Secure Evergreen Truthful Heterogeneous Economically Unbiased Market -SETHEUM

Muhammad-Jibril BA[1], Md Selim Hossain[2, *]

[1]Department of Computer Science and Technology, International Education Centre, Weifang University of Science and Technology, Shouguand, Weifang, Shandong China.

[2, *]Department of Computing and Information System, Daffodil International University, Dhaka-1207, Bangladesh.

Abstract: We see a lot of cryptocurrencies coming up every day, but what we don't see is a cryptocurrency that is decentralised, secure, scalable and having the option for price stability at the same time, especially one without debt or having to be centralised by a physical reserve in a corporate bank, and one that is also propping adoption. Setheum gives us the properties of both Fiat and Crypto with PES (Price Elasticity of Supply) without compromising decentralisation or economic stability. A cryptocurrency that has scalable value and trust, Setheum provides just that, backed by the resource of immutable trusted cryptography and efficient treasury system with elastic money supply that is immune to hyperinflation and price volatility, and is also 'propping diversity and incentivizing adoption. The intent of Setheum is to improve upon the concepts of the Stable coin decentralisation, scalability, mass adoption, diversity and interoperability. So, Setheum provides six (6) major solutions, the first of which is: Providing Humanitarian Aid on-chain; Fixing the stable coin inefficiency, narrow adoption strategies & use cases, and centralization Issues; Propping and boosting Industrial synchronisation and mass adoption of the Blockchain with all kinds of communities; Filling the gap between financial markets, general-use and mass adoption of blockchain technology, especially stable coins and cryptocurrencies in general; Solving the usability and sovereignty issue on most popular stable coins.

Keywords: Setheum, Cryptocurrency, Secure Evergreen, Unbiased Market, Blockchain, Byzantine Fault-Tolerant, Secure, etc.

1. Introduction

We could say that it all started in 1976, when cryptographers Whitfield Diffie & Martin E. Hellman published their paper "New directions in cryptography". David Chaum first proposed a protocol similar to Bitcoin in his thesis "Computer Systems Established, Maintained, and Trusted by Mutually Suspicious Groups." in the year 1982. Then S. Even, O. Goldreich, and Y. Yacobi published "Electronic wallet" later in 1983. Furthermore, since then we've seen inventions in this field being introduced by some of the most brilliant minds around, this gradually builds up and leads to what we know today as the Blockchain. In 1998 yet again, Nick Szabo introduced the design of a mechanism for a decentralised digital currency he called "Bit Gold". Though Bit Gold was never implemented, it has however been dubbed "the direct precursor to the Bitcoin architecture." In Nick Szabo's Bit Gold, a participant would dedicate computing power to solve cryptographic challenges (like puzzles). In the Bit Gold network, solved cryptographic hashes would go through a BFT (Byzantine Fault-Tolerant) public registry and be assigned to the public key of the participant/solver. Each solution would become part of the next challenge, creating a growing chain of new challenges. This provided the Bit Gold network with a method to verify and time-stamp new Bit Golds, because unless a majority of the validation participants agree to accept new hash solutions, they couldn't start on the next challenge.

When attempting to design a digital currency, challenges like the "double-spending" problem arise. Once data has been created, reproducing it would simply be a matter of copy and paste. Most digital currencies would solve the problem by advocating some control over to a central authority, which keeps track of the account balances. This was clearly an unacceptable solution for Nick Szabo, "I was trying to mimic as closely as possible in cyberspace the security and trust characteristics of gold, and chief among those is that it doesn't depend on a trusted central authority, "said Szabo. The phrase and concept of "smart contracts" was also developed by Nick Szabo, with the goal of bringing what he calls the "highly evolved" practises of contract law to the design of trust-less e-commerce protocols on the Internet. More papers were published to achieve fairly the same objective, a peer-to-peer trust less and secure electronic monetary equivalent.

All these inventions were neglected and almost forgotten until when we needed them the most in the 2007-2008 financial crisis, what a crash, I had wish we saw the black swan coming earlier and took all preventive measures, but we just simply didn't trust crypto, and now it's proven us totally wrong, though it hurts to be wrong we have to admit we must transition to a better economic stability strategy. On the 7th of April 2008, MICHAEL NÜSKEN published "WORKSHOP e (ELECTRONIC MONEY)." Then in the same catastrophic 2008, Blockchain was invented by a person under the alias of "Satoshi Nakamoto", to serve as the public transaction ledger of the cryptocurrency "Bitcoin". The identity of Satoshi Nakamoto remains unknown till date. The invention of the blockchain for the bitcoin network, made it the first digital currency to solve the "double-spending" (where one could spend a unit of exchange more than once) problem without the need for a trusted centralised authority. The bitcoin design has inspired many other applications, and blockchains that are public, transparent and widely used by cryptocurrencies. The blockchain is considered as a type of payment rail. Then in the catastrophic 2020, I proposed Setheum to change the lives of people and the situation of the NEEDY, most importantly to serve the underserved in this industry and introduce an ethical shari'ah compliant Blockchain and a group of cryptocurrencies.

2. Blockchain

The blockchain is a decentralised, electronic ledger made up of blocks used to record transactions across distributed nodes such that any recorded block cannot be altered retroactively, without the alteration of all the subsequent blocks. This enables the participants to verify and audit transactions independently. A blockchain's database is managed autonomously using a peer-to-peer network and a distributed timestamping server. They are authenticated collectively by participants with similar self-interests. The blockchain does away with having to trust a central authority or server, making it trust less and it is transparent to support auditing and ensuring readability.

2.1. Bitcoin (Cryptocurrency)

The 1st generation of the blockchain aimed at Cryptocurrency is the first implementation of distributed ledger technology (DLT). This allows financial transactions based on blockchain technology or DLT (for the sake of simplicity often seen as synonyms) to be executed with Bitcoin being the most prominent example in this segment. It is being used as "cash for the Internet", a digital payment system and can be seen as the enabler of an "Internet of Money".

2.2. Ethereum (Smart Contracts)

Ethereum blockchain aims to execute 'Smart Contracts' to reduce the cost of verification, execution and fraud prevention. They are independent computer programs that automatically execute predefined conditions. A DAPP can have frontend code and user interfaces written in any language that can make calls to its backend, like a traditional App. But a DAPP can have its frontend hosted on decentralised storages such as Ethereum Swarm. [DAPP = frontend + contracts (running i.e., on Ethereum).

2.3.Web3.0 (Leapfrog)

The first generation of the Blockchain aims at solving the issue of double-spending and providing a decentralised and secure monetary system on the internet, and this is where Bitcoin lands as the first successful implementation of decentralised finance. The Second generation focuses on the programmability of the blockchain layer, to support a diverse range of application development on the blockchain, and that is when Ethereum was introduced that supports an EVM (Ethereum Virtual Machine) which is a programmable layer on the blockchain that allows the deployment of smart-contracts that can interact with each other on top of the blockchain. The 3rd generation blockchain revolves around the idea of interoperability and the 3 Ss namely sustainability, scalability, and security. This is where we see Proof of Stake implementations that are environmentally friendly and an alternative to the legacy "Proof of Work" for long-term environmental sustainability with works like Polkadot and Setheum. Here we see decentralised storage like File coin, IPFS, and Chia that use Storage Consensus mechanisms.

Here we see state upgradability without forking like in Polkadot and Setheum, we see on-chain built-in DeFi systems like in the case of Acala and Setheum. We also see layer 0 solutions like Polkadot and layer 2 solutions alongside many innovations in the blockchain and crypto space. But we haven't seen specific significant contributions to the Islamic Finance market in this space, little to no DeFi presence of the Muslim community and those Christians alike that seek out for halal (permitted) zero-interest theologically acceptable DeFi protocols and modes of making money apart from trading speculation on exchanges, staking on PoS and hodling tokens. This is why Setheum was completely rectified into the conclusive go-to DeFi network for people and communities alike that share my enthusiasm as well as those that share my concerns.

