Synzeris – Synthetic zero rate instruments
New stability enhancing instruments for (digital) monetary regime changes and debt restructuring programs

1. Executive summary

The gradual arrival of virtual money brings us new financial-monetary concepts. The fact that virtual money is digital by nature, means that money and its behaviour can be programmed, for instance in contexts of scarcity, money creation or smart contracts. Also completely new money types with new risk and return characteristics can be introduced.

Greater monetary diversity can help to improve system stability as the new money types provide more functionalities to the financial-monetary ecosystem. At the same time, new money types can also disrupt existing systems.

Synthetic zero rate instruments – in short 'synzeris' – are introduced as tought provoking monetary policy instruments. Synzeris can be viewed as a temporary accounting plug or placeholder in (commercial) banks balance sheets in case of systemic funding shortages. Synzeris can be seen as temporary regime change instruments. They hold 'accounting value' during the regime change and are nullified after the regime change is complete.

Synzeris are neither a new digital currency nor is their issuance dependent on distributed ledger technology.

They strongly differ in nature from existing policy options as they appear synthetically and temporarily only on the right hand side of the balance sheet of (commercial) banks in case of a lack of traditional funding. In a sense, synzeris break with the classical view of balanced accounting, but so will new digital currency concepts that may be disruptive, and synzeris may answer to this.

Synzeris could be used in order to respond to systemic threats that new digital currency forms could bring. Moreover, they can enhance system stability for (digital) monetary and currency regime changes. Synzeris could also facilitate the orderly control of debt restructuring programs that involve currency changes.

Synzeris can provide temporary synthetic plugs in banks' balance sheets and can subsequently maintain systemic liquidity, avoiding contagion effects when monetary regimes change. As a result, some regime changes could take place in this orderly, controlled manner. After the regime change, the synthetic instruments can be nullified – as they are synthetic by nature - effectively not causing any permanent impact.

In addition, this paper discusses the potential of new fundamental monetary diversity, highlighting in particular the differences between monetary concepts that are created in a two-sided balance sheet context and in a 'one-sided balance sheet context'. We refer to them as dualistic and non-dualistic monetary concepts. The dualistic and non-dualistic money concepts (and financial-monetary systems) are to be seen and interpreted differently from accounting, legal, financial and monetary perspectives.

This paper is also written for the International Workshop P2P Financial Systems 2016. It introduces new monetary concepts and wording and also seeks to appeal to a non-academic audience of cryptocurrency practitioners. As a result, its presentation differs in style from traditional scientific papers.

2. Duality and non-duality: introducing some fundamental monetary and accounting diversity

One of the potentially greater differences that may arise between traditional 'fractional reserve banking currencies' and new digital currencies is their fundamental approach to value.

Because their approach to value may be fundamentally different, financial-monetary systems may gain some new functionalities and policy options.

In this paper, particular attention is given to 'dualistic and non-dualistic monetary concepts'.

In dualistic monetary concepts, there is a very strong relation between debt creation and money creation as well as money destruction and debt destruction.

This dual relationship between money and debt implies the use of a dualistic monetary concept or system.

On the other hand, in the world of digital entities or digital assets, typical use is made of digital or virtual representations. Fundamentally, the creation and destruction of digital representations, such as tokens, does not depend on, or relate to, the creation and destruction of other digital representations. As such, the creation and destruction of digital (token) money, does not need to hold a dual relationship with the creation and destruction of debt.

These digital tokens would form a pool, representing digital scarcity in a societal context where such scarcity would represents value, in a similar fashion that traditional money is valued because of its relative scarcity in relation to the total 'money pool'. The picture below summarises the different dynamics.

