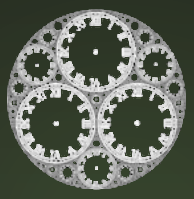

TIME

The Time Financial System

An Introduction To Time As A Currency

Powered by DEVINE GROUP

An Introduction To Time As A Currency

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An Introduction To Time As A Currency

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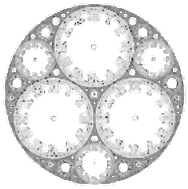


TIME

Abstract

We put forward a peer-to-peer time-based decentralised economic system, where we use time itself as a medium of exchange and reserve currency. This paper showcases the pioneering thoughts and stages that could facilitate a time-based shift of our current ideological opinions on economic theory, proposing the idea of a smart contract system engineered upon Ethereum blockchain infrastructure. Our findings hope to illuminate the implications and advantages of adopting a time-based economic system, including ideological changes towards time as a digital commodity. Our efforts are to improve the efficiency of global financial systems, and sovereignty for all participants involved in this system.

Time definition: the measured or measurable period during which an action, process, or condition exists or continues.

Programmable Financial systems | The Evolution Of Monetary Value

In recent years, the global economy has experienced a significant transformation in the way currencies are understood and valued. Traditional fiat currencies, particularly the US dollar, have been the cornerstone of international trade and economic policy for decades. However, these currencies are not without their challenges (Modern Money Mechanics Federal Reserve Bank Of Chicago). The system design of fiat currencies have many inherent flaws, For instance inflation and endogenous collateral backing, which can erode purchasing power over time. Historical data shows that since the end of the Bretton Woods system in 1971, the US dollar has lost over 80% of its purchasing power due to cumulative inflation.

Additionally, fiat currencies are vulnerable to manipulation through discretionary monetary policies implemented by central banks. This centralization of control introduces risks, such as those seen during the 2008 financial crisis when central banks employed unconventional measures like quantitative easing. While these actions were intended to stabilize economies, they also increased the money supply, contributing to asset bubbles and long-term inflationary pressures.

Geopolitical dynamics further exacerbate these vulnerabilities. For example, sanctions, trade wars, and diplomatic conflicts can undermine the stability and globalization of fiat currencies. The recent shifts in global power dynamics, such as the rise of China and the increasing use of currencies like the yuan in international trade, challenge the dominance of the US dollar and create uncertainties in global currency markets.

In response to these challenges, programmable money has emerged as a transformative innovation in modern economics. (Ethereum: A Next-Generation Smart Contract and Decentralized Application Platform. By Vitalik Buterin (2014)) This concept involves the integration of digital currencies within smart contracts, self-executing agreements that incorporate turing complete (on computable numbers with an application to the entscheidungsproblem. By A.M Turing 1936.) programming logic to automatically enforce the terms of a contract. These smart contracts can define and regulate the rules, conditions, and policies governing an economic system, making financial processes more efficient, transparent, and secure.

Programmable money can automate complex financial transactions, reduce the need for intermediaries, and provide immutable records that enhance transparency and trust. The effectiveness of programmable money, however, hinges on the architecture and engineering of the underlying smart contracts. Flaws in the code or vulnerabilities in a blockchain can lead to significant financial losses, as seen in high-profile cases like the 2016 DAO hack, where an exploit in a smart contract led to the loss of millions of dollars worth of Ethereum.

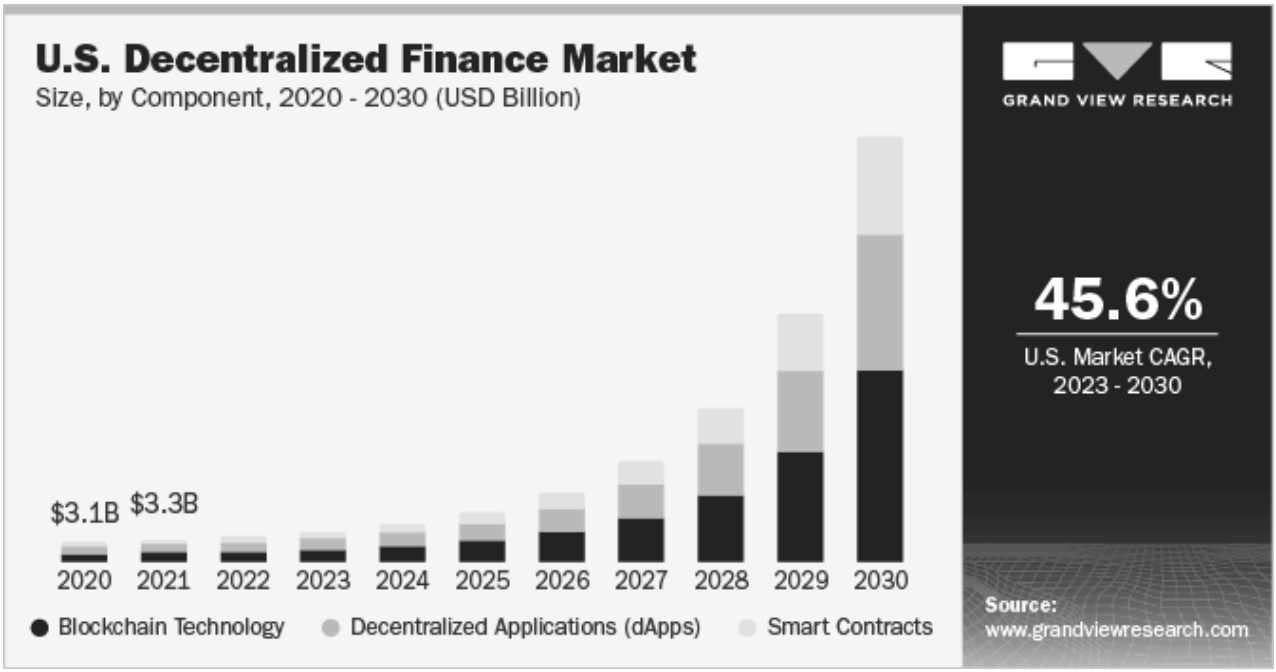
The adoption of programmable money also depends on its ability to address economic challenges more effectively than traditional approaches. When a smart contract is deployed on a public blockchain, its success and adoption rely on whether participants believe it offers superior solutions. For example, decentralized finance (DeFi) platforms have gained traction because they offer alternatives to traditional banking by providing services like lending and borrowing without the need for central authorities.

In parallel, central banks and governing bodies have proposed their versions of programmable money, often referred to as central bank digital currencies (CBDCs). These digital currencies, backed by the full faith and credit of the issuing government, incorporate programmable features that allow for automated enforcement of monetary and fiscal policies.

The Bank for International Settlements (BIS) and several central banks have explored CBDCs as a way to enhance the efficiency of payment systems and maintain governance over the monetary system in the digital age.

However, while programmable money and blockchain technology have shown great potential, they are still in their early stages of development. The field of economics is only beginning to explore the full implications of these technologies. As research and development continues, significant advancements and innovations are expected, which could further reshape the landscape of global finance in the coming years. As with any emerging technology, the long-term impact of programmable money will depend on ongoing experimentation, regulation, and adaptation to the complexities of the global economy.

Projected Growth of the U.S. Decentralized Finance Market (2020-2030)



Bitcoin has pioneered this movement and can objectively be seen as stored electricity, as mining it requires significant computational power, which in turn consumes a large amount of electricity. (Bitcoin: A Peer-to-Peer Electronic Cash System) This concept has inspired the idea of embedding the natural universal constant, time, into an economic system of smart contracts. These smart contracts regulate, conduct algorithmic policies, and issue a digital currency that has an intrinsic backing and store of value based on Unix epoch time as a fundamental economic unit of account.

We will now take a first principles and quantitative approach to analyse economic models used in governing the fiat currency financial system compared to the theorised time smart contract system. Our goal is to quantify clear progressive steps that will lead to the discovery of new economic laws. Let's begin with some basic data to facilitate this analysis.

