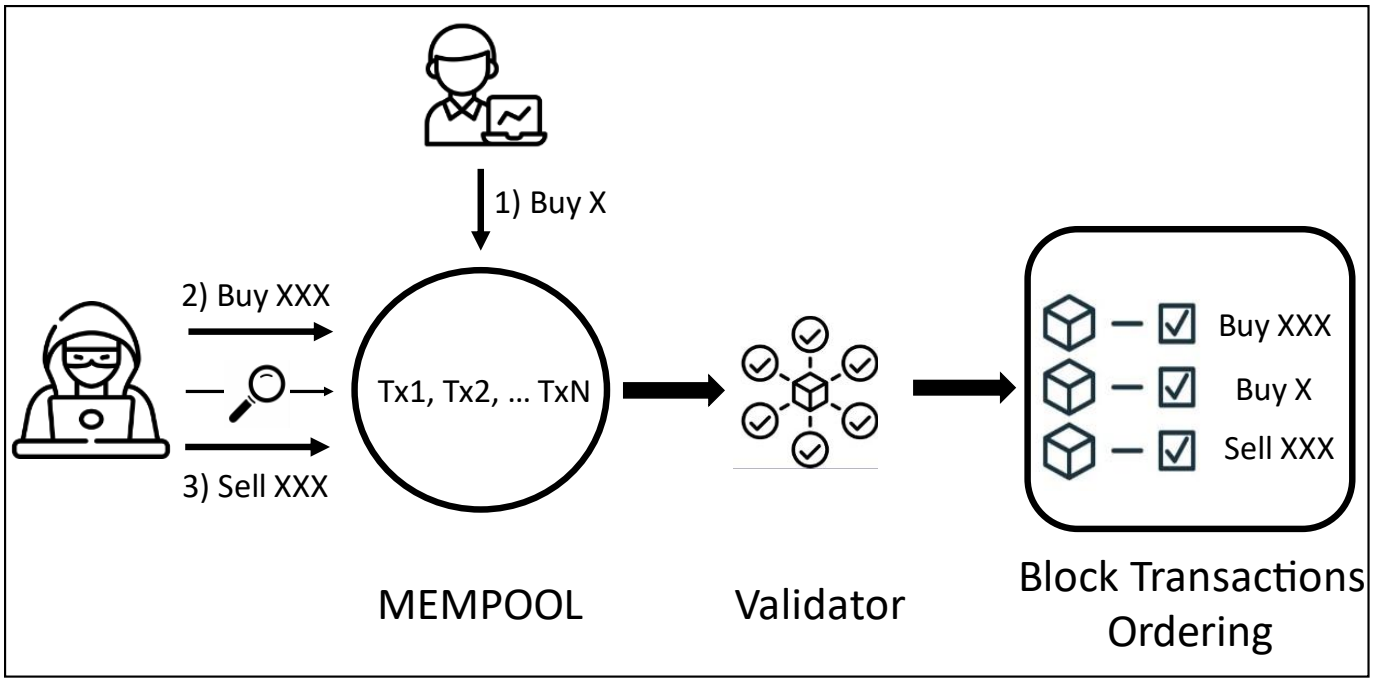

Figure 1: The mechanism of frontrunning mempool transactions.

assess profitability of copy-trading a specific address, analyze buyers and holders of a specific coin, monitor the execution of a wallet address (public or private transactions), be part of machine learning (ML) trading bots, generate passive income from AI-based trading strategies, monitor a leaderboard of most profitable wallets over a specific period of time, and exploiting many other fine-tuned analytical tools to boost profitability, CHAIN THEORY is here to bridge this gap!

Chain Theory is a platform that aggregates carefully crafted on-chain analytical and execution tools for the average user to exploit. These are remarkably tested tools to give a cutting edge given the current state of maximal extractable value (MEV) bribes, private transactions, and snipers on Ethereum [6]. For over a year, the developers at Chain Theory have been monitoring the chain, crafting, and testing some of the most artistic decentralized finance (DeFi) tools that would tip the scale into users' favor. The mission of Chain Theory is to maintain a loyal and trustworthy environment for all users to contribute, participate, and of course, make profits. The user is above all, the user is the community, and the community will always be made whole.