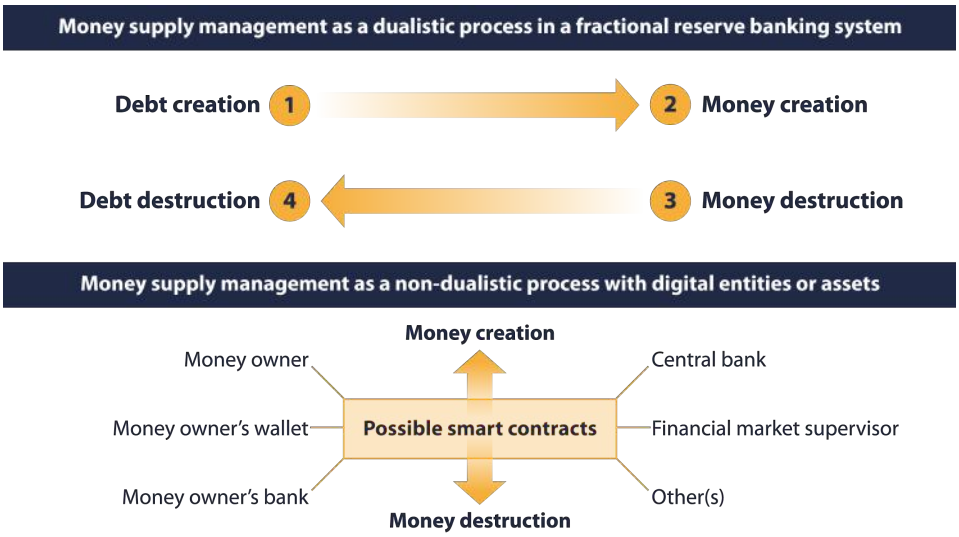

Exhibit 1. Differences in money supply management in 'dualistic' debt-related contexts and 'non-dualistic' contexts.

We will first elaborate on the dualistic and non-dualistic systemic designs of respectively fractional reserve banking and new digital monetary currency concepts.

3. Fractional reserve banking – an introduction to dualistic money and finance

Money, is overwhelmingly created by commercial banks. The interesting thing in these dynamics, is that money creation is an activity that is initiated on the left hand side of the balance sheet of banks, resulting in money to the bank's clients on the right hand side. Accounting-wise we are trained and conditioned to look from right to left chronologically. We have means, on the right hand side of the balance sheet and (afterwards) we put them to use on the left hand side. With money creation, this chronology does not hold. We will take a more profound look at matters.

Banks historically, for their clients, have facilitated the safeguarding of deposited funds and operated a (global) payment infrastructure. This global infrastructure requires that banks are able to remit funds from and for one party to others. This does not mean that banks actually send physical coins and notes to each other every time a payment takes place. They maintain an accounting system with each other and accounts get cleared and settled.

At the same time, banks provide loans, such as credit card debt, mortgage loans, working capital and trade finance and corporate finance.

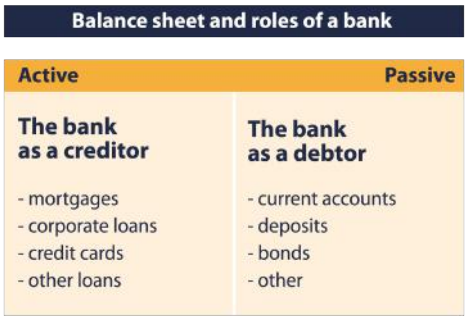

Exhibit 2. Balance sheet and roles of a bank

The current, globally applied banking system is a so called 'fractional reserve banking system'. In this system, banks only need to hold a fraction of the money that clients can claim back from the bank. They hold that fraction as some kind of reserve buffer, hence the name fractional reserve banking.

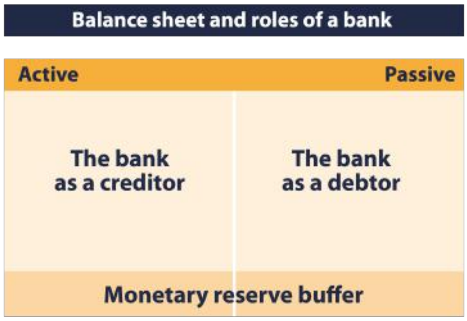

Exhibit 3. The need for monetary reserve buffers

We typically do not go to the bank every day to take out all our money. We sporadically take all our money and if we do take it, we tend to spend it and it

ends up in some one else's bank account (who may not immediately withdraw the money). As such, banks - at least theoretically - can manage to keep a fraction of the claims that clients have to withdraw cash in order to fulfil the clients needs.

