RIVCoin: an alternative, integrated, CeFi/DeFi-Vaulted Cryptocurrency

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Abstract

This whitepaper introduces RIVCoin, a cryptocurrency built on Cøsmos, fully stabilized by a diversified portfolio of both CeFi and DeFi assets, available in a digital, non-custodial wallet called RIV Wallet, that aims to provide Users an easy way to access the cryptocurrency markets, compliant to the strictest AML laws and regulations up to date. The token is a cryptocurrency at any time stabilized by a basket of assets: reserves are invested in a portfolio composed long term by 50% of CeFi assets, comprised of Fixed Income, Equity, Mutual and Hedge Funds and 50% of diversified strategies focused on digital assets, mainly staking and LP farming on the major, battle tested DeFi protocols. The cryptocurrency, as well as the dollar before Bretton Woods, is always fully stabilized by vaulted proof of assets: it is born and managed as a decentralized token, minted by a Decentralized Autonomous Organization, and entirely stabilized by assets evaluated by professional independent third parties. Users will trade, pool, and exchange the token without any intermediary, being able to merge them into a Liquidity Pool whose rewards will be composed by both the trading fees and the liquidity rewards derived from the reserve's seigniorage, that should affect the token's price movement.

In the long run, RIVCoin holders will also have access to an ecosystem of added-value services that will further increase the token's value. Our cryptocurrency is built to be Proof of Stake (PoS - energy saver), Proof of Asset (PoA - stabilized) and Proof of Liquidity (PoL – market provided).

RIVCoin allows the User to enter the cryptocurrency market easily, without experiencing unjustified huge price depreciations, being the reserves pledged in last resort in favour of the users. Moreover, using RIV Wallet will allow the User to perform KYC/AML procedures that comply with the latest international regulatory FATF-GAFI VASP framework. The Liquidity Pool fair incentive mechanism is executed such that it will force a de facto democratic redistribution of wealth: Users who wish and decide to pool RIVCoin in the Liquidity Pool will receive additional RIVCoin for themselves, and new RIVCoin are minted when the reserves increase in value or in case of purchase of new RIVCoin. All wealthier Users are then accepting a redistribution of income, to the benefit of those who have purchased less tokens. In (Cooperative) Game Theory, maximization of the economic benefit of the ecosystem is achieved when players' incentives are perfectly aligned. The proposed model allows for alignment of incentives: decreasing the risk exposure by wealthier Users, but implicitly increasing that of smaller ones to a level perceived by them as still sustainable and never creating ultra-speculative positions (according to H.P. Minsky definition, "when the incoming flows are not sufficient even to pay interest, so that it is necessary to apply for new loans both to repay the principal portion of the initial loan but also to honor the payment of the related interest"). In other words, wealthier Users stabilize the risk associated with the market portfolios of the reserves invested in Centralized and Decentralized Finance, without falling into the "bet scheme". Users indirectly benefit from the access to the rewards of sophisticated cryptocurrency portfolios hitherto precluded to them, as well as having access to a real redistribution of wealth, without this turning into a disadvantage for the wealthy User, who benefits from the greater stability created by the huge influx of smaller Users. Therefore, the progressive growth becomes additional value that tends to stabilize over time, optimizing RIVCoin on the systemic risk level.

1 Introduction

The access of end Users to the cryptocurrency market is one of the most crucial points to solve before cryptocurrencies can reach mainstream adoption. Although cryptocurrency has seen a spike in interest in 2021, bolstered by the last Bitcoin halving occurred in May 2020, still mainstream adoption is far from happening.
Currently, Users access the markets by the means of centralized entities (usually via Centralized Exchanges), while only the more tech-savvy Users can quickly interact with Staking Pools, Liquidity Pools and all the various DeFi protocols. While using Centralized Exchanges is usually straightforward, still the User needs to trust a centralized entity, that often does not act in the best interest of its Users.
The aim of this whitepaper is to describe the first CeFi/DeFi-stabilized cryptocurrency built on Cøsmos and whose cash reserves are invested in a diversified combination of CeFi and DeFi assets with high degree of liquidity. The token, named RIVCoin, is completely guaranteed by its reserves, and has as its primary objective to allow everyone to easily access the cryptocurrency market via carefully enforced, self-imposed boundaries.
In the system we are designing, the User can only operate after proper KYC/AML procedures have been carried out: as a result, there is total transparency on who the Users are, drastically reducing the possibility of frauds, criminal or improper use of the token.
The problem of how retail Users access the cryptocurrency market is not to be overlooked. Trust in cryptocurrency slows at its minimum when scams happens. The recent cases of CEX bankruptcies have shed a bad light on crypto assets: while these have been isolated cases of mismanagement of the User's funds, still the whole cryptocurrency market suffered from these crashes.
Crucial for every cryptocurrency is now to be, far beyond any other doubt, **Proof of Stake** (PoS - energy saver), **Proof of Asset** (PoA - stabilized) and **Proof of Liquidity** (PoL – market provided). These three core features contribute to the final tangible concept of cryptocurrency: its circulation as a medium of exchange adds value and does not represent a danger (i.e., energy-wise), it is accepted given its

stabilized intrinsic value (constantly officially evaluated), it can be always exchanged either through the Liquidity Pools or through the Vault which will act always as the Seller of Last Resort (SoLR).

The is no direct linking between the RIVCoin value and the value of the underlying reserves. Our purpose is to create a cryptocurrency whose value should gradually increase towards a reference value, with possible fluctuations around such value. The reference value will change according to market conditions, while the primary minting price could temporarily be above or below such price, to stabilize the value of the currency.

In the system we are going to build, the Vault guarantees the total number of coins minted and, as a last resort, it can always be sold to reimburse part/all the coins in circulation. The Vault Reserves are invested in a portfolio of productive assets. They fluctuate in its value, but they cannot be used for anything else except for guaranteeing the reference value of all the coins minted.

The potential "bad inflation" is a-priori defined by the total number of coins mintable. The seignorage will be used for a democratic redistribution of the wealth generated by the reserves of the Vault, subject to explicit actions to be implemented by the Users. Like Central Banks redistribute the incomes to the national banks pro-rata their participation, the same will happen with our proposed model, which will redistribute the seigniorage to all the holders that actively operate as Liquidity Providers, as an extra incentive to the normal trading fees that every Liquidity Pool redistributes. Differently by what happens in the real economy, where the seigniorage increases with the monetization of public spending not covered by tax revenues, thus creating "*bad inflation*", here the seigniorage is constantly redistributed and cannot be affected by new print of money. To some extent, it generates "good inflation".

1.1 Towards a Decentralized Store of Value

Fiat-pegged stablecoins have emerged throughout the years as a solution to the high volatility of the crypto space. The need of having a numeraire which can hold value, being an effective mean of payment and unit of account, is of the utmost importance for cryptocurrencies to be considered actual currencies.

According to the Bank of International Settlements [2], stablecoins *"evolved in order to address the failure of Bitcoin and other cryptocurrencies to provide an effective monetary and payment instrument. This reflected the preference of main market participants to base transactions and payments on sovereign fiat currencies, in particular the US dollar"*.

It is evident that the need of a stable unit of account is essential for crypto to reach mainstream adoption. Still, the relatively small market capitalization, the macro-economic uncertainties and the low appetite for risk that nowadays characterize markets hinder this possibility from the start. The need for regulation is evident, now: the more the market capitalization of cryptocurrencies and digital assets grows, the more regulators will try to capture this unregulated market into a normative frame.

Central Bank Digital Currencies (CBDCs) have emerged as a possible stable unit of account in the cryptocurrency markets. Their potential to allow faster settlement of transactions and to reduce settlement risk is an interesting innovation in Banking and Financial Markets.

Many different regulators have taken initiatives towards the development of CBDCs [9]. Among the most important projects, the National Bank of Cambodia has launched in 2020 the first CBDC in the Asia region. Other important projects have been carried out by China and Singapore. Still, Central Bank Digital Currencies suffer from centralization: it is the Central Bank that issues the currency and guarantees for the value of the currency.

There have been many classifications of stablecoins in literature. The one of G. Liao and J.Caramichael [15] classifies stablecoins as follows:

- **Public Reserve Backed Stablecoins**, such as Tether, USDC and Paxos Dollar;
- **Public Algorithmic Stablecoins**, such as DAI and FRAX;
- **Private Stablecoins**, such as the JPM Coin.

This classification highlights two distinctive frames of reference in which stablecoins

are labeled: the **public vs. private nature** of the stablecoin (i.e. whether the stablecoin can be publicly purchased and traded) and the **intrinsic nature of the pegging mechanism** (i.e. whether the stablecoin is backed by cash/cash equivalents, or if the peg is maintained through an algorithm).

Private Stablecoins are by nature centralized: there is a single entity that controls the emission of the currency. At the same time, Public Algorithmic Stablecoins heavily suffer from market downturns. This is the case of TerraUSD, collapsed in 2021 after a speculative attack.

We would like to highlight how the logic behind the general concept of stablecoin is similar to the one behind the mechanism of ETFs: instruments which exist to replicate the movements of a certain underlying. Unfortunately, if there is a disruptive detachment of correlation between the underlying to replicate and the basket used to achieve the performance of the replica, then the stablecoin will inevitably de-peg, in some cases causing the entire crash of the stablecoin.

Our solution is inscribed into the idea of providing a decentralized store of value, stabilized by a diversified portfolio of liquid assets: reserves are invested in funds holding a combination of traditional financial assets and cryptocurrencies, whose proceeds are distributed only to Liquidity Providers. At the same time, we are also focused on bringing an innovative cryptocurrency to Crypto Users, allowing them to pool the token to reap the rewards of the cryptocurrency markets without dealing with the complexity of the underlying protocols.

The cryptocurrency market still lacks a "gold standard-type" stabilized token traded in the market in the same way utility tokens are. It is fundamental to build tokens that are **fully compliant with upcoming laws and regulations** (ex. VARA recently official in Dubai, or Europe's upcoming MICAR) and **created and traded as tokens** on the main blockchain platforms and ecosystems.

Still, such tokens have immense potential, since they can allow a whole potential market of Users to enter the cryptocurrency market: namely, Users that are now worried by the entry barrier that crypto requires.

2 Solution

In this section, we will discuss how we are planning to build the first cryptocurrency on the Cøsmos ecosystem stabilized by a diversified portfolio of CeFi and DeFi assets and that distributes to Liquidity Providers its overprice and/or part or all of its seignoirage created, using an innovative approach, which combines Centralized and Decentralized Finance.

Let us recall this simple, yet so profound principle: you cannot have a meaningful store of value backed by cryptocurrencies **automatically** shielded from the inherent volatility of the crypto space. This depends on the nature itself of cryptocurrencies: assets that only exists in the digital space, without a real physical counterpart.

Stablecoins have surely contributed to provide a fixed conversion between fiat and cryptocurrencies, via different pegging mechanisms. While fiat-backed stablecoins such as Tether and USDC have been used, still they rely on a central trusted party which backs every token with possibly enough sufficient cash equivalents. Crypto-Backed Stablecoins are inherently dangerous, since their peg relies on the stability of the cryptocurrency markets: while over-collateralization still mitigates the risks of default, the mechanism is still suboptimal from the beginning, since they protect the peg via assets falling in value when the market where the token is valued loses capitalization: it should be the other way around. Algorithmic stablecoins such as TerraUST, on the other end, tried to maintain the peg via the execution of an algorithm. The result has proven inadequate to the expectations of the holders, many of whom have lost all their money.