II. Motivation

During our early days in cryptocurrencies and on-chain trading, we have all struggled with avoiding scams, rug-pulls, and fighting the fear of missing out (FOMO) on a specific trade, some of the worst nightmares that all readers and users have experienced in the past and can relate to. Soon enough, we started noticing projects and tokens that go on to make thousands of returns for early buyers, which begged the question: how are they coming across such opportunities?

Instead of cracking the cause, we decided to build a copy-trading bot (product of Chain Theory) and take a leap of faith, with calculated risk, with wallets that have proven to be extremely, and consistently, profitable. Needless to say, this was one of the best actions we took at the time. In addition to making consistent profits, we started realizing patterns that we took action upon and tested out. Whenever something odd/interesting happens, we would run thorough analyses and develop a specialized bot/strategy to target this edge. Some has proven to be extremely useful and profitable, others were just theories that went horrible.

Following months of copy-trading, coding strategies, implementing and fine-tuning ML techniques (mainly decision trees, random forest, and support vector algorithms), we have arrived at a collection of state-of-the-art on-chain analytical and trading tools that have never been made public before. Some of these tools, we can almost assure that, developers and skilled traders use on a regular basis as part of their trading strategies. Once the users at Chain Theory read about and test them out, they will understand this high level of conviction. Perhaps the edge such tools offer is the sole reason that these have never been made public before!

We have been making enough consistent profits that the passion grew much bigger, a lifelong mission of building a strong community with whom we can thrive together. As such, instead of solo developing and keeping such research and execution tools a secret, we, at Chain Theory, take it upon ourselves to transform a promising vision into a solid, supportive, and genuine community whereby we can all benefit from these services and generate consistent profits together. Chain Theory will be your shelter from insider traders and players who exploit the game in bad faith. It will be your stage to speak your mind and develop with us. You will be part of an organization, perhaps even a movement,

whereby your feedback will be critical, and your brilliant mind is highly valued, so that we can keep building together with your ideas of other useful on-chain tools, trading bots, and AI strategies. Chain Theory shall forever remain sustainable with your assistance; you are the reason we are building this, and none can thrive without your participation!

III. METHODOLOGY

As previously discussed, the team at Chain Theory have dedicated their time and efforts to building some of the most novel research and execution tools for on-chain trading and analytics. In this section, upon project's inception, services that will be readily available will be discussed. A proper roadmap and timeline will be later provided in the near future. All products, services, and tools shall be broadly discussed herein to keep the whitepaper short and to the point. In-depth articles about each one of these tools will be later released, on a regular basis, on our website, medium, github, and social platforms. The services at Chain Theory can be subdivided into 3 subcategories as follows:

A. On-Chain Analytical and Research Products

Chain Theory has developed, and will continue to build, cutting edge research and analytical tools aimed at maximizing on-chain trading profitability. Products currently available are:

1- The analyzer: the analyzer is a tool programmed to run through a provided wallet to assess and return its profitability figure as follows:

$$Profit = \sum_{k=1}^{k=t} A_{out} - A_{in} \qquad (1)$$

where: **A** represents wallet assets and **t** is the total number of transactions.

2- The eye: the eye is, thus far, one of the most novel tools we are currently proud of at Chain Theory. As discussed in the introduction, it is near to impossible to assess all wallets living on Ethereum. If such data is properly fetched, sorted based on ROI, profitability, and maximum risk, users will have a database of top trading wallets on the Ethereum chain readily available to assess and pick from to copy their trades. Rest assured, the team at Chain Theory has found the secret potion to fetch, maintain, and update such a dataset. The eye is an updated dataset of such analytics in the form of a "leaderboard". It will provide users with a leaderboard to shuffle through and pick a highly profitable wallet to copy its trades based on the ROI, risk, and reward that satisfies users' risk appetite. Its backend has complex, ML-based, algorithm that can be thought of to work as follows:

$$Wallet\ 1: "0x11\ldots" \Rightarrow Profit = \sum_{k=1}^{k=t} A_{out} - A_{in}$$
$$Risk = \sum_{k=1}^{k=t} D_{max} \quad ; \quad ROI = \sum_{k=1}^{k=t} \frac{S_k}{B_k}$$
$$Wallet\ 2: "0x22\ldots" \Rightarrow Profit = \sum_{k=1}^{k=t} A_{out} - A_{in}$$
$$Risk = \sum_{k=1}^{k=t} D_{max} \quad ; \quad ROI = \sum_{k=1}^{k=t} \frac{S_k}{B_k}$$
$$\ldots \qquad (2)$$
$$Wallet\ n: "0xnn\ldots" \Rightarrow Profit = \sum_{k=1}^{k=t} A_{out} - A_{in}$$
$$Risk = \sum_{k=1}^{k=t} D_{max} \quad ; \quad ROI = \sum_{k=1}^{k=t} \frac{S_k}{B_k}$$

where: **A** represents wallet assets, **t** is the total number of transactions, **D** is the maximum drawdown, **S** are the sell orders, and **B** are the buy orders.

3- The detective: the detective is another proud and innovative product of Chain Theory that returns a tabulated data of all trades executed by a specific wallet in a timely manner. The user, thus, bypasses all the hustle of going through each trade on etherscan, for example, and cuts down to the gest of doing in-depth analysis on trades executed by promising wallets. The detective works as shown in figure 2.

4- The watcher: given the current dark forest state of Ethereum MEV, private transactions, and insider plays, the watcher is a tool at the users' fingertips to distinguish between wallets that execute their trades in the public mempool (thus can be copy-traded in the same block) from those who send private transactions. The process of the watcher is illustrated in figure 3.

5- The simulator: the simulator will be an extremely useful tool for sniping launches. It is a tool that simulates a specified launch, offline, based on parameters such as liquidity pool supply and maximum transaction limit, and will return to the user a list of how much the first 40 buyers will have to pay to get in. This will give the user an idea of how much maximum ETH and tip users would have to risk in order to buy at a decent price (rather than overtipping or buying the top).

B. Execution Tools

At Chain Theory, the team has proudly developed execution tools and been using them for over a year. These are powerful execution tools that users will find handy to execute and