This fraction, or monetary reserve buffer, is money that hence cannot be invested. It has to be put aside. On the right hand side of the bank's balance sheet it is just some reserve percentage of the total amount of claims that creditors have to the bank. On the left hand side, it is money that is not invested. It frequently is placed with the central bank or monetary authorities of the jurisdiction in which the bank operates. Or it can be just plain physical cash in ATMs and at the counters of banks for clients that want to withdraw physical cash.

Still, this does not yet explain how money is created and how we can start using that money to get funded with equity or debt. It only explains that we apply a fractional reserve banking system.

When we go to a bank and ask for money we either take it from our own account or in case we do not have that money with the bank, we may ask for a loan.

The more conventional accounting approach would believe us to think that the bank – in order to play its role as a creditor on the left hand side of the balance sheet – would need to find means on the right hand side of the balance sheet.

In the end, this is also how banks are managed. Clients are persuaded to deposit their money and hold their accounts with the bank. Investors are asked to buy bonds and shares of the bank. Once banks are successfully enough in that, they can start being successful creditors. Yet again, banks do this with money of depositors and investors that already existed. So where does that money come from?

For our loan request, the bank may decide to create the money for us. That created money was not previously of the bank, it basically is created as new money. If you want to make the comparison with physical cash and serial numbers, this would be new money with new serial numbers.

The bank may create that new money, as long as it can fulfil its obligations of the minimum required monetary reserve buffers. This new money is not the property of the bank, the money would become our property.

The only thing we would have to do is to sign an agreement that we owe the bank a debt, equivalent to the newly created money. In that agreement, we typically also agree to pay some interest over the outstanding debt amounts during the life-time (also called the tenor) of the loan.

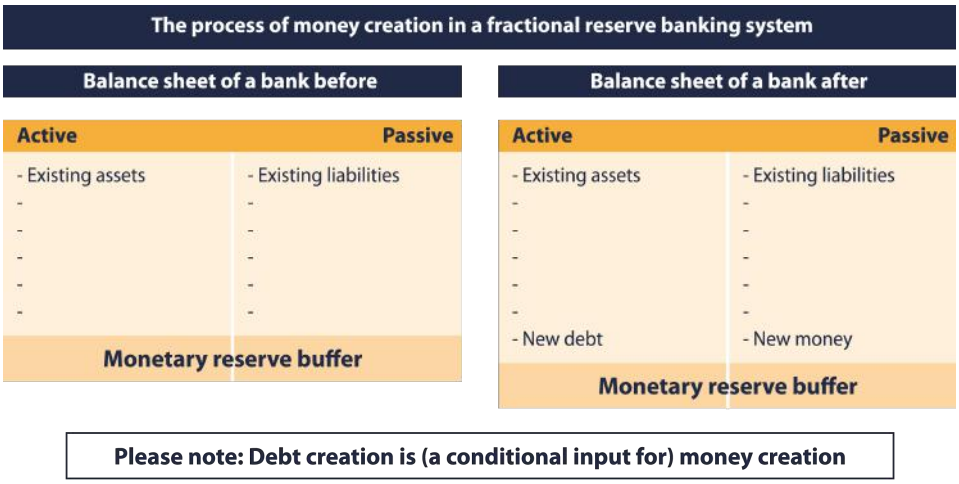

Exhibit 4. The process of money creation in a fractional reserve banking system

As can be seen in the diagram above, the balance sheet of the bank grows with the same amount of new debt on the left side and new money on the right side. The growth of the balance sheet is literally referred to as a lengthening of the balance sheet. The bank can continue to do this, as long as it maintains its (minimum) reserve buffers (and complies with 'mountains' of other legal requirements). In other words, it cannot continue to create new money and debt indefinitely, just like that.

Again, we want to stress that the process of money creation is a process that starts on the left hand side of the bank's balance sheet, basically originating from credit requests.