Sustainability

Sustainability is a notion introduced in the domain of environment. It has been extended to almost every field. Albeit the technical means in the previous sections are unquestionably important to the development of blockchains, this topic goes far beyond the pure technical realm. The balance and growth of an industry is always governed by a number of factors. We need a network that is based on PoS (Proof of Stake) so as to be sustainable, have low carbon footprint and better chances for smaller validators that don't have the resources to mine on PoW because it is overpowered by strong highly resourced miners and mining pools - making the network more centralised and breaking the core value of the network. That's why we need PoS consensus on Setheum.

Interoperability

Blockchain Interoperability is the ability of a blockchain to communicate seamlessly with another blockchain outside its scope of protocols. Blockchain interoperability generally tackles the ability of sharing states and transacting across different chains. Blockchains can be seen as isolated databases, without proper interfaces for intercommunication of data. Blockchain interoperability could enrich use cases for blockchains like portable assets, payment-versus-delivery and cross-chain oracle. Ideally, different blockchains would be abstracted, such that a user can readily manipulate all the functions without accurate understanding of each blockchain.

Elasticity & Economic Stability

Elasticity is a measurement term that applies to a variable's sensitivity to a change in another variable. In most cases, this sensitivity is the difference in price relative to changes in an array of other factors. In the field of business and economics, elasticity is a reference to the degree to which individuals, consumers, or producers modify their demand. Alternatively, when the supplied amount in response to price or income changes, it is primarily a way to evaluate the change in consumer demand mainly due to a change in price. We need a blockchain with a

built-in elasticity system for its stable coins in order to curb inflation and volatility in the stable coin standard of the blockchain, that's why SERP (Setheum Elastic Reserve Protocol) is introduced.

Propping Adoption

How can cryptocurrencies reach mass adoption and foster diversity of use cases in our day to day lives as effectively as the fiat does and even advantageously better? Propping adoption basically means to support diversity in use cases and propagate adoption. So, for Setheum to support diversity and foster adoption of its network, we need to first create a relationship between our financial market, our familiar currencies, our day-to-day activities, our practical use cases of the blockchain, our communal utilities and our cryptocurrencies. To do just that, I introduced an efficacious Monetary Regime, an adoption incentivizing Fiscal Regime, the SERP to foster economic stability, and the Equilibrium of blockchain forces - Setheum Blockchain to connect them all with our financial markets and our daily activities.

3. Filling The Financial Gap

Economics thinking and research faces what the Institute of New Economic Thinking (INET) has dubbed "a crisis of conformity". Our current monetary policies are clearly against equality and transparency, something the blockchain provides and Setheum as a protocol adds efficiency and stability to this and gives eloquence to the blockchain. An example in finance that anyone who's traded treasuries is familiar with, is: "Failure to Deliver", so for example, ***bank A*** will sell a bond to ***bank B***, who borrows it from ***bank C***, and the same bond in a day, might trade across a dozen banks. And if one back office ***fails to make delivery*** of that bond, you get what's called a "**Cascading Failure to Deliver.**" Because no one knows who actually owns the bond, and that can take weeks to fix. So, imagine if you just have a shared database, a database that each of those banks held, that was kept accurate in real time, and that no one could maliciously change or manipulate. You would know who owns what bonds and you might be able to eliminate half of the existing back offices in big banks, resulting in massive cost savings. So, to fill the financial gap, Setheum provides the infrastructure for financial markets & Institutions to develop a reliable blockchain that shares the security, diversity and mass adoption of the Setheum Network, can be permissioned and independently governed, and can issue tokens and make use of the vast array of Setheum Currencies to trade and transact more efficiently and rely on the network's Economic stability for long term benefits. The general public will also now have the ability to spend cryptocurrency, send/receive cryptocurrency, and earn passive income with cryptocurrency on the Setheum network, without having to engage in tough cryptocurrency acquisition processes or cash outs.

4. Setheum Finance Protocol: Financial System of Setheum

As we already know, price-stable cryptocurrencies combine the best of both worlds, both fiat currencies and cryptocurrencies like Bitcoin, but not many have a clear plan for the usability let alone the adoption of such a currency. Cryptocurrencies and stable coins in particular, were designed as a direct result of shortcomings in financial markets and in the global economy – lack of capacity for cross-border payments, high transaction fees, opacity on banking systems, investor risks, market hours and exchange limitations, etc. And since the value of a currency is driven by its network effects, a successfully progressive new digital currency needs to maximise adoption in order to be useful. Creating just another stable coin is not enough, the "use case" is what matters more. Are there any practical use cases apart from trading in exchanges, airdrops and staking? Setheum Finance Protocol brings us a solution, the ultimate solution in fact, where no portion of the stability mechanism is centralised. Therefore, no two fingers to type the wrong numbers for "brrr"; I propose "Setheum Finance Protocol" to push cryptocurrencies to reach their full potential, by addressing every practical use case of a stable coin as a result of Setheum's "Dinar-Serp Stability System" (DS3) that introduces the SERP (Setheum Elastic Reserve Protocol), The Dinar (DNAR) and the Serp (SERP Tokens). My proposed price-stable "SETR" is not just price-stable but also growth-driven, it is the

exemplary price-stable cryptocurrency in the forefront towards the wider growth of blockchain adoption, it achieves stability through an elastic money supply, enabled by stable minting and mechanisms based on the “PES” (Price Elasticity of Supply). Setheum Finance also uses seigniorage created by its minting operations as transaction stimulus and more to be discussed on the next subtopic (Setheum Fiscal policy), thereby facilitating adoption.

There is high demand for decentralised, price-stable currencies that should be both fiat-pegged and absolutely crypto-economic in nature, eliminating fiat’s inflation fracas and bitcoin’s volatile nature. And when it succeeds, then it will have a significant impact as one of the best use cases for cryptocurrencies and a dam of market liquidity. Setheum Finance Protocol makes that balance of truthful trust less equilibrium between fiat currencies and cryptocurrencies. Setheum is leveraging Dinar: Serp cryptocurrency bilateral-collateral backing as the reserve assets for its fiat-pegged stable currencies, and also maintains its decentralised nature while also avoiding extreme price volatility and hyperinflation. Setheum Finance has combined Bitcoin, Ethereum (discussing the S-EVM further down the pages), Fiat and Stable coin features that maximise the better of all concepts. The price-volatility of cryptocurrencies is a well-studied problem by both academics and market observers (see for instance, Liu and Tsyvinski, 2018, Makarov and Schoar, 2018). Most cryptocurrencies, including Bitcoin, have a predetermined issuance schedule that, together with a strong speculative demand, contributes to wild fluctuations in price. Bitcoin’s extreme price volatility is a major roadblock towards its adoption as a medium of exchange or store of value. Intuitively, nobody wants to pay with a currency that has the potential to double in value in a few days, or wants to be paid in a currency if its value can significantly decline before the transaction is settled. But other cryptocurrencies that have infinite supply also have speculations as to how they can sustain hyperinflation in the long run, what happens to their PPP (Purchasing Power Parity) when their always infinitely increasing supply is a matter of concern. So, we need a balance right in the middle, and a mechanism to curb both volatility and inflation, in order to harness the economic stability of cryptocurrencies - their best day to day use cases hide behind the curtains of economic stability. Setheum gets rid of that curtain, for God says let there be light, so then why do we prevent it from reaching us even though we’re in the dark.

