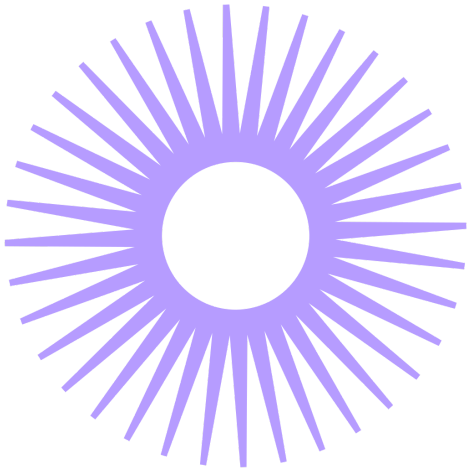
Opulence: Deterministic Wealth



millennium.cash

Published:

Whitepaper Version: 1.0.0

Code Version: 1.0.0

“You do pay a price for your financial freedom, but it is far lesser than what you pay for a lifetime of slavery.” - Robert Kiyosaki.

Abstract

Decentralized Finance (DeFi), is an open and global financial system built for the internet age – an alternative to a system that's opaque, tightly controlled, and held together by decades-old infrastructure and processes. With DeFi, the markets are always open and there are no centralized authorities who can restrict payments or deny you access to products. Services that were previously slow and at risk of human error became automated and more reliable now that they're handled by code that anyone can inspect and scrutinize. Above all these advantages, DeFi also provides a massive opportunity for people seeking a way out of modern slavery and the impending death of bank money. Apart from this, there is also a massive ticking time bomb at hand - the pension time bomb. An aging population and increased lifespan will mean more people needing to draw a pension in the coming decades with the danger that both private and state pensions will buckle under the strain. To combat these issues, we propose an Ethereum-native protocol that issues an ERC-20 Standard token that continuously appreciates in price, similar to an interest bearing token (ibToken). The token price will appreciate through three main mechanisms; (1) supply control through minting and burning of tokens; (2) strict enforcement of trade execution price as opposed to traditional price discovery; and (3) an automated credit score-based system of monthly allowances meant to balance the protocol. The goal of Opulence is to serve as an experiment to prove that it is possible to create and sustain an asset backed by the positive expectations of the community and credibility of its monetary properties. We expect the OPLL token to become a viable alternative to current safe-haven assets, which proved to be prone to inflationary dynamics and volatility. Opulence's vision is to create a viable form of savings for everyone which not only avoids getting devalued over time, but in fact continuously appreciates in value, generating additional value for investors. Opulence is released under the Millennium ecosystem umbrella.

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1 A Brief History of Money

Money has been part of human history for at least the past 5,000 years. Money was introduced to increase the speed at which business could be done, and the first currencies came in the form of metal coins that were made of precious metals such as silver and gold, meaning that the coins themselves had value. Around 700 CE however, the Chinese moved from coins to paper money. Paper money was quickly adopted by banks as it was much easier to carry around. People were also given the choice to exchange their banknotes at any point of time for their face value in silver/gold coins at the bank.

Fast forward to The Gold Standard. The Gold Standard was a system under which most countries connected the value of their currencies to gold to stabilize currency exchanges markets. However, when World War I broke out, many countries suspended their use of the gold standard, which devalued their currencies. By this time, the U.S. had already established itself as the world's largest economy, and before the U.S. entered World War II, their reserves served as the Allies' main supplier of weapons and other goods. Most countries paid in gold, making the U.S. the owner of the majority of the world's gold by the end of the war. This made a return to the gold standard impossible for the countries that chose to pay in gold.

In 1944, forty four Allied countries met together to come up with a system to manage foreign currency exchange markets that would not disadvantage any country. They came to a conclusion that the world's currencies should no longer be linked to gold but instead be pegged to the U.S. Dollar because the U.S. held most of the world's gold supply. This is now known as the Bretton Woods Agreement. This established the authority of central banks to maintain fixed exchange rates. The U.S. on the other hand allowed dollars to be redeemed for gold on demand, allowing other countries to regulate their money supply. This is what made the U.S. Dollar the world's reserve currency.

However, the demand for U.S. treasury securities and deficit spending that was needed to finance the Vietnam War and domestic programs, caused the U.S. to flood the market with paper money. Eventually, the supply of dollars abroad became higher than the value of gold held by the States. This created a possibility of a *gold run* and there was a loss of confidence in the U.S. to meet its obligations. With inflation on the rise and a *gold run* looming, President Nixon decided to end dollar convertibility to gold. This officially turned the U.S. dollar into a free-floating currency.

Today, the U.S. dollar is still regarded as the world's reserve currency. Nearly 60% of the $12.8 trillion in world-wide currency reserves are held in dollars. However, if you think about it, there is nothing backing the U.S. Dollar except for the future tax-generating ability of the U.S.'s growing productive economy and a defense structure to defend that economy's strength. But is that really a good reason? Let's dive into the risks that the U.S. faces.

1.1 Decline of Fiat

We are currently facing a crisis in the eastern hemisphere — The 2022 Russian Invasion of Ukraine. Many sanctions have been imposed on Russia. A huge chunk of its $630 billion worth of foreign reserves have been frozen. Major financial services such as Visa and Mastercard have suspended their operations in Russia. Global corporations, from Netflix to Nike, have been cracking down and leaving Russia.