Suppose we would go to the bank for a mortgage to buy a house, because we do not have enough money to buy the house. In case the bank agrees to give us a loan, we first will have to sign a debt agreement, in which we declare to become liable to pay back the debt plus interest. Only after we signed the agreement and the debt has been created (out of nothing, the debt or agreement did not exist before), the money is created (also out of nothing, as 'the serial numbers of the new money did not exist before').

Debt creation hence is a necessary input for money creation. The bank would not have given us the money, if we would not had signed the debt agreement first. Money creation therefore cannot be initiated as such. At least simultaneously, but in practice first, also debt will have to be created when money is created in a fractional reserve banking system. This is a fundamental feature with its origins in the duality of the balance sheet.

The opposite also holds true. Money can be destroyed by banks. This typically happens when we pay back our loans.

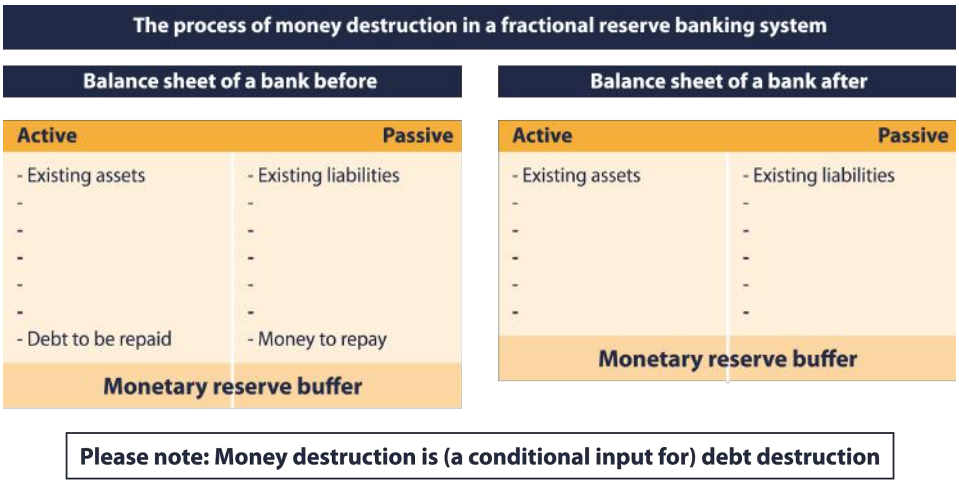

Exhibit 5. The money destruction process in a fractional reserve banking system

For example, we pay back our credit card debt. What happens is that (first) our cash or current account is debited. Afterwards, our credit card account is credited. So the balance on the right hand side (our credits with the bank) are reduced as well as our debits on the left hand side (our debits with the bank). The next time we take a look at our bank statements, both accounts have turned smaller. Both money and debt were destroyed. The balance sheet of the bank has shortened.

In this case, dynamics do run from the right hand side of the balance sheet to the left hand side of the balance sheet of the banks. We (first) destroy money (as conditional input) and then destroy debt.

The interesting thing is that banks see money and debt creation and destruction as a side-effect of doing business. It is not a purpose in their vision and mission statements. Banks typically do not steer strategically on 'let's create so much new money next year' or 'let's make sure that we create so much more new money than that we are going to destroy money next quarter'. At most, they want clients to use new loans and they want clients to pay back their loans plus interest. To banks, money creation and money destruction is a secondary side-effect in managing their balance sheet, profitability and stakeholder interests. It is not something they intentionally steer.

Money and debt creation is more something for central banks or monetary authorities, who regard and supervise the health of the monetary-financial system. Typically their mandates stipulate to manage price stability (i.e. not too much inflation, but certainly also no deflation), stability in the financial-monetary system (banks and insurance companies should not do too many risky things) and frequently -already to a lesser extent - dynamics that stimulate the growth and well-being of the economy.

When the 'supply of money' is growing very fast, the relative amount of money to the relative amount of goods and services is going up. Suppose we have an economic ecosystem which production consists of 50 oranges, 20 litres of milk and 10 kilos of rice. In money, we have 100 coins amongst us. The oranges, milk and rice would have a certain price with these 100 coins. If we suddenly would

have 200 coins amongst us, chances are that prices will go up. The relative scarcity of money to the relative scarcity of oranges, milk and rice has changed.