The problems of high volatility are aggravated when the transaction requires more time, i.e; for deferred payments such as mortgages or employment contracts, as volatility would severely disadvantage one side of the contract, making the usage of existing digital currencies in these settings prohibitively expensive. At the core of how the Setheum Protocol solves these issues is the idea that a cryptocurrency with an elastic money supply would maintain a stable price, retaining all the censorship resistance of Bitcoin, and making it viable for use in everyday transactions just like the fiat. However, price-stability is not sufficient for the wide adoption of a currency. Currencies inherently have strong network effects: a customer is unlikely to switch over to a new currency unless a critical mass of merchants are ready to accept it, but at the same time, merchants have no reason to invest resources and educate staff to accept a new currency unless there is significant customer demand for it. For this reason, Bitcoin’s adoption in the payments space has been limited to small businesses whose owners are personally invested in cryptocurrencies. The reality is that while an elastic monetary policy is the solution to the stability problem, an efficient fiscal policy can drive adoption and a strong technology can prop diversity in use cases, therefore cultivating prop-adoption. In addition, the Setheum Protocol offers strong incentives for users to join the network with an efficient fiscal regime, managed by the Setheum Reserve [SERP Treasury], where everyone on the network is a participant in the economy and has some rights over the SERP treasury.

5. Cryptocurrency vs Mobile Money

Figure 1: Cryptocurrency vs Mobile Money—Setheum

The way many people see mobile money is so distinct from what it actually is. I live in China where e-payment is pretty much the most familiar form of transaction in the country. The Chinese often ask me, do you have payment options like WeChat and Alipay, or questions like digital payments or cash which are more prevalent in your country? And believe me, China is way ahead of pretty much any other country in digitization. And they did in such a short time and adopted it nationwide. There is a misconception that Mobile money functions just like Alipay or WeChat but using phone numbers as accounts and calling credit/broadband as credit/money something like WhatsApp for payment for instance. This belief is wrong, not even close. Mobile money and payment apps work verily distinct in both their mechanisms and policies. But this part of the paper will focus on the comparison between mobile money and cryptocurrency. Is mobile money more secure, is it more efficient, is it faster, is it cheaper, all these questions lead to a big NO! It's a crystal-clear answer and here is why. First of all, when comparing these two, there are factors to consider which we will categorically determine to know which system has the upper hand where four factors are considered which are; Fee Structure; Usability; Accessibility; Reliability. And mobile money clearly has strategic flaws in these factors to consider.

6. The Blockchain Network

Setheum is a DeFi operating system, liquidity exchange provider, and financial system that resolves around the issues of interest, liquidity and stable coin reliability issues mostly raised by centralised stable coins by creating algorithmic elastic stable coins stabilised by pristine crypto assets and managed by the network's Shari'ah backed governance system that gives back all upturn elasticity returns and market growth to the community and provides zero-interest loans for all Muslims and non-Muslims alike. Setheum is built with the Substrate modular interoperable blockchain framework and is based on the Nominated Proof-of-Stake (NPoS) consensus algorithm. In Setheum, one can pay for transaction fees in any token currency without having to hold Setheum's native token. Setheum implements a free and fair economic system that pursues equality of opportunity and the maximisation of public utility in the crypto-economy.

6.1. Setheum Monetary Policy

Retaining purchasing power is the primary objective of a stable currency. Given that most of the goods and services produced are being consumed domestically, it is important to create cryptocurrencies that peg to the value of localised fiat currencies. And given that the US Dollar is the most recognisable and acceptable international yet localised fiat currency, we recognise the strong importance and activity of the US Dollar, and we provide SETUSD (pegged to $1) and SETR (pegged to $0.1). For number details on the currencies, read further below. The SETUSD is maintained by a CDP (Collateralized Debt Position) System based on the SERP whereby the users of the CDP maintain the value just like Maker DAO (without the interest rates of stability fees) and the SERP maintains the SETR's stability with the Setheum DEX (aka. SetSwap) and the SETUSD, creating an independent ecosystem that neither needs external mechanisms to stabilise nor to expand as it also has inflation rates and mechanisms governed by the Financial Council (an on-chain governance council) that incentivizes users to spend or trade (read further below to see the uniqueness of the Setheum DEX and other Setheum products); Unlike today's popular monetary policies, it is a unique one in the Setheum Reserve, first of all the Monetary Aggregates are extended and incorruptible in Setheum Finance, so Setheum does not compute

high-powered money (HPM) into its currencies, which is basically the multiplication of the Monetary Base (MB or M0) with Fractional Reserve Banking.

Setheum mints SETR through an elastic money supply relying on PES and through the on-chain SERP inflation mechanisms and the EFE (Exchange Fee Evaluator - read further below for the unique EFE), so the amount of SETR to be minted is proportional to the pairing of DNAR:SERP and its price relative to the SETUSD versus the corresponding DEX pool relative to its fiat peg and its market cap. Whenever SETR or SETUSD is minted automatically by the SERP, some amounts are used for T1 tokens (SETM, SERP, DNAR, HELP) buyback (read further below for these numbers too) and these SERP:DNAR tokens are used in exchange to buy back excess SETR:SETUSD from the market through the built-in DEX (Setheum DEX/SetSwap). In the long term this provides a very strong backing for the SERP's stable coins as the values of the T1 tokens increase overtime in the market; If the system detects a price deviation from a stable coin's peg, the Elastic Reserve protocol applies pressure to stabilise the price back to peg ratios. Therefore, based on the principles of demand and supply, the SERP (Setheum Elastic Reserve Protocol) contracts or expands the supply relative to the price change to stabilise the market price of the stable coins. Since contracting the supply of money isn't free; like any other asset, money needs to be bought from the market. The centralised authorities like Central banks and governments support contractionary costs for pegged fiat systems through a variety of mechanisms including intervention, short-term instruments and the bonds, thus incurring interest expenses, hiking of market exchange rates and reserve ratio requirements, thus losing revenue. Put it this way, governments and central banks absorb the volatility of the stable currencies they issue. In Setheum, in the short term, the DNAR: SERP reserve pairs absorb SetCurrency contraction costs through newly minted tokens that get swapped on the Setheum DEX/SetSwap for the SetCurrencies which then gets immediately burned in the SERP directly before it even leaves the DEX. The Contraction and Minting method in SERP, is inspired by the Terra model of contraction and minting for price-stability two years back when I first went into designing how Setheum should be, and I went through writing and scrapping a lot of whitepapers over the years. But the SERP improves much on that.

6.2. Setheum Fiscal Policy

Users of the Setheum network get what I'd like to call Cashdrops from the SERP-Treasury that were issued due to a need for price stability by increase in supply or due to SERP inflation mechanisms for economic growth. CashDrops are essentially cashback given (from the CashDrop Fund in the Serp Treasury, so it's not unlimited) to the users of the SetCurrencies whenever they claim on their transactions. So, each transaction has a sort of toggle button that says "claim cashdrop" before the transaction is sent (transfers "to" only).

6.3. Setheum Foundation and the SPF

The Setheum Foundation is the non-profit organisation that supports development and growth in the Setheum ecosystem. It supports projects and teams building on Setheum with financial grants, technical support, community partnerships and community support. The Setheum Foundation stewards the Setheum Public Fund (SPF) that supports humanitarian and environmental causes to help the needy and underprivileged communities, minorities, orphans, physically challenged, the sick, refugees, and animals around the world. It focuses on funding NGOs, Public Health and Research Institutions around the world and communities in need to lessen the suffering felt by all kinds of people, communities, animals around the world and even ecological problems. The Setheum Foundation also supports R&D in blockchain tech, cryptography and computing for the common good of the public.

6.4. Setheum EVM (SEVM)

The Setheum EVM (SEVM) enables Solidity smart contracts to be deployed on the Setheum blockchain with minimum changes. It also offers many distinct features such as "bring your own gas" (paying fees in any tokens other than Setheum's native token), and an on-chain automatic scheduler that enables use cases like subscription and recurring payments, microgas (paying very miniscule gas fees), etc.