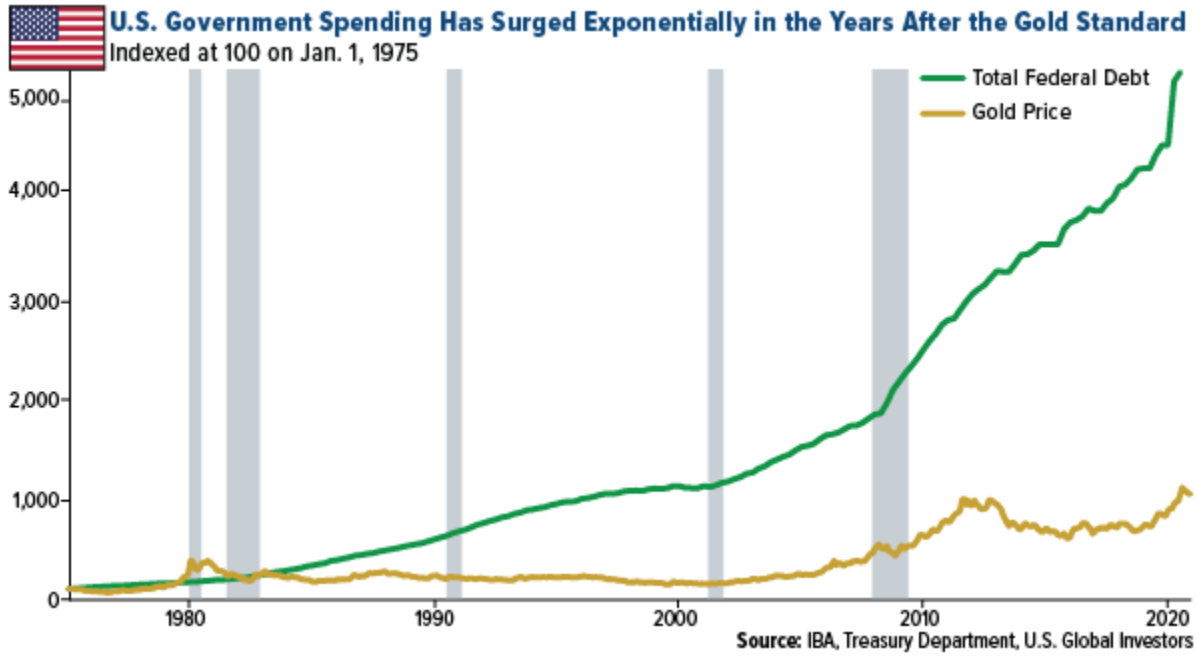

Figure 1: U.S. Government Spending After Gold Standard

That said, even the de-facto leaders of the free world are suffering from their lavish monetary policies, with COVID-19 being a major trigger. While being the world's reserve currency allowed the U.S. and other governments to respond with unprecedented speed to the ongoing pandemic, easy monetary policy and QE resulted in worldwide debt exploding with unprecedented pace. Huge budget deficits and uncontrollable money printing may result in the rest of the world losing confidence in the U.S. dollar, calling the currency supremacy into question.

In the latest inflation (CPI) report (March 2022), inflation stood at a 40 year high of 8.5%. Gas prices soared by 48% YoY. In contrast, wages growth has not been able to keep up with inflation. If the bubble in stock valuations pops, the $6 trillion shortfall in public and private pensions would worsen. After bailing out Wall Street through QE by printing more money, are we able to afford bailing them out again once more? How will the rest of the world respond to seeing the reserve currency debased in such a swift and egregious manner?