For this reason, we believe that, to guarantee a stable and fixed conversion between cryptocurrency and fiat currency, **we must use a different approach**. And the approach is to **provide a token that is stabilized by a combination of both fiat and cryptocurrency**.

While the combination of CeFi and DeFi assets will be the guaranty for the Users of the token, at the same time the decentralized nature of the token itself, with the possibility of being freely traded on many different blockchains, will remove the need to trust a third party: nevertheless, for the Authorities the existence of third

parties also will be a further mechanism of control.
Actually, the solution we are building solves in a single cryptocurrency two different and related problems:

1. The existence of a decentralized token that is stabilized by real-world assets;
2. The existence of a cryptocurrency which allows non tech-savvy Users to enter the crypto space, while guaranteeing both liquidity and ease of use.

We are planning to solve this problem by providing a cryptocurrency called **RIVCoin**, which is minted by a Decentralized Autonomous Organization on the Cøsmos ecosystem if, and only if, a certain amount of real asset, as a reserve, is pledged (in a Vault deposit) as a minimum guarantee behind the issuing of the RIVCoin. The RIVCoin can be stored in a KYC/AML-compliant, digital non-custodial wallet called **RIV Wallet**. Afterwards, with the setup of an Osmosis Liquidity Pool, everyone will be free to purchase RIVCoin on any Cøsmos-compatible wallet.
The emission of RIVCoin will be subject to a very strict minting schedule: there will be a maximum coinbase amount of **99 billion** RIVCoin (max cap), and each RIVCoin will be issued and made available to the market only after an equivalent investment has been acquired and vaulted as a pledge for all the users. In other words: the evaluated amount of reserves vaulted and pledged represents the quasi-full hedge of all the coins minted (both the primary minted and the ones in the liquidity pools).
A reasonable, fixed part of the total token supply will be pre-allocated to a separate Wallet and it will be used to compensate the team and the most relevant advisors adherent with the best incentives schemes. These tokens will be vested proportionally to the minting activity. The larger the minting the faster will be the premium that Users will release to this Wallet. This separate Wallet will be filled with a maximum cap of 4% of all the token supply. In other words, for every 100 EUR of collateral, the final token minted could be up to 104.
RIVCoin will be a **fully decentralized cryptocurrency** whose issuing will be carried out by a DAO (called RIV DAO). Users will be able to buy RIVCoin by downloading a digital, non-custodial Wallet called RIV Wallet, and performing the

required Know Your Customer and Anti-Money Laundering procedures.

The fiat funds arising from the token sale will be securely stored in a Vault and will compose the underlying of the token. Reserves will be mostly used to purchase units of a Luxembourg SICAV RAIF (Reserved Alternative Investment Fund) in order to increase the reserves and/or the Liquidity Pool. A half of the invested reserves will go into a compartment invested in a model-driven, traditional quantitative strategy, not automated called A-RAIF, which diversifies into Fixed Income, thematic equity portfolios, and mutual/hedge funds, while the other half will be conveyed into another compartment called C-RAIF, which invests in hedge funds' portfolios composed of outright positions on crypto assets, staking, and liquidity pools on the leading Decentralized Exchanges, through a portfolio of ISIN-coded funds.

Trusted Oracles will ensure the **Proof of Assets**, being able to prove, at every given moment, that all the assets that collateralize RIVCoin exist.

It is statistically unpredictable the case of all CeFi and DeFi reserves both down to zero, but we can argue that such a case can only happen either in case of extreme natural catastrophic events or in case of extreme fraudulent schemes (i.e. Madoff, FTX, etc.). While we are optimistic that the first case will not happen, for the second case we have set a blind mechanism of enlarged trust and checks, which drastically limits the possibility of fraud.

Cryptocurrency companies should never use their tokens as collateral. Instead, the focus should be on asset-referenced tokens and network-based connected liquidity pools that serve as "large reserves" to always ensure liquidity. **The code is written to maintain an impeccably transparent and constant monitoring of the assets in the Vault**, without permitting any distraction out of the investment framework agreed with the token's owners.

We can say that RIVCoin is built on the three pillars of **MPH**: *Meritocracy* (Users gain the more they own coins and the more they make them work though the activities of pooling and staking), *Pragmatism* (Users final best interest is always covered by best effort coding and/or democratic decisions), and *Honesty* (Users have always clear rules to play with and no surprises can emerge which are not written in advance).

The way the code is written, paired with segregated and transparent accounts, does exclude any chance to use either fiat or cryptocurrencies to enter improper or fraudulent transactions. In other words, no bad surprise can happen. The price of the token can fluctuate due to demand and supply, but always in a transparent environment and within a strict legal frame.

The aim is to launch a cryptocurrency suitable to the highest number of Users. Traditional professionals are always eager to develop new skills, but they do not accept a superficial approach to risk management and to legal compliance. Hence, we developed a cryptocurrency which is suitable to CeFi and arouses the interest of DeFi Users. In fact, the code automatizes the pledge behind the token, **net of fees quasi-full guaranteed**, and at the same time, **fixing the exposure at risk of the invested reserves, that consists of 50% traditional investments and 50% virtual asset investments** (in the long run).

We will offer to our Users an innovative way of entering the crypto markets, which conjugates decentralization with a liquidity providing reward structure. This innovative way of thinking DeFi, namely a complement and not an adversary to Traditional Finance, will add value both for institutional players and smaller Users.

2.1 Business Strategy

We will now delve more in detail into our business strategy. As already mentioned before, RIVCoin is a cryptocurrency minted by a Decentralized Autonomous Organization, called RIV DAO. The issuing of RIVCoin follows a tight schedule: namely, a RIVCoin is minted for each new reference value unit of fiat currency pledged in the Vault. Since the invested reserves will increase the value of the Vault, the value of the RIVCoin should be, to some extent, affected by these increases.

When that happens, an opportunity to mint new currency emerges. In this case, a part of the increased liquidity will be cashed out and yield new RIVCoin, that will be democratically redistributed through all Liquidity Providers.

A change in the value of the reserves could (but must not) lead to a change in the same direction of the RIVCoin price, due to the perception of the Users. Reality is that the invested reserves fluctuate, and it is not due that by raising the level of the reserves the token necessarily appreciates its value. As a matter of fact, fluctuations of the RIVCoin cannot be prevented *ex ante* and, therefore, stabilization mechanisms need to be put in place as described in this Whitepaper.

If all these conditions hold, one (or more) RIVCoin are issued and sent to the User's address. From that moment onwards, the sum will be sent into the Vault. The funds are distributed on two portfolios: the first portfolio will be allocated on traditional Fixed Income investments (such as high-yields bonds), Equity and Funds (mutual/hedge) through the A-RAIF, while the other 50% will fuel a portfolio that invests in staking and LP farming on the main decentralized protocols through the C-RAIF. All the investments are executed under a strict risk management control to assure the immediate liquidity at occurrence and convenience.

Part of the returns of the reserves will be distributed to the Liquidity Providers via incentive to the pool's rewards, that will sum up to the rewards derived from trading fees.

We plan to launch RIVCoin starting from a Presale Phase, where selected Users will be able to acquire the token before the actual release. Following the Presale, the Primary Minting will be held: tokens will be sold at the reference price to all Users. We will then create a Liquidity Pool that will give holders the possibility of trading

the token on the secondary market.
More in detail:

- **First Minting - Presale**

  We will hold presales where a limited number of tokens will be released to selected Users at the reference price. To secure a spot in a presale, you will need to download RIV Wallet, perform all KYC/AML measures and digitally sign a Token Offering Request.

  The Token Offering Request is a formal document that states your intention to acquire a certain number of RIVCoin before a given date in the future. In the Token Offering Request, you must state the number of tokens you want to buy. After signing the document, you will still have 21 days if you wish to withdraw your order. The token offering will mint the number of tokens necessary to fill out the requests of all interested parties.

- **Development of RIV Wallet**

  A digital non-custodial wallet has been developed: the **RIV Wallet**. This will allow Users to buy and sell RIVCoin. The wallet will be set up and managed by **RIV Technologies FZE LTD**, 100% subsidiary of RIV Capital Luxembourg, and will have all the functionalities of a known digital non-custodial Cøsmos wallet.

  RIV Wallet will be available on the main stores for Android and iOS as soon as possible. Everyone will be able to download the wallet from the website after the registration.

- **Token Minting - Primary Minting**

  Primary Minting will then be open. Users will be able to buy RIVCoin through a predefined fiat on-ramp procedure. The minting price will initially be fixed to a reference value. The Primary Minting price will not necessarily remain the same, but it could fluctuate due to the different variables affecting the price (i.e., supply and demand, value of the reserves, etc.) subject to strict

and rigorous protocols of risk monitoring, with the sole purpose of ensuring the stabilization of the RIVCoin.

- **Liquidity Pool Bootstrap**

  We will set up a Liquidity Pool on Osmosis, that will allow Users to buy and sell RIVCoin in the secondary market against USDC and/or OSMO.

  The Pool could be incentivized with the usual rewards and/or the redistribution of the token's overprice upon the activities of bonding. The choice of if and when to redistribute the token's overprice is taken in the exclusive interest of the Users and the RIVCoin stability.

At regime, Users will be able to buy RIVCoin from both the Primary Market during the minting activity and, at a later stage, from the Secondary Market, buying it from the Liquidity Pool. When the max cap will be reached, Users will exchange the RIVCoin on a continuous secondary market.

While the Secondary Market will always be open, Primary Minting could be temporarily paused according to market conditions.

A sudden change in the RIVCoin price, or more in general a clear uptrend, signals an abrupt change in the token's demand. The Primary Market price mitigates such trends, since it creates a natural arbitrage where Users could buy the token on the primary market and sell it for a profit in the Liquidity Pool, nullifying eventual token appreciations.

For example, if it is profitable to stimulate the demand for higher prices, a temporary halt to Primary Minting could be implemented. More in general, the Primary Minting price will be used for the sole purpose of stabilizing the price on the reference value.

Also, Primary Minting could be varied according to the reserves' appreciation or depreciation. For example, if the reserves lose value, token mintings could be halted to avoid further dilution of value, or alternatively more RIVCoin could be minted at lower prices.

RIV Wallet will be available on the main App Stores for Android and iOS. We plan

to distribute the token on the leading Decentralized Exchanges.

2.2 Technical Framing - The Cøsmos Ecosystem

We operated a careful choice of all the available blockchains and ecosystems, choosing the one that, in our idea, fits best with how we want to create and evolve the project. For this reason, we have chosen to build on the **Cøsmos** ecosystem.

We will now introduce Cøsmos, describing it and motivating the reasons why we chose to build on this innovative network of blockchains. If you already know Cøsmos, or you are simply not interested in these details, you can skip this section and go directly to section three.

Cøsmos [11] is a network of independent and interconnected blockchains. Together with Polkadot [12], it is one of the so-called "third generation" blockchains: to say, blockchains that aim to solve the scalability issues of Ethereum.

Ethereum is a unicum in the blockchain space: the first decentralized platform for the creation and execution of Smart Contracts, where no party has power over the others, has been one of the main innovations in the blockchain field, fueling a vast amount of new development. From Decentralized Finance to Non-Fungible Tokens, most of the blockchain applications have been built on Ethereum. It is the most used Smart Contract platform, with thousands of DApps built on it.

Still, Ethereum has a few fundamental issues: transaction fees are high, and it is poorly scalable. That has a direct effect on the applications that are built on it: the Ethereum blockchain can quickly become congested.