6.5. Setheum Elastic Reserve Protocol (SERP)

The Setheum Elastic Reserve Protocol (SERP) is the backbone of the Setheum Economy, it is the stable coin financial system of Setheum first of its kind and unique to Setheum. The Serp implements algorithmically stabilised stable coins that are serped or stabilised algorithmically with the Serp Reserve Assets called the "Serp and Dinar" which are a Tier-1 token class (free-floating cryptocurrency) on Setheum, sort of like the gold-standard but superior in technology and system utility, bilateral-backing (with SERP & DNAR) and a lot more. Elasticity is a proportionate change in one variable over the proportionate change in another variable:

$$pes = \frac{\%\Delta QS}{\%\Delta P} \text{ , and}$$

$$serptes = \frac{\frac{mp}{pp} \times S}{1} \vee \frac{\frac{pp}{mp} \times S}{1}$$

Where QS is the quantity of supply and P is the price, representing the % Change in Quantity / %Change in Price. Where S is the total Supply, mp is the market-price, pp is the peg-price. If price is above peg, mp/pp, else if price is below peg, pp/mp;

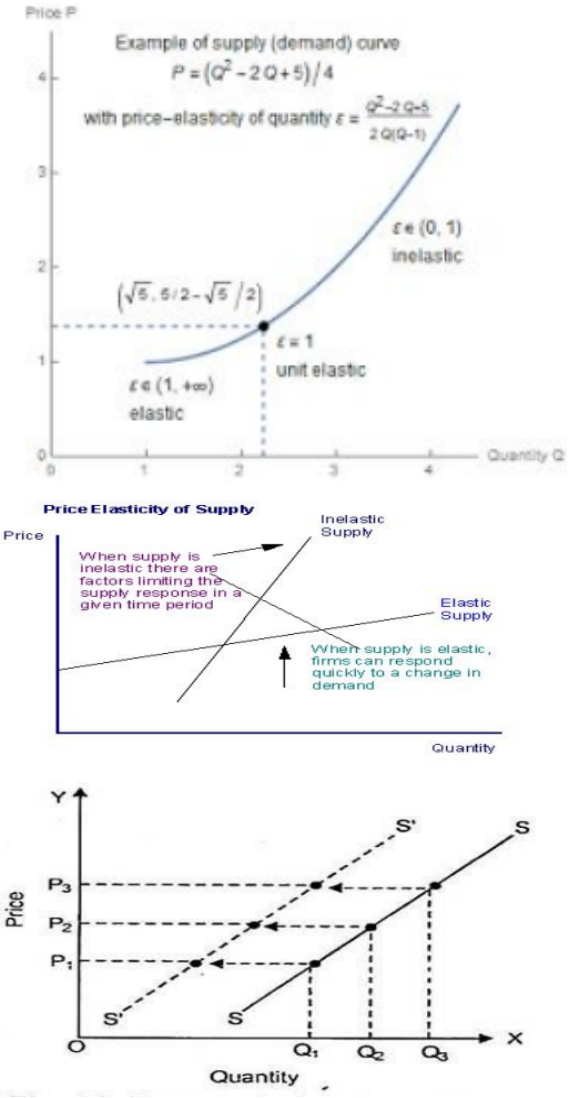


Figure 3: SERP-TES price elasticity examples.

The SETR is automatically adjusted by the SERP-TES (SERP-Token Elasticity-of-Supply), while the SETUSD is adjusted by the SERP and SetMint based on CDPs (Collateralized Debt Positions). When a Setheum Stable Currency goes higher than its peg in price (higher demand than supply), then that height in demand is injected into the economy to stabilise the price of that stable currency, we call that a Serp Up, the opposite is done for a Serp Down to Serp down the supply. The supply injected into the economy during upturns/Serp ups of a stable currency is distributed as such 75% to buy back the Serp Reserve Assets for burning, and 25% to the "CashDrop Pool" for users to claim. The SERP also issues a per period inflation rate balance for

the Setheum stable currencies, the inflation rates are initially set as shown below, and the inflation rate can be adjusted through the governance under the Setheum Shura Council with a democratically voted approval by the members of the Shura Council.

The injected inflation balance will be distributed as such in the table below:

Buy Back DNAR	Buy Back HELP	Buy Back SERP	Buy Back SETM	CashDrop Pool
20%	20%	20%	20%	20%

Table 1: CashDrops

Currency	Min. Claimable Transfer	Max. Claimable Transfer	Claim Rate
SETR	10 SETR ($2.5)	2_000_000 SETR ($500k)	4%
SETUSD	4 SETUSD	100_000 SETUSD ($100k)	2%

6.6. Tokens and Stable Coins

There are two classes of currencies, free-floating tokens (what I like to call the “Tier-1 Tokens” (T1)), and stable-currencies (what I like to call “Tier-2 Tokens” (T2) OR simply “SetCurrencies”) in Setheum.

6.7. CashDrops

CashDrops are essentially cashback given (from the CashDrop Fund, so it’s not unlimited) to the users of the SetCurrencies whenever they claim on their transactions. So, each transaction has a toggle button that says “claim cashdrop” before the transaction is sent (transfers “to” only). Below is the CashDrop claims minimum transfer amounts that can claim and cashdrop rates per currency of claim (these parameters can be updated via network runtime upgrade with the approval of the governance council of Setheum):

7. The SetMint Protocol

Figure 4: Multi-Collateral CDPs on SetMint

Inspired by Maker DAO Protocol, the CDP (Collateralized Debt Position) protocol on Ethereum. The Setheum CDP has zero interest rates, zero stability fees, and is fully halal and collateralized. This differentiates SetMint from any other CDP Protocol, making it by far the only halal loan protocol in the entire industry. And it is multi-Collateral**.** Just reserve some collateral to mint some SETUSD, when returning the loan just return exactly what was loaned and unreserve the collateral with no fees and no interest. This lets the Muslim world also participate in the industry and take part in trading and yield making strategies that are within their dome of principles, for me this is a gamechanger that I wished was there for me, therefore I am building it for people like me who need it but haven’t been given the chance to be pleased by it, and also non-Muslims that want to break-free from the interest-based alternatives to a more efficient system based on truth, fairness and equality. Every SETUSD issued through SetMint is backed in excess by a cryptocurrency and is stabilised against the USD through the SetMint Protocol - a flexible dynamic system of Zero-Interest Collateralized Debt Positions (CDPs) in extension to the SERP - the Setheum Elastic Reserve Protocol, on-chain governance and incentivized key actors.

Ticker	Name	Class	Initial Supply	Price	Ecosystem Market Cap (~$916.3 million)
DNAR	The Dinar	T1	70,000,000	$0.14	$9,800,000 (nano cap)
SERP	Serp	T1	258,000,000	$0.05	$12,900,000 (micro cap)
HELP	HighEnd LaunchPad	T1	700,000,000	$0.07	$49,000,000 (micro cap)
SETM	Setheum	T1	313,303,003.	$0.01	$31,330,300.3 (micro cap)
SETR	Setter	T2	2,000,000,000	$0.25 (Stable)	$500,000,000 (small cap)
SETUSD	SetDollar	T2	313,300,000	$1 (Stable)	$313,300,000 (small cap)

Table 1: Tokens and Stable Coin

The CDP loans system design in Setheum is inspired by the first decentralised stable coin Maker DAO project, which has become the DeFi building block in the Ethereum ecosystem. Along with a set of incentives, supply & demand balancing, the SERP stability mechanism and risk management mechanisms, as the core components of the Setmint protocol, the value of a SetDollar (SETUSD) is pegged to the value of a US Dollar (USD), with relative stability and this helps stabilise the SETR through the Setheum Elastic Reserve Protocol (SERP). The SETR and the SERP relatively stabilise each other with the help of the SERP too. Unlike in Ethereum, where an external liquidator is required to monitor and close dangerous positions, which is by and large due to limitations in Ethereum, the SetMint Protocol is able to use the substrate Off-chain Worker (an automatic scheduler unique to parity's Substrate) to automate the process and inherently increases the security and stability of the stable currency.