Taking an objective view of the current federal reserve system in DeFi Related Terms

The U.S. dollar has value because a centralized institution, the Federal Reserve, claims it does. The Board of Governors of the Federal Reserve System consists of seven members who are nominated by the President and confirmed by the Senate. This small group of decision-makers stands in contrast to decentralized autonomous organizations (DAOs), which allow all participants in an economic process to have voting rights in policymaking and other important aspects of running a complex network like a financial system.

The U.S. dollar is not backed by a physical commodity like gold. In DeFi terms, this would be known as endogenous collateral backing, where a protocol's intrinsic assets back other assets within the protocol. This concept contributed to the collapse of Terra Luna, highlighting the risks associated with such systems. The Federal Reserve aims to maintain an average inflation rate of around 2% per year, as measured by the Consumer Price Index (CPI).

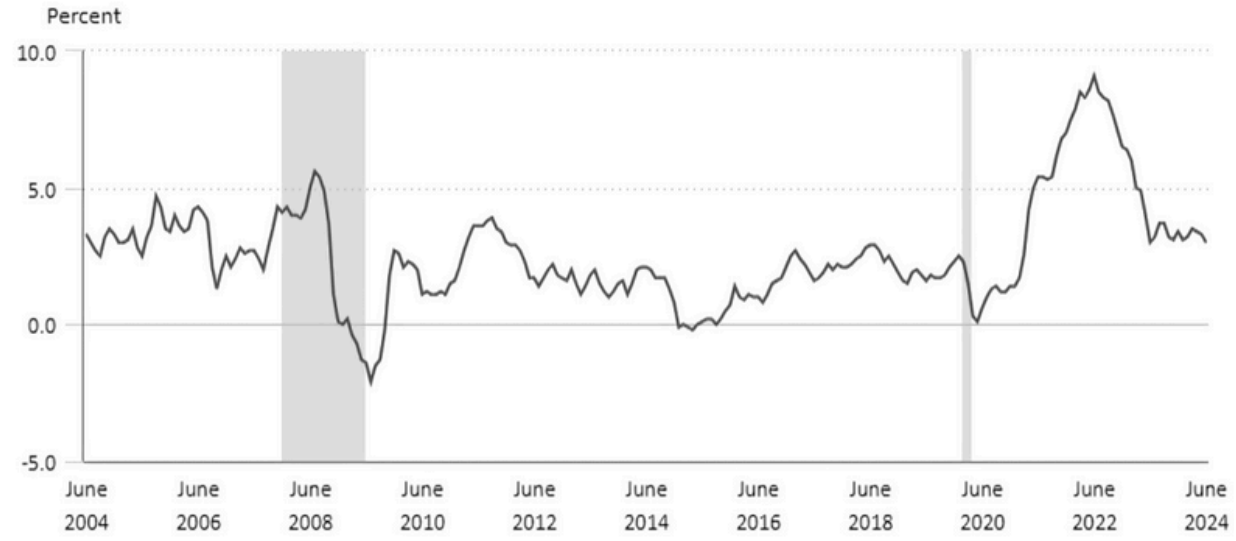
In DeFi terms, think of this as a stablecoin protocol's stability mechanism (The Maker Protocol: MakerDAO's Multi-Collateral Dai (MCD) System 2014), where the target inflation rate (around 2%) serves as a way to maintain a stable value, similar to a stablecoin's collateralization goal. The objective is to keep the value of the U.S. dollar relatively stable, ensuring predictable purchasing power.

When the U.S. government needs money or seeks to maintain economic stability, it doesn't simply print more currency. Instead, it issues debt, which can be seen as the collateral backing the U.S. dollar. This debt takes the form of U.S. Treasury bonds, bills, and notes (collectively known as T-bills).

T-bills, or U.S. Treasury bonds, bills, and notes, are analogous to endogenous collateral in DeFi, regardless of future cash flows that taxes may provide. In decentralized finance, endogenous collateral refers to assets within the same system backing other assets.

Similarly, T-bills support the U.S. dollar's value through government-issued debt, just as a DeFi token's value is backed by assets within its protocol. This approach is similar to the mechanism used by Terra Luna, where its stablecoin was backed by assets within the same ecosystem. However, Terra Luna's collapse highlighted the risks of relying solely on endogenous collateral, as the value of the entire system can become unstable if the internal assets lose value, causing a chain reaction that undermines the currency's stability.

Chart Of CPI, The U.S Dollars DeFi Equivalent Stability Mechanism



Hover over chart to view data.
Note: Shaded area represents recession, as determined by the National Bureau of Economic Research.
Source: U.S. Bureau of Labor Statistics.

As you can infer from the above CPI graph, the US dollar depegs from its 2% target rate undermining it's stability and value.

The Role of U.S. Treasury Bills as a Stability Mechanism for the Fiat System

U.S. Treasury bills (T-bills), along with other Treasury securities like notes and bonds, play a crucial role in maintaining the stability and integrity of the fiat system, particularly the U.S. dollar. These instruments are integral to the financial ecosystem and serve multiple functions that collectively reinforce the stability of the dollar.

Collateral for Monetary Supply

When the U.S. government needs to raise funds, it doesn't simply print more money; instead, it issues Treasury securities. These securities, are sold to investors. The proceeds from these sales provide the government with the necessary funds for its operations and obligations. This approach ensures that the money entering circulation is backed by a 'tangible financial instrument', which in the past, investors have had confidence in.

In DeFi terms, T-bills act similarly to endogenous collateral within a protocol. They back the value of the U.S. dollar by representing a claim on the government's future revenue, primarily through taxes. This creates a stable foundation for the fiat currency, reducing the risk of inflationary pressures that would arise from 'unbacked money printing'.

What is dollar debasement?

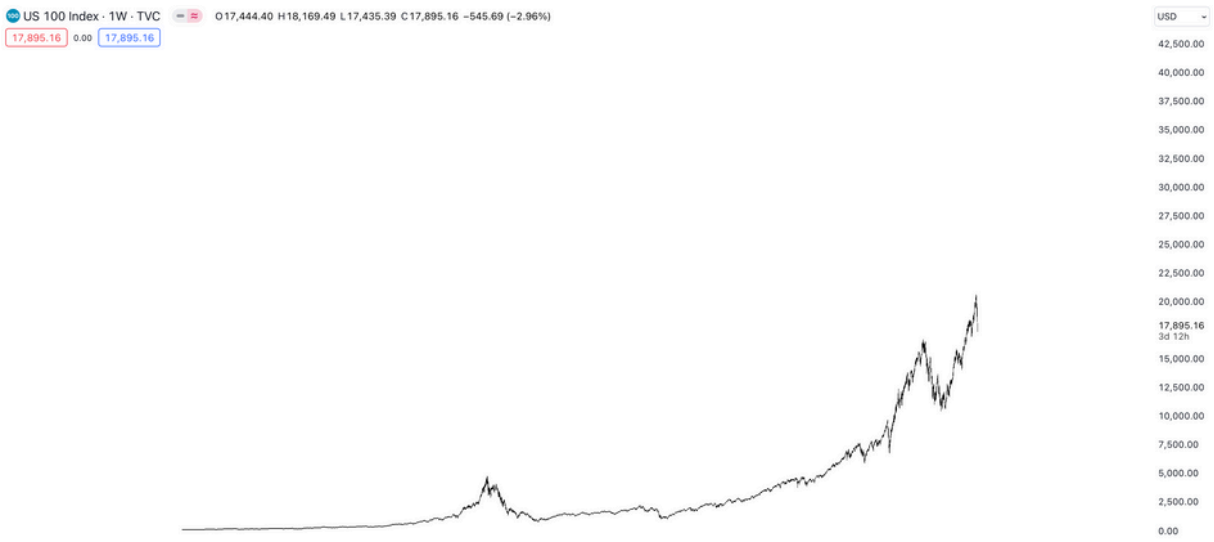
Dollar debasement refers to the decline in the value of the U.S. dollar relative to other currencies and assets, often caused by excessive monetary supply or inflationary policies. This process reduces the purchasing power of the dollar, making goods and services more expensive over time.