We believe that Cøsmos can solve all the issues of Ethereum, providing what is called the **Internet of Blockchains**. Building on Cøsmos will mean accessing an ecosystem of independent and trusted networks, easily exchanging value with one another.

The capability of Cøsmos blockchains to communicate with each other, using the IBC Protocol, together with the use of Tendermint [13] as a consensus algorithm and the low transaction fees, allows for a secure and resilient network.

Cøsmos is a vibrant ecosystem composed of different blockchains, called **zones**. Each Cøsmos zone has its peculiarities and aims to solve a different business problem. Use cases range from DeFi and Non-Fungible Tokens minting and issuance to more specialized services, such as building decentralized cloud networks.

Decentralized networks [14] [15] allow developers to build applications where Users can invest their liquidity on DeFi protocols based on other blockchains, such as Ethereum, using decentralized and secure bridges.
The Cøsmos Hub secures the Cøsmos network: a network of validators that use a Proof of Stake, Byzantine Fault Tolerant consensus algorithm, allowing them to stake their ATOM to gain rewards. It works like a hub, letting different blockchains communicate securely with one another.
Interoperability, scalability, and low transaction fees are the main reasons we have chosen to build on Cøsmos.
Users will have the possibility of accessing a wide range of DeFi instruments, not restricted to Cøsmos blockchains. Access to DeFi protocols on Ethereum, such as Yearn.Finance or Sushiswap pools will be possible.
RIVCoin is built upon a specific Cøsmos zone called Commercio.Network, which we will describe in the following paragraph.

2.3 Commercio.Network

The platform on which RIVCoin is built is a Cøsmos Zone called **Commercio.Network** [7]. It is a low-cost, scalable blockchain with Smart Contracts for natively minting Fungible and Non-Fungible Tokens. It enables many different use cases, such as the tokenization of physical or financial assets, the creation of Self-Sovereign Identities using W3C Standards (ex. DID, DID Document), and the digital signing of documents.
Rather than building on second-generation blockchains like Ethereum or Solana, we chose to build our solution on a blockchain developed explicitly for financial applications. The use of pre-built Smart Contracts makes it easier to safely mint and distribute tokens by implementing eIDAS standards.
Commercio.Network has, in fact, many interesting features, such as:

- **High Scalability**
  Commercio.Network can manage thousands of transactions per second, providing a secure ecosystem for building and deploying blockchain applications.

Scalability is one of the key issues when choosing a blockchain: second-generation blockchains like Ethereum would not have guaranteed us the minimum throughput necessary for our ecosystem to run.

- **Low Cost**

  Transactions on Commercio.Network cost only 0.01€, plus VAT. Low transaction costs facilitate the exchange of value, allowing for a fairer ecosystem.

- **Sustainable**

  Sustainability is one of their core values. Building on a sustainable blockchain is essential. Proof of Work-based blockchains have a higher environmental impact since miners need to solve the POW algorithm to be able to mine the subsequent block on the chain.

  Commercio.Network consumes in a year the same amount of computing power that a Proof of Work-based blockchain would consume in one second. That makes the network fully sustainable and able to function without having a high environmental impact.

- **Interoperable**

  Being built on Cøsmos makes the blockchain fully interoperable. Commercio.Network can communicate with any other blockchain in the Cøsmos ecosystem using the Inter-Blockchain Communication protocol. Via Axelar or Gravity bridges, RIVCoin will be bridged in the future to the Ethereum Mainnet.

- **Legally Binding**

  Commercio.Network follows eIDAS specifications: for this reason, transactions happening on this blockchain are legally binding. Everyone willing to buy RIVCoin must undergo a rigorous KYC/AML process. In this way, we are sure that you are who you say you are.

The use of pre-built Smart Contracts makes building applications on this network reasonably easy. Commercio.Network has, in fact, six Smart Contracts ready to use:

- **eMINT**

  eMINT allows the minting of Fungible and Non-Fungible Tokens, making it possible to tokenize physical and non-physical assets.

- **eID**

  eID allows the creation of digital, Self-Sovereign Identities compliant with all the directives of W3C, allowing to create and sign Verifiable Credentials and Verifiable Presentations.

- **eSignature**

  eSignature allows you to sign PDF and XML documents digitally. Digital Signatures signed via this certificate are legally binding.

- **eDelivery**

  eDelivery allows to notarize and store any document exchange between two parties. The document exchange has the same value as any paper document exchange.

- **eArchive**

  eArchive allows you to store documents in a WORM (Write Once, Read Many) immutable object storage for decades at a minimum cost

- **eKYC**

  eKYC allows you to easily handle KYC and AML procedures, simplifying all the necessary operations.

- **ePAY**

  ePAY allows you to ask for a certified SEPA or credit card payment.

We are fully committed to developing blockchain ecosystems. For this reason, we chose to become a validator node of Commercio.Network, actively participating in the security of the protocol. Commercio.Network counts currently 96 different validators, among the most significant IT companies in Europe.

3 Governance

We plan to implement a mixed governance system to govern and direct the investments meaningfully. With this term, we are referring to a system where the regulated and authorized Asset Management Company determines the strategic asset allocation of the two macro portfolios that compose the Reserves investments: the CeFi and the DeFi one. In contrast, decisions on the percentage allocation between CeFi and DeFi can be affected (not necessarily modified) in a decentralized way.

The reserves investments will be implemented by applying pre-coded proprietary strategies, which have been fine-grained to be used in the cryptocurrency markets. RIV Capital experience in Asset Management and a consolidated realized track record have shaped the strategies to be effective in every market condition, showing a constant risk adjusted return in the top 1% of the world. Governance proposals will be blockchain-based and accessible to RIVCoin holders directly from their wallets.

Decisions affecting the rewards distribution via the incentivization of the Osmosis Liquidity Pool will be decided via internal voting. The amount of token distribution will be decided according to market conditions, performance of the reserves and need for stabilization for the price of RIVCoin. The amount of token distributed will be made available on public sources.

RIV Capital will periodically put suitable decisions to the vote: obviously, no technical decisions will be submitted with the potential consequence to compromise the stability of the asset allocation of the reserves. Only a subset of upgrade proposals will be subject to voting. RIVCoin holders can check the proposals subject to voting from their wallet's "Governance" section. They will be able to analyze the proposals in detail and discuss them.

Voting will be open at a given date and time. Users who want to vote on the governance proposal will need to submit the vote within the specified timeframe (usually one week). After the temporal window has passed, Users will not be able to cast their votes.

4 Tokenomics

In this section, the Tokenomics of the project will be described. More in detail, the following topics will be discussed:

- The minting schedule of RIVCoin
- The strategic Asset Allocation between CeFi and DeFi portfolios of reserves
- The potential rewards distribution to the Liquidity Providers

4.1 Definitions

We will start by providing the definitions of all the terms that will be used throughout the course of the section.

- **AML**: Short Term for Anti-Money Laundering, refers to laws and regulations intended to stop criminals from disguising illegally obtained funds as legitimate income.
- **Centralized Exchange (CEX)**: An online platform, owned by one or more companies, that offers custody and exchange of Digital Assets.
- **Centralized Finance (CeFi)**: The ecosystem of companies and private institutions that offer financial services related to cryptocurrency and Digital Assets. Services can range from cryptocurrency custody and trading, clearing, loans and simplified access to Staking and Liquidity Pools.
- **Decentralized Autonomous Organization (DAO)**: An organization that operates on a decentralized blockchain network governed by smart contracts, that enables its members to make decisions through a consensus mechanism.
- **Decentralized Exchange (DEX)**: A protocol that allows decentralized exchange of Digital Assets through an automatic algorithm, called Automatic Market Maker. A Decentralized Exchange is composed by one or more Liquidity Pools where users can trade without relying on intermediaries such as brokerages, exchanges or banks.

- **Decentralized Finance (DeFi)**: The offering of financial services and products, such as lending, borrowing, trading, and investing, using decentralized platforms that run on blockchain technology.
- **Digital Asset**: A term that defines any fungible or non-fungible token on a distributed ledger.
- **Farming**: Locking tokens into high-yield strategies on DeFi protocols (ex. DEXes).
- **KYC**: Short term for Know Your Customer, that is, all the procedures required by regulatory authorities that aim to identify a Users, prevent money laundering and other illegal activities.
- **Initial Liquidity Offering (ILO)**: The process of initial token distribution at the launch of a project, performed by adding Liquidity on a Decentralized Exchange.
- **ISIN**: International Securities Identification Number, a 12-digit alphanumeric code that uniquely identifies a specific security.
- **Liquidity Pool**: A Smart Contract that contains two or more digital assets, locked with the aim of providing liquidity to a Decentralized Exchange.
- **Minting**: The process of emitting a cryptocurrency on a Distributed Ledger.
- **Net Asset Value (NAV)**: The underlying value of an investment fund's assets less its liabilities, divided by the number of shares outstanding, expressed in fiat terms.
- **Presale**: Any token offering that precedes the initial offering to the public.
- **Tokenomics**: A term that indicates all the factors that define a token price, allocation and distribution to Users, including any factor that can change the token supply and/or demand (such for example token burn or incentive mechanisms).

4.2 RIVCoin

The ecosystem is fueled by RIVCoin: a cryptocurrency minted by RIV DAO that is designed to have a value which fluctuates around a stable reference. RIVCoin has a fixed cap of **99 billion tokens**. The initial selling price of the token in the primary market will be chosen according to the main fiat currencies. If market conditions vary abruptly, such as if a sudden increase in demand doubles the price of the token, RIVCoin's reference value could change. The token minting schedule will reflect such change.

Note that the reference value does not necessarily coincide with neither the primary nor the secondary minting price. To avoid price speculations different from normal supply and demand equilibriums, all main numbers will be publicly disclosed in order for the Users to be able to judge at any time.

1. **Initial Liquidity Offering (ILO) Presale**

   During the ILO Presale phase, we will collect funds from selected Users that have expressed their interest in the project. Users will acquire the token at the starting reference value.

   To secure a spot in the presale, Users need to complete all the required KYC/AML procedures. Orders will be filled using the *first come, first served* principle: whoever can reserve a spot first will be able to receive tokens before the others.

2. **DEX Sale + Residual ILO**

   Following the Presale Phase, a **Liquidity Pool** will be built. Users will be able to pool their funds for rewards directly from their Wallet to the Liquidity Pool, and freely trade their RIVCoin against USDC (as well as OSMO at the soonest). Users can decide to pool their tokens in the Osmosis Liquidity Pool and receive the reward distribution given by the transaction fees together with the pool incentives.

   After the Liquidity Pool launch, we still plan to hold a certain number of token issuing with primary token emissions (i.e. minting new tokens): both primary and secondary markets will be available in this phase.

3. **DEX Sale Only**

   After all the established RIVCoin will be issued and the maximum number of tokens is reached, the only way for Users to acquire RIVCoin will be to buy them on the secondary market, on the Liquidity Pool on Osmosis, or any other Decentralized Exchange that supports it.

We forecasted a long primary dealing minting to allow the Community to study and understand the token and familiarize with it. The period to release all the RIVCoin available could be foreseen as a decade. Within that period, it is reasonable to expect adjustments and fine tuning of the model. By that time in the long run, only a listed, secondary market will be available and all the RIVCoin will remain fully collateralized by real assets (Equity, Bonds, Funds).
We plan to open a **limited number of presales** and allot a minimum purchase for entering the presale. Presales will be announced on RIVCoin's website and on Twitter, as well as on any social media which can be used in full compliance.