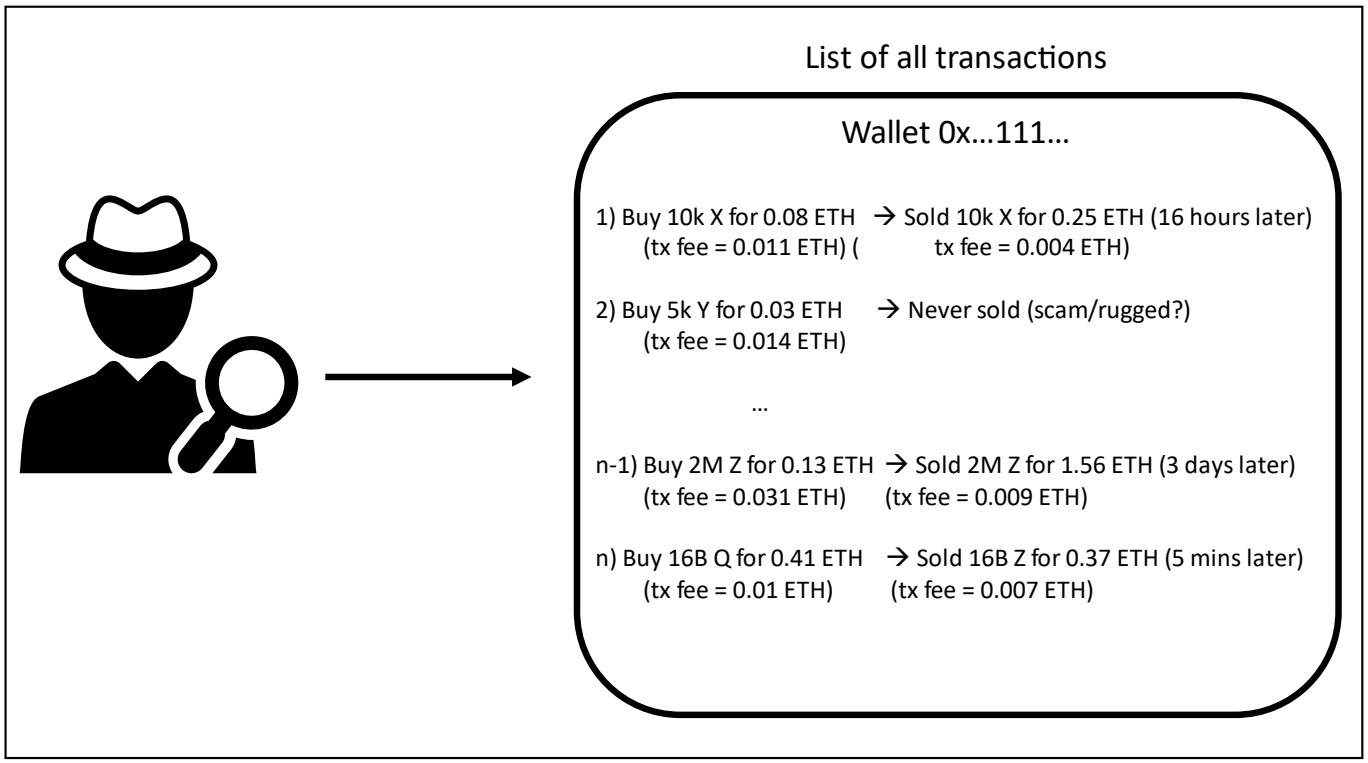

Figure 2: The action and sample results of the detective.

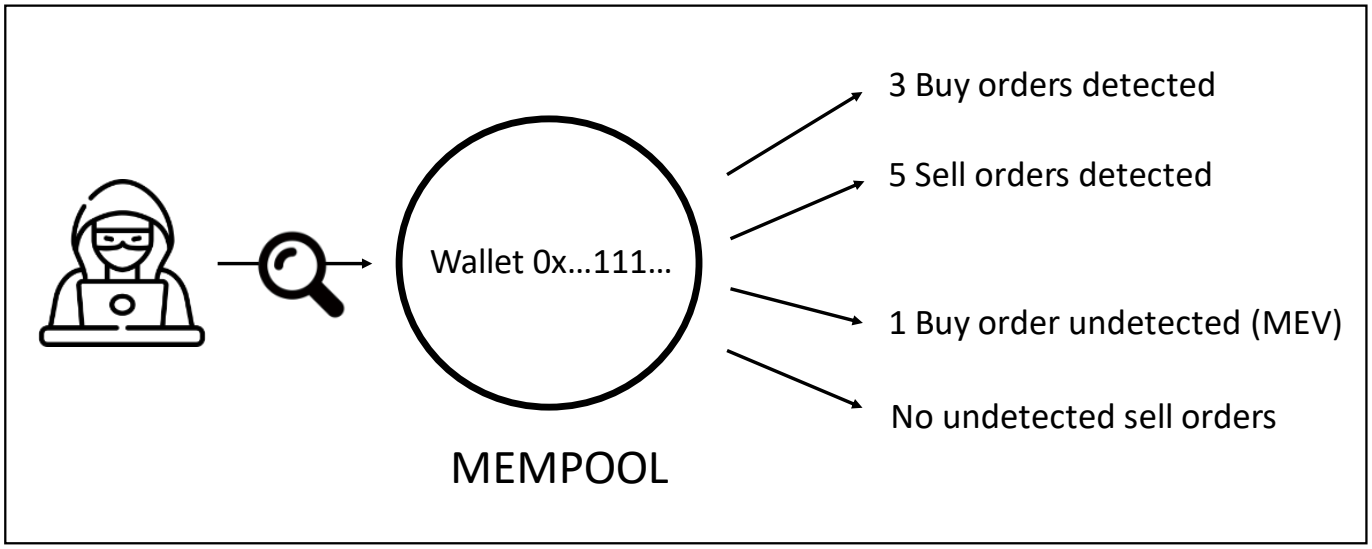

Figure 3: The action of the watcher under the hood

manage on-chain trades. These will include the following:

1- The collector: based on experience, taking profits is far more important than the entry. Objective decisions without engaging emotions are extremely important, hence your friend, the collector. It is simply a take-profits bot configured based on your conditions. It features take profit targets and a stop loss. It is highly recommended you use it to minimize risk, stay in the game as long as possible, and avoid watching your bags going from being profitable to zero.