As traditional fiat currencies like the dollar lose value, investors and consumers often seek refuge in alternative assets that promise higher returns or more stability. In recent years, much of this value has been channelling into technology sectors, including cryptocurrencies, tech stocks, and innovative start-ups.

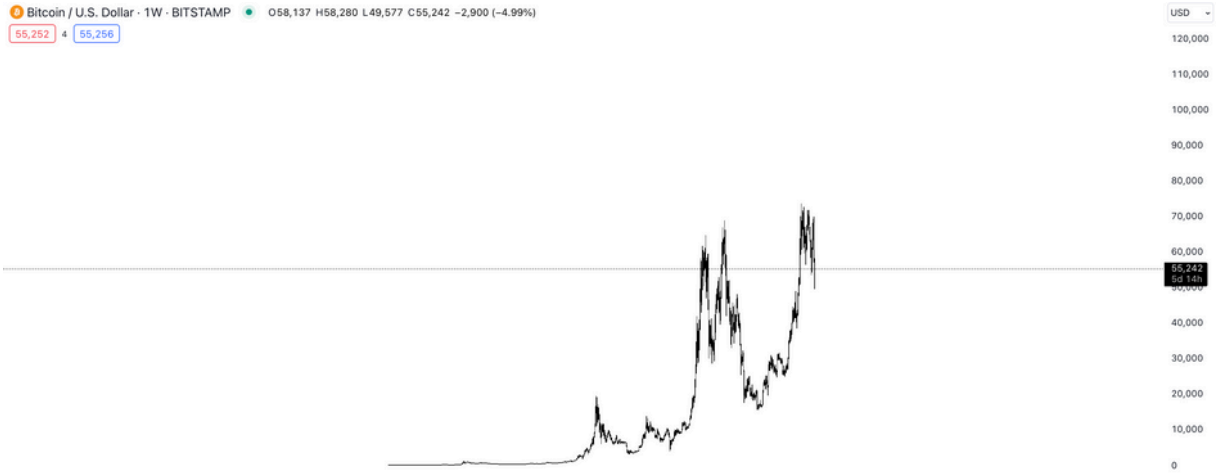
These areas are perceived as high-growth opportunities and offer potential hedges against inflation. The influx of capital into technology signifies a shift in investment strategies, as people look for assets that can outpace the depreciating dollar and provide better long-term value.

The annualised returns of the Nasdaq and cryptocurrency sector is clear evidence of dollar debasement.

NASDAQ/USD



BTC/USD



Have you noticed the elephant in the room yet?

Beyond all of the financial jargon, policies and economic models, what is the value backing the entire fiat financial system?

You could argue that the military is it's backing, yet most of the intellectual property within the defence sector is privately owned. Maybe it's the confidence of the nation or the information asymmetry across participants, we can discuss all day the philosophies behind this intrinsic value but to our understanding thus far. The fiat currency system relies on human perception, often informed by limited knowledge, as its core operational mechanism.

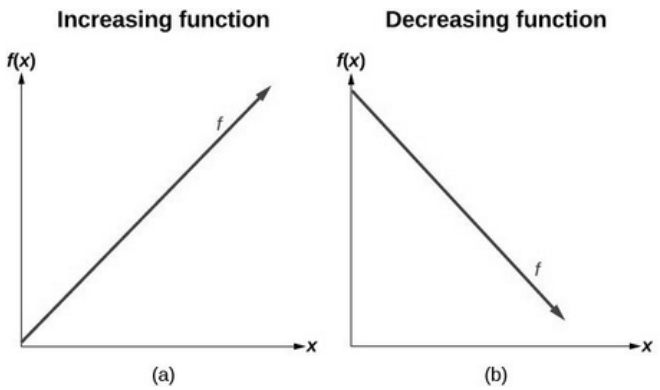
I believe that the U.S. Federal Reserve, the Bank for International Settlements, and central banks around the world have played a crucial role in providing us with a solid solution to an extremely complex problem over the last one hundred years. However, we also believe that all available information is at an equilibrium across all social classes, due to the technological advancement.

And this brings me on to the logic and reasoning behind investing my energy into the time system, we are assuming a long term reform on governance structures and traditional financial systems.

Time can be visualized and engineered as a linear function of value, either decreasing (ticking down) or increasing (ticking forward). This constant, predictable nature gives it a unique property in economics when compared to other forms of value. Unlike other assets, this linear relationship cannot be manipulated. It serves as either an inflationary or deflationary asset, depending on the architecture of the system.

Current unit of account systems like the dollar do not have any functions driving its value, it is based on arbitrary economic models prone to manipulation from a free form design (Keynesian or monetarist theories) with no substance that can be modelled to fit the actor issuing the currency, we see this often within token economics, an imperfect design in the modern era of programmable money.

We do not wish to impose a design that is not modular and decomposable; that is left to the participants. Our role is to build a foundation of the time system and propose and build ideologies that we believe will align with the consensus view.



Why Pursue Such Unconventional Economic ideology?

The Time system is a mission to reform current economic and monetary ideology through new unconventional yet inventive economic application. Unlike central banks and other DeFi primitives that build on auxiliary economic models, we aim to base our approach on natural laws and state-of-the-art advances in science and technology.

After studying Peter Thiel's work, an American entrepreneur, venture capitalist, and political activist. With an estimated net worth of $11.2 billion. A few major points on success have stuck with us and inspired the pursuit of this unconventional economic ideology:

Pursue Unique Ideas: Thiel emphasizes the importance of creating something new and avoiding competition by pursuing unique and groundbreaking ideas.

Long-Term Vision: He advocates for a long-term perspective, focusing on sustainability and lasting impact rather than short-term gains.

Monopolistic Advantage: Thiel argues that successful businesses achieve monopoly-like status by being the best at what they do, thus dominating their markets.

“We live in a world of conformist society and constrained imagination.”

“The most contrarian thing of all is not to oppose the crowd but to think for yourself.”

“If you want to create and capture lasting value, don’t build an undifferentiated commodity business.”

“The single most powerful pattern I have noticed is that successful people find value in unexpected places, and they do this by thinking about business from first principles instead of formulas.”

And then the work of George Soros' theory of reflexivity that wasn't widely accepted for several reasons:

Complexity and Abstract Nature: Reflexivity, which posits that market participants' biases and perceptions can influence market fundamentals, is complex and abstract. It challenges the traditional, more straightforward economic models that assume markets are efficient and self-correcting.

Difficult to Quantify: Reflexivity is challenging to model mathematically and empirically. Traditional economists prefer theories that can be tested and quantified with clear, predictive outcomes, which reflexivity lacks.

Reputation and Perception: Soros is a controversial figure due to his political activism and high-profile financial activities. This controversy can overshadow his academic contributions, leading some to dismiss his theories outright.

Resistance to Change: Academic and professional circles can be resistant to new ideas that disrupt established norms. Reflexivity requires a paradigm shift in how markets and economic behaviors are understood, which can be met with skepticism and resistance.

From synthesizing our academic research of quantitative finance and economics thus far, I can say with relative conviction that financial and economic laws are still very much in discovery and revolutionary ideas have yet to be theorized and manifested into future macroeconomic behaviour.

We predict a general reform of capitalism and monetary systems, as George Soros states, “A lot of the evil in the world is actually not intentional. A lot of people in the financial system did a lot of damage without intending to.”

Learning from past economic models and addressing some of the current inefficiencies within capitalism and utilizing the technological advancement of our financial system, we believe in a world where people will have little to no choice but to obey future economic laws as our systems will consist of near ‘perfect efficiency’ or at least possess orders of magnitude more efficiency than our current solutions.