If central banks believe that money and credit are growing too fast, they can set higher central bank interest rates (which makes parties borrow less or repay faster – and debt repayment means money and debt destruction). In addition, central banks can ask banks to maintain higher monetary reserve buffers (relative to their total activities or balance sheet) and finally they have other policy measures to their disposition.

We typically do not review our financial-monetary system as such, but holistically spoken, it is a balance sheet.

When we combine capital markets (in layman terms: those markets where debt is traded that does not have to be paid back within the next 12 months), money markets (markets for debt that has to be paid back within 12 months) and banks, we would probably end up by drafting a balance sheet of the consolidated financial-monetary system that looks like this:

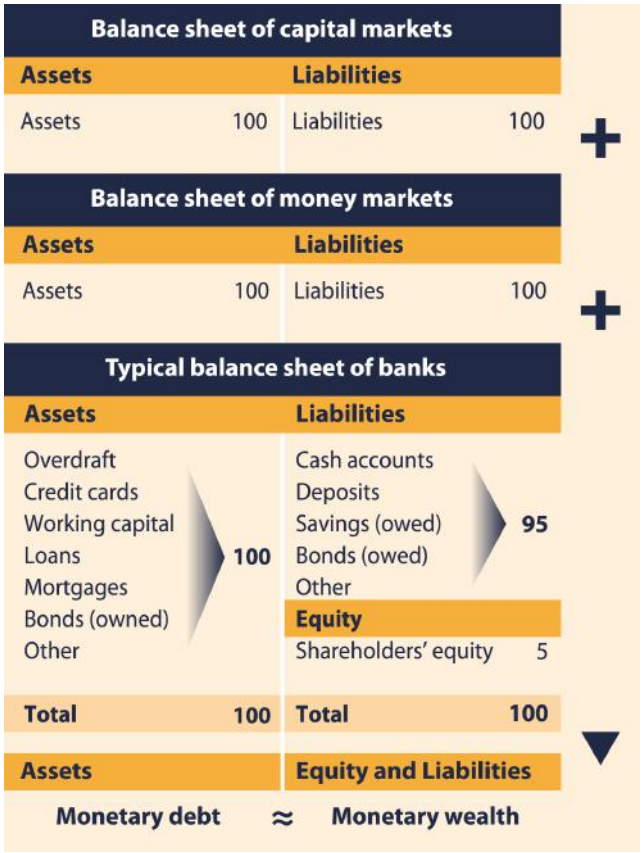

Exhibit 6. The consolidated financial system represented as a balance sheet

(numbers are illustrative examples of percentages within their respective contexts of capital markets, money markets and banks)

When taking a holistic view, we would see that our financial-monetary system represents an almost perfect dualistic relationship between those who own and those who owe money.

In other words, the monetary wealth of society is almost equal to the monetary debt of society.

An average person or society at large may interpret this as, 'if someone wants to have more money, someone else has to have more debt. If someone wants to repay its debt, someone else needs to have less money.' Such interpretations can especially gain traction or become relevant when non-dualistic alternative digital currency systems emerge with scale, convenience, legitimacy and low transaction costs.

For a proper understanding, at this point, it is very important to note the difference between monetary wealth and wealth. Monetary wealth is referred to as money in any kind of form. This is different than wealth that can be expressed in money.

We will demonstrate with a short example. Suppose I have 25,000 currency units in my bank account and I own a house (without mortgage debt) worth 250,000 currency units and shares worth 50,000 currencies units.

My monetary wealth then is 25,000, my non-monetary wealth is 300,000 and my total wealth if 325,000 currency units.

The same holds true for debt and monetary debt. The duality we refer to is of a monetary nature only.

4. Digital entity money – introducing non-dualistic monetary concepts

We are entering into a new era of digital connectivity and interaction. An era in which we no longer connect applications with each other, but digital entities directly, which the picture below demonstrates.

