Sigmadex Whitepaper

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Abstract. Herein lies the whitepaper for the non-custodial, blockchain financial network called Sigmadex. Rather than substitute decentralization for trust, the protocol algorithmically scales on social capitals by exposing actors to a punishment/reward policy within DEX flavoured repeated prisoners dilemma games. Onboarding of ones crypto cannot be stranded by bridge operators, while accounting integrity is preserved by only offering personalized and ever decreasing constrained set of moves that rest within the punishment/reward algorithm. Counterparty risk is mitigated by allowing actors to group together in semi-autonomous groups called Clans, each offering their own governance, liquidity and collateralization rules that build into Sigmadex through the SigmadexSDK. Sigmadex drives adoption by cultivating an Ethereum Canary network on the Binance Smart Chain, Providing a more realistic development experience at a much cheaper cost, and providing a less terrifying place for experiential learning, especially for those in the poorest regions of earth who need crypto the most. A core focus will be to encourage the educated educating the uneducated, and flourishing an environment where new ideas can be tested, scaled and embraced. These aspects combine to form an efficient, resilient and yet dynamic financial network that can take DeFi to the next level.

KEY WORDS

1. Blockchain 2. Defi 3. XCMP

0. Contents

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1. Introduction

To all whom it may concern:
Welcome, doers of blockchain, to the Sigmadex whitepaper. Heretofore provides an in depth reasoning and characterization for the community and technology we intend - with your help and leadership, to bootstrap and grow into a first class DeFi network. Its philosophy differs most radically from other DEX's insofar that it doesn't attempt to substitute decentralization for trust, which we believe in the end will lead to a product that will provide neither, but to build on both together in a self-reflexive, algorithmically constrained, but ever scaling fashion. The solution that emerges here focuses on providing a non-custodial solution to the acts of bridge crossing, swapping, liquidity providing, yield farming, borrowing and lending and hopefully one day leveraged instruments. While at the same time providing a set of punishment, reward and constraint policies based on game theory that make salient and constrain to rational cooperation against the desire to defect. The specific game in question is the repeated prisoners dilemma, and between canonical game theory and behavioural economics, enabling methods of communication and community are key to maximizing platform utility.

The community call to action then, if not important at the outset, is critical to the flourishing of Sigmadex. Opportunites to collaborate, communicate, and build relationships build social capital and positively correlate with increased rates of cooperation. Such an advent provides ample justification to plant its stake in the ground towards the creation of a low-stakes 'canary network' for Ethereum, a space for low-risk experiential learning in Defi, and an environment that loops in the emerging world where transactions costs remain prohibitively expensive. Community building revolves around individuals or entities organizing themselves into groups called Clans, which build their own custom DEX logic and governance into Sigmadex, providing rules on how

Sigmadex distributes capital through the SigmadexSDK. It aught to be through working together to create novel Defi, educating each other about how it works, that the clan grows and becomes more successful. If there is no silver bullet to AMM, than it remains logical to become amorphus, and allow Sigmadex not to rest soley on a single method of being.

The structure of the whitepaper is as follows, we begin with a more indepth description of the problem and solution statements, followed by opening up the reasoning behind the community call to action, than characterizing the game theory behind the key ingredient, the honourbox mechanism, and henceforth describing how the Clan formation, the sigmadex engine, the SDEX token, and how the core DEX all work. Preceding the conclusion a brief outlook noting the high scale technological ambitions the platform eventually seeks to explore and hopefully achieve.

2. Problem and Solution Statement

2.1. Introduction—Regardless if blockchain enables the creation of trustless architectures, trust is still foundational to the flourishing of financial networks. It is the negative externalities accrued from misplaced trust and being stuck without options that led to the desire to decentralize in the first place. Current solutions in the DEX landscape do a great job providing a trustless experience, but in the same fashion forgo any opportunity for efficiency gains begotten by it. Sigmadex's non-custodial, and repeated prisoners dilemma- punishment/reward strategy offers a pathway were the desires of decentralization are kept intact, while still being able to scale on social capital. This section heretofore briefly notes how Sigmadex comes together as an innovative solution to DeFi's open questions of Safe Bridging, Whale Proofing, Volatility events, and excessive overcollateralization requirements.