Figure 5: Setheum - SetMint Protocol

Collaterals currently are SETM, SERP, DNAR, HELP, SETR. More collaterals could be added through runtime upgrades by system governance. The collateral parameters are given as in Table2 below;

Table 3: Initial Token Allocations

Currency	Treasury	SPF	On-Chain DEX	Foundation	Team and Private Sale	Advisors and Partners	CashDrop Pool	Community
SETM	10%	10%	20%	20%	30%	5%	-	5%
SERP	-	10%	30%	20%	30%	5%	-	5%
DNAR	-	10%	30%	20%	30%	5%	-	5%
HELP	-	10%	30%	20%	30%	5%	-	5%
SETR	-	10%	~ 2.777%	~ 47.223%	30%	10%	10%	10%
SETUSD	-	10%	~ 4.43%	~ 45.5%	30%	10%	10%	10%

Table2: SetMint Collateral Parameters

Collateral	Liquidation Rate	Liquidation Penalty Rate	Required Liquidation Rate	Max. Debit Value
SETM	105%	5%	110%	25,800,000 SETUSD
SERP	105%	5%	110%	25,800,000 SETUSD
DNAR	105%	5%	110%	25,800,000 SETUSD
HELP	105%	5%	110%	25,800,000 SETUSD
SETR	103%	3%	106%	33,000,000 SETUSD

Table 4: Vesting Schedule on Allocations

Currencies	Advisors and Partners	SPF	Foundation	Team
SETM	50% for 7 years	50% for 9 years	50% for 23 years	50% for 23 years
SERP, DNAR, HELP	52% for 5 years	52% for 7 years	52% for 19 years	52% for 19 years
SETR	30% for 3 years	30% for 3 years	30% for 3 years	30% for 3 years
SETUSD	25% for 2 years	25% for 2 years	25% for 2 years	25% for 2 years

Table 5: Setheum DeFi Metrics

Metrics: (Approx.)	SETM	SERP	DNAR	HELP
TVL of Total Supply in DEX	~ 20%	30%	30%	30%
TVL of Total Supply in Staking	~ 20%	NIL	NIL	NIL
TVL of Total Supply in Vesting	~ 32.5%	33.8%	33.8%	33.8%
TVL in Total Supply	~ 72.5%	63.8%	63.8%	63.8%
TVL in Total Economy	~ 2.5%	0.9%	0.6%	3.3%
Total Supply	~ 3.13 Billion SETM	258 Million SERP	70 Million DNAR	700 Million HELP
Domination in Total Economy	~ 3.4%	~ 1.4%	~ 1%	~ 5.3%
Market Price	$0.01	$0.05	$0.14	$0.07
...	...	...	...	...
Initial Market Cap	~ $31.3 Million	~ $12.9 Million	~ $9.8 Million	~ $49 Million
...	...	...	...	...

Figure 6: SetSwap – Setheum DEX

Inspired by Uni-swap V2, Setheum has a built-in Decentralised Exchange that I like to call “SetSwap” (or Setheum Swap). In SetSwap there is what I call the EFE (Exchange Fee Evaluator) that is the first of its kind and unique to Setheum (one of the Setheum originals). The EFE essentially lets available two types of Exchange fees, one for Tier-2 paired pools (LPs paired with at least one Setheum stable currency for example “BTC_SETUSD_LP”), then another fee structure for every other pool that is not a “T2-Paired-LP” could access Setheum’s DeFi features with a more beginner-friendly UI. on the DEX.

7.1.Exchange Fee Evaluator (EFE)

The EFE structure takes less fees from traders that swap with a “T2-Paired-LP" than it takes from a “non-T2-Paired-LP" (i.e., “BTC_DNAR_LP”). The difference between these fees is then paid to the pool by the SERP by issuing the T2-token to the pool to balance out the full Exchange Fee. This lets the traders pay less fees while the Liquidity Providers earn more. This in turn attracts more traders, more trading volume, more liquidity, more market attractiveness, more trading opportunities and more natural economic growth based on market drive and demand, which in turn props the market value of the Serp and the Dinar and the entire Setheum tokens which in turn improves overall market performance and economic growth. The initial Exchange Fees are as such, exchange fee is 0.3%, stable currency exchange fee is 0.1%, and the EFE (effect/difference) is 0.2%. They can be updated with governance through runtime upgrades.

7.2.HighEnd LaunchPad (HELP) Protocol

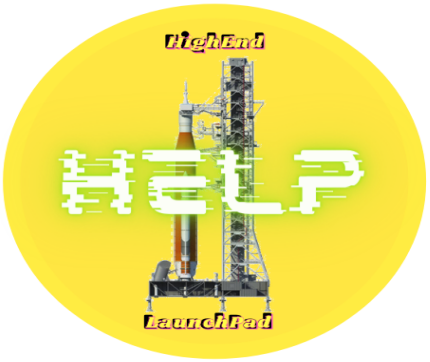


Figure 7: HighEnd LaunchPad - HELP Protocol

Teams and projects that are building smart contracts and DAPP on the SEVM would need to raise funds and even bootstrap their tokens on the SetSwap. They need community backing by liquidity providers and the crowd so that they could have a strong start and a high-end launch by creating a crowdfunding campaign that ends with their ERC20 Tokens getting sold to the public and bootstrapped on the DEX through a crowdfunding IDO. I happen to be working on that in Setheum, providing the High-End Launch Pad (HELP) Protocol to do just that for the projects building/deploying their tokens on Setheum's SEVM as ERC20 start contracts. The HELP Protocol has a token of its own called the "High-End Launch Pad - HELP" token, which serves as a utility token for the High-End Protocol. The token is used as a "SubmissionDeposit", which will be locked in the protocol by the Campaign creator to propose a Launch Pad Campaign until the Campaign is closed, then the HELP tokens are returned to the creator after the project is closed (successful or not).

A Sample Sequence Diagram of the HELP Protocol pallet (initial framework design)

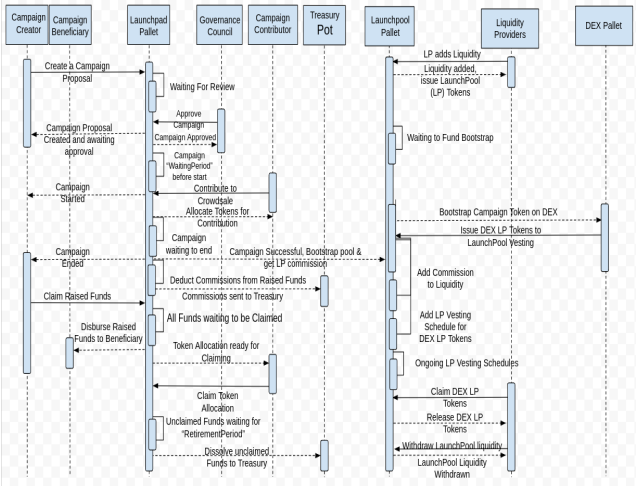


Figure 8: Launchpad Crowd sales Sequence Diagram

Figure 9: QMA Flash loans - Setheum Flash Loans

7.3. Halal Flash loans on Setheum QMA

It was a cold winter night, I just had supper and finished reading about the then recent crypto bull run, and it was all exciting—more like fomo plus excitement. That feeling is refreshing as well as a bit disturbing, if you know you know. That night, and that entire day, I had read a lot as well as watched a lot of YouTube, for what you say, well, it all has to do with something they call Flash loan. This Flash loan thing kept me awake for days even, as it ate through my mind thinking of all sorts of possible trades I could perform and profit in a Flash loan. It turned out to be a bit

harder than I thought, it was 2020 and I was so broke, though I had big plans I also had big failures (I meant big lessons) that I learnt from. So, I said over and over to myself, if I had a chance to make a million dollars in a block time and I made it how grateful will I be, the answer is an ocean load of it, so I said.