2- The copytrader: the copytrader is a powerful product of Chain Theory with novel configurations that have not been explored thus far. It features highly adjustable user risks and entry methods as will be thoroughly explained in the discussion section. It further guards against users security whereby providing private keys is not necessary,

a critical security vulnerability that many have raised concerns about [7, 8].

3- The sniper: although powerful launch snipers exist, after project's maturity, if the community prefer to use bots that are exclusive products of Chain Theory, the team will be happy to release the sniper into the market.

4- The wizard: As discussed earlier, the team has been testing and fine-tuning ML and AI trading strategies based on factors such as token deployer, code scam, liquidity status, anticipated hype, and many more. The team is proud of two major strategy bots that have been sniping some of the best launches. Users will get the chance to monitor the results of these strategies and, if they approve of the risk-to-reward, they are more than welcomed to participate.

C. Alpha Revenue Services

As discussed earlier, the trading hub adopts a basket of research and execution tools whereby the finest of those will be put in action to generate passive income, grow the treasury and the protocol hand-in-hand, as well as distribute profits to Alpha users (detailed information later provided in the discussion section). Chain Theory aims to be a not-for-profit protocol; hence, all profits (after expenses) collected from active products and services will be deposited into the treasury. Treasury funds will then be diversified into top-tier execution tools and trading strategies developed at the trading hub, practicing minimal diversified risk (as will be crystal clear once users test out released products). These will be, but not limited to, the following:

1- The active: the active is a high-risk high-reward branch of the ML strategy developed by the Chain Theory team. It features a particular mathematical algorithmic configuration of the ML strategy resulting in high frequency trading to increase the probability of catching runners and sniping launches with high potential. Although position size will be carefully calculated and capped, the high frequency nature of this strategy requires enough capital to result with insignificant volatility and investment balance; hence the reason of being part of the Alpha Revenue Services.

2- The patient: the patient is a minimal risk high reward branch of the AI strategy developed at Chain Theory. Similarly, it features a particular configuration of the developed AI strategy employing tight constraints to snipe launches. It filters through all newly launched tokens and patiently waits for set target parameters to be met before initiating a trade. Such constraints are the secret sauce of the strategy, and thus, cannot be disclosed; they are, however, a collection of tokenomics and on-chain data. Loyal users deserve to make passive income from a minimal risk strategy; hence the reason being part of the Alpha Revenue Services.

3- The octopus: the octopus is simply a copy-trading strategy targeting a the finest (the cherry on top) of profitable wallets. The octopus will exploit the research products explained earlier to keep shuffling through the highest ROI, minimal risk, active daily trading wallets. From experience, most of these will be insider and dev wallets though; thus, the highest possibility of getting early into coordinated launches of runner potential. This will also be exclusive to the Alpha Revenue Services to maximize passive income of loyal users.

All Chain Theory users will have the same fair chance of getting onboard the Alpha Revenue Services for the chance of consistent passive income. All such services will be run based on a profit-sharing model whereby earnings will be distributed among eligible users. Further details on how to be part of this will be provided in the discussion section.

IV. Business Model

In short, the protocol aims to operate on a profit-sharing model. Users will be the key partners in the protocol, whereby services will provide equal opportunities for users to be shareholders at Chain Theory. As a partner, or being part of the Alpha Revenue Services, the user will be eligible for LIFETIME profit distribution (passive income) on a regular basis. The protocol will provide unprecedented value in the form of the research products, execution tools, and revenue services explained above. Chain Theory will have associated costs in the form of human resources, maintenance of databases and services, APIs usage, and on-chain infrastructure. The protocol will have three income streams as per the subsections discussed above: 1- Users will pay a subscription fee or hold the native token in order to access the On-Chain Analytical and Research Products; 2- The protocol will take a percentage cut from trades taken by users via the Execution Tools; 3- The protocol will generate consistent profits from the basket of various trading activities under the Alpha Revenue Services employed. Percentage of collected profits (tentatively 75%) will be distributed among users involved in these services (more on this in the discussion section). All other profits will be circulated back to the treasury, and protocol as a whole, to serve as trading capital funds, pay for protocol costs, test new strategies, conduct research and development activities, run research contests for users, incentivize active research involvement from users, and welcome new ideas from the community. A summary of this model can be found in figure 4.