2.2. Why a Non-Custodial Bridging Solution is Needed—Solutions to the challenge of blockchain interoperability are a current open question in the DLT community. While decentralized solutions have been attempted utilizing PoA or PoS validator networks, at the end of the day, these solutions are economically bounded over how much is staked or bonded by validators. In the world where there is always a bigger whale, even these decentralized architectures must resort to centralized strategies like enable/disable bridge from a superaccount, or implement less than savoury smart contract upgrade architectures to fully close the system. Indeed, in my own review of the space in general, and especially in respect to low collateralization environments, the statement ”We formalize the underlying research problem and show that CCC (cross chain communication) is impossible without a trusted third party, contrary to common beliefs in the blockchain community”.[1] is well appreciated.

If one than assumed, by the prior source, that trust-less, decentralized bridges are impossible in nature, than the solution to blockchain interoperability must be approached from a different perspective. How would one go about providing a guarantee that a users crypto cannot be stranded, while at the same time providing a guarantee of the bridges accounting integrity? This question is answered here with the honour box bridging architecture, allowing a user to be 100 percent certain they can get their crypto out in case of emergency, as it really never leaves his custody, while actions on the other side are subject to a punishment/reward system that constrains moves on the DEX by the repeated prisoners dilemma. The goal exposed to the user is simple, self stake tokens in an honour box, receive tokens on the other chain, and use Sigmadex. If the user chooses to engage in bad behaviour, they are punished by the seizure of their honourbox to be placed on the secondary market for a process called redemption, by which another user can payout that who got scammed, plus a fee, to start with that honourbox, instead of from scratch. We will see there are a number of ways to increase the value of ones honourbox beyond faithful platform use, such as self KYC, sinking gas fees into cosmetic upgrades, and much more.

2.3. Whale Proofing: Addressing Volatility with Liquidity Timelocking—Thin orderbooks are a fact of life that every cryptocurrency has too wade through on its journey into the instrument it desires to be. The price dynamics in such systems are often antithetical to the use of the system itself and forces all players, centralized or decentralized, to resort to artificial strategies to manage the tokens value. Unsavoury antics such as wash trading, buy and sell walls and tape spoofing are all in play in an effort to bring an ounce of volatility dampening to the asset. Unfortunately, as seen with many crypto projects, the requirement to build this infrastructure exposes organizations to the malincentives of pumping and dumping, rug pulling and self hacking. The decentralized story presents its own challenges, one being the incentive to liquidity provide a mooning token exposes those interests to alot of divergence loss (impermanent loss) by definition. In the low collateralization, start up project environment, liquidity provision resembles more of a service than an economically sensible investment. To address these concerns, and to bring the project in line with the goal of creating a hub for Defi education, experimentation and innovation, Sigmadex allows liquidity providers to signal to the market their intent to service their project with timelocking.

2.4. Tolerating Mimetic Resonance: Resisting Flash Crashes with Community driven and governed liquidity pool models within Sigmadex—Mimetic theory, as penned by the philosopher Rene Girard appears well described by his phrase "Man is the creature who does not know what to desire, and he turns to others in order to make up his mind. We desire what others desire because we imitate their desires." and is undoubtedly well applied to characterizing the nature of price volatility in the age of information. In cryptocurrency specifically, where many instruments are hinged on ETH, which correlates heavily with BTC, all it takes is a single tweet to trigger to cascade into a hurricane of volatility. In the world of small collateralized, startup crypto's, its all to easy to do everything right, but to be driven to malincentive in a wrong place, wrong time mimetic resonance cascade; to be rugged pulled, stranded on the wrong end of a bridge, or having a contract upgraded into something one wouldn't of ever invested in. In the face of such entropic- small changes in inital state lead to drastic differences, chaos, and the mimetic resonant nature of price volatility, the question asked at Sigmadex was how an DEX architecture could be construed so as to mitigate the desire to act on malincentives in the wake of these affects.