4.3 Reserves Allocation

The Vault's reserves are granularly invested in a wide range of financial products, ranging from high-yield Fixed Income securities to DeFi staking and liquidity pools. On the basis of the model, we expect a close to zero delinquency rate. This makes the token fully stabilized and shields the Users from the high downward volatility usually experienced in cryptocurrency markets.
More in detail, the strategic asset allocation that backs RIVCoin is summarized as follows. In the long run:

- **50%** (or more) of the reserves will be invested in a **model-driven, traditional quantitative strategy** that diversifies into Fixed Income, thematic equity portfolios, and mutual/hedge funds.
- **Up to 50%** of the reserves will be invested in portfolios composed of **outright positions on crypto assets, staking, and liquidity pools** on the leading Decentralized Exchanges.

Diversification of the vaulted assets ensure that, if a black swan event happens, Users are shielded from catastrophic losses of the token's reserves. Of course, volatility can always increase, but the expectation is that the risk/reward will be on an optimal point, marking an acceptable position given the expected return associated to that variability in prices.

RIVCoin is born as a cryptocurrency fully stabilized by assets. As such, **its value should never eventually slow below the stabilized Net Asset Value price** of the invested reserves, since natural arbitrage mechanisms will push the price back to it.

No leverage will be ever implemented using the tokens of the Users as a collateral, no matter the haircut granted by the banking system. The code is written exclusively to build up the reserves, properly pledged in favour of all Users holding the tokens.

Portfolio allocation will be decided via selected strategies that will strike a balance between risk and reward, always in the exclusive interest of the Users and following the highest standard practice. The staking and LP farming portfolios of the reserves will be diversified enough to minimize market risk: Liquidity Pools will be chosen on the leading Decentralized Exchanges, from Osmosis to Uniswap.

4.4 Token Allocation

The allocation of tokens will follow the principles of equality and fairness. Tokens will only be issued after a user's purchase.

Also, the issuing mechanism is built such that each User, by buying RIVCoin and contributing to fill the Vault with new reserves, enables the issuing of other RIVCoin, thus actually acting as *miner* of new currency. The miner and User at time t_{-1} is RIV Capital or one of its companies within the Group investing the very first seed. The users at time t_0 are the miners of the RIVCoin minted in t_1, the Users in t_1 becomes the miners of the coins minted in t_2, and so on. Every User purchases coins already stabilized, vaulted and secured.

We believe that enabling a secondary market for RIVCoin will lead to a fairer network, allowing Users to gain full control of their investment. This contrasts

with black boxes where Users invest their money without any possibility to use and unwind it.
The goal is to create a Gold Standard for the world of cryptocurrencies, as the token is immediately convertible into assets already valued, be they CeFi or DeFi, in full credibility of the coin itself being convertible in last resort, being the Vault the "Seller of Last Resort" (SoLR).
The following rules will be strictly applied without any exception:

- The portfolio allocation is decided within the regulated and vigilated Asset Management Company managing the SICAV RAIF.
- The cryptocurrency allocation of the reserves cannot be over 50% of the total reserves. This will prevent overexposure to cryptocurrency.
- In case of a depreciation of the RIVCoin price of more the 30% of its value in a week's timeframe, the Liquidity Pool contract on Osmosis could be paused *(Safeguard Policy)*. Such pausing will have the sole purpose of preventing an excessive depreciation of the RIVCoin, safeguarding the peg to the reference value.
- In case of overshooting of the RIVCoin, the governance could decide to intervene with open market measures buying/selling RIVCoin.

4.5 Rewards, NAV and Applied Fees

At the end of each month, if the vaulted reserves have increased in value and there is a perceived changed value of RIVCoin, new tokens could eventually be distributed to RIVCoin Liquidity Providers, always with the aim to stabilize the price around the reference value. In this case, RIVCoin holders will then receive rewards in token terms, that will be calculated from the amount of RIVCoin LP Tokens they have in their Wallet directly from the Osmosis protocol. Users and analysts will always be able to verify the performance of the reserves by analyzing the RAIF's monthly NAV chart and the DAO's monthly yield. Rewards made available to Liquidity Providers will vary depending on the performance of CeFi and DeFi portfolios.

Liquidity Rewards will be paid in RIVCoin, as the standard practice. Liquidity Providers will have the opportunity to cash out and/or to reinvest the rewards. Rewards will be paid **net of performance fees**.

A **Swap Fee** (transaction fee) will be applied when the token is purchased and sold, of the amount of **0.03%**. The **Entry Fee** (paid when buying RIVCoin in the primary market) will be **5%**.

The Performance Fees, taken from the NAV appreciation of the underlying assets, will vary according to three stages of performance, calculated on a monthly basis:

- **0-9%**: **10%** Performance Fee Applied
- **9-20%**: **15%** Performance Fee Applied
- **20+%**: **25%** Performance Fee Applied

The annual **Management Fee** will correspond to **2%** of the total investment, deducted pro rata on a monthly basis.

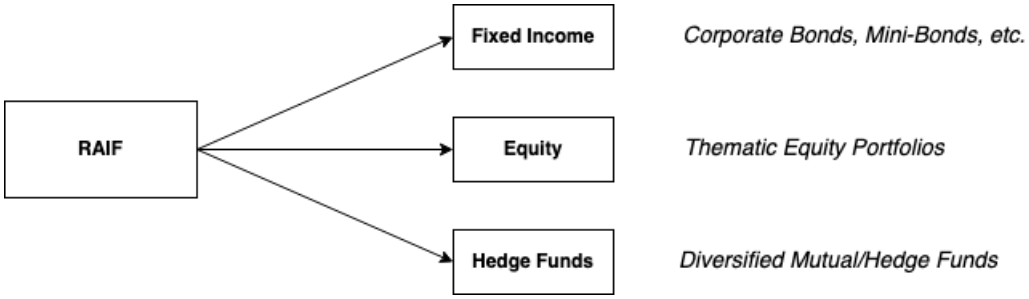
Performance Fees and Management Fees are designed only to compensate the entities involved in the stabilization mechanisms and are not in any way distributed to the final Users.

5 The underlying structure of the reserves

In this section, we will describe the Reserves Structure, explaining in detail how the mechanisms of RIVCoin Issuing and Democratic Rewards Distribution work. As we will see, the issuing of new RIVCoin is subject to a strict minting schedule: new RIVCoin will be issued if, and only if, there is the correspondent amount of reserves that backs them in the Vault.
We first need to define the two entities that are behind the Reserves investments. These entities are part of a **RAIF** (Reserved Alternative Investment Fund) [1].

Definition 1. *A **RAIF (Reserved Alternative Investment Fund)** is an investment fund based in Luxembourg, which qualifies as Alternative Investment Fund, and for this reason it is not subject to the Commission de Surveillance du Secteur Financier (CSSF) product approval.*

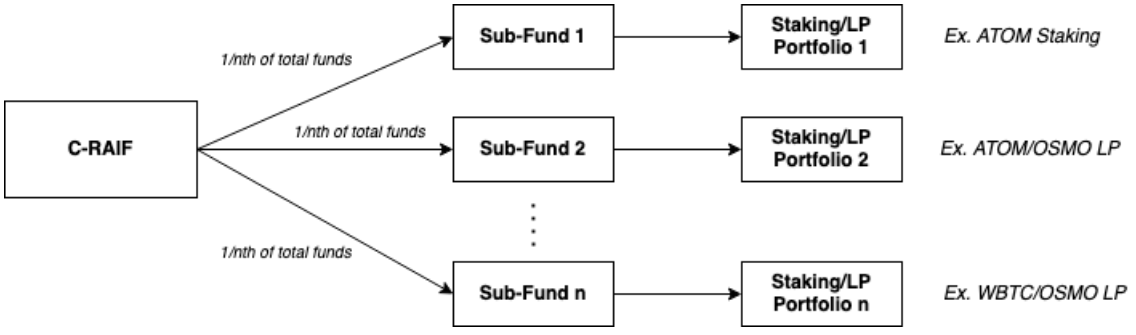
RAIF can invest in all types of assets. They must appoint an authorized external Alternative Investment Fund Manager (AIFM). Also, investment in RAIF is limited to "*well-informed investors that are able to adequately assess the risks associated with an investment in such a vehicle*". These are defined as institutional investors, professional investors and investors that are "*well-informed*", in the sense that they have confirmed to be aware of all the risks involved with investing.
As we said before, RAIFs are not subject to the approval of the CSSF. However, the fund manager needs to inform the CSSF, via regular reporting requirements.
According to *Association of the Luxembourg Fund Industry* (ALFI), "the net assets of a RAIF may not be less than 1.250.000€. This minimum must be reached within a period of twelve months following its authorization. At least 5% of the capital must be paid up at subscription". The RAIF does not need to obtain any regulatory approval and may therefore gain in efficiency in terms of time-to-market.
Here you can find an example of a RAIF structure. The following picture describes, at a very high level, the allocation of the RAIF where RIV Capital is also invested.



To be able to effectively invest in cryptocurrency while still guaranteeing liquidity of the invested funds, we will introduce a new concept called **Crypto RAIF**, or equivalently **C-RAIF**.

Definition 2. *We define **C-RAIF** a RAIF that invest in other funds whose strategies are comprised in one of the following: outright position on cryptocurrency, cryptocurrency staking and/or cryptocurrency Liquidity Pool farming, model-driven automated trading codes.*

C-RAIF allows us to build over DeFi decentralized protocols with a CeFi top layer, at the same time allowing institutional and professional investors to enter the crypto markets with a professional intermediary that is able to perform a risk analysis on the underlying assets of the Vault. Professional investors and institutions don't have to manage a Hardware Wallet, safely store their keys and actively thinking about the protection of their account.
A structure of a typical C-RAIF is described in the following picture:



In this case, the C-RAIF invests its available capital in parts (not necessarily equal) among the sub-funds: these can be any other fund, ISIN coded, investing in long only positions on cryptocurrencies, Liquidity Pool farming or staking. The sub-fund takes care of the complexity of the investment, performing practically all the steps required to allocate the User's funds in the given DeFi protocol (ex. by physically putting the assets at stake or providing liquidity to Liquidity Pools).
In our model, a half of the invested reserves will go into a RAIF that invests in Fixed Income, Equity and Mutual/Hedge Funds strategies, while the other half will be routed towards a C-RAIF that will apply a risk-balanced portfolio allocation, to minimize drawdowns at the same time guaranteeing high yields and minimizing the systemic delinquency rate of the crypto market.
We will now describe more in detail how the flows of RIVCoin issuing and reward distribution work, by providing a description of the algorithm and describing its main parts. Before starting to delve into the details, we need to define all the variables involved in the current flows:

- **Vault**: The Vault it is the legal entity containing the collateral assets of RIVCoin. It is composed of a Bank Account that will contain the fiat currency sent by the users for the minting of new RIVCoin, and a Deposit Account, where the units of the RAIF pertaining to RIV Capital are stored. RAIF units are locked as pledge in the Vault, guaranteeing the stability of RIVCoin. These units can be sold only as a Sale of Last Resort, and are stored to guarantee the User's funds. Every time a User wants to cash out, the funds will be at minimum guaranteed by these assets.

- **A-RAIF**: This is a RAIF managed by a Luxembourg Asset Management Company, authorized and regulated in Luxembourg. This RAIF invests using the strategy described above;

- **C-RAIF**: This is a separate and segregated compartment of the same RAIF above, that will route the invested capital to staking and LP portfolios;
- **Liquidity Pool**: This entity represents the Osmosis Liquidity Pool that allows RIVCoin to be exchanged for USDC and several other cryptocurrency pairs.