The goal with Time is not to be a central component of the financial system but to contribute to the evolution of digital commodities and challenge traditional notions of value. Several inherent principles of time itself make it a relevant counterpart in universal commodity exchange, which we will dive deeper into over the next pages.

From other sub-disciplines we can see some form of loss or inefficiency is always present within sciences:

Thermodynamics: In thermodynamics, a system that converts all its input energy into useful work with no waste is said to have 100% thermal efficiency. However, due to the Second Law of Thermodynamics, achieving 100% efficiency is practically impossible in real-world systems.

Information Systems: In information theory, a communication system with no loss of data is described as having perfect information efficiency.

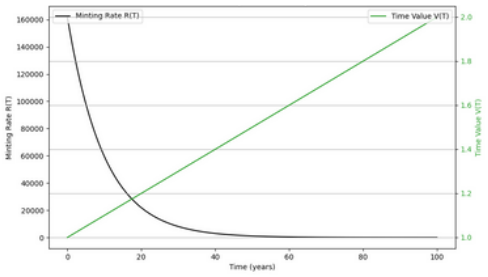
In the conclusion to pursuing such unconventional economic ideology, I believe that the time protocol will at worse provide an the institutional global reserve intrinsically backed asset of time and at best play a big role in the reform of fiat-like inefficient economic systems.

Quantitative relationships between time and the empirical econo-physics evidence.

We will now take a quantitative approach to analyse economic models used in governing the fiat currency financial system compared to the time protocols smart contract system. Our goal is to quantify clear progressive steps that will lead to the discovery of new economic laws. Let's begin with some basic data to facilitate this analysis.

Purchasing power of the dollar

Time as a reserve currency and store of value



Based on inflationary time value and deflationary token design

The concept of linear time is fundamental in many areas of science, philosophy, and everyday life. When we talk about time being "linear," we mean that it progresses in a straight line from the past through to the present and into the future.

The concept of linear time can create the proposition of stored value over time that can be systemized and modelled into a system of smart contracts.

Time is often referred to as the fourth dimension in the context of physics and our understanding of the universe. In classical mechanics, space is viewed as having three dimensions. Length, width, and height where physical objects exist and interact. However, with the advent of Einstein's theory of relativity, time was introduced as an equally essential dimension that intertwines with space to form what is known as spacetime.

In this framework, time is not separate from the spatial dimensions but is intrinsically linked to them, creating a four-dimensional continuum where events occur in both space and time. This concept has revolutionized our understanding of the motions of gravity, and the nature of our universe, as it recognizes time as a measurable, directional flow that impacts all matter and energy in the cosmos.

Science itself has progressed much further than economics and our line of thinking is how can we effectively model these finding within the study of economics to promote efficiency, demand and equilibrium across participants in a social system.

Axioms Of Time:

- Continuity: Time flows uninterrupted and sequentially, with each moment seamlessly following the next.
- Irreversibility: Time moves in one direction—once a moment passes, it cannot be revisited or undone, promoting immutability.
- Relativity: Time is not absolute; it can be experienced differently depending on context, such as speed or environment.
- Interconnection with Space: Time and space are intertwined, forming a unified structure where events happen in both dimensions.
- Scarcity: Time is finite and non-renewable, making it one of the most limited resources available.

Beneficial Economic Properties Of A Time-Backed Digital Currency:

Immutable Nature of Time:

- Constancy: Time is often viewed as a universal constant that progresses in a linear fashion, unaffected by external influences. This constancy provides a reliable mechanism that can be modelled within an economic system through modular engineering of time as a scarce resource relating to how we perceive our time outside of economic theory.
- Immutability: Time flows in one direction, from the past through the present to the future. This unidirectional nature is fundamental to our understanding of cause and effect.
- Interconnection with Space: Time and space are not independent; they are intertwined. Events happen at specific times and places, forming a unified spacetime fabric.
- Scarcity: Time is finite for individuals and systems. There is only so much time available to allocate to different tasks, decisions, or processes.

Universality:

- Global Standard: Time is a universal measure that applies across the entire universe. Unlike other resources or currencies, time is not limited by geography or current economic boundaries.
- Equal Accessibility: Everyone experiences time in the same way, making it a universal constant that is inherently fair and accessible to all. Since time is a constant and universal measure, using it as a resource could promote fairness in transactions and value assignments.

Time as a Resource in an Economic System:

Storing Time:

- Conceptualizing Time Storage: Time could be conceptualized as a resource that individuals or entities can "store" or "reserve" for future use. This involves mechanisms within a digital ledger where time units are quantified, traded and recorded.

Using Time in Transactions:

- Time-Based Value Exchange: Economic transactions could be conducted based on units of time against other assets. For instance, services or goods might be priced in terms of how much time they represent or consume.

Turning Time Into A Quantifiable Asset: Unlike money or other material possessions, time cannot be replaced once it is gone. Every moment that passes is unique and cannot be recovered, making time a finite and invaluable resource. Time is directly tied to economic value even in established economic theory. In professional settings, time is often equated with money through wages, salaries, and productivity. Efficient use of time can lead to greater economic benefits and career advancement, using cutting edge technological solutions we can now quantify this as a digital asset.

Applying These Axioms to Economic Theory:

- Continuity in Markets: Just as time flows without interruption, economic systems should be understood as dynamic, continuous processes. Market conditions, pricing, and supply-demand factors are always in motion. This idea can help build more fluid, real-time economic models that respond to ongoing changes rather than static snapshots, ongoing research will take place regarding time based electronic market infrastructure.

- Irreversibility and Opportunity Cost: The concept of time's irreversibility aligns closely with opportunity cost in economics. Once a decision is made or resources are allocated, the potential for other opportunities is lost. Recognizing this can lead to better decision-making frameworks, encouraging long-term planning and efficient resource allocation.

- Relativity and Economic Perspectives: Time's relativity to speed may allow for advancements in econo-physics in the future to promote nonlinear modelling of time as a value.

- Scarcity and Value Creation: Time's scarcity reinforces its role as a valuable economic asset. In an economy, time is often monetized indirectly—through wages or services—but recognizing time as a core, limited resource could lead to innovations in how we assess value, particularly in the digital economy.

Application to a Digital Reserve Currency:

- We are architecting a digital reserve currency could be designed by taking into account these axioms of time. The currency will reflect the continuous flow of time intrinsically modelled and tied to economic value in real-time electronic markets within decentralized finance.

- The currency will embody the scarcity of time, reflecting its finite nature by being tied to economics, creating a new type of value and innovative economic commodity.

Incorporating the axioms of time into economic theory and a digital reserve currency could fundamentally transform how we view, store, and exchange value, aligning financial systems more closely with efficiency, energetic exchanges and the true dynamics of space and time.

At the core of the Time system is the Time Reserve, a digital unit of account mechanism that represents a quantifiable measure of time. Unlike traditional currencies that are subject to inflationary pressures and external market fluctuations, the time reserve offers stable and universal value directly tied to the immutable passage of time. This intrinsic stability makes them an ideal medium for trading real-time, whether it be for services, experiences, or goods.

The time-based economic system described offers a ground-breaking way to conceptualize and engage with economic transactions. By researching and developing the time financial system we open the door to a more equitable, balanced, and community-focused economy that recognizes time as the ultimate currency. This model not only has the potential to transform individual lives but also to reshape the broader economic landscape, making it more resilient, sustainable, and aligned with human values and needs.

By anchoring the economic value to time, this system introduces a universal measure of value that transcends traditional currency systems. This could lead to a more stable and efficient economic models, as the value of time is inherently less volatile than fiat currencies, which are subject to inflation, governmental policies, and market fluctuations. The time-based economy also fosters a sense of fairness and equity, as time is a universal resource that every individual possesses.

The ongoing research, development, and Time Protocol

The Time Protocol is actively researching and developing V1, aiming to reform current economic and capitalist ideologies through new unconventional economic discoveries. Unlike central banks and DeFi primitives that build on auxiliary models, we aim to base our approach on natural laws and state-of-the-art advances in science and technology.