Like how a wall made of many sized bricks is more tolerant to an earthquake than one built of just a single size, Sigmadex provides the infrastructure to become a heterogeneously composed financial protocol by allowing users to build different types of exchange mechanisms and integrate into Sigmadex with the SigmadexSDK. The sum total of each of these subprotocols, with their own algorithms and governance functions, make the sum total of Sigmadex, and represents a core call to action for the community, to create a heterogenous and amorphous DEX to meet the chaos of tomorrow. As mimetic resonance passes through the DEX, not all protocols will react the same way, tempering what feedback loops vortex into existence compared to homogeneous, centrally developed protocols.

2.5. Reducing overcollaterization and moving into undercollaterization with Sigmadex Risk Index and Honour Staking—In the world of 0% fractional reserve banking, where effectively entire depository institutions are uncollateralized, the over-collateralization requirements resting over %300 for the Canonical lending protocols leaves a clear target at a great distance. Many undercollateralization techniques, resting on a form of KYC, a central authority, or the restriction to less volatile assets, rest outside of Sigmadexes' principles on decentralization, and are not well suited to low cap startup crypto projects. The solution provided herein allows users to stake their honour points accumulated throughout platform usage to lower collateralization rates, and the creation of an algorithmic collateralization engine.

3. The Community Call to Action

3.1. Introduction—

3.2. The Need for an Ethereum Canary Network—- cronje's need to dev in prod, spiel
- Justification: realistic blocktimes, defragmenting the space, enabling defi's plug and play
- miner malincentives
- polkadots canary network
- deving in prod on BSC

3.3. The Need for experiential learning in DeFi—- Crypto is mathematically complex, jargon filled and ever changing, getting the confidance to create a transaction is taxing in itself - Learning by Doing is more effective than learning by seeing or reading - Intuition is the foundation by which innovation scaffolds itself - Communities teaching each other cements knowledge

3.4. The Rich Mans Game no More: Enabling Emerging Markets—- Special concerns for The Emerging world, Pakistan, India, Nigeria, Argentina, Venezuela

3.5. Cultivating Creativity and Innovation—- low risk of failure + experiential learning + canary network + growth incentives = Fertile ground for new DeFi

3.6. Conclusion—

4. The Honourbox

4.1. Introduction—Solutions to the challenge of blockchain interoperability are a current open question in the DLT community. While decentralized solutions have been attempted utilizing PoA or PoS validator networks, at the end of the day, these solutions are economically bounded over how much is staked or bonded by validators. In the world where there is always a bigger whale, even these decentralized architectures must resort to centralized strategies like enable/disable bridge from a superaccount, or implement less than savoury smart contract upgrade architectures to fully close the system. Indeed, in my own review of the space in general, and especially in respect to low collateralization environments, the statement "We formalize the underlying research problem and show that CCC (cross chain communication) is impossible without a trusted third party, contrary to common beliefs in the blockchain community".[1] is well appreciated.

If one than assumed, by the prior source, that trust-less, decentralized bridges are impossible in nature, than the solution to blockchain interoperability must be approached from a different perspective. How would one go about providing a guarantee that a users crypto cannot be stranded, while at the same time providing a guarantee of the bridges accounting integrity? The solution provided herein, the honour box bridging architecture, allows a user to be 100 percent certain they can get their crypto out in case of emergency, as it really never leaves his custody, while actions on the other side are subject to a punishment/reward system that constrains moves onthe DEX by the repeated prisoners dilemma. The goal exposed to the user is simple, self stake tokens in an honour box, receive tokens on the other chain, and use Sigmadex. If the user chooses to engage in bad behaviour, they are punished by the seizure of ones honourbox to be placed on the secondary market for a process called redemption, by which another user can payout that who got scammed, plus a fee, to start with that honourbox, instead of from scatch. We will see there are a number of ways to increase the value of ones honourbox beyond faithful platform use, such as self KYC, sinking gas fees into cosmetic upgrades, and much more.