The entities involved in the Issuing and Liquidity Rewards Distribution flows are the following:

- **Trusted Oracle**: The Trusted Oracle is an off-chain component, that notifies the DAO for the issuing of new RIVCoin and buys new shares of the A-RAIF and C-RAIF after new Users buy RIVCoin
- **RIV-DAO**: The Decentralized Autonomous Organization that issues new RIVCoin and sends them to the Users' RIV Wallet. It is subject to a mixed governance.

We will now describe the two main flows of RIVCoin Primary Issuing and Liquidity Rewards Issuing, which will allow RIVCoin Liquidity Providers to earn rewards from their activity.

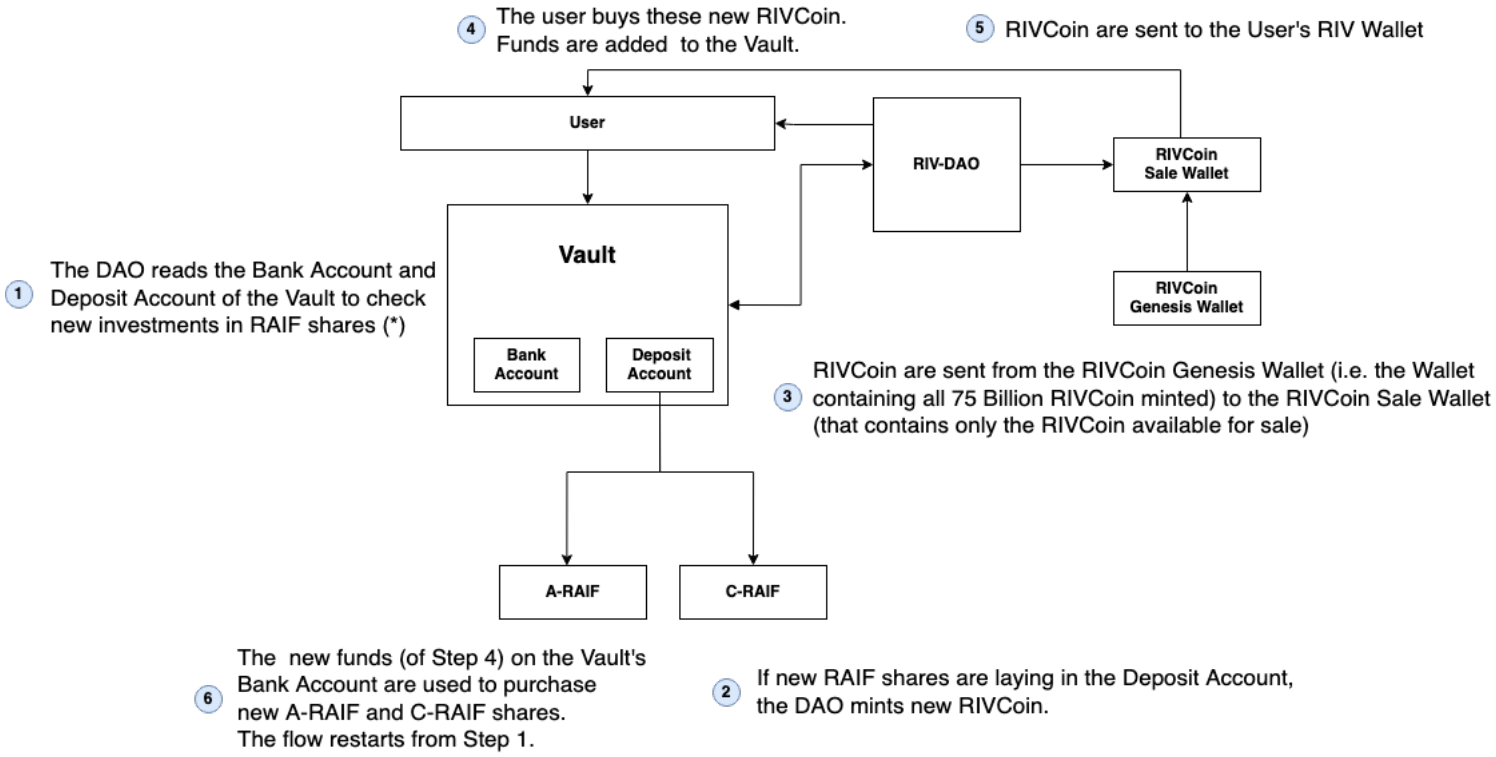
5.1 Flow - RIVCoin Minting

The Trusted Oracle is the component which is deputed to automatically manage the Issuing Flow, by checking the presence of new fiat currency in the Vault, notifying the DAO when new RIVCoin can be issued and ensuring that the User's funds lay in the Deposit Account. The Trusted Oracle will notify each day the DAO Smart Contract whether new RIVCoin can be issued, and if yes, the number of new RIVCoin to be issued. Since Users transactions are written on the blockchain, the DAO knows all the transactions happening each day and the amount of each transaction. The DAO proceeds to mint RIVCoin and send them to the User's wallet, after the user purchase has been made.
At the start of the flow, to be able to issue new RIVCoin, enough cash needs to lay

in the Vault's Bank Account. For this reason, RIV Capital will bootstrap the flow with the first cash deposit in the Vault, giving birth to the first 250.000 RIVCoin. The reserves of the Vault can vary in time following the value of the Vault's investments: this should always, to some extent, affect the price of the RIVCoin in the secondary market, but the redistribution of the overprice to the Liquidity Providers will mitigate any big price movement.

After a new investment has been pledged into the Vault, there is the possibility for new RIVCoin to be minted. If tokens have been bought by a User and the equivalent amount of fiat currency has been pledged in the Vault, then the Trusted Oracle proceeds to notify the DAO of the new number of RIVCoin to be issued. The DAO will then issue new RIVCoin and send them to the Users who bought them.

Here you can find a Use Case Diagram that graphically describes what we have just said before.



(*) When the flow starts, RIV Capital will buy the first RAIF Shares, giving birth to the process. At each subsequent step each user will, with his investment, "mine" new RIVCoin, that will be bought by the next user.

5.2 Flow - Liquidity Rewards Distribution

Let us now examine how, in our model, rewards are distributed to Liquidity Providers. The last day of each month, the Vault's Directors determine how many RIVCoin needs to be distributed as rewards the following month (in addition of trading fees rewards), by computing, also considering market conditions, the effective reserves value update. This will determine whether a rewards distribution will hold for the subsequent month on the Osmosis Liquidity Pool.

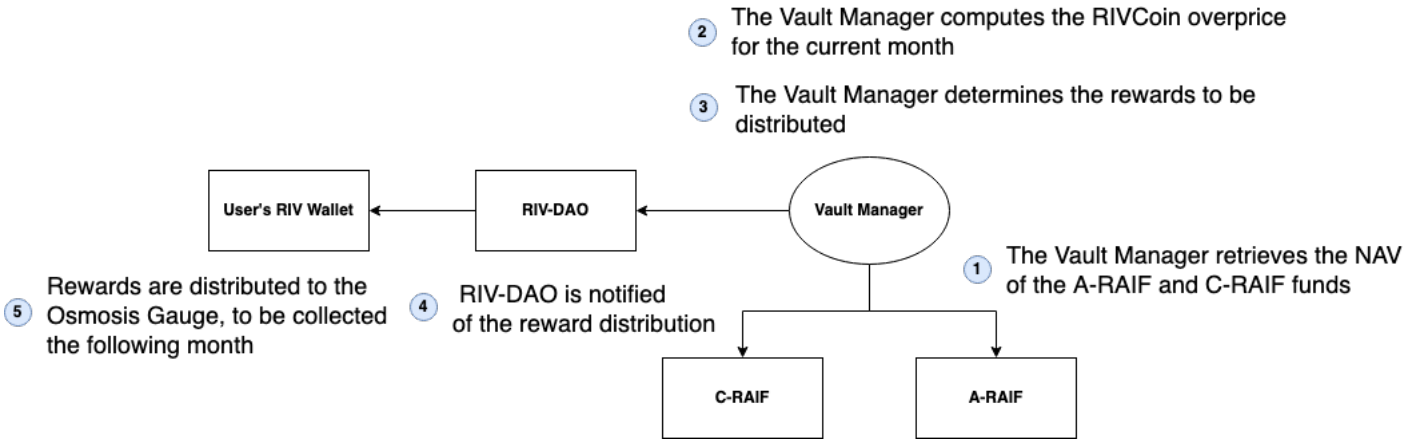
When a Rewards Distribution takes place, there will be a proceeds distribution of a certain percentage of the reserves appreciation value to the Liquidity Providers, via the Osmosis gauge.

If RIVCoin has no appreciation for the current month, such as for example if the reserves have lost value, the only incentive that could be distributed to the Liquidity Providers are those acquired via trading fees and/or not eventual cashed returns.

In the occurrence of an unattended event (such as for example a "bank run") Users will be able to redeem the equivalent fiat value of the reserves underlying RIVCoin, simply dividing the total amount of the reserves locked in the Vault by the number of RIVCoin in circulation.

Upon the occurrence of the distribution of the overprice, which is also determined by the increase in purchases, a democratic redistribution of wealth is performed, where all Users who buy RIVCoin do that with the intention of creating additional wealth for themselves in the long run, accepting a redistribution of wealth even to the benefit of those who have invested much less. Of course, the more one provides in terms of liquidity pooling and/or staking, the bigger the potential rewards.

Here you can find the Use Case Diagram corresponding to the scenario described above:


2 The Vault Manager computes the RIVCoin overprice for the current month
3 The Vault Manager determines the rewards to be distributed
User's RIV Wallet
RIV-DAO
Vault Manager
1 The Vault Manager retrieves the NAV of the A-RAIF and C-RAIF funds
5 Rewards are distributed to the Osmosis Gauge, to be collected the following month
4 RIV-DAO is notified of the reward distribution
C-RAIF
A-RAIF

6 Information, Noise and Equilibrium

6.1 Introduction

In what follows we use some crucial results known in the literature to prove that an higher number of informed and uninformed traders contributes to informational efficiency of the market, by making prices of any security less volatile. To do so, we take advantage of some results contained in several contributions in a well consolidated literature. We re-interpret the results obtained by Kyle (1989), Rindi (2008) and DeJong and Rindi (2009), to focus on the role of information diffusion, when agents can have differential information about the price of single risky security.

As a preview of our results, we show that:

1. In a model with rational expectations, but with agents having differential information, increasing the number of agents (uninformed and informed) improves informational efficiency and lowers price volatility.

2. Increasing the number of both informed and uninformed agents will reduce the negative impact played by noise traders.

3. After an increase in the number of agents, the return will be lower, as the result of the improved ability of prices in conveying information to the market, and the volatility will be lower as well.

4. In Fully Revealing Rational Expectations equilibrium, when the number of agents (both informed and uninformed) tends to be very large, private information becomes public, since uninformed agents learn about the private signal owned by informed agents.

As a general comment, increasing the number of agents improve the quality of the market as a whole, lowering price volatility. Increasing the number of agents creates a problem relative to the supply of the risky security: to cope with higher demand, without incurring into the risk to have price jumps, the direct consequence of this will be a cheaper price for the risky security. To guarantee a larger access to risky

investments, making the demand higher, the single price should be smaller than in the case with a restricted demand.