This is a movement towards econo-physics developments in financial systems, monetary and economic theory.

“We live in a world of conformist society and constrained imagination.” - Peter Thiel

This paper constitutes an introductory remark surrounding the ongoing research and development of the Time Protocol.

The transition to a time-based economy holds the promise of a more stable and efficient system. By issuing and anchoring the value of currency to time, the Time Protocol manifests a way to innovate and mitigate the risks associated with fiat currencies as we research and engineer an economic system that promotes stability and efficiency through programmable money and a unit of account system of time.

This paper serves as an introduction to the concept of time as a currency, providing foundational insights rather than comprehensive empirical analyses, logical frameworks, or detailed system designs. Future publications will delve into the system's architecture and present quantitative models for effectively issuing this system to the public.

Current related developments nearing completion:

The Time Reserve Whitepaper and Smart Contract System (Daniel Campbell, Devine Group)

Algorithmic Policy Making and decomposable social ideologies (Daniel Campbell, Devine Group)

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Logic Set: Fiat Systems vs. Time-Based Systems

Claims

Sentence

Time can be modeled as a linear function of value, either decreasing (ticking down) or increasing (ticking forward). This linearity is immutable, making time unique as an economic asset.

Time-based currency eliminates the trust dependency of fiat systems and ensures predictable value.

Time is a universal constant that can modelled as a unit of account and provide innovation to economic systems.

Time is a base economic

Logic Set: Fiat Systems vs. Time-Based Systems

Formal Definitions

Set 1

Variable	Description

1. T(t):
2. The value of time at a specific moment t.
3. ΔT The change in time value over a given period.
4. Linear Function: A relationship of the form $T(t)=T0+r \cdot t$ where r is a constant rate of change.
5. Decreasing Function: $r<0$, representing time ticking down.
6. Increasing Function: $r>0$, representing time ticking forward.
7. Immutable Linearity: The property that time cannot deviate from its predetermined trajectory.

Axioms

Proofs

Proofs	Description
t0	This is the initial reference variable in time when the system is initiated, genesis.
V(t)	This is the value of the time calculated at time **V(t)**, based on the **G**.
T	A specific point in time.
Δt - t0	Difference between ***t0*** and elapsed time since system genesis.
v	VDF Time Signature.
u	Unix epoch time (chainlink oracle).
bt	Block.timestamp.
{*v, u, b* ∈ G}	Time pillar set.
TDT	The maximum allowable drift between all pillars, ensuring the system remains within an acceptable range of accuracy.
BT	Base Time, the finalized verified time result in the system.
Δv - {b, u}	Difference between VDF work and b, u.
R	VDF Reserve Ratio.
ph	ProofHash.
sub	Submitter address.

Axioms

Axioms	Description

- Continuity: Time flows without interruption or gaps. Formally, T(t)T(t)T(t) is continuous for all ttt.
- Predictability: The rate of change rrr is constant and known in advance.
- Non-Manipulability: Time cannot be accelerated, decelerated, or reversed arbitrarily.
- Scarcity: Time is finite for individuals and progresses uniformly.

The dollar's debasement is not merely a symptom of flawed monetary policies but a reflection of the deeper need for a more resilient and equitable reform of current economic ideology. By transitioning to a time-based currency, we can mitigate the adverse effects of currency debasement and build an economic model that values universal law as a medium of exchange. The Time Protocol represents not just an innovative concept but a necessary evolution in our approach to economic exchange, offering a vision for a future where the true value of time is recognized and revered in every transaction.

Unix Epoch Time: The Universal Constant

Unix epoch time, marking the number of seconds that have elapsed since January 1, 1970, at 00:00:00 UTC, serves as a universally consistent standard across computing systems. This simplicity and universality make it an ideal candidate for underpinning a new economic system. By leveraging a time-based unit of account rooted in Unix epoch time, the Time Protocol introduces a currency that is not only universally accessible but also immune to the inflationary and deflationary pressures that affect fiat currencies.

A Universal Measure of Value

Using Unix epoch time as a measure of value transcends geographical and economic boundaries, creating a universal currency that can facilitate transactions across different jurisdictions and financial systems without the need for conversion rates or concerns about exchange rate fluctuations. This universality simplifies international trade, reduces transaction costs, and enhances the efficiency of cross-border transactions.

Enhanced Transparency and Trust

The immutable nature of Unix epoch time, coupled with blockchain technology, provides a level of transparency that builds trust among participants in the economy. The incorruptible nature of blockchain driven time-based transactions eliminates the possibility of fraud and manipulation, fostering a more secure and reliable economic environment.

Equity and Accessibility

We will provide a way of valuing transactions and assets in terms of time by trading within the secondary markets. Time, unlike money, is a resource equally distributed among individuals, making it a fair and equitable measure of value. This shift encourages a reevaluation of how goods, services, and experiences are valued, leading to a more balanced distribution of economic resources and opportunities.

The adoption of Unix epoch time as a measure of value offers a visionary approach to economic transactions in the digital age. By grounding the economy in the universal and immutable metric of time, the Time Protocol proposes a more equitable, transparent, and efficient model for valuing goods, services, and human effort. The concept of time as currency invites us to reimagine the foundations of economic exchange and opens the door to a future where the true value of time is recognized and revered.

Transacting with Time

In an era where the essence of value is continuously evolving, This concept after further research could transcends traditional monetary systems, presenting an innovative model where time itself becomes the currency of exchange. As we delve into this transformative approach, it's essential to understand the mechanics, implications, and potential of transacting with time, especially within the framework of the Time Protocol.

Transacting with time involves using units of time — rather than conventional currencies — as the medium of exchange for goods, services, and experiences. This system operates on the principle that time is a universal, inexhaustible resource, equally available to all individuals. Time-based transactions are facilitated through the Time Protocol acting as a decentralized central banking system, where the protocol adopts economic models and unit of account measures to represent specific units of time as the currency.

We envision this as a financial system and currency of the future, a digital asset that represents quantifiable measures of time.

Similar to how debt is the underlying asset that backs the u.s dollar and many fiat based derivatives.

Intrinsic Unix Epoch Time and the time reserve digital asset backs the time based derivatives, where we have decomposable ideologies, policy making to fit the needs of the economy.

The Time Reserve asset has a limited supply with the time reserve inflationary time aspect to it.

People can then tokenize their time with the time token standard which creates derivative time modules within the reserve.

Policy making for economic stability happens and is conducted through the derivative time modules.

Algorithmic Fiscal Policies for a time economy

T: Total supply of time in system
N: Number of participants
B_i: Balance of tokens for participant i
G: Gini index of the time distribution among participants
τ: Total tax collected
R: Redistribution threshold (Gini index value triggering systematic redistribution)
α: Progressive tax rate based on balance
T_L: Threshold below which participants receive additional support
UBI: Universal Basic Income amount for participants below T_L

Conceptualizing Time Based Economic Models:

Gini Index Calculation:

- $G = \Sigma|B_i - B_j| / (2 * N * \Sigma(B_i))$
    - Sum of absolute differences between all pairs of participants' balances.

Taxation Mechanism:

- Define a progressive tax rate function $\alpha(B_i)$ such that:
    - $\alpha(B_i) = 0.1$ if $B_i > 1000$
    - $\alpha(B_i) = 0.05$ if $B_i > 500$
    - $\alpha(B_i) = 0.02$ if $B_i \leq 500$
- Tax collected from participant i is:
    - $\tau_i = \alpha(B_i) * B_i$
- Update participant's balance and total tax collected:
    - $B_i = B_i - \tau_i$
    - $\tau = \tau + \tau_i$
    -

Redistribution Mechanism:

Trigger Redistribution:

- When G exceeds R, trigger redistribution of τ.