The structure of the following paper is as follows, we begin with a review of the repeated prisoners dilemma to understand how even rational players will choose cooperate if they believe the other user is likely enough to continue using Sigmadex in the future. We than apply this model upon the decision to honour or dishonour a swap agreement on sigmadex. We than discuss the risk-free max-swap amount as the point where the critical probability is 0, the area where it is functionally unlikely 0-5, than the areas where a user will need to use their own judgement based on the other users profile to determine the risk, and than finally when there is so much reputation that a user believes they will operate in perpetuity.

4.2. Harnessing the Repeated Prisoners Dilemma—The special glue that holds this architecture together is predicated on the idea that rational actors facing the repeated prisoners dilemma game will pick the pareto-efficient collusion strategy if they sufficiently believe the other party will play the game again given the payoffs. This uncertainty over if/when a user will dishonour resolves the paradox of backward induction and sets up "the circumstances where credible threats and promises to secure a particular strategy, such as cooperation in the prisoners' dilemma, can be made.[2]

Table 1. The Generalized Prisoners Dilemma

		Player Y: A	Player Y: B
Player X	A	(a,a)	(b,c)
	B	(c,b)	(d,d)

Where c ¿ a ¿ d ¿ b.

If the probability that the game will be played more than one time is P, and more than n times is p_n, than the expected payoff of cooperating with his counter party is

$$EPO_{coop} = a + aP + aP_2 + aP_3 + ...aP_n = \sum_{n=0}^{\infty} aP_n = \frac{a}{1-P}$$

and the expected payoff of defecting against his counter party is

$$EPO_{defect} = c + dP + dP_2 + dP_3 + ...dP_n = c + \sum_{n=0}^{\infty} dP_n = c + \frac{dP}{1-P}$$

than we can define a critical probability threshold where

$$EPO_{coop} > EPO_{defect}$$

resulting in

$$P > \frac{a-c}{d-c}$$

In other terms, If a player believes the probability that his counter party will use sigmadex at least once more after him is greater than $\frac{a-c}{d-c}$, than cooperate is not only the pareto-efficient outcome, but also the nash dominant. When P becomes so great as is practical to assume your counter party will play forever, than we can substitute P for F where

$$F = \frac{1}{1+r}$$

$$F > \frac{a-c}{d-c}$$

where F is denoted the discount rate and r the annualized rate of return of the asset

4.3. The Carrot and Stick: Honour and Honourbox Confiscation—

4.4. Managing Payoff Asymmetry—

4.5. Applying To a Swap Agreement—A most basic function of Sigmadex will be in the implementation of swaps between parties. Using the honourbox architecture, we can model the game as a prisoners dilemma between honouring and dishonouring the swap. Exogenous variables for transaction costs on both networks, the rate of return of the asset are added, the endogenous variable for swap volume is included. Parameters that characterize the swap utility and honour utility are included. Critically, a punishment strategy is implemented, that if a player dishonours their commitment, Sigmadex can seize the honourbox from the user, and place it into a separate marketplace. Redemption allows for the refunding of whomever got scammed, and allows a new player to not have to start from the bottom by buying this box. This allows sigmadex to generate efficient estimates on the marginal price of honour and a boxes particular value. Mathematically, the game is of the character.