The QMA has been Illustrated Below:

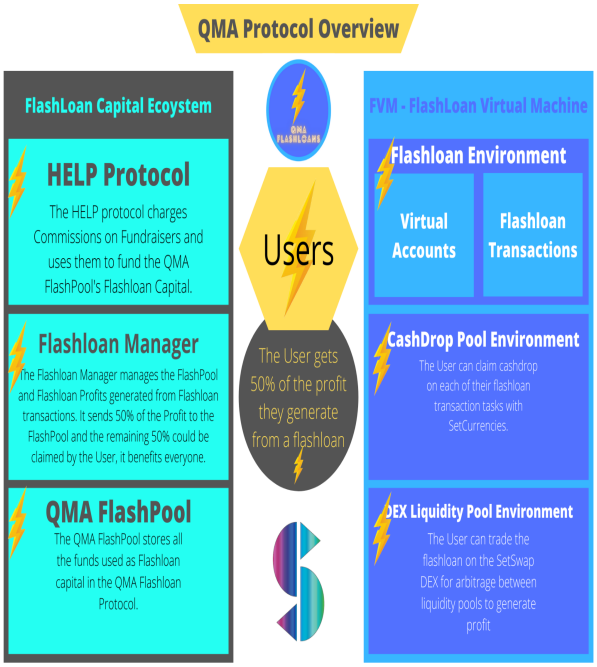


Figure 10: Protocol Overview of QMA

Literally and simply, when a flash loan is successful, by the way – flash loans don't complete if they are not profitable therefore there is no chance for loss of the capital in the pool, only the user loses transaction fees (BTW these fees could range from a few cents to a few dollars, i.e., $0.5 - $12) if the flashloan is not profitable/successful. We could set the `PoolProfitMargin` at 50% (meaning - half of the profit gained from a flashloan goes back into the FlashPool for more Flashloan capital). These parameters could be updated via Governance extrinsic or with a runtime upgrade by the Chain Governance Council.

7.4. Al-Ethaar Protocol

Figure 11: Al-Ethaar Protocol

Setheum is made for altruism, for the public, for helping the poor and the needy, for securing the planet and funding causes we care about. Some of those causes include feeding the hungry, quenching the thirsty, clothing the unclothed, housing the unsheltered, medicating to the sick, protecting the unprotected, financing the poor, voicing the unvoiced, helping the afflicted, warming the freezing, and cooling the hot.

Figure 12: Al-Ethaar Protocol

To do just the purpose of Setheum, we have to empower the unempowered and support the unsupported by funding the unfunded through

transparently governed algorithmic crowdfunding mechanisms that radically raises funds for only this purpose, for Al-Ethaar—an Arabic word meaning Radical Altruism. The main purpose of Setheum is Al-Ethaar, to essentially, thoroughly, radically and altruistically be a gift from me to all of the entirety of Creation, both human and non-human, both animate and inanimate, both celestial and earthly.

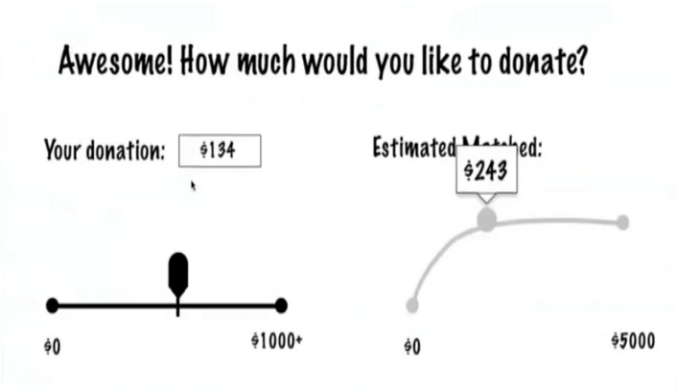
Quadratic Funding Formula: $V_i^p\left(\left(\sum_j \sqrt{c_j^p}\right)^2\right) - c_i^p.$

First and foremost, what is Altruism or Al-Ethaar (in Arabic). Altruism is derived from the French altruisme, and its etymology can be traced back to the Italian and earlier Latin alter, meaning other, others. Altruism is a selfless act of thinking about the welfare of others. In moral judgement, the happiness of others is more important than one's own. Altruism is a virtue in many ideas and cultures. In evolutionary genetics, altruistic behaviour is defined as increasing the survival of others and decreasing the survival of one's own.

From the term "Quadratic Funding", the term "Quadratic Altruism" is Quadratic Funding that focuses on Humanitarian Altruistic missions and campaigns that support altruistic causes like those mentioned above. The concept of Quadratic Funding extends ideas from Quadratic Voting to a funding mechanism for endogenous community formation as exemplified by Vitalik Buterin, Glen Weyl and Zoe Hitzig in their paper on Quadratic Funding.

8. Design and Analysis of Quadratic Altruism

Referred to as the "Liberal Radical" (LR) mechanism by Vitalik Buterin, Glen Weyl and Zoe Hitzig in their paper on Quadratic Funding.



The Liberal Radical Mechanism $\Phi^{LR}\left(c_i^p\right)$ generates funding F^P for each good $p \epsilon P$ such that $F^p = \left(\sum_i \sqrt{c_i^p}\right)^2$.

Any positive contribution must satisfy by differentiation

$$\frac{2V_i^{p\prime}(F^p)\left(\sum_j \sqrt{c_j^p}\right)}{2\sqrt{c_i^p}} = 1 \leftrightarrow V_i^{p\prime}(F^p) = \frac{\sqrt{c_i^p}}{\sum_j \sqrt{c_j^p}}$$

To alternatively vocalise the maths, the matched amounts (amounts each funding campaign/project gets from a matching pool/round) are calculated by the CLR formula:

$$V_i^p\left(\left(\sum_j \sqrt{c_j^p}\right)^2\right) - c_i^p.$$

where, the total amount received by a project (matched amount) is proportional to the square of the sum of the square-roots of the contributions that are received.

	Project X	Project Y	Project Z
Funding	$1,000	$1,000	$1,000
Contributors	5 ($200 each)	2 ($500 each)	20 ($50 each)
Matched Amount	$1,851.85	$740.74	$7,407.41
Initial Amount	~185%	~74%	~740%

Therefore, no participating project campaign will exit with nothing, they all share the funds in the pool and come together for the good of each other, this essentially is al-ethaar (true altruism). Therefore, every contribution matters as well as every project matters, even the smallest of projects and the smallest of contributions. The inventors did a great thought here, kudos, and we shall implement it in Setheum Insha'Allah. To simplify the module, the user flow of the QF campaign based on the Constrained Liberal Radicalism algorithm (CLR) is demonstrated with the sequence diagram below.