Conditional Redistribution:

- Determine the set of participants below threshold T_L.
- Let L be the set of participants with $B_i \leq T_L$.
- Universal Basic Income (UBI) is calculated as:
    - $UBI = \tau / |L|$
    - where $|L|$ is the number of participants in L.
- Redistribute tokens:
    - For each participant i:
        - If $B_i \leq T_L$, increase balance by UBI: $B_i' = B_i + UBI$
        - Otherwise, redistribute remaining tokens equally: $B_i' = B_i + (\tau - \Sigma(UBI \text{ for each } i \text{ in } L)) / (N - |L|)$
- Reset total tax collected:
    - $\tau = 0$

Two economic systems, A token System and A Time System

Time Policy Model

Key Components

1. Time as Currency
 - Time Units (T): Primary currency (In Seconds).
 - Deflationary Mechanism: Time units decrease over time. (System timer ticks backwards)

2. Economic Agents
 - Individuals (I): Consumers and workers.
 - Businesses (B): Producers of goods/services.
 - Government (G): Adjusts time units to stabilize the economy.

3. Economic Indicators
 - GDP (Y): Total output in time units.
 - Inflation/Deflation Rate (π): Change in the value of time units.
 - Unemployment Rate (U): Percentage of unemployed labor force.

4. Time Injection Mechanism
 - Injection Function (I(T)): Amount of time units injected based on macroeconomic conditions.

Quantitative Model

1. Deflationary Mechanism
 - Rate of Change of Time Units:

dT/dt = -alpha * T

 where alpha > 0 is the deflationary rate.

 where:
 - alpha: Deflationary rate (per second)
 - T: Time units (in seconds)

2. Production Function
 - Cobb-Douglas Production Function:

Y = A * T_L^beta * K^gamma

 where:
 - Y: Output in time units.
 - A: Total factor productivity.
 - T_L: Total labor in time units.
 - K: Capital.
 - beta, gamma: Output elasticities of labor and capital.

3. Time Injection Function
 - Injection Function:

I(T) = lambda * (Y - Y_bar) + mu * (U - U_bar)

 where:
 - lambda, mu: Policy parameters.
 - Y_bar: Target GDP.
 - U_bar: Target unemployment rate.

Price Level and Inflation/Deflation

- Price Level:

$$P = T / M$$

where M is the money supply in time units.

- Inflation/Deflation Rate:

$$\pi = (dP/dt) / P$$

5. Labor Market Dynamics
- Wage Rate:

$$W = \partial Y / \partial T_L$$

Example Parameters and Initial Conditions

- Deflationary Rate: $\alpha = 0.01$
- Total Factor Productivity: $A = 1$
- Output Elasticities: $\beta = 0.7$, $\gamma = 0.3$
- Policy Parameters: $\lambda = 0.5$, $\mu = 0.5$
- Initial Time Units: $T_0 = 1000$
- Initial Labor and Capital: $T_{L0} = 500$, $K_0 = 500$

Stability Mechanisms

- Deflationary Rate Control: Manages the overall value of time units.
- Government Intervention: Adjusts the time supply based on deviations from target GDP and unemployment.
- Production Function: Predicts output based on labor and capital inputs.
- Price Level Monitoring: Ensures stability in the value of time units.
- Wage Adjustment: Aligns wages with productivity.

Enhanced Transparency and Trust

The immutable nature of Unix epoch time, coupled with blockchain technology, ensures that each transaction is timestamped in a manner that is tamper-proof and transparent. This level of transparency builds trust among participants in the digital economy, as every transaction can be verified against a universally recognized standard of time. Furthermore, the incorruptible nature of time-based transactions eliminates the possibility of fraud and manipulation, fostering a more secure and reliable economic environment.

Equity and Accessibility

By valuing transactions and assets in terms of time, the Devine Time system democratizes access to the economy. Time, unlike money, is a resource equally distributed among individuals, making it a fair and equitable measure of value. This shift encourages a reevaluation of how goods, services, and experiences are valued, potentially leading to a more balanced distribution of economic resources and opportunities.

The adoption of Unix epoch time as a measure of value offers a visionary approach to economic transactions in the digital age. By grounding the digital economy in the universal and immutable metric of time, the Devine Time system proposes a more equitable, transparent, and efficient model for valuing goods, services, and human effort. As we continue to explore the potential of blockchain and other digital technologies, the concept of time as currency invites us to reimagine the foundations of economic exchange and opens the door to a future where the true value of time is recognized and revered.

Transacting with Time

In an era where the essence of value is continuously evolving, the notion of transacting with time stands as a groundbreaking paradigm shift. This concept transcends traditional monetary systems, presenting an innovative model where time itself becomes the currency of exchange. As we delve into this transformative approach, it's essential to understand the mechanics, implications, and potential of transacting with time, especially within the framework of the Time Protocol.

The Mechanics of Time Transactions

Transacting with time involves using units of time — rather than conventional currencies — as the medium of exchange for goods, services, and experiences. This system operates on the principle that time is a universal, inexhaustible resource, equally available to all individuals. Time-based transactions are facilitated through digital platforms and blockchain technology, where time tokens represent specific units of time and serve as the currency.

Time Tokens: The Currency of the Future

Time Tokens: The Currency of the Future, time tokens are digital assets that represent quantifiable measures of time. These tokens are created, distributed, and managed on a blockchain, ensuring transparency, security, and immutability. Each token corresponds to a predetermined unit of time, such as an hour or a minute, allowing for precise valuation of transactions.

Transactions in the Devine Time system are conducted with Time Tokens, enabling users to trade goods, services, and experiences based on their time value. This introduces a new dimension of economic interaction where the focus shifts from monetary wealth to time wealth. For instance, services rendered or goods provided are compensated with tokens that represent a quantifiable amount of time, reflecting their true value in the most universal currency available.

The Process of Transacting in Time

Transacting with time begins with the assignment of a time value to goods, services, or experiences. This value is determined based on various factors, including the amount of time taken to produce a good or deliver a service, and the perceived value of an experience. Participants in the time-based economy can then exchange time tokens that correspond to these time values, facilitating a direct and equitable trade of value.

Creating a Balanced Exchange

The Devine Time system ensures a balanced exchange by employing a dynamic and adaptive framework that accounts for the varying perceptions and valuations of time across different contexts and individuals. This adaptability allows for fair and equitable transactions, where the value exchanged reflects the true cost and worth of the goods, services, or experiences involved.

Advantages of Transacting with Time

Equity and Accessibility

One of the most significant advantages of transacting with time is the promotion of equity and accessibility. Since time is a resource that everyone possesses equally, a time-based economy enables a more equitable distribution of wealth and opportunities. It democratizes economic participation, allowing individuals to contribute and benefit based on the time they can offer, rather than their financial status.

Sustainability and Mindfulness

Transacting with time encourages sustainability and mindfulness in consumption and production. By valuing goods and services in terms of time, it prompts individuals and organizations to consider the true cost of their activities, leading to more sustainable choices. This mindfulness fosters a culture of responsible consumption, where the environmental and social impacts of transactions are taken into account.

Fostering Community and Collaboration

A time-based economy has the potential to strengthen community bonds and encourage collaboration. It emphasizes the value of collective effort and shared experiences, facilitating exchanges that are not just transactional but also relational. By focusing on time rather than monetary gain, individuals are incentivized to support one another, share skills, and build stronger communities.

The Historical Context of Mathematization in Social and Economic Sciences

The mathematization of social and economic science has roots that extend back to the 17th century, with significant advances occurring in the 19th and 20th centuries. Today, mathematics is integral to much of the research in these fields, shaping how theories are formulated, tested, and applied. However, despite these advancements, the progress in social and economic sciences has not mirrored the leaps seen in physics. While physics has achieved a high degree of precision and predictive power through mathematical modeling, the complexities of human behavior and social systems present challenges that have limited the ability of economics and other social sciences to attain the same level of rigor and empirical success. This disparity raises important questions about the inherent differences between these fields and the potential for further development in the mathematization of social sciences.