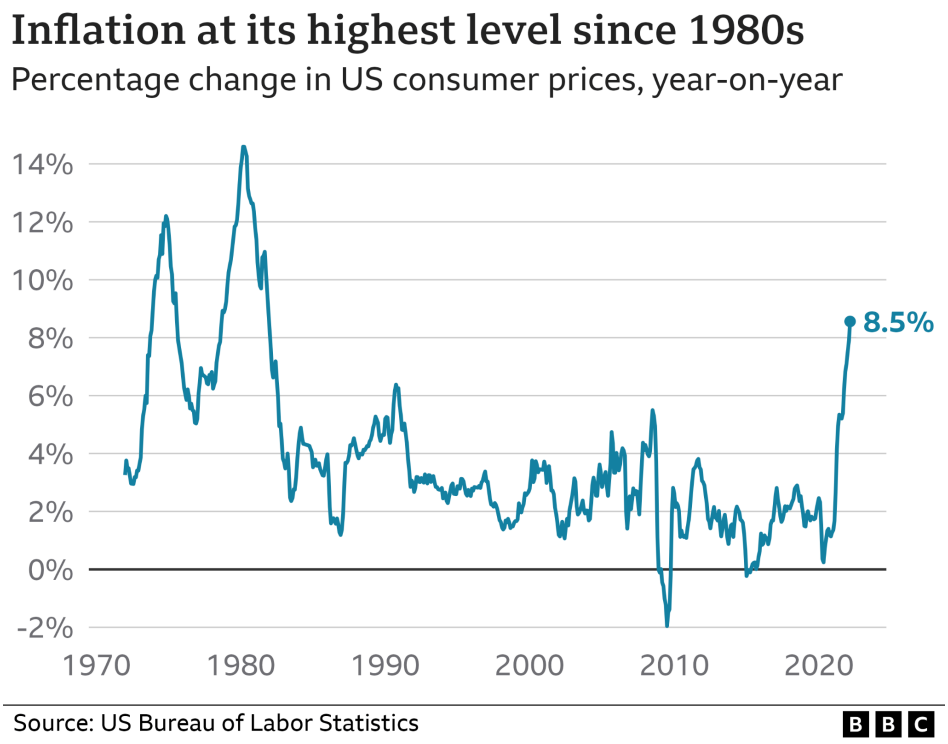

Figure 2: Inflation Numbers

1.2 The $400T Pension Time Bomb

According to an analysis by the World Economic Forum (WEF), there was a combined savings gap in excess of $70 trillion in 2015, spread between 8 major economies, with the deficit growing by $28 billion every 24 hours. This will eventually hit $400 trillion by 2050, which is 5 times the size of the global economy today.

Since social security programs were introduced, demographics worldwide have changed immensely. Life expectancy has been rising by three years each decade, and the population of retirees globally is expected to grow from 1.5 billion to 2.1 billion people between 2017-2050. In the U.S. alone, it is expected that the Social Security Administration will run out of funds by 2034. At that point, only 77% of promised benefits will be able to be fulfilled.

While some countries have already tried to sandbag the issue by raising the retirement age, increasing taxes or cutting benefits, this is not a sustainable solution.

1.3 Savings = Investing?

With inflation at an all time high in 40 years, more and more people are being forced to consider the idea of investing to outpace inflation, as their wages are unable to keep up. The primary way new

investors can tap into the stock market is by investing in Indices such as the S&P 500 Index, as it produces an average annual return of about 10%. For the average Joe, this means that a portion of their already declining real wage needs to be set aside for investing. For the people who are living paycheck to paycheck and struggling with debt, it may be hardly possible to allocate a part of their income towards investing, but that is the only way they can avoid the decline in their inflation-adjusted net worth.

However, if you're using your savings to invest, are they really "savings"? Are you really saving your hard earned money by investing in this uncertain macro-environment where stock valuation is in a bubble? Most individuals believe that investing in financial assets is the only way to save, which stops it from being perceived as a risk-taking endeavor.

Savings is an "income not spent". It represents the excess of what one has produced but not yet consumed. However, as central banks print more and more money, savings are perpetually devalued. Put simply, if you do not invest the money you made, its value will diminish fairly quickly. If you do invest the money you made, you are also exposing yourself to macroeconomic risks as well as stock market prices, which is not something that an average investor can calculate. This further substantiates the need for a new, safe-haven asset that will allow investors to tackle the inflation and preserve their wealth reliably.

2 Interest-Bearing Tokens (ibTokens)

Equities pay dividends and bonds pay interest. The money in your savings account, however, barely generates any upside. For context, the national average interest rate in the U.S. is 0.06%. When you store money in a bank account, you are taking on a counterparty risk with the bank as your bank can always fail. The bank takes in your money, then lends it out to borrowers. With fractional reserve banking adopted almost everywhere across the world, an average bank never has sufficient liquidity to satisfy the redemption requests from its clients, should they occur *en masse*. This creates a situation where to ensure the system is functional, the bank must prevent customers from withdrawing their money too fast (bank run). This is widely implemented via credit & debit cards limits, as well as restrictions on how much cash can be taken out OTC.

Interest-bearing tokens (ibTokens) were as such created. One such example is Aave's aUSD. When one deposits USD to any of the dollar lending pools, an equal amount of aUSD gets sent back. As one continues to hold aUSD in their account, the balance grows over time, as the lending pool gains more interest payments. If the pool interest rate is 1%, one's 100 aUSD will turn into 100.00276… USD. When a payment is made with aUSD, the accumulated interest follows the transaction to the recipient, meaning that no accumulated interest is lost at any point.