Table 2. To Honour or Dishonour a Swap Agreement

		Player Y	
		$HonourSwap$	$DishonourSwap$
2*Player X	$HonourSwap$	(a,a)	(b,c)
	$DishonourSwap$	(c,b)	(d,d)

From theses values than, a critical P can be characterized for comparison

$$P^* = \frac{\kappa + tx_{eth} - CV + BV}{-\sigma - CV}$$

Given the cost of an ethereum transfer and the economic resale value of a box, it is reasonable to characterize the max risk free swap. Before this value, the game is in fact not even a prisoners dilemma, and honouring the swap is the pareto-efficient nash equilibria. To find the max risk free swap we find the CV where P = 0

$$CV = \kappa + tx_{eth} + BV$$

After this swap range, we begin receiving positive critical values of P, When P reaches one even if the user was gauranteed to play again, defection is higher valued. This is reached in the limit

$$\lim_{CV \to \infty} \frac{\kappa + tx_{eth} - CV + BV}{-\sigma - CV} = 1$$

$$\frac{\partial P}{\partial CV} = \frac{\sigma + \kappa + tx_{eth} + BV}{(-\sigma - CV)^2}$$

In order for a user to increase the volume they can swap, a user can look to increasing the value of their box in several ways. Among them being to accumulate honour points κ through faithful use of the platform, cosmetically upgrade your honourbox, volunteer for KYC (lost on new owner), among others. The Key is that every honour box is an NFT that competes for prestige and credibility that grows with the users good behaviour, opening up more risk and more prestige. The value of honour and a users box is inferred from the market price of dishonoured boxes.

When a user commits a dishonour, Sigmadex has the right and obligation to remove the box from the possession of the counter party. Sigmadex than places it on the open market for NFT honourboxes. Individuals who would rather pay to win than start from scratch can purchase these boxes by refunding the person who got scammed, reclaiming the box and its honour. This process is known as redemption. Since it is a floating price, mostly based on intangibles designed to help a user inform their own opinion on another users likelyhood to use the platform again. Sigmadex bases its value on sunk costs of production- the gas cost of creating the box, cosmetically upgrading the box explicitly, and infers the value of honour by comparing the box to another with similar honour on market. Conservative estimators and linear additions to honour form a basic model to begin with, but as the platform grows its entirely reasonable to introduce non-linear honour rewards, and begin implementing machine learning models built from the behavioural economics of the prisoners dilemma to gather more reliable estimators for the Box Value and honour points. Increasing ones Box Value than decreases the required critical P by the equation

$$\frac{\partial P}{\partial BV} = -\frac{1}{(-\sigma + CV)}$$

Table 3. Payoffs

Payoff	Equation	Comments
a	CV + σ + κ - tx_{bsc}	Cooperative payout
b	-tx_{bsc}	Price of getting scammed
c	2*CV + σ - tx_{eth} - tx_{bsc} - BV	Scamming
d	CV - tx_{eth} - tx_{bsc} - BV	Both attempting to scam

figures/to-90.png

Fig. 1. visualizing the critical P value as the swap value increases, here we can not the max risk free swap where the y-axis is zero, and the curve that characterizes how the critical value needed grows as the swap value increases

Figure 1. The idea behind honourbox upgrading is effectively similar to how Native American Peoples utilized Wampum[3] as a form of currency, honour, authority, trustworthness and much else concerning the valuation and forthrightness of their tribe. Hopefully, with the power of 3d, users will be able to create beautiful and meaningful wampums to help empower higher trust levels between participants, allowing higher volume trades with greater critical P values.

4.6. Managing Payoff Asymmetry—The framework described above is useful when considering the relative value of the coins remains roughly equal over the time staked. However, this will almost never be the case save stablecoins. The series of games that emerge coincide with 25 social dilemma games[4], and more explicitly, the alibi games[4]. The following section describes the systems by which the game returns to symmetry.

The game than, can be decomposed into an asymmetric and symmetric component

Where

$$CV_2 = CV_1 - x = CV_1 - y$$

As sigmadex in nature operates as a continuous, simultaneous game, it is to be expected that there will exist an arbitrary amount of time between a swap and a moment when a user offloads their crypto. As such, the relative value of the tokens changing after a swap will incentivize the person holding the appreciated crypto to deviate, while incentivizing the holder of the depreciated crypto to cooperate. To manage this affect, two systems are implemented. The first being the voluntary timelocking of tokens within ones honourbox, and the second being an daily honour incentive for continuing to hold appreciated crypto. One would expect that marginal value of honour to be low during the initial stages of sigmadex due to lack of demand, as such timelocking is unboxed first.