V. Discussion

There exists limitless on-chain data that can be utilized to gain an edge in the cryptocurrency market. The limited access to such data, whether due to lack of expertise or costs associated with obtaining such data, puts a burden and

prevents the average user from benefiting from cutting-edge trading strategies. Chain Theory aims to bridge this gap by publicly disclosing important on-chain data, consistently researching for new critical analytics, and building a unity strong community to benefit from this.

The analyzer, eye, detective, watcher, and simulator are proudly state-of-the-art analytical tools developed at Chain Theory. To the team's knowledge, none has yet explored the avenue of developing and publicly disclosing similar products thus far. Undoubtedly, the availability of these would provide the user with appropriate tools to gain a significant edge in on-chain trading. At a backend level, whether subscribing to or developing APIs, renting or deploying nodes as a service, and establishing comprehensive infrastructure, these tools have associated costs to be fully functional. As such, the usage of these tools will be contingent on paying a small subscription fee (to be discussed close to launch date) or holding a certain number of the native token.

On the other hand, a handful of projects have successfully launched powerful execution tools. At Chain Theory, the team aims to release highly configurable trading execution tools as well. Take for example the copytrader: the one developed at Chain Theory will give the user the peace of mind to limit the risk via numerous methods. For example, the user will have the option to scale down the mirrored trade such that, if the original wallet is buying 20k of token X for 0.1 ETH, the user has the option to scale it down to buying 10k of X for 0.05 ETH. Another example is, if the original is an MEV wallet, yet it is still highly profitable to enter the trade in the second block, the user will have the option to assess the trade first. If the original wallet has paid 0.035 ETH for 20k of token X, the user has the option to enforce a condition such that, for example, only buy the same 20k of X if the ETH required to get those is still less than 0.07; otherwise, the trade will not be initiated. Bottom line is, the execution tools released at Chain Theory will feature minimal risk configurations that the user is comfortable with. Security is another important feature of these tools. It is never safe to disclose your private keys [7, 8], NEVER. The team at Chain Theory is happy to discuss this further with the community at a later stage; however, for now, please note that the team has a plan for users to use all execution tools without the need to provide users' private keys. Using these execution tools will provide an additional, albeit minor, income stream for the protocol. Trades executed via the copytrader, collector, and sniper will be subject to a small trading fee (tentatively 0.3%) on each trade. Using the wizard, on the other hand, will have a different fee structure which will be communicated in further medium articles once fully established.

Lastly, users will have the chance to generate passive income by taking part in the Alpha Revenue Services. The Chain Theory team has proudly developed the aforementioned strategies and has rigorously tested those for months proving consistent significant profits. Upon project maturity, all tools will be released for a free trial period (tentatively 7 days) for all users to test out and explore all features. Shortly after, a public presale will be held dedicated to the Alpha Revenue Services. In short, all users will have the chance to deposit ETH in exchange for an associated percentage of consistent passive income. In addition, should the user decide to deposit an amount of ETH beyond a certain threshold (tentatively 0.5 ETH), the user will have