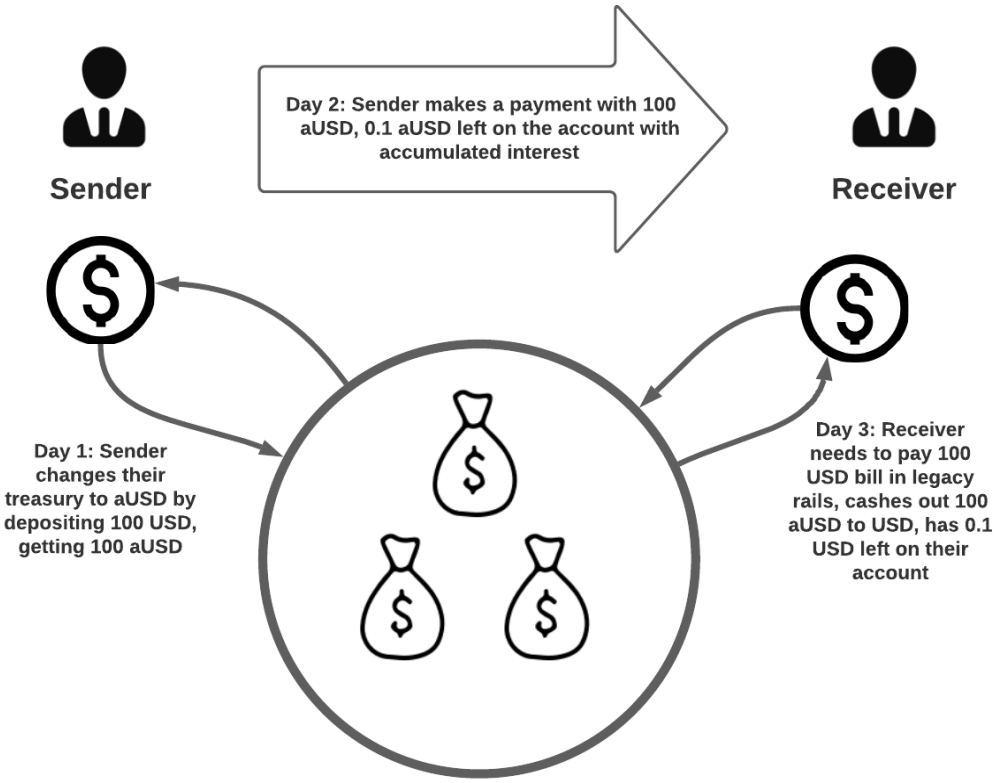

Figure 3: aUSD

People's savings in interest-bearing cash are less punishable by bad monetary policies.

3 Vision

With the decline of fiat, the changing demographics and the problem of people taking unnecessary risks to invest in assets to outpace inflation, the goal of Opulence is to help preserve and promote deterministic wealth generation to combat these issues. We strongly believe that more and more people are waking up to the monetary crisis that the planet is facing, and are starting to embrace cryptocurrencies in an attempt to preserve their wealth.

The vision behind Opulence is to first and foremost present a new type of safe haven asset that is not affected by the broader macro-environment, and which is continuously appreciating in value programmatically. The second step is to become a viable form of savings that will solve the devaluation of money. As no one can predict what direction the macro-environment might take (Uncertainty around Ukraine War/Covid-19/Government outlook on inflation), we believe that no one should be exposed to these macroeconomic risks by investing their savings randomly in the hopes of beating inflation. Our proposed safe haven asset protects investors from the macro-environment and prevents the devaluation of their savings.

The third step in Opulence's vision is to develop an entire ecosystem that revolves around the OPLL token to drive widespread adoption. At first, various financial applications powered by OPLL token will be released, including but are not limited to a crypto-native brokerage platform, allowing users to get exposed to real-world ETFs and stocks without leaving the chain. Among other things, we plan to consider acquiring a real world financial institution that is a member of FDIC, and ultimately converting users' OPLL balances to real world accounts in a bank fully insured by FDIC. As a result, we will be able onboard more and more people into the cryptocurrency space and solve the financialization of the economy.

4 Opulence: a part of Millennium ecosystem

We present a new type of asset that is designed to always appreciate in price at a predetermined rate, that will ultimately become an alternative to the current *status quo* safe haven assets. This is achieved via a range of mechanisms set forth below, that include a novel concept of a *protocol-owned price discovery,* and a credit score-based system of monthly withdrawal allowances intended to incentivize behavior that is mutually beneficial to all investors.

4.1 The Rationale

Following a 2021 year where DeFi has exploded across all blockchains, numerous DeFi protocols sprung up in droves. Since the inception of yield farming, its users have always had a large focus on the APY offered by the farm. This gave birth to almost a cult behind an APY offered by this or that project. When new users start exploring what DeFi has to offer, oftentimes the first thing that they learn about is APY, after all that is the main allure of DeFi, to allow users to earn passive yield through various financial applications. However, new users are also not informed enough about where this yield is coming from.

Let's take a short dive into the Anchor Protocol, the biggest go-to "savings" protocol in the DeFi history. Anchor was conceived in March 2021 and saw unprecedented growth, reaching $18 Bn TVL within a year. It advertised a "risk-free" APY of 20%, that was paid in UST, Terra's stablecoin. All you had to do was to deposit UST and keep collecting the yield. There were no restrictions imposed on capital moving in and out the protocol, with deposits and withdrawals being settled immediately. This seemed revolutionary, and many people invested substantial portions of their wealth in the protocol.

However, the promise of Anchor to become the world's ultimate savings solution is far from what has actually transpired. Anchor continued to eat into its reserves to pay out early depositors, and eventually reduced its yield to 18% in an attempt to alleviate the pressure of redemptions; to no avail. Eventually, Anchor collapsed, while suffering a major bank run, with UST stablecoin getting depegged from its supposed one dollar price. With UST and Anchor playing systemic roles in the entire Terra ecosystem, the functioning of the blockchain became impossible, and it was halted.