Larger is the number of participants to the market, smaller is going to be the unitary price of each security, lower its volatility and higher the informational efficiency conveyed by prices.

6.2 The Model

Let us start with designing a market with asymmetric information. Assume there exists two groups of agents, both are assumed to be risk-averse: N are assumed to be informed and M are assumed to be uninformed. Intuitively, we can imagine that informed agents are professional traders and uninformed traders are individual non-professional traders, considering trading activity almost like a spare-time job. Furthermore, we assume the presence of noise traders in measure equal to Z: these individuals are assumed to be interpreted like automated traders.

The utility function for both informed and non-informed traders can be represented by following mean-variance utility:

$$U = E(\tilde{W}) - \frac{\alpha}{2} Var(\tilde{W}) \tag{1}$$

where α is the risk aversion coefficient and $\tilde{W}$ is the end of period wealth of each agent given by:

$$\tilde{W} = Y(\tilde{S} - p) \tag{2}$$

where Y is the demand of each agent, p is the today's price of the security, and $\tilde{S}$ is the future's price of the security, which is assumed to be a random variable, with an i.i.d. normally distributed probability density function:

$$f(\tilde{S}) \sim N(S, \sigma_S^2) \tag{3}$$

where, of course, $E(\tilde{S}) = S$, $Var(\tilde{S}) = \sigma_S^2$.

For simplicity, we assume that each agent has an initial endowment of risky asset equal to zero, and there is not a risk-free security. These assumptions are non-crucial to our results, but help us to save the burden of notation.

By maximizing utility (1) subjected to wealth accumulation constraint (2), we obtain the following demand of risky asset expressed by:

$$Y = \frac{E(\tilde{S}) - p}{\alpha Var(\tilde{S})} \tag{4}$$

Equation (4) is the demand expressed by each agent who does not have any private information: she makes a forecast about the future evolution of the security price $\tilde{S}$. Each agent expects to gain a return measured by the difference from future price $\tilde{S}$ and current price p: $\tilde{R} = \tilde{S} - p$.
The demand is weighted by the volatility of the risky asset, measured by its variance, $Var(\tilde{S}) = \sigma_S^2$ and by risk aversion coefficient α: higher risk aversion, and higher variance, lower will be demand for the risky security.
Furthermore, we assume that informed trader, here assumed to be of mass N, receive a signal $\tilde{X}$ at time $t = 0$ about the behavior of future asset $\tilde{S}$. The signal is private, proprietary information of only informed traders.
There can be many examples of such situation: we can imagine, for example, that the issuance of a digital coin can be reserved to only few, selected investors. Therefore, the question we need to answer is whether extending this possibility to many other non-informed traders can improve the informational quality of the market and reduce the volatility of the asset.
The private signal received by informed traders is assumed to be a random variable conditional to the evolution of future security's price $\tilde{X}|\tilde{S}$, with a probability density function i.i.d. and normal: $f(\tilde{X}|\tilde{S})$:

$$f(\tilde{X}|\tilde{S}) \sim N(\tilde{S}, \sigma_X^2) \tag{5}$$

Clearly, the expected value of the signal is exactly equal to the future value of the security: on average the signal is a non-distorted forecast of the future price. The

informed agent makes her decisions based on information coming from the signal given the probability density (5).

Therefore, the demand of informed agent Y_I is expressed as follows:

$$Y_I = \frac{E(\tilde{S}|\tilde{X}) - p}{\alpha Var(\tilde{S}|\tilde{X})} \tag{6}$$

As a final step, we explicit the role of noise traders, whose demand function is assumed to be a pure random variable $\tilde{h}$ is normally distributed and i.i.d., such that:

$$f(\tilde{h}) \sim N(0, \sigma_h^2) \tag{7}$$

To find equilibrium level of prices, we need to obtain an analytical expression for the statistics $E(\tilde{S}|\tilde{X})$ and $Var(\tilde{S}|\tilde{X})$ included in 6. To this purpose, we can take advantage of the results contained in the following proposition.

Proposition 1. *Given assumptions (3) and (5), the distribution of the future asset's price $\tilde{S}$, conditional to the signal $\tilde{X}$, is i.i.d. and normal, given by:*

$$f(\tilde{S}|\tilde{X}) \sim N(\mu_n, \sigma_n^2) \tag{8}$$

where:

$$\mu_n = \frac{\lambda_S S + \lambda_X \tilde{X}}{\lambda_S + \lambda_X}; \qquad \sigma_n^2 = \frac{1}{\lambda_S + \lambda_X} \tag{9}$$

and:

$$\lambda_S = \frac{1}{\sigma_S^2}; \qquad \lambda_X = \frac{1}{\sigma_X^2} \tag{10}$$

where λ_S, λ_X are the precision, defined as the inverse of the variances.

Proof. See Appendix B. □

Now, we can easily rewrite the distribution in (8) as follows:

$$f(\tilde{S}|\tilde{X}) \sim N(\mu_1 \tilde{S} + (1 - \mu_1)\tilde{X}, (1 - \mu_1)\sigma_S^2) \tag{11}$$

where μ_1 is defined as:

$$\mu_1 = \frac{\lambda_S}{\lambda_S + \lambda_X} \tag{12}$$

Essentially, the result proved in Proposition (1) delivers a Bayesian posterior for the distribution of the future assets' price conditional to the signal $\tilde{X}$, as represented by equation (8), or (11). The prior distribution is given by (3), the likelihood is identified with distribution in (5).

Now we have all the elements to define the equilibrium price. We distinguish two cases: a naïve expectation equilibrium and a Rational Expectation Equilibrium.

6.2.1 Naïve Expectations

In this context, each trader submits her demand to the market where the price adjust in order to equate demand with supply. The market clearing condition is defined according to the following equilibrium condition:

$$NY_I + MY + Z\tilde{h} = 0 \tag{13}$$

Therefore, to obtain the equilibrium price level, we need to substitute the expression of the demand coming from informed trader Y_I, non-informed traders Y and noise traders $\tilde{h}$ into equilibrium (13). The result is condensed in the following theorem.

Theorem 1. *The equilibrium level of price of the risky asset is given by:*

$$p = \theta_1 E(\tilde{S}|\tilde{X}) + (1 - \theta_1)E(\tilde{S}) + \theta_2\tilde{h} \tag{14}$$

where θ_1, θ_2, are defined, respectively as:

$$\theta_1 = \frac{NVar(\tilde{S})}{NVar(\tilde{S}|\tilde{X}) + MVar(\tilde{S})} \tag{15}$$

$$\theta_2 = \frac{\alpha Var(\tilde{S}|\tilde{X})Var(\tilde{S})}{NVar(\tilde{S}|\tilde{X}) + MVar(\tilde{S})} \tag{16}$$

Proof. See Appendix C. □

According to the naïve equilibrium outlined in Theorem 1, each trader does not act strategically, in the sense that when submitting an order, it is not taken into account the impact of her order on the equilibrium price or the market equilibrium.

Despite the simplicity of this equilibrium, it is worth to check that, when the number of non-informed traders, represented, for example, by a set of large passive traders becomes arbitrarily large, i.e. when $M \to \infty$, from (15) and (16) we obtain immediately that $\theta_1 \to 0$, $\theta_2 \to 0$, so that: $p \to E(\tilde{S})$: the increase of the number of passive traders makes the price to converge to their expectations of future price $E(\tilde{S})$.
If, on the other hand, is the number of informed traders to become arbitrarily large, when $N \to \infty$, we obtain that $\theta_1 \to 1$, $\theta_2 \to 0$: the equilibrium price converges to the expectation formulated by informed agents.
Interestingly, even from this simple representation of the equilibrium, when the size of both type of agents tend to be very large, the role of noise trader tends to be neutralized: this is a simple example showing the increase in information efficiency. The final equilibrium price converges to the expectations made by the relatively large group of traders, whose expectation becomes dominant in the market.
It is important to stress the importance of this preliminary result: increasing the number of individuals participating in the market, neutralizes the noise trader demand, making the price level more informative and anchored to expectations formulated by market players, no matter if they are informed or uninformed.
The equilibrium price is driven by the relative size of each group of individuals (informed, uninformed, noise traders). If non-informed traders become arbitrarily large, private information and noise trading activity both become irrelevant in price determination.
We now extend this result to the context of a rational expectations equilibrium.

6.3 Rational Expectations Equilibrium

In this context, we extend previous results to the context characterized by Rational Expectations Equilibrium. Let us start by assuming that the signal is truly informative about the evolution of the future price of the asset. This implies that the relationship existing between the price $\tilde{S}$ and the signal $\tilde{X}$ can be represented according to the following equation:

$$\tilde{S} = \tilde{X} + \epsilon \tag{17}$$

we assume now that the signal is normally distributed and i.i.d. with zero mean and constant variance σ_X^2: $\tilde{X} \sim N(X, \sigma_X^2)$. Moreover, we assume that the error ϵ is also i.i.d. normally distributed, with zero mean and constant variance σ_ϵ^2: $\epsilon \sim N(0, \sigma_\epsilon^2)$. Moreover, the signal $\tilde{X}$ and the error ϵ are assumed to be orthogonal. From these assumptions, we obtain that the stock price is normally distributed with the following density function:

$$\tilde{S} \sim N(0, \sigma_X^2 + \sigma_\epsilon^2) \tag{18}$$

Assume that informed traders (or insiders) observe the signal $\tilde{X}$. Therefore, the conditional expectation and the variance of $\tilde{S}$ are:

$$E(\tilde{S}|\tilde{X}) = X; \qquad Var(\tilde{S}|\tilde{X}) = \sigma_\epsilon^2 \tag{19}$$

Each type of trader uses the actual price p as a mean to update their expectations about future price. Uninformed agents form their expectations by using only current price, so that: $E(\tilde{S}|\tilde{X}) = X$ and $Var(\tilde{S}|\tilde{X}) = \sigma_\epsilon^2$.

On the other hand, informed agent use also the signal together with the current price to make expectations about future price, so that their expectation is $E(\tilde{S}|\tilde{X}, p)$. If price is correlated with insiders' signal and with the true value of the security, we will have that: $E(\tilde{S}|\tilde{X}, p) = E(\tilde{S}|\tilde{X})$, and $Var(\tilde{S}|\tilde{X}, p) = Var(\tilde{S}|\tilde{X})$.