The study of social economics dates back to the 17th century, where early thinkers like William Petty began applying quantitative methods to economic issues, laying the groundwork for what would eventually become the field of political arithmetic. Over the centuries, especially during the 19th and 20th centuries, the mathematization of social and economic sciences advanced significantly with contributions from scholars like Vilfredo Pareto and Paul Samuelson, who introduced formal mathematical models to analyze economic behavior. The late 20th century saw the rise of computational advancements, enabling more sophisticated modeling of social and economic systems. Today, with the advent of big data, machine learning, and blockchain technology, computational tools have further expanded the possibilities in this field, allowing for real-time analysis, hypothesis testing, and the modeling of complex social interactions, pushing the boundaries of what is possible in social economics.

Blockchain as a Tool for Advancing Social and Economic Sciences

Blockchain technology introduces a novel approach to addressing some of the challenges that have historically hindered the mathematization of social and economic sciences. One of the most promising applications of blockchain is in its ability to facilitate complex, multi-party interactions and transparently record them, which is essential for modeling the complexities of human behavior and social systems.

Real-Time Hypothesis Testing and Data Collection

Blockchain-based systems can be used to test hypotheses in real-time, allowing researchers to observe how participants respond to different incentives and governance structures. This capability enables a level of empirical testing and model validation that was previously difficult to achieve in social sciences due to the complexity and variability of human behavior.

Enhancing Data Integrity and Enabling New Economic Models

The secure and decentralized nature of blockchain ensures data integrity, which is crucial for the accuracy of economic and social models. Additionally, blockchain enables the creation of new economic models and systems, such as decentralized finance (DeFi) and token economies. These innovations offer fresh opportunities for experimentation, pushing the boundaries of what is possible in the study of economics and social behavior.

Bridging the Gap Between Social Sciences and Physics

While social and economic sciences have not yet reached the same level of mathematical rigor as physics, the advent of blockchain technology presents a promising avenue for innovation. By enhancing data integrity, enabling new economic models, and offering tools to better understand complex human behaviors, blockchain is helping to bridge the gap between the social sciences and the mathematical precision seen in fields like physics. This technological advancement opens the door to a new era of scientific exploration and discovery in social and economic sciences.

Proof Of Time Mechanism

In the realm of digital currencies, the creation and distribution of tokens are pivotal processes that define the economics of a cryptocurrency system. The Time Token introduces an innovative approach to token minting, governed by principles of mathematical beauty and sustainability. Inspired by the Golden Ratio, the system is designed to ensure a harmonious balance between token availability and long-term value when compared to other units of account i.e the dollar. This outlines the core mathematical concepts of the Time Token's economic process, the exponential decay of the minting rate, and the elegantly designed total supply curve, ensuring the system's integrity and value for a millennium (1000 years)

The Time Token system initiates with a pre-defined set of parameters that dictate the generation and distribution of tokens. The essence of this system lies in its ability to mint tokens at a rate that decays over time, adhering to a mathematical formula inspired by natural processes. This method not only secures a steady, predictable supply but also embeds a time value adjustment mechanism to refine the token's intrinsic worth as a time based unit of account.

Core Parameters Of The Proof Of Time Mechanism

- **Start Time (T0):** The inception of the token minting process.
- **Initial Mint Rate (R0):** 161800.93 tokens/year, the rate at which tokens are initially minted.
- **Total Supply Cap (SC):** 1,618,033 tokens, a nod to the Golden Ratio, representing the maximum supply.
- **Decay Rate (λ):** 0.099994, determining the rate of exponential decay in minting.
- **System Completion (S):** Minting concludes 100 years post-genesis, ceasing token production.

Exponential Decay and Minting Rate

The minting rate of tokens decreases over time following an exponential decay model. This ensures that the supply gradually approaches the cap, preventing over-minting and preserving value. The rate at time T is given by:

R(T) = R0 * e^(-λ * T)

Where:

- **R(T) is the minting rate at time T.**
- **R0 is the initial minting rate.**
- **λ is the decay rate.**
- **T is the time since the start, in years.**
- **e is the base of the natural logarithm.**

Total Supply Calculation

The total supply of tokens is a function of the integral of the minting rate over time, from the start of the system to its completion. Mathematically, it is expressed as:

S = ∫ from 0 to 1000 of (R0 * e^(-λ * T) * dT)

Given that the total supply integral (SCi) equals 1,618,032.9999999998, it aligns closely with the predetermined supply cap (SC), illustrating the system's precision in regulating token supply.

Time Value Adjustment

To enhance the time value of the Time Token and ensure its attractiveness and fairness for early and later adopters alike, a Time Value Adjustment (V(T)) is implemented. It is formulated as:

V(T) = V0 + k * T

Where **V0** is the base time value, **k** is a constant that moderates the rate of time value increase, and **T** is the elapsed time since T0. This adjustment factor adds an additional layer of value to the tokens over time, rewarding stakeholders throughout the system's lifespan.

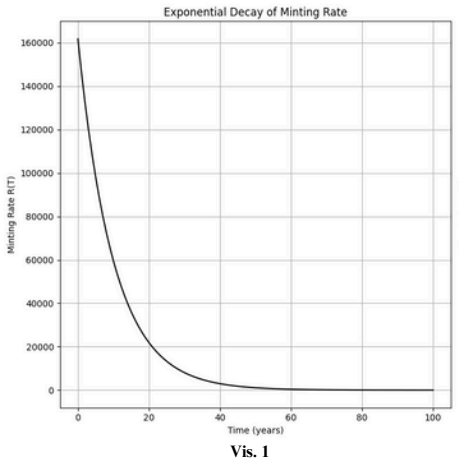
The Time Token system presents a forward-thinking approach to token minting and supply management. By harnessing the principles of exponential decay and integrating a time value adjustment, the system ensures a balanced, sustainable economy. Designed to last a millennium, the Time Token stands as a testament to the power of combining mathematical principles with digital asset innovation.

TLDR

Variables:
Start Time (T0): Genesis.
Initial Mint Rate (R0): 161800.93
Decay Rate (lambda): 0.099994
Time Since Start (T): Measured in years.
Total Supply Cap (SC): 1,618,033
Total Supply Integral (SCi): 1618032.880376517
16239800558
Time Value Adjustment (V(T)): V(T) = V0 + k * T
Unit Of Time (K)
System Complete (S): Stops at 100 years.
Base time value(V0)

Equations:
Initial Mint Rate (R0): 161800.93
Decay Rate (lambda): 0.099994
Exponential Decay: R(T) = R0 * e^(-lambda * T)
Total Supply Calculation: S = Integral from 0 to 1000 of (R0 * e^(-lambda * T) * dt)
Time Value Adjustment: V(T) = V0 + k * T

The system's adherence to exponential decay in minting rates, combined with a precise total supply calculation and time value adjustment, solidifies its foundation for enduring time as value over its 100 - year lifespan.