When a user deposits crypto into their honourbox, an option will be provided to enter a date alongside it that cryptographically prevents the user from withdrawing that crypto until an end date. It is worth mentioning that sigmadex will still be able to withdraw in the event of offboarding the swapped assets. In the economic model, this translates into decreasing the payoffs of defection by limiting the amount of coins that can be scammed away, an re introducing symettry by automatically offboarding the minimum required amount of the counter parties crypto to player 1. Referencing the asymmetric component we can determine the concept of minimum required timelock $CV_{1timelock}$ for the coin appreciating in value. To balance the incentives under timelock, in the event the counter party requests an offboard of player 1'c appreciated crypto thats timelocked, sigmadex automatically offboards the equivalent value of player twos stake to

Table 4. Values

Symbol	Value	Explanation
CV	Coin Value	Value of token being swapped
σ	swap Value	subjective, assumed ¿= tx_{bsc}
κ	honour Value	priced by honourbox repo market
tx_{bsc}	tx cost bsc	Transaction cost of swap on BSC
tx_{eth}	tx cost eth	cost of removing ETH from lockbox
BV	Box Value	priced by honourbox repo market

Table 5. Introducing Asymmetric coin values

		Player 2	
		HonourSwap	*DishonourSwap*
Player 1	*HonourSwap*	(a_1, a_2)	(b, c)
	DishonourSwap	(c, b)	(d_1, d_2)

Table 6. Payoffs

Payoff	Equation	Comments
a_1	$CV_2 + \sigma + \kappa - tx_{bsc}$	Cooperative payout
a_2	$CV_1 + \sigma + \kappa - tx_{bsc}$	Cooperative payout
b	$-tx_{bsc}$	Price of getting scammed
c	$CV_1 + CV_2 + \sigma - tx_{eth} - tx_{bsc} - BV$	Scamming
d_1	$CV_1 - tx_{eth} - tx_{bsc} - BV$	Both attempting to scam
d_2	$CV_2 - tx_{eth} - tx_{bsc} - BV$	Both attempting to scam

Table 7. Values

Symbol	Value	Explanation
CV_1	Coin Value of player ones stake	Value of token being swapped USD
CV_2	Coin Value of player twos stake	Value of token being swapped USD
σ	swap Value	subjective, assumed ¿= tx_{bsc}
κ	honour Value	priced by honourbox repo market
tx_{bsc}	tx cost bsc	Transaction cost of swap on BSC
tx_{eth}	tx cost eth	cost of removing ETH from lockbox
BV	Box Value	priced by honourbox repo market

Table 8. Asymmetric component

		Player 2	
		HonourSwap	*DishonourSwap*
Player 1	*HonourSwap*	$(0, x)$	$(0, 0)$
	DishonourSwap	$(0, 0)$	$(y, 0)$

the user.

Without rehashing the equations, it is sufficient to comprehend that the the timelocking of crypto reduces the payoffs of defecting strategies, offering a sort of insurance that can aid in higher volume swaps at the cost of the freedom to be able to withdrawal ones crypto at anytime and the possibility of having a portion of ones paper gains hashed onto ethereum if

Table 9. Payoffs

Payoff	Equation	Comments
x	CV_1 + σ + κ - tx_{bsc} - a_1	increased incentive to coop for p2, holder of the coin that decreased in valu
y	CV_1 - tx_{eth} + tx_{bsc} - BV - d_2	increased incentive to deviate for p1, holder of the coin that increased in va

Table 10. Symmetric component

		Player Y	
		$HonourSwap$	$DishonourSwap$
2*Player X	$HonourSwap$	(i_1, i_2)	(j, k)
	$DishonourSwap$	(k, j)	(l_1, l_2)