With these assumptions, the demand of risky security coming from non-informed, Y, and from informed agents Y_I are given, respectively, by:

$$Y = \frac{E(\tilde{S}|p) - p}{\alpha Var(\tilde{S}|p)} \tag{20}$$

$$Y_i = \frac{E(\tilde{S}|\tilde{X}p) - p}{\alpha Var(\tilde{S}|\tilde{X}p)} = \frac{E(\tilde{S}|\tilde{X}) - p}{\alpha Var(\tilde{S}|\tilde{X})} \tag{21}$$

To get the equilibrium price, let us assume that uninformed agents conjecture the price to be a function of the signal and of the demand coming from noise traders according to the following function:

$$p = \gamma_1 \tilde{X} + \gamma_2 \tilde{h} \tag{22}$$

As discussed previously, informed agents make investment decisions by considering the role of signal which is assumed a sufficient statistic for the true price. Therefore, the demand of informed agent is:

$$Y_i = \frac{\tilde{X} - p}{\alpha \sigma_\epsilon^2} \tag{23}$$

Uninformed agents, instead, define their expectations for their demand conditional to actual price, as defined in equation (22). Therefore, by applying Projection Theorem (see Appendix A), we obtain the following expression for the conditional expectation $E(\tilde{S}|p)$:

$$E(\tilde{S}|p) = E(\tilde{S}) + \frac{Cov(\tilde{S}, p)}{Var(p)}(\tilde{S} - E(p)) \tag{24}$$

We need now to get an analytical expression for $Cov(\tilde{S}, p)$. To this purpose, using the expression given in (22) for p, together with the definition of $\tilde{S}$ given in (17), we can write:

$$Cov(\tilde{S}, p) = E(\tilde{X} + \epsilon, p) = E\left[(\tilde{X} + \epsilon)(\gamma_1 \tilde{X} + \gamma_2 \tilde{h})\right] = \tag{25}$$

$$= \gamma_1 E(\tilde{X}) = \gamma_1 \sigma_X^2 \tag{26}$$

The other ingredient which is needed is represented by the variance of the price: $Var(p) = \gamma_1^2 \sigma_X^2 + \gamma_2^2 \sigma_h^2$. Therefore, the expectation of future stock's price conditional to today's price p will be:

$$E(\tilde{S}|p) = \frac{\gamma_1 \sigma_X^2}{\gamma_1^2 \sigma_X^2 + \gamma_2^2 \sigma_h^2} p = \theta p \tag{27}$$

where θ is defined as:

$$\theta = \frac{\gamma_1 \sigma_X^2}{\gamma_1^2 \sigma_X^2 + \gamma_2^2 \sigma_h^2} \tag{28}$$

Finally, it is immediate to get that conditional variance is:

$$Var(\tilde{S}|p) = Var(\tilde{S}) - \frac{Cov(\tilde{S}, p)^2}{Var(p)} \tag{29}$$

$$= \sigma_X^2 + \sigma_h^2 - \frac{\gamma_1^2 \sigma_X^4}{\gamma_1^2 \sigma_X^2 + \gamma_2^2 \sigma_h^2} \tag{30}$$

The demand of non-informed agents (20) is now given by:

$$Y = \frac{(\theta - 1)p}{\alpha Var(\tilde{S}|p)} \tag{31}$$

We are now in the position to state the following Theorem:

Theorem 2. *The equilibrium price level for a Rational Expectations Equilibrium is:*

$$p = \delta_1 E(\tilde{S}|X) + \delta_2 \tilde{h} \tag{32}$$

where δ_1 and δ_2, are defined as follows:

$$\delta_1 = \frac{NVar(\tilde{S}|p)}{NVar(\tilde{S}|p) + (1-\theta)M\sigma_\epsilon^2} \tag{33}$$

$$\delta_2 = \frac{\alpha Var(\tilde{S}|p)\sigma_\epsilon^2 Z}{NVar(\tilde{S}|p) + (1-\theta)M\sigma_\epsilon^2} \tag{34}$$

Proof. See Appendix D. □

Clearly, the rule (32) should be equivalent to the guessed expression (22). The solution for γ_1 and γ_2 is obtained by setting $\delta_1 = \gamma_1$, $\delta_2 = \gamma_2$. It is easy to see that both (33)-(34) - through the definition of $Var(\tilde{S}|p)$ given in (30) - are nonlinear function of parameters. The solution to be found is given by γ_1^*, γ_2^*, which are a function of all other parameters of the model. However, it is not immediate to find a solution ready to be intuitively interpreted.

Therefore, to get a deeper sense of these results, let us proceed in two steps. First, let us make a simplifying assumption, by setting $\gamma_2 = 0$. Secondly, we simplify our setting to focus on a fully revealing Rational Expectations equilibrium.

Let us start with the first case, postponing the second to the following subsection. Assume now that $\gamma_2 = 0$: in this case, we do not have any noise traders in the economy. Thus, after taking advantage of (30), by setting $\delta_1 = \gamma_1$, we find, after rearrangement the following solution for γ_1^*:

$$\gamma_1^* = \frac{1}{1 + \frac{M(1-\theta)\sigma_\epsilon^2\sigma_h^2}{N\sigma_X^2}} \tag{35}$$

It is immediate to check that if the number of informed traders tends to infinity, the coefficient γ_1^* tends to 1: the equilibrium price converges to $E(\tilde{S}|X)$.

A similar result obtains when we set $\gamma_1 = 0$: in this case, if $N \to \infty$, then $\gamma_2^* \to 1$ and the price level converges directly to the noise trader signal.
In both cases, by increasing the number of market participants, makes prices more informative, making private information to become public, also by neutralizing the noise trading activity.

6.4 Fully Revealing Rational Expectations Equilibrium

Let us assume that noise demand is non-stochastic, so that $\tilde{h} = h$. Recall the naïve equilibrium price given by equation(14), here recalled:

$$p = \theta_1 E(\tilde{S}|\tilde{X}) + (1 - \theta_1)E(\tilde{S}) + \theta_2 h \tag{36}$$

with θ_1 and θ_2 defined by (15) and (16), respectively.

From equation (36), the only unknown is given by the signal $\tilde{X}$, which belongs to the information set of informed traders' only. Therefore, non-informed traders can learn about the signal by considering the actual price p: in this way, they can use the price p to update both expected value and variance of future security's price $\tilde{S}$ conditional to the observed market price p. Clearly, this situation is close to a context where non-informed traders are conditioning on the signal $\tilde{X}$.
In this case the key results are condensed in the Theorem 3.

Theorem 3. *The equilibrium price for the Fully Revealing Rational Expectations Equilibrium (REE) is given by:*

$$p = E(\tilde{S}|\tilde{X}) - \frac{\alpha Z Var(\tilde{S}|\tilde{X})h}{N + M} \tag{37}$$

where $E(\tilde{S}|\tilde{X}) = X$, $Var(\tilde{S}|\tilde{X}) = \sigma_S$.

Proof. See Appendix E. □

The result stated in Theorem 3 is absolutely important. **The equilibrium price p differs from the expectation about future price given the signal, because of a correction due to volatility, risk aversion and noisy demand**: higher risk aversion α, higher is the volatility $Var(\tilde{S}|\tilde{X})$, or the demand of noisy

traders h, lower will be the price and, for any given value of the future's value $\tilde{S}$ of the security's price, higher will be return: $\tilde{R} = \tilde{S} - p$.

Clearly, when N of M (or both) become absolutely large (i.e. when $M, N \to \infty$), then the price level tend to be higher, converging to $E(\tilde{S}|\tilde{X}) = X$. In this case, higher is the price, narrower will be the gap with respect to $\tilde{S}$ and lower will be the return $\tilde{R} = \tilde{S} - p$.

Therefore, when the number of traders (both informed and non-informed) increases indefinitely, the price level increases and the return gets lower.

The intuition behind this result goes as follows: **as the number of trader increases, the distortions derived from differential information tend to disappear, prices become fully informative and the compensation for the risk becomes smaller**.

What are the impact on risk associated to the security? We need to compute the variance of price p, whose expression is given as follows:

$$Var(p) = Var(\tilde{S}|\tilde{X}) + \frac{\alpha^2 Z^2 Var(\tilde{S}|\tilde{X})^2 h^2}{(N+M)^2} - 2E(\tilde{S}|\tilde{X})\frac{\alpha Z Var(\tilde{S}|\tilde{X})h}{N+M} = \quad (38)$$

$$= Var(\tilde{S}|\tilde{X}) + \frac{\alpha Z h Var(\tilde{S}|\tilde{X})}{N+M}\left[\frac{\alpha Z h Var(\tilde{S}|\tilde{X})}{N+M} - 2E(\tilde{S}|\tilde{X})\right] \quad (39)$$

The expression inside the square brackets in (39) is positive if: i) the degree of risk aversion α is sufficiently high; ii) the number of noise traders Z is high; iii) $Var(\tilde{S}|\tilde{X})$ is high; iv) N, M are small: all circumstances easily verified.

It is immediate to check from (39), that if $M, N \to \infty$, $Var(p)$ becomes smaller, and tend to the conditional variance $Var(\tilde{S}|\tilde{X})$.

The informational efficiency index IE is defined as the reciprocal of the variance:

$$IE = \frac{1}{Var(p)} \quad (40)$$

When $Var(p)$ becomes smaller, IE increases.

Summing up we found that, increasing the number of agents in a fully revealing REE, makes prices more informative and converging to privately owned information. At the same time, the volatility of the price becomes lower, as well as informational efficiency. The return is lower than in the case of a low number of informed or uninformed traders. Moreover, as the number of agents becomes progressively larger, the degree of risk aversion becomes negligible.
By increasing the number of market participants, private information becomes publicly available, thanks to the assumption that non-informed traders can learn about the private signals, by monitoring current equilibrium market prices.

6.5 Concluding Remarks

In this note by taking advantage of the results contained in Kyle (1989), DeJong and Rindi (2009) and Rindi (2008) we study the role of equilibrium asset pricing when the market is populated by group of agents with differential information, with different sizes. We considered a naïve equilibrium without any update of the beliefs and a fully revealing rational expectations equilibrium when non-informed agents can update their beliefs based on current prices.

In all cases the number of agents - both informed and uninformed - is crucial to determine the characteristics of the equilibrium. As the number of agents increases, prices increase their informative efficiency, enhancing the spreading out of the private information to the market. The Volatility of security's price lowers. The return on the security lowers since agents need less protection against adverse price fluctuations.

These results show that by making the market for a security larger, open to a larger group of investors, improves the information conveyed by prices and makes private information to become publicly available. At the same time, the volatility lowers and the overall quality of the market information improves. The return will be lower, but this is the price that each agent will be willing to pay to have a market

more open, transparent, liquid and less volatile.

A larger number of agents, given a fixed supply of the security, implies that each share will be issued to a lower price than in a context with a lower demand (because of a smaller number of traders).

As a consequence, a large number of players implies also a cheaper price, with lower volatility and better quality of information. The advantage of this situation is given by the fact that an higher number of individuals can be part of the market.

7 Roadmap

We plan to launch the cryptocurrency minting from **British Virgin Islands**, but already **compliant with the main regulatory licenses in Middle East and Europe**.

The **Roadmap** is divided into three main steps. It aims to build a fully functional product that will serve the entire RIV ecosystem as a foundational block, allowing access to an entire ecosystem of value.

Below you can find a detailed description of all the phases that will compose the launch of the RIVCoin. The timeline will be further expanded in the subsequent years when we plan to build even more added-value services for our Users.

1. Phase 1: the **Presale Phase** where everyone interested in the project will be able to reserve a spot, purchasing batches of coins. Downloading RIV Wallet and completing the related KYC will allow the User to see the coins in the digital wallet, without any possibility to trade them yet.

2. Phase 2: the **RIV/OSMO and/or USDC Liquidity Pool** will be up and running. Users will be able to buy and sell RIVCoin on the secondary market. Also, Users will be able, in a subsequent phase, to bridge their tokens on Ethereum using Cøsmos bridges.

3. Phase 3: **the Primary and the Secondary Market are both active**. RIV DAO opens or closes Primary Minting according to market conditions and/or to the reserve's appreciation, to stimulate or deter demand and with the sole objective of stabilizing the price around the reference value, until the max cap has been reached.

RIV Wallet will be further expanded by incrementally implementing the RIV Ecosystem. Detailed information will be provided in the following versions of this Whitepaper.

8 RIV Capital Group

Founded in 2021 and headquartered in Luxembourg [20], we focus on long-term investment strategies developed by carefully studying and analyzing investment opportunities.