One of the reasons behind such a downfall was that no precautionary measures were taken by the developers of the protocol to control the possible liquidity crunch, and no levers were designed to mitigate the potential exodus of investors, should one occur. Another reason was that investors fell prey to a so-called *herd instinct behavior*: once a downward trend had emerged, a wave of withdrawals began, originating from investors concerned that if they do not exit their position now, they may not be able to do it in the future. Ironically, should these investors not have liquidated their positions, the collapse of the protocol could have been avoided. This became one of the most notorious examples of recent crypto bank runs, along with Celsius.

Instead of focusing on yield, we are proposing an asset focused on token value growth and price appreciation. We believe that DeFi protocols should not be involved in APY wars, where they compete to see who can offer a higher APY to attract more liquidity. This only promotes inflationary aspects as we have seen with the hundreds of OlympusDAO forks that had sprung up last year, with their native token prices eventually plummeting to below widely advertised backing price levels.

For protocols that are currently facing sustainability and inflationary issues, it might be worthwhile to look into implementing precautionary measures to control possible liquidity crunches and to mitigate the potential exodus of investors. In Anchor's case they were moving towards implementing veANC and introducing locked deposits in exchange for higher yield, but it was too late.

4.2 Pioneering Deterministic Wealth

Opulence is pioneering a so-called *deterministic wealth generation*, which is defined by the programmatically determined price and strict enforcement of it. The protocol will own a proprietary swap contract intended to act as a proxy between the ERC-20 token and the Uniswap liquidity pool. This ensures that all the trades are executed with the proper assumed price. By initially restricting the composability and tradability of $OPLL, we help to protect from the irrational behavior of some financial agents, stabilize the protocol in times of global uncertainty, and therefore guarantee the continued returns to all participants.

According to the *Prospect theory* of behavioral economics, financial agents (investors) assess their loss and gain perspectives in an asymmetric manner. For example, for some individuals, the pain from losing $1,000 can only be compensated by the pleasure of earning $2,000. Given the above, we believe that Millennium protocol will cater well to vast majority of investors thanks to technical inability to demonstrate losses (fulfilling the *Loss Aversion* tendency of investors), providing a highly certain environment where the price of $OPLL appreciates according to a set of strictly enforced rules (fulfilling the general preference of people for certainty over uncertainty), and, finally, preventing bank runs via a set of automated guardians.

4.3 Protecting Users from Erroneous Investment Decisions

Most humans are not good investors; crypto users are no exception. With 97% of crypto day traders ultimately losing money, the best decision that the vast majority of crypto investors can make is to buy in passive investment instruments, generating stable and risk-free returns. With all the investments being predicated on a simple thesis of “buying low and selling high”, most of the traders behave the opposite way. One of the leading causes of investment loss is a so-called *herd mentality*. All financial markets are subject to volatility, sometimes severe, causing rapid sell-offs. Many investors fall prey to their emotions and jump into the sell-off bandwagon, catching a falling knife and driving the price of the security further down, closing their trade with a net loss.

Millennium is a protocol for users willing to preserve their funds, while enjoying greater than average risk-free returns. We propose the Opulence Token ($OPLL) to be included in a basket of safe haven assets that any investor who wants to hedge against the bear market and ride the bull market should own. Millennium caters well to those who need to preserve and multiply their wealth.

4.4 Opulence Token ($OPLL)

The $OPLL token is an asset implementing an ERC-20 standard that is programmatically designed to always appreciate in price. $OPLL is meant to be an ultimate store-of-value asset, similar to bitcoin, enabling you to park your wealth reliably, while, unlike bitcoins and most crypto assets, not being exposed to macro-economical risks. It satisfies the recognized criteria of what a safe asset constitutes:

- **Predictable price**
    - $OPLL is programmed to always appreciate in value. This is enforced through a mechanism that keeps track of the $OPLL price at genesis, the programmed interest rates (both *base* and *boost* rates), and the time that has passed since the most recent adjustment of any of the rates.
    - $OPLL will only be tradable via the protocol-owned swap contracts, making it impossible for $OPLL price to be skewed at other DEXs and CEXs.
- **Liquidity**
    - $OPLL is backed by the treasury and protocol-owned liquidity ensuring that $OPLL can always be sold for USDC stablecoins.
- **Not correlated to the rest of the economy**

Most cryptocurrencies, including bitcoin, do not satisfy the above criteria due to price instability and being correlated with the other markets, including stock markets.

While being an intrinsically inflationary asset, $OPLL is bound by prominent deflationary forces. In particular, the $OPLL token will have a **capped supply of 1 billion tokens**, **100%** of which will be allocated into the Millennium reserve at the time of deployment. Immediately after that, $OPLL will embark on its supply reduction rodeo, continuously burning the tokens in Millennium reserve for two years or until Millennium reserve hits **10M** tokens, whichever happens first. The protocol will not mint anymore tokens from then onwards.

$OPLL burn rate	Around 56,506 $OPLL burnt per hour

4.5 Implementation

4.5.1 Limited Composability

Initially, $OPLL is going to be an asset tradable only via the protocol-owned swap smart-contracts. This is required for the purposes of maintaining programmatic price appreciation as discussed above. Peer to peer transfers will be prohibited to avoid creation of a parallel “black market” of tokens where the $OPLL-USDC exchange rate may differ from the algorithmically enforced one. As a result of this, $OPLL will have a limited composability at genesis, pursuant to our strategic goals of capturing a significant market share first before allowing developers to build on top of $OPLL. These restrictions are temporary and are crucial for Millennium early development and adoption. Down the road, $OPLL will become a fully-decentralized asset with no limitations on the wallets it can be transferred to, and exchanges where it can be traded. Millennium will also have a peer-to-peer trading marketplace where $OPLL holders will be able to trade their $OPLL between each other at the programmatically enforced price, coming at a later stage.