Table 11. Symmetric Payoffs

Payoff	Equation	Comments
i_1	CV_2 + σ + κ - tx_{bsc}	Cooperative payout
i_2	CV_1 + σ + κ - tx_{bsc} - x	Cooperative payout
j	-tx_{bsc}	Price of getting scammed
k	CV_1 + CV_2 + σ - tx_{eth} - tx_{bsc} - BV	Scamming
l_1	CV_1 - tx_{eth} - tx_{bsc} - BV - y	Both attempting to scam
l_2	CV_2 - tx_{eth} - tx_{bsc} - BV	Both attempting to scam

Table 12. Timelocking the appreciated coin

		Player 2	
		$HonourSwap$	$DishonourSwap$
Player 1	$HonourSwap$	(a_1, a_2)	(b, c_2)
	$DishonourSwap$	(c_1, b)	(d_1, d_2)

ones counterparty attempts to defect. On the offboarding end, Sigmadex treats $CV_{1timelock}$ and $CV_{2-1timelock}$ as maximum required amounts, and will minimize the amount required to timelock needed to balance CV_2 and CV_1, even going so far as to remove a portion of player1s time locked funds and giving it back to him, to provide PD game symmetry in the wave of token volatility

$$CV_2 = CV_1 - x = CV_1 - y$$

Returning back to this function, a secondary system for managing token volatility comes into play when sigmadex reaches enough usage that the market for dishonoured boxes is active enough to return the shadow price of a point of honour. A user holding the appreciated crypto is than awarded daily with additional honour points per the marginal price of honour to quench the temptation of defection. This amount would be equal to x and y in the above equation.

Table 13. Payoffs

Payoff	Equation	Comments
a_1	$CV_2 + \sigma + \kappa$ - tx_{bsc}	Cooperative payout
a_2	$CV_1 + \sigma + \kappa$ - tx_{bsc}	Cooperative payout
b	-tx_{bsc}	Price of getting scammed
c_1	CV_1 - $CV_{1timelock} + CV_2 + \sigma$ - tx_{eth} - tx_{bsc} - BV	Scamming
c_2	$CV_1 + CV_2$ - $CV_{2-1timelock} + \sigma$ - tx_{eth} - tx_{bsc} - BV	Scamming
d_1	CV_1 - $CV_{1timelock}$ - tx_{eth} - tx_{bsc} - BV	Both attempting to scam
d_2	CV_2 - $CV_{2-1timelock}$ - tx_{eth} - tx_{bsc} - BV	Both attempting to scam

Table 14. Values

Symbol	Value	Explanation
CV_1	Coin Value of player ones stake	Value of token being swapped USD
CV_2	Coin Value of player twos stake	Value of token being swapped USD
$CV_{1timelock}$	Coin Value of player ones timelock	amount inaccessible to p1
$CV_{2-1timelock}$	Coin Value of player ones timelock in p2 crypto	amount automatically swapped to p1 if p2 offb
σ	swap Value	subjective, assumed ¿= tx_{bsc}
κ	honour Value	priced by honourbox repo market
tx_{bsc}	tx cost bsc	Transaction cost of swap on BSC
tx_{eth}	tx cost eth	cost of removing ETH from lockbox
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4.7. Applying To Liquidity Provision—

4.8. Applying to Yield Farming—

4.9. Applying To the Borrowing, Lending and Collateralization of Assets—

4.10. The Market for Dishonoured Boxes—

4.11. Conclusion—A Novel Bridging Architecture that brings a degree of control back to the user given the impossibility of a bridges existence without a central 3rd party is presented. The solution embraces the trust of rational actors operating in a repeated prisoners dilemma game. Tokens are never removed from the custody of the user crossing the bridge, solving the centralization problem. Guarantees of the stakes legitimacy are kept with a carrot and stick strategy that promises more network utility for good behaviour, and loss of network utility with bad. The idea of a minimum-swap amount is disfavoured for the idea of max risk-free swap, and probabilistically favoured swaps. A user relies on various forms of trust signals to determine if they think the probability of their counterparty using Sigmadex again to compare against the critical P value calculated by the algorithm. Token Volatility is managed by teasing apart the asymmetric and symmetric component of the game, and offering tools and policies that re-balance the game, such as volunteer timelocking of tokens, and the introduction of additional honour incentives for holders of appreciated assets.