At a proprietary and RAIF level, managed by an asset management company authorized and regulated, we deploy quantitative, model-driven strategies to develop insights about asset value based on statistical and fundamental analysis. Fuzzy Logic is used to combine and weight both the fundamental and statistical indicators with limited leverage.

Strategies involve investing in high-yield Fixed Income securities, focused on private debt (i.e., mini-bonds) and corporate bonds, combined with thematic equity portfolios based on the mega-trends characterizing the current economic wave. Our people are top investment bankers and traders with years of experience in the business and an undisputed reputation. A team of talented quant developers works and helps to implement and improve 24/7 the strategies and the automated system. We have profound knowledge of financial markets, blockchain, and DeFi. Passion, commitment, and competence are the guiding principles that sustain our growth.

The solution proposed is specifically thought for the Users. They have been traditionally subject to scams, frauds, financial illusions and fake hopes to become rich quickly.

This cryptocurrency is explicitly designed to offer a secured model of crypto and at the same time to be indeed a currency (medium of payment, fractionable, with a guarantor seller of last resort, etc.) starting from the first day. On top of that, when there is a Central Bank printing money we have to ask ourselves questions about inflation and seigniorage. RIVCoin is a cryptocurrency, but the decentralized seller of last resort will not create inflation and will democratically redistribute the seigniorage. This is very important to feed the reputation and the credibility of the cryptocurrency, as the scarcity is defined and the production of the reserves are clearly conveyed following an automated rule through the mechanisms of the DAO. We could also open another chapter which is the skilled and professional use of the

reserves which are active to produce returns through methods available to the top notch of the markets. It is with patience and a realistic aim that one can save money, accumulate returns and see personal wealth increasing in time.
The Founders invest themselves in this cryptocurrency and they expect both the strongest safety and also the best compounding in the time derived by the sane management of the reserves behind.
The User of any currency would like to base the use of it on a few factors: **trust of the issuer**, **undisputed intrinsic value of the coin** (i.e., Gold Standard until 1973) and **accepted medium of exchange**. The first and the third are a matter of gradual achievement. The second one is a matter of numbers. If one of the three comes less, then inefficiencies arise.
This is indeed a new paradigm: the integration of CeFi and DeFi, the stabilized cryptocurrency, the vaulted reserves and the related generated returns distributed to Liquidity Providers.

9 Conclusion

In this Whitepaper, we introduced RIVCoin, a cryptocurrency stabilized by a combination of CeFi and DeFi assets, fully compliant with all the relevant laws and regulations worldwide.
RIVCoin will be accessible to all Users via subsequent Token Mintings. By buying RIVCoin and providing liquidity, Users can earn rewards on their investment, allowing them to build a second income stream, and being able at the same time to spend it and use it. We, as RIV Capital, believe that Blockchain and DeFi will democratize finance allowing a fairer redistribution of wealth, co-operating and integrating with the traditional universe.
In the real world, both in the old and the new economy, no substantial progress has been achieved regarding the biases caused by wealth inequality. The problem of inequality has been perceived mostly as a political matter dividing the electorates between left and rightwing. The reality is that aggressive taxation can only produce conflicts. Direct taxes are often too high in general to be raised further and indirect

taxes usually increase income inequality.

We have explored the problem from a different point of view. Let's bear in mind this analogy: as well as we have to be creators and not competitors, we found the way to create and add wealth instead of causing its dispersion. No doubt that such a cryptocurrency will increase the capacity of the wealthy people, but the marginal utility is bigger for Retail Users who will benefit, with the *placet* of Wealthier Users, from the bigger amounts invested by these ones. The last ones look for stability, the first ones would like not to be frauded participating at a fair game.

The Blockchain Revolution will enable a fairer world [18] where everyone can profit. We believe that anyone has the right to live a life at its fullest potential: by creating RIVCoin, we want to allow you to achieve this objective.

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Appendices

A Projection Theorem

Given two random variables $\tilde{X}$, $\tilde{Y}$, both distributed normally, conditional mean and variance of $\tilde{X}|\tilde{Y}$ can be recovered according to standard projection Theorem for Normal Distributions, such that:

$$E(\tilde{X}|\tilde{Y}) = E(\tilde{X}) + \frac{Cov(\tilde{X}|\tilde{Y})}{Var(\tilde{Y})}(\tilde{Y} - E(\tilde{Y})) \tag{41}$$

Q.E.D. □

B Proof of Proposition 1

Consider the following prior distribution $f_{pr}(\tilde{S}) \sim N(S, \sigma_S^2)$, whose kernel is given as:

$$f_{pr}(\tilde{S}) \sim \exp\left\{-\frac{1}{2\sigma_S^2}\left(\tilde{S} - S\right)^2\right\} \tag{42}$$

The conditional likelihood $f_L(\tilde{X}|\tilde{S}) \sim N(\tilde{S}, \sigma_X^2)$ is:

$$f_L(\tilde{X}|\tilde{S}) \sim \exp\left\{-\frac{1}{2\sigma_X^2}\left(\tilde{X} - \tilde{S}\right)^2\right\} \tag{43}$$

Therefore the posterior:

$$f_{po}(\tilde{S}|\tilde{X}) = \exp\left\{-\frac{1}{2\sigma_S^2}(\tilde{S}^2 + S^2 - 2S\tilde{S}) - \frac{(\tilde{X}_2 + \tilde{S}^2 - 2\tilde{S}\tilde{X})}{2\sigma_X^2}\right\} = \tag{44}$$

$$= \exp\left\{-\frac{\tilde{S}^2}{2}\left(\frac{1}{\sigma_S^2} + \frac{1}{\sigma_X^2}\right) + \tilde{S}\left(\frac{S}{\sigma_S^2} + \frac{\tilde{X}}{\sigma_X^2}\right) - \frac{1}{2}\left(\frac{S^2}{\sigma_S^2} + \frac{\tilde{X}^2}{\sigma_X^2}\right)\right\} \tag{45}$$

Focus now on the term in curly brackets of equation (45) which can be rewritten as:

$$-\frac{1}{2}\left(\frac{1}{\sigma_S^2} + \frac{1}{\sigma_X^2}\right) = -\frac{1}{2\sigma_n^2}\left(\tilde{S}^2 - 2\tilde{S}\mu_n + \mu_n^2\right) \tag{46}$$

$$= -\frac{1}{2\sigma_n^2}\left(\tilde{S} - \mu_n\right)^2 \tag{47}$$

where:

$$\frac{1}{\sigma_n^2} = \frac{1}{\sigma_S^2} + \frac{1}{\sigma_X^2} \tag{48}$$

or, given the precision:

$$\lambda_S = \frac{1}{\sigma_S^2} \qquad \lambda_X = \frac{1}{\sigma_X^2} \tag{49}$$

implying:

$$\lambda_n = \frac{1}{\sigma_n^2} = \lambda_S + \lambda_X \tag{50}$$

and, from (47):

$$\mu_n = \frac{\lambda_S S + \lambda_X \tilde{X}}{\lambda_S + \lambda_X} = \tag{51}$$

$$= \frac{\lambda_S}{\lambda_S + \lambda_X} S + \frac{\lambda_X}{\lambda_S + \lambda_X} \tilde{X} = \tag{52}$$

$$= \mu_1 S + (1 - \mu_1)\tilde{X} \tag{53}$$

with:

$$\mu_1 = \frac{\lambda_S}{\lambda_S + \lambda_X} \tag{54}$$

as stated. □

C Proof of Theorem 1

Consider Market Equilibrium condition in (13) and substitute out the demand for risky security for non-informed and informed traders, given, respectively by (4) and (6). After some steps, we have:

$$\frac{NE(\tilde{S}|\tilde{X})}{\alpha Var(\tilde{S}|\tilde{X})} + \frac{M}{\alpha Var(\tilde{S})}E(\tilde{S}) + Z\tilde{h} = \left[\frac{N}{\alpha Var(\tilde{S}|\tilde{X})} + \frac{M}{\alpha Var(\tilde{S})}\right]p \tag{55}$$

$$= \left[\frac{NVar(\tilde{S}|\tilde{X}) + MVar(\tilde{S})}{\alpha Var(\tilde{S}|\tilde{X})Var(\tilde{S})}\right]p \tag{56}$$

Therefore, solving for p we obtain, after simplifying:

$$p = \left[\frac{NVar(\tilde{S})}{NVar(\tilde{S}|\tilde{X}) + MVar(\tilde{S})}\right]E(\tilde{S}|\tilde{X}) + \left[\frac{MVar(\tilde{S}|\tilde{X})}{NVar(\tilde{S}|\tilde{X}) + MVar(\tilde{S})}\right]E(\tilde{S}) +$$

$$+ \left[\frac{\alpha Var(\tilde{S}|\tilde{X})Var(\tilde{S})}{NVar(\tilde{S}|\tilde{X}) + MVar(\tilde{S})}\right]Z\tilde{h} \tag{57}$$

which proves the stated result. □

D Proof of Theorem 2

After substitution of (21) and (31) into market equilibrium condition (13), we have:

$$N\left(\frac{E(\tilde{S}|\tilde{X}) - p}{\alpha Var(\tilde{S}|\tilde{X})}\right) + \frac{M(\theta - 1)p}{\alpha Var(\tilde{S}|p)} + Z\tilde{h} = 0 \tag{58}$$

Recall that $Var(\tilde{S}|\tilde{X}) = \sigma_\epsilon^2$. After rearrangement, we find:

$$p\left[\frac{N}{\alpha\sigma_\epsilon^2} + \frac{M(\theta - 1)}{\alpha Var(\tilde{S}|p)}\right] = N\frac{E(\tilde{S}|\tilde{X})}{\alpha Var(\tilde{S}|\tilde{X})} + Z\tilde{h} \tag{59}$$

which is equivalent to:

$$p\left[\frac{NVar(\tilde{S}|p) + (1 - \theta)\sigma_\epsilon^2 M}{\alpha\sigma_\epsilon^2 Var(\tilde{S}|p)}\right] = N\frac{E(\tilde{S}|\tilde{X})}{\alpha Var(\tilde{S}|\tilde{X})} + Z\tilde{h} \tag{60}$$

Therefore:

$$p = \left[\frac{\alpha\sigma_\epsilon^2 Var(\tilde{S}|p)}{NVar(\tilde{S}|p) + (1-\theta)\sigma_\epsilon^2 M}\right]\frac{E(\tilde{S}|\tilde{X})}{\alpha\sigma_\epsilon^2}N + \frac{\alpha Z\sigma_\epsilon^2 Var(\tilde{S}|p)}{NVar(\tilde{S}|p) + (1-\theta)\sigma_\epsilon^2 M}\tilde{h} \quad (61)$$

which after simplifying, proves the stated result. □

E Proof of Theorem 3

Recall Market equilibrium condition:

$$NY_I + MY + Zh = 0 \quad (62)$$

In this case, the demand of informed and non-informed agents are the same:

$$Y_I = Y = \frac{E(\tilde{S}|\tilde{X}) - p}{\alpha Var(\tilde{S}|\tilde{X})} \quad (63)$$

Therefore, by substituting out the expression for the demand of informed agents Y_I and non-informed, given by (63), we get:

$$N\left(\frac{E(\tilde{S}|\tilde{X}) - p}{\alpha Var(\tilde{S}|\tilde{X})}\right) + M\left(\frac{E(\tilde{S}|\tilde{X}) - p}{\alpha Var(\tilde{S}|\tilde{X})}\right) + Zh = 0 \quad (64)$$

Which, after rearrangement, implies directly the results. Q.E.D. □