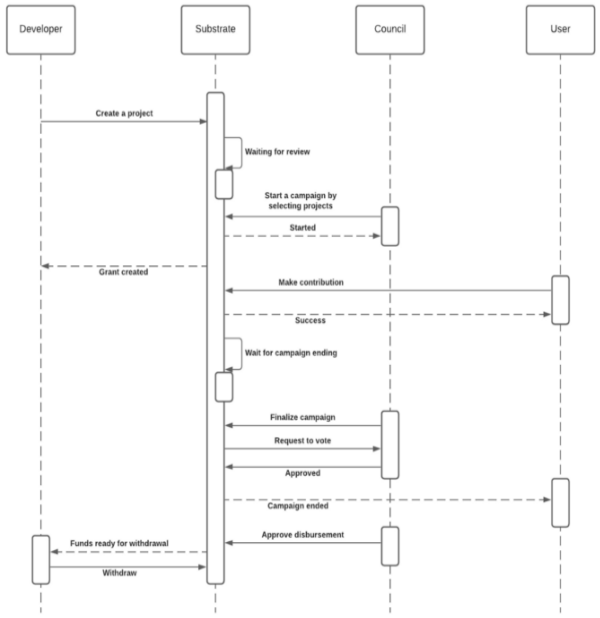


Figure 13: Al-Ethaar Protocol initial prototype design

9. Network Governance

Governance is the way rules, norms and actions are structured, sustained, regulated and held accountable. Setheum has a governance protocol with several governance chambers all having some on-chain parameters to pass binding system jurisdiction. The primary chamber is "the Shura Council", it comprises a set of accounts. There is a "Technical Committee for maintaining technical governance such as on-chain runtime upgrades, and a Financial Council for financial protocols' governance.

10. Network Security

Security is the "S" in SETHEUM; therefore, network security is of utmost importance in the Setheum Network. The Nominated Proof-of-Stake protocol that Setheum uses provides a strong guarantee for security, it lets the system select validators that stake huge amounts of the SETMs in aggregate. And it is expected to be staked, a considerably large fraction of the total issuance of the SETMs in this scheme, which makes it more difficult for a malicious actor to be elected, regarding that the reputation of the validators count in relativity to the nominator backing required to get elected. And attacking the network would result in a costly operation, considering that the SETMs staked by the actor will be slashed by the system alongside the stakes of their backers/nominators, this also disincentivises attackers and incentivises backers to choose reputable validators, which in turn goes back to the first point - which is, a considerably large amount of SETMs backing is required to be an elected validator.

The NPoS scheme is highly more efficient than the legacy Proof-of Work (PoW), also faster than the standard PoS (Proof-of-Stake). With NPos (Nominated Proof of Stake), a virtually all the SETM token holders are allowed to indefinitely participate in staking and earning rewards for securing the system, all while ensuring the maintenance of high-level security by having more staked value and democratising validation and yield earnings. Providing compounding security right alongside compounding rewards for profitability in the continuous public security of the network.

11. Consensus

Setheum's finality protocol for consensus is the very healthy GRANDPA consensus mechanism. GRANDPA (GHOST-based Recursive Ancestor Deriving Prefix Agreement) finalises blocks based on availability and validity checks that are done as the proposed chain grows. The finality is expected to be very fast. Setheum uses BABE for block authoring and GRANDPA for finality. And Setheum uses the NPoS staking consensus protocol.

Specification Sheet

Key	Value
Currencies (symbol = decimals, index)	SETM = 18, 0; SERP= 18, 1; DNAR = 18, 2; HELP = 18, 3; SETR = 18, 4; SETUSD = 18, 5;
Native Token (symbol = decimals, index)	SETM = 18, 0;
SS58 Prefix	258
EVM chain_id	258
Block authoring	BABE
Finality Gadget	GRANDPA
BlockTime	3 seconds
BlockSize	1.25MB to 3.75MB
BlockHashCount	4,800 (4 hours)

Staking, Nominating and Validating

Setheum uses a Nominated Proof-of-Stake (NPoS) consensus mechanism to secure the network. Nominators nominate validators to be in the active set of chain validators by staking their Setheum (SETM) with a validator/validator. Validators produce new blocks, validate existing blocks, and also guarantee finality. It is important to note, validators only earn SETM rewards if they have enough staked SETM to qualify into the active validators set. The active validators set updates every Era, which is 2 hrs on Setheum. Therefore, Setheum uses NPoS to select validators from a small set, allowing even small token holders to nominate validators who run infrastructure while still claiming staking rewards without running their own node infrastructure. And so, with Setheum able to stay alive even when most of the network goes offline, Setheum COULD be able to survive WWIII. The Staking rewards range from a minimum of 2.58% to a maximum of 25.8%, ideal stake of 50%; Setheum uses NPoS (Nominated Proof-of-Stake) as its mechanism for selecting the validator set. It is designed with the roles of validators and nominators, to maximise chain security. Actors who are interested in maintaining the network can run a validator node.

12. Conclusion

Setheum has a unique approach to the problems facing the space and provides opportunities that incentivize adoption and usability and most importantly because it helps people with a means to survive, thrive and get educated through its public fund (SPF). Setheum has amazing investment opportunities with astonishing usability. Setheum is the brainchild of a cluster of ideas and challenges that inspire the founding of it. And so, with the expected level of equilibrium, security, decentralisation, scalability, efficiency, diversity and adoption, Setheum is set to implement the finance in the Web3 Ecosystem extending hands to the halal consumer market and the Islamic Finance community. Launching of the Setheum Protocols will take a Phased approach with most of the protocols launching in the Phase 1, and the HELP Protocol + QMA Flash loans launching in the Phase X, and the Al-Ethaar Protocol Launching in the Phase Y.

Funding Statement: The authors have not received any funding for this research.

Competing Interests: The authors declare that they have no competing interests.

Ethics Statement: No unethical work has been performed in this research work.

References:

1. M. Rahouti, K. Xiong and N. Ghani, "Bitcoin Concepts, Threats, and Machine-Learning Security Solutions," in IEEE Access, vol. 6, pp. 67189-67205, 2018, doi: 10.1109/ACCESS.2018.2874539.
2. Muhammad-Jibril B.A., Setheum Labs, what is Islamic Finance In light of Setheum with founder Khalifa-MBA, January 25, 2022, <https://medium.com/setheum-labs/what-is-islamic-finance-in-light-of-setheum-with-founder-khalifa-mba-6661517a9932>
3. Muhammad-Jibril B.A., Setheum Labs, QMA Flashloans Protocol — How Setheum provides Flashloans in an On-Chain VM, Jan 22, 2022, <https://medium.com/setheum-labs/qma-flashloans-protocol-how-setheum-provides-flashloans-in-an-on-chain-vm-d49c87ea75fb>
4. Muhammad-Jibril B.A., Setheum Labs, Al-Ethaar Protocol — Quadratic Altruism on Setheum, Jan 21, 2022, <https://medium.com/setheum-labs/al-ethaar-protocol-quadratic-altruism-on-setheum-aa696ba9247c>
5. Muhammad-Jibril B.A., Setheum Labs, HELP “HighEnd LaunchPad” | Setheum’s IDO Crowdfunding Protocol, Jan 21, 2022, <https://medium.com/setheum-labs/help-highend-launchpad-setheums-ido-crowdfunding-protocol-36c43566c927>
6. Muhammad-Jibril B.A., Setheum Labs, How Zero-Interest SETUSD Loans Work in Setheum — Islamic DeFi 101 in SetMint Protocol, Jan 15, 2022, <https://medium.com/setheum-labs/how-zero-interest-setusd-loans-work-in-setheum-islamic-defi-101-muhammad-jibril-b-a-14f694dfefef>
7. Muhammad-Jibril B.A., Setheum Labs, Understanding the Tokenomics of Setheum’s Vesting Schedules, Jan 15, 2022, <https://medium.com/setheum-labs/understanding-the-tokenomics-of-setheum-muhammad-jibril-b-a-872863792d47>
8. Muhammad-Jibril B.A., Setheum Labs, Cryptocurrency vs Mobile money, January 15, 2022, <https://medium.com/setheum-labs/cryptocurrency-vs-mobile-money-f56ab725bcc0>
9. Muhammad-Jibril B.A., Setheum Labs, Introducing The First and Only Halal Islamic Finance DeFi Blockchain and Cryptocurrencies — Setheum Transitions to The Best Economic System and DAO., Jan 1, 2021, <https://medium.com/setheum-labs/introducing-the-first-and-only-halal-islamic-finance-defi-blockchain-and-cryptocurrencies-8065349a1ac8>
10. Muhammad-Jibril B.A., Setheum Labs, Are stablecoins ready for the masses? A convincing solution emerged — Setheum, November 18, 2020, <https://medium.com/setheum-labs/are-stablecoins-ready-for-the-masses-a-convincing-solution-emerged-setheum-6d01ef25c92b>
11. Muhammad-Jibril B.A., Setheum Labs, The Stablecoin Stability Mechanism on Setheum’s SERP, November 18, 2020, <https://medium.com/setheum-labs/the-stablecoin-stability-mechanism-on-the-setheum-network-5b18118aa04e>
12. Muhammad-Jibril B.A., Setheum Labs, make a Difference: Why it makes History and Why Try — Setheum, November 15, 2020, <https://medium.com/setheum-labs/make-a-difference-why-it-makes-history-and-why-try-setheum-55ea288ffbc8>
13. Muhammad-Jibril B.A., Setheum Labs, what is Setheum? — A preview into the Blockchain 5.0 space…, September, 2, 2020, <https://medium.com/setheum-labs/what-is-setheum-a-full-review-into-the-blockchain-5-0-space-cec0ef1be808>
14. D. Bauso, L. Giarre and R. Pesenti, "Distributed consensus protocols for coordinating buyers," 42nd IEEE International Conference on Decision and Control (IEEE Cat. No.03CH37475), 2003, pp. 588-592 Vol.1, doi: 10.1109/CDC.2003.1272627.
15. Hayden Adams, Noah Zinsmeister, and Dan Robinson. 2020. Uniswap v2 Core. Retrieved Feb 24, 2021 from https://uniswap.org/whitepaper.pdfG. Wood, "Ethereum: A secure decentralised generalised transaction ledger", Ethereum Project Yellow Paper, 2014.
16. H. Al-Shaibani, N. Lasla and M. Abdallah, "Consortium Blockchain-Based Decentralized Stock Exchange Platform," in IEEE Access,