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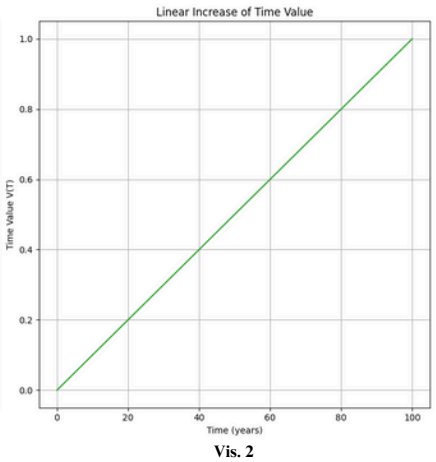

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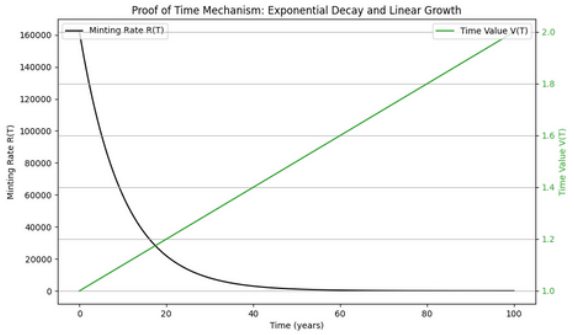

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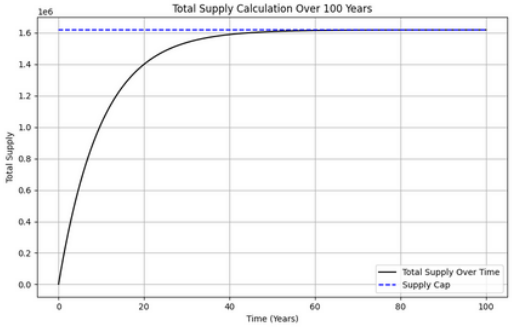

Vis. 4

balance between the inherent limitations of the blockchain and the need for precise time management

Given a target event supposed to happen at a specific time T, and a tolerance period P (in seconds), the validity of an action at the current block timestamp C can be checked using the following condition:
$Tlower = T - P$
$Tupper = T + P$

T lower ≤C≤ T upper

Launch the system and then add the time values for accuracy

Dynamic Adjustment Mechanism (DAM):

1. Establish a Reference Time: Use a combination of block timestamps and, optionally, external oracle time data as reference points for "true" time.
2. Monitor and Record Discrepancies: Regularly compare the blockchain time (block timestamps) with the reference time to identify discrepancies.
3. Calculate Adjustment Factors: Based on observed discrepancies, calculate adjustment factors to align the system's internal time representation with the reference time. This could involve simple correction factors or more complex algorithms depending on the pattern of discrepancies.
4. Apply Adjustments: Apply these adjustment factors to time-based values or operations within your system. This can be done in real-time or through periodic updates, depending on your system's design and requirements.
5. Feedback Loop: Continuously monitor the effectiveness of applied adjustments and refine the DAM based on ongoing observations and system performance.

Formula Example:
SupposeTblock is the current block timestamp, and Treference is the reference time. The adjustment factor A could be calculated as:
A=kTreference−Tblock
Where k is a constant defining the sensitivity of the adjustment. The adjusted time Tadjusted could then be:
Tadjusted=Tblock+A
This formula is a basic example. The actual implementation should be tailored to the specific patterns of time discrepancies observed and the precision requirements of your system.

Genesis time
time elapsed
tokens

At the core of this system is the Time Token, a digital asset that represents a quantifiable measure of time. Unlike traditional currencies that are subject to inflationary pressures and external market fluctuations, Time Tokens offer a stable and universal value directly tied to the immutable passage of time. This intrinsic stability makes them an ideal medium for trading real-time, whether it be for services, experiences, or goods.

Impact on Work and Life Balance
The adoption of time as a currency has profound implications for work-life balance. By quantifying and trading time directly, individuals gain a tangible sense of the value of their personal and professional time. This awareness can lead to more mindful decisions about how time is spent, encouraging a balance that prioritizes well-being and personal fulfillment alongside economic productivity.

The time-based economic system described offers a groundbreaking way to conceptualize and engage with economic transactions. By trading Time Tokens for real-time, we open the door to a more equitable, balanced, and community-focused economy that recognizes time as the ultimate currency. This model not only has the potential to transform individual lives but also to reshape the broader economic landscape, making it more resilient, sustainable, and aligned with human values and needs.

By anchoring the economic value to time, this system introduces a universal measure of value that transcends traditional currency systems. This could lead to a more stable and efficient economic model, as the value of time is inherently less volatile than fiat currencies, which are subject to inflation, governmental policies, and market fluctuations. The time-based economy also fosters a sense of fairness and equity, as time is a universal resource that every individual possesses.

Unix Epoch Time System

The cornerstone of our Time-Based Unit of Account System is its reliance on Unix epoch time, a universally recognized standard for measuring time across computing systems. Unix epoch time, defined as the number of seconds that have elapsed since January 1, 1970, at 00:00:00 Coordinated Universal Time (UTC), serves as a pivotal reference point for our system. This section elaborates on the rationale behind adopting Unix epoch time as our foundational time measurement and its implications for the system's operation and integrity.

Rationale for Using Unix Epoch Time

Unix epoch time offers a universally consistent, straightforward, and widely supported framework for time representation. By adopting this standard, our system benefits in several key ways:

- **Universality**: Unix epoch time is recognized and utilized worldwide, facilitating interoperability and standardization across different systems and regions.
- **Simplicity**: It provides a simple yet precise method for time measurement, counting time in seconds and thereby avoiding complexities associated with calendars, time zones, and daylight saving times.
- **Reliability**: Given its widespread use in computing and IT infrastructure, Unix epoch time is a reliable standard that ensures consistency in time-based calculations and operations.

Implementation in the Time-Based System

Our system utilizes the Ethereum blockchain, which inherently records the Unix timestamp of each block. This alignment allows our system to leverage the blockchain's time-stamping capabilities to anchor our time-based units of account in real-world time. By doing so, we ensure that each transaction, minting event, or any time-dependent operation is securely tied to a universally accepted time standard.

Moreover, the choice of Unix epoch time as our base facilitates ease of integration with other systems and applications, which commonly use Unix time for logging and time-stamping purposes. This interoperability is crucial for a system designed to operate on a global scale and interact with a multitude of external data sources and services.

Dealing with Leap Seconds

It's important to note that Unix epoch time does not account for leap seconds, occasional adjustments made to UTC to keep it close to mean solar time. However, the impact of leap seconds on our system is negligible. The primary focus of our time-based unit of account system is on longer-term time measurement and accuracy over days, months, and years, where the addition or subtraction of a leap second has an insignificant effect.

Security and Precision

Utilizing Unix epoch time within the Ethereum blockchain context provides a secure and precise method for time tracking. The decentralized and immutable nature of blockchain ensures that the recorded time is resistant to manipulation, providing a trustworthy basis for all time-related calculations in our system.

The decision to base our Time-Based Unit of Account System on Unix epoch time underscores our commitment to precision, reliability, and universality. It ensures that the system is built on a solid, widely recognized foundation, enhancing its functionality, interoperability, and credibility. By aligning with a global standard, we position our system to seamlessly integrate into the broader digital economy, enabling accurate, secure, and consistent time-based transactions and operations.

Leap Year Consideration in the Time-Based Unit of Account System

A critical component of designing a time-based unit of account system, especially one that aspires to span centuries, is the accurate accounting for leap years. Leap years add an extra day to the calendar approximately every four years to align the calendar year with the astronomical year. This section outlines our approach to integrating leap year calculations into our system, ensuring precise time tracking over long periods.

Understanding Leap Years

A leap year occurs almost every four years to correct a small discrepancy between the calendar year and the solar year. The exact rule is that a year is a leap year if it is divisible by four, except for years which are both divisible by 100 and not divisible by 400. For example, the year 2000 was a leap year, but 1900 was not. This system corrects the calendar year to closely match the 365.2425 days of the solar year.

Implementation in Smart Contracts

The Time-Based Unit of Account System leverages the Ethereum blockchain's inherent time-keeping functionality, which is based on the Unix timestamp. The Unix timestamp does not account for leap seconds but is adequate for tracking leap years as it simply counts the number of seconds since January 1, 1970. However, the granularity of blockchain transactions does not natively resolve the distinction between common and leap years in the context of transaction timestamps or block creation times. To address this, we have devised a method to programmatically identify leap years within our smart contract, ensuring that our system's time accounting is both accurate and automatic.

Leap Year Calculation

Our smart contract incorporates a function dedicated to leap year determination. This function calculates whether the current year, or any specified year, is a leap year by applying the leap year rules. This is crucial for accurately determining the length of a year in days, which affects annual minting rates, time-based transactions, and other system functionalities that are sensitive to yearly variances.