As proven by the repeated demise of reserve currency protocols and some stablecoins, even the most well-capitalized and trusted entities are subject to massive bank runs that can happen overnight. The recent example with UST, a Terra’s signature stablecoin, demonstrated the utter requirement for checks and balances in the system preventing such rapid and unsubstantiated exodus of investors from the protocol. What started as a natural mild correction and some investors taking their profits, transformed into a broad bloodbath making its waves on the entire crypto ecosystem and other blockchains. Should Terra have had restrictions in place limiting how much UST can be liquidated within 24 hours, among many other possible solutions, the disaster could have been averted.

4.5.2 Continuous price appreciation

$OPLL price keeps appreciating every second thanks to an automated module in the smart-contract that determines the present price based on the following factors:

$$OPLL_{price} = OPLL_{prevPrice} * (1 + rate_{boost} + rate_{base})^{\frac{time_{now} - time_{prevPrice}}{24hours}}$$

- Most recent price is the $OPLL price at the moment of the most recent update of the savings interest (either Base rate or Boost rate)
- Base interest rate is the standard rate of return of $OPLL. Base rate can never be reduced, and can only be increased by the team. Once increased, base rate can never be reduced again. This ensures that $OPLL price is ever increasing.
- Boost interest rate is the situational rate of return that is fully updateable and can be changed any time. This can act as a lever enabling the protocol to manipulate supply and demand for $OPLL.
- Time passed is how much time passed since most recent interest rate update

Because of limited composability of $OPLL, all trades involving the token can only be conducted on our official website (app.millennium.cash). $OPLL can be purchased and sold to one of the whitelisted tokens, most generally stablecoins. We are also considering listing $OPLL on Uniswap V3, with granular liquidity provided to match the current price.

Trades involving $OPLL are done using whitelisted assets that are predetermined by the protocol.

Purchases of $OPLL are immediate and are executed with 0 slippage. Funds acquired are further split up between the Millennium Reserve and a Uniswap LP pool. Sales of $OPLL are conducted via the Uniswap LP pool and can therefore experience some slippage depending on the size of the trade relative to the LP pool. Users are able to indicate the slippage they are willing to undertake when selling their position.

Uniswap liquidity pool is refilled after each transaction involving $OPLL tokens to ensure that the price matches the programmatically enforced one. Depending on whether the current price of $OPLL in the liquidity pool immediately after the trade settles is higher or lower than the target price, additional $OPLL tokens may be taken from Millennium Reserve and deployed into the liquidity pool or rather taken out of the pool and burnt. This ensures that the price of $OPLL in the LP pool always tracks the actual price of the asset.

After each interaction with the liquidity pool (sale or purchase of OPLL), the ratio of assets in the LP changes, with the price of OPLL in the LP being affected. In order to restore the price back to where it's supposed to be, the formula below is used to calculate the delta OPLL tokens:

$$OPLL_{delta} = \frac{USDC_{pool}}{OPLL_{price}} - OPLL_{pool}$$

A positive number of delta $OPLL means that extra tokens need to be burnt from the LP pool. On the other hand, when the delta number is negative, new OPLL tokens will be automatically deposited into LP from the reserve smart contract. These manipulations happen within a single trade transaction, yielding an $OPLL price chart with no volatility.

4.5.3 Millennium score and monthly allowances

Millennium enforces a monthly allowance system that is implemented with the goal of limiting how much $OPLL a single wallet can liquidate per month. Monthly liquidation allowance of a certain wallet is always a derivative of the score of that wallet. Millennium score is impacted by the users' buying and selling behavior. Each new wallet joining the protocol is automatically assigned a score of 500. Minimum possible score is 100, and the maximum possible score is 900. As users interact with the protocol, their score may change, determined by the following factors:

Factors that increase a score:

- **Time**. All scores automatically increase over time at a predetermined rate
- **New Contributions**. Existing users can always purchase more $OPLL, which will result in an immediate boost to their score. The extent of the boost depends on how much more $OPLL has been purchased relative to the monthly allowance of that wallet. The greater the ratio is, the bigger the boost is. However, after making a certain number of additional $OPLL purchases within 30 days, no additional score boost will be applied until the period ends.
- **Ownership of $MILL, a governance token of the Millennium protocol**. The automatic score appreciation rate can be further boosted by locking $MILL tokens in vaults. To enjoy the fastest score increase rate, users need to purchase some $MILL and lock it in the vault. The longer one locks $MILL for, the faster score would appreciate.

Factors that decrease a score:

- **$OPLL liquidations.** The extent to which a score drops will depend on the ratio of how much $OPLL is sold relative to the monthly allowance of the wallet. If a sale results in monthly allowance utilization exceeding 75%, a greater impact on a score should be expected. Sales resulting in a lower than 75% utilization of the monthly allowance will still cause a score

reduction, but it will be smaller, and linearly correlated with the resulting utilization. Each sale impacts a score, just like each new purchase.