5. Clan Formation

5.1. Introduction—

5.2. Minimizing Counter Party risk with the grouping of Honourboxes—- Actors grouping together by pooling their honourboxes into clans
- Game theory model that illustrates the distribution of payouts over honourboxes, mitigating counter party risk

5.3. Clan Creation and Integration with the SigmadexSDK—- Using the SigmadexSDK to deploy custom smart contracts and tools that builds into sigmadex

5.4. Clan Governance and the management of their own unique DeFi—- Separate governance tokens for each pool give a higher level of impact per user

5.5. Mimetic Resonance Resistance: The Emergence of a Heterogenously composed DEX through semi-autonomous Clans—- emergence a dex with spontaneously emerging AMM with different rules, all integrated atop sigmadex, offers different risk and utility profiles that will be resilient to price changes in their own way

5.6. Conclusion—

6. The Sigmadex Engine

6.1. Introduction—

6.2. Bridge Manager—- event listener, core accounting system that mints and tracks the validity of honourboxes on a block by block basis

6.3. Judge, Jury and Executioner: The Arbiter of Sigmadex—- the powers of arbitration, judgement and confiscation of honourboxes

6.4. Saliencer: Making Payoffs Obvious Between Parties—- How game payoffs are made obvious to actors to inform their decision, and to maximize cooperative gains

6.5. Algorithmic Collaterization Engine—- How collateral values are calculated in sigmadex

6.6. Aggregator: Offboarding as a Rollup—Rolling up the crypto offramp for scalability, because why not.

6.7. Conclusion—

7. The Cryptoeconomics of the SDEX Token

7.1. Introduction—

7.2. The Token Generation Event—

7.3. Token Model—

7.4. Burn and Mint Balancing Mechanism—describing the burn mint mechanism and its similarity to pancakeswap

7.5. Platform Utility Model—

7.6. Conclusion—

8. The Decentralized Exchange

8.1. Introduction—

8.2. Bootstrapping the Network with a Constant Products Liquidity Model—The base DEX

8.3. Managing Volatility with Liquidity Timelocking—whale protection with timelocking

8.4. Managing Overcollaterization with the Sigma Risk Index—building in the sigma risk index for users to understand why collateral rates are changing

8.5. Conclusion—

9. Over the Horizon: Highscale Technological Ambitions

9.1. Introduction—

9.2. Omnichain System Bridged by Honourboxes—omnichain bridging with honourboxes like polkadot, fantom, polygon (matic) and more

9.3. Becoming the Hub of Defi Education and Innovation—Zeroing in on cultivating experiental learning, to providing an optimal blockchain dev environment and a platform to begin testing and scaling the newest innovations in DeFi

9.4. Increasing Network Cooperation Rates by Nudging with the Behavioural Economics of the Repeated Prisoners Dilemma—Utilizing machine learning and behavioural economics to capture additional rates of cooperation

9.5. Spontaneously Evolving Amorphous DEX—Successfull user DeFi experiments gain popularity and scale within Sigmadex, offering a path to remain on the edge of innovation without dictating usage to users with 'upgrades'

9.6. Precognition with Machine Learning—Vacuuming additional market data and applying it to sigmadex

9.7. Quantum Honourboxes—Expressing honourboxes as entangled or superimposed applying the research in the quantum prisoners dilemma games
Ocacle calls to Quantum cloud APIs

9.8. Conclusion—

10. Conclusion

Notes and References

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