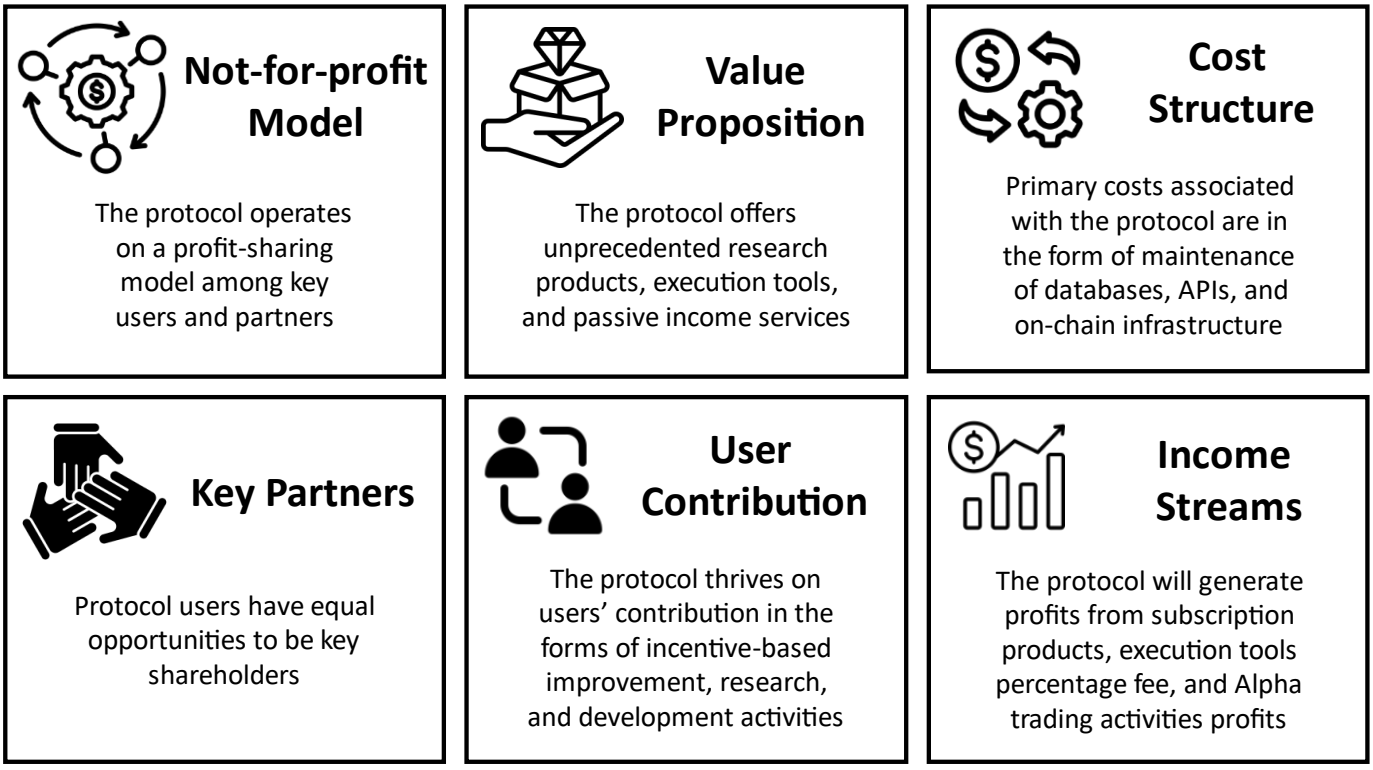

Figure 4: Summary of business model at Chain Theory.

LIFETIME access to all other Chain Theory tools that normally require subscription or holding amount. This will be the only stage where users will have the chance to be part of this specific service. Raised capital will, therefore, be used to kickstart available profit-sharing strategies. As the capital grows, after profit distribution, more research and trading avenues will be explored. Down the road, once available minimal risk strategies are capable of making use of more capital, other rounds of fundraising could be held to onboard new users. Moreover, according to a certain timeline, users are absolutely free to withdraw their deposited ETH and forfeit their position with the Alpha Revenue Services.

Additionally, users are encouraged to be an active research and development member at Chain Theory. For instance, those who are actively using the On-Chain Analytical and Research products and are fortunate enough to find highly profitable wallets that are eligible to be added to the top 100, for example, are incentivized with LIFETIME shares in the Alpha Revenue Services for regular passive income as an appreciation for their efforts. Similar incentives will also be dedicated for those who suggest execution strategies that prove to be profitable. Incentive-based educational contests will also be regularly held on Chain Theory social accounts. Limitless other incentive-based opportunities will also be available for the active community ranging from insightful ideas, contributing to the project, and suggesting improvements to available tools.

VI. Conclusion

Chain Theory is the shelter for all active on-chain traders; it is an innovative community for all. Chain Theory is your portal to do on-chain research, hunt for profitable wallets, gather insightful information, ease your decision-making, execute and manage trades, watch your capital grow, gain passive income, have fun with like-minded traders, as well as innovate and give back to a supportive community. The chain has always something to offer, it is consistently changing and moving forward; thus, Chain Theory becomes a FACT, a UNIVERSAL LAW, a lifetime mission aiming to establish grounds for years to come through regularly researching chain data and fine-tuning execution/trading tools. Such research and development activities call for a loyal and active community to be part of the team. None of your efforts will be overlooked; all your contributions will be rewarded!

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