Below is the formula demonstrating how the score increases with time:

$$score_{current} = score_{prev} + netScoreGrowthRate * \frac{time_{passed}}{30days}$$

where the *previous score* is the score that the given wallet had at the time of the most recent transaction, and the *netScoreGrowthRate* is how many points the score grows by every 24 hours. *netScoreGrowthRate* is calculated as follows:

$$netScoreGrowthRate = growthRate_{base} + growthRate_{governance} - reductionRate_{savings}$$

where *base growth rate* is the standard daily score growth rate assigned to each wallet, *governance growth rate* is an optional additional rate that is dynamically assigned to each wallet when and if a that wallet has a certain quantity of governance $MILL tokens locked in a vault, as stipulated in the next section, and, finally, *savings reduction rate* is a deduction in daily score growth applicable when the user has at least 1 $OPLL token locked in the vaults, generating $OPLL yield.

Governance growth rate is not summed up across all the vaults and time periods that the user locked their $MILL tokens in; instead, the biggest score boost value is taken.

Each new user starts with a score of 350 points. Minimum possible score in Millennium is 100 points, and the maximum possible one is 900 points. Base daily score growth rate is +2 points per day, which can be further boosted by $MILL tokens locks as discussed above.

Minimum Score	100 points
Maximum Score	900 points
Initial User Score	350 points
Base Daily Score Growth Rate	+2 points

4.5.4 Monthly liquidation allowances

Monthly liquidation allowance is assigned based on the wallet's Millennium score at the beginning of each time period, which lasts for 30 days. The allowance is positively correlated with the score, meaning that the greater the score becomes, the more $OPLL tokens can be liquidated per month. Users can never sell more $OPLL than 100% of their current monthly allowance.

Monthly allowance is calculated based on the wallet's score using the following formula:

$$allowance = \frac{OPLL_{maxHoldings}}{liquidationPeriod}$$

where *liquidationPeriod* is what depends on the score, and *maxOPLLHoldings* is the highest quantity of tokens held by the wallet since inception (including OPLL locked in vaults). The bigger the score is, the less time it will take users to liquidate their $OPLL holdings.

The *MaxOPLLHoldings* variable is reset every 6 months.

The table below illustrates how the liquidation period depends on the user score, with the values being linearly scaled between max and min values of any relevant bracket:

User score bracket	Liquidation period bracket	Monthly allowance (%)
100 points — 250 points	250 days — 150 days	
250 points — 750 points	150 days — 100 days	
750 points — 900 points	100 days — 55 days	

Each sale of $OPLL results in score reduction. The extent to which score is reduced after the sale depends on the resulting allowance utilization percentage after the sale, as well as the score of the user before the sale. The bigger part of the monthly allowance is utilized as a result of the sale, the bigger is the reduction in score. Similarly, the bigger the score of the wallet was before the sale, the more score points will be deducted after the sale. Below is the formula of how the score reduction is calculated after each $OPLL sale:

$$scoreReduction = maxPenalty * utilizationRate$$

where *maxPenalty* is the maximum possible reduction in score that users should face in case of selling 100% of their monthly $OPLL allowance, and *utilizationRate* is the percentage of monthly allowance used after the completion of a given sale.

The table below describes how the maximum sale penalty is defined based on the score of the wallet before the sale:

User score bracket	Max sale penalty bracket
100 — 250 points	50 points — 150 points
250 — 400 points	
400 — 550 points	150 points — 250 points
550 — 700 points	
700 — 900 points	250 points — 350 points

The table below outlines the relationship between the monthly allowance utilization as a result of the sale and the score reduction:

Allowance utilization bracket	Percentage of max sale penalty bracket
0% — 25%	0% — 11.5%
25% — 75%	11.5% — 38%
75% — 100%	38% — 100%

4.5.5 Additional $OPLL purchases

Unlike $OPLL sales that result in score reduction, purchasing more $OPLL results in one-time score boosts. Score boosts are limited to 3 per month to avoid system abuse. The extent to which score is boosted depends on the ratio of the number of $OPLL purchased compared to the monthly allowance of a given user. The higher the ratio is, the bigger is the score boost. The formula below defines the purchase-induced boosts:

$$scoreBoost = \frac{OPLL_{purchased}}{userAllowance} * scoreBoostBracket$$

The table below defines the relationship between the ratio of the number of $OPLL purchased relative to the current monthly allowance of a user and the score boosts:

Purchase ratio bracket	Score boost bracket
25% — 75%	5 points — 18 points
75% — 200%	18 points — 60 points
200% — 500%	60 points — 80 points

4.5.6 $MILL Vaults

Locking $MILL tokens in vaults will result in a faster daily score growth rate. Refer to the table below to see how locking $MILL tokens boosts the score:

$MILL Vaults + $OPLL Score Boost					
Asset	**Lockup**	**Min APY**	**Max APY**	**Holdings***	**Daily Score Boost ***
$MILL	UNLOCKED	5%	8%	ANY	0
	30D	8%	12%	> 10,000	+1 Points
	90D	12%	20%	10,000 - 14,999	+1 Points
				> 15,000	+1.5 Points
	180D	15%	25%	10,000 - 14,999	+1 Points
				15,000 - 19,999	+1.5 Points
				> 20,000	+2 Points
	360D	20%	40%	10,000 - 14,999	+1 Points
				15,000 - 19,999	+1.5 Points
				20,000 - 24,999	+2 Points
				> 25,000	+3 Points
	720D	30%	60%	10,000 - 14,999	+1 Points
				15,000 - 19,999	+1.5 Points

				20,000 - 24,999	+2 Points
				25,000 - 29,000	+3 Points
				> 30,000	+4 Point

*** Token Holdings of $MILL:** each vault will qualify for Daily points boost, depending on the number of tokens held by the user.
*** Daily Score Boost** indicates how many additional points can be added to the base daily growth rate

5 Bank Runs

Bank runs occur when a large number of customers of a bank or other financial institutions withdraw their deposits simultaneously over concerns of the bank's solvency. As more people withdraw their funds, the probability of the bank collapsing increases, prompting more people to withdraw. Eventually the bank might not have enough in its reserves to cover the withdrawals.

In modern history, bank runs are often associated with the Great Depression. The first banking collapse due to mass withdrawals occurred in 1930 in Tennessee. This incident then went on to spur a string of subsequent bank runs across the country as people heard what happened and sought to withdraw their funds before they lost their savings, a herd mentality that only sped up more bank runs via a negative feedback loop.

One measure to prevent a bank run in the context of the stock market is the practice of temporarily restricting or halting trading at the times of crisis or major corrections. This practice is nothing new, and has been used in the past to rescue tanking markets. Most recent examples include NYSE (New York Stock Exchange) and NASDAQ halting trading on March 12, 2020 and March 9, 2020, as well as following 9/11 attacks, when markets remained closed for a week. This was done purposefully to avoid further sell-offs and cascading liquidations across the market.

Learning from the historical bank runs that have occurred, we developed a few approaches to react proactively and to protect the Millennium protocol and Opulence in the event of a potential bank run:

- **Slow it down (Automated Bank-Run Prevention Mechanism)**
- **Information Obscurity**
- **Time-locked deposits ($OPLL Vaults)**

5.1 Automated Bank-Run Prevention Mechanism (ABRPM)

Millennium implements several automated temporary trading halts that happen in times of rapid sell-offs and are meant to protect the health of the protocol. Two major mechanisms are at work:

- If the liquidity pool loses at least X% of the liquidity within the Y time period, the trading is halted for 1 hour. Typically, X% is going to be at least 70%, and Y is going to be 1 hour.
- If the liquidity pool loses X% of liquidity over the span of Y days, the trading is halted for 24 hours Typically, X% is going to be at least 300%, and Y is going to be 3 days.

Parameters X and Y will be subject to change based on market conditions.

Liquidity pools where $OPLL can be sold will hold 0.1% - 10% of the funds present in the Millennium Reserve. The exact ratio will depend on market conditions. Liquidity pools will fill up automatically when somebody purchases or sells $OPLL, as long as 24 hours or more have passed since the most recent fill up. If no trades are conducted within 24 hours, a fill-up function on the Millennium Reserve smart contract can be called by any external wallet to bring the liquidity pool back to normal. However, no fill ups will happen if one of the above bank run prevention rules is triggered until trading is resumed again.

By keeping the liquidity pools relatively tight when compared to the Millennium market cap and reserve size, we are protecting the community from black swan events that can never be predicted, and can cause severe harm to the protocol in the matter of hours/days.

5.2 Information Obscurity

Due to the tendency of investors to follow others, a small correction of the asset price may trigger a snowball effect of massive liquidations. While price instability is not really a thing for Millennium protocol, investors may still grow overly concerned when a natural short-term correction of Millennium Reserves happens during bearish times or times of reduced demand. As a solution to that, Millennium will only be revealing their reserve information on a monthly basis through social media announcements and audit reports. In order to further obscure accumulated funds in the Reserve, most funds will be deposited into Tornado Cash, where they can be withdrawn at a later date from when the Reserve needs to be tapped for emergencies or investment decisions. This is done for two reasons:

- Protecting proprietary investment decisions from copying that could reduce alpha
- Not letting investors monitor the current level of reserves to avoid panicking at the times of short-term cycle of redemptions

Temporary crises and corrections are inevitable, and Millennium may face those too. We believe that by withholding information about the Millennium Reserves and making it available only once per

month will lead to a healthier market conjecture and will help avoid the manifestations of herd mentality.

5.3 $OPLL Vaults

To further incentivize mutually beneficial investment behavior by investors, Millennium offers staking vaults where investors can lock their $OPLL to receive yield. The rewards will be paid out in $OPLL tokens. No new tokens will be minted; instead, originally minted $OPLLs will be used from Opulence reserve. There will be multiple time periods available to lock $OPLL tokens for, the longer ones typically offering greater APY.

However, the tradeoff for a higher yield is that investors will face a reduced base Millennium score appreciation rate; and if users choose to unlock their $OPLL early from the vault, they will incur a 30% early exit penalty fee. The fee will be redirected back to the LP.