vol. 8, pp. 123711-123725, 2020, doi: 10.1109/ACCESS.2020.3005663.
17. V. Buterin, On public and private blockchains, 2015, [online] Available: https://blog.ethereum.org/2015/08/07/on-public-and-private-blockchains/.
18. Evan Kereiakes, Do Kwon, Marco Di Maggio, Nicholas Platias, Terra Money: Stability and Adoption, April 2019, <https://assets.website files.com/611153e7af981472d8da199c/618b02d13e938ae1f8ad1e45_Terra_White_paper.pdf>
19. Jack Fransham, Parity Substrate, Polkadot, what is Substrate? July 09, 2018, <https://www.parity.io/blog/what-is-substrate>
20. Alfonso Cevallos, Overview of NPOS, <https://research.web3.foundation/en/latest/polkadot/NPoS/1.%20Overview.html>
21. Gourinchas, Pierre-Olivier and Martin, Philippe and Messer, Todd, The Economics of Sovereign Debt, Bailouts and the Eurozone Crisis (June 2020). CEPR Discussion Paper No. DP14891, Available at SSRN: https://ssrn.com/abstract=3628214
22. Jack Fransham, Polkadot Network - Medium, Never Fork Again, Nov 28, 2018, <https://medium.com/polkadot-network/never-fork-again-438c5e985cd8>
23. Integrating The BWM and Tops is Algorithm to Evaluate the Optimal Token Exchanges Platform in Taiwan Technological and Economic Development of Economy, 2021 DOI:10.3846/tede.2021.15935
24. Khacef K., Benbernou S., Ouziri M., Younas M. (2022) Trade-Off Between Security and Scalability in Blockchain Design: A Dynamic Sharding Approach. In: Awan I., Benbernou S., Younas M., Aleksy M. (eds) The International Conference on Deep Learning, Big Data and Blockchain (Deep-BDB 2021). Deep-BDB 2021. Lecture Notes in Networks and Systems, vol 309. Springer, Cham. https://doi.org/10.1007/978-3-030-84337-3_7
25. Mohanty, D.; Anand, D.; Aljahdali, H.M.; Villar, S.G. Blockchain Interoperability: Towards a Sustainable Payment System. Sustainability 2022, 14, 913. https://doi.org/10.3390/su14020913
26. Dobrovnik, Mario, David M. Herold, Elmar Fürst, and Sebastian Kummer. 2018. "Blockchain for and in Logistics: What to Adopt and Where to Start" *Logistics* 2, no. 3: 18. https://doi.org/10.3390/logistics2030018
27. Schoenmaker, Dirk, 2013. "Governance of International Banking: The Financial Trilemma," OUP Catalogue, Oxford University Press, number 9780199971596.
28. MoneyAndBanking.com, The Other Trilemma: Governing Global Finance, July 24, 2017, <https://www.moneyandbanking.com/commentary/2017/7/23/the-other-trilemma-governing-global-finance>
29. Steven Ehrlich, Forbes, After An $850 Million Controversy, What Everyone Should Know About Bitfinex, Tether and Stable coins, May 2, 2019, <https://www.forbes.com/sites/stevenehrlich/2019/05/02/after-an-850-million-controversy-what-everyone-should-know-about-bitfinex-tether-and-stablecoins/?sh=2a0932d2492f>
30. Blockchain Economics and Financial Market Innovation Contributions to Economics, 2019 DOI:10.1007/978-3-030-25275-5_2
31. Portfolio optimization in the era of digital financialization using cryptocurrencies Technological Forecasting and Social Change, 2020, DOI: 10.1016/j.techfore.2020.120265
32. Buterin, Vitalik and Hitzig, Zoë and Weyl, Eric Glen, Liberal Radicalism: A Flexible Design For Philanthropic Matching Funds (December 2018). Available at SSRN: https://ssrn.com/abstract=3243656 or http://dx.doi.org/10.2139/ssrn.3243656
33. S. Singh and N. Singh, "Blockchain: Future of financial and cyber security," 2016 2nd International Conference on Contemporary Computing and Informatics (IC3I), 2016, pp. 463-467, doi: 10.1109/IC3I.2016.7918009.
34. Reuters, Islamic Finance Development Report, 2018, <https://ceif.iba.edu.pk/pdf/Reuters-Islamic-finance-development-report2018.pdf>
35. S. Ghimire and H. Selvaraj, "A Survey on Bitcoin Cryptocurrency and its Mining," 2018 26th International Conference on Systems Engineering (ICSEng), 2018, pp. 1-6, doi: 10.1109/ICSENG.2018.8638208.
36. Kociemska, H. (2020), "Islamic finance merging public finance within public–private partnership", International Journal of Islamic and Middle Eastern Finance and Management,

Vol. 13 No. 4, pp. 579-592. https://doi.org/10.1108/IMEFM-01-2018-0022

37. M. Angelova, "Application of Blockchain Technology in the Cultural and Creative Industries," 2019 II International Conference on High Technology for Sustainable Development (HiTech), 2019, pp. 1-4, doi: 10.1109/HiTech48507.2019.9128267.
38. D. Das, "Toward Next Generation of Blockchain Using Improvized Bitcoin-NG," in IEEE Transactions on Computational Social Systems, vol. 8, no. 2, pp. 512-521, April 2021, doi: 10.1109/TCSS.2021.3049477.
39. Oyinloye, Damilare P., Je S. Teh, Norziana Jamil, and Moatsum Alawida. 2021. "Blockchain Consensus: An Overview of Alternative Protocols" Symmetry 13, no. 8: 1363. https://doi.org/10.3390/sym13081363