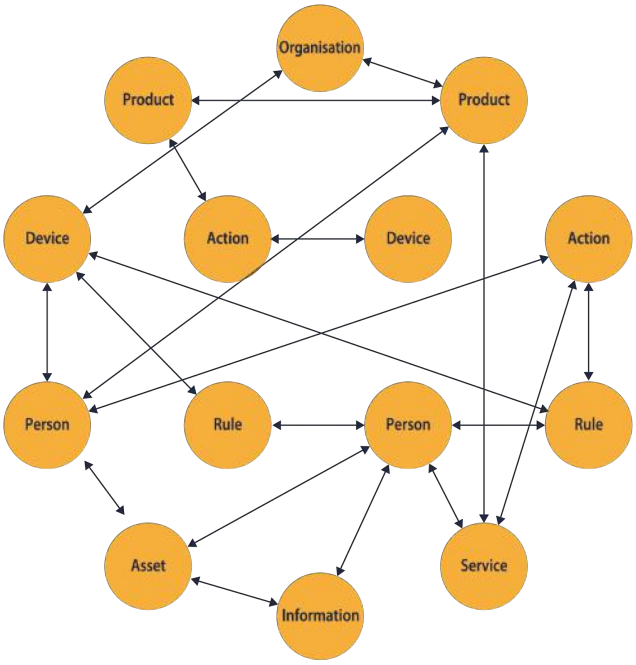

Exhibit 7. Interaction of digital entities outside the context of applications

These digital representations or entities can be universally uniquely identified through a new distributed 'telephone directory' infrastructure, which is called DENARS. DENARS is to operate through a federated structure of independent, neutral not-for-profit foundations spread across the world.

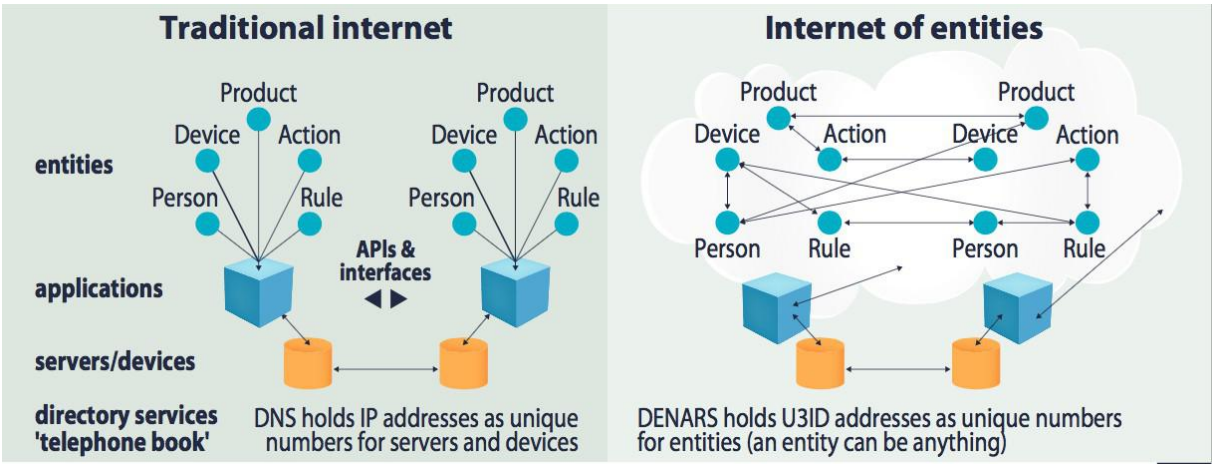

Exhibit 8. The traditional internet versus the internet of entities

For the purpose of this paper, we will refer to digital entities as they are to be identified in DENARS and described in UETP, the Uniform Entity and Transaction Protocol, a new and free to use internet protocol which can run on top of the existing internet. UETP is a protocol that helps to define entities in a uniform way

(every virtual representation imaginable) and facilitate the interaction between entities (possibly in smart contracts).

Entities can literally be anything, people, organisations, products, goods, services, rules, information, transactions and many more things. They can also represent money or 'be money' in the sense that they represent relative (digital) scarcity of a digital pool of tokens.

The word entity derives from the Latin entitatem (nominative entitas), from ens (genitive entis) "a thing," proposed by Caesar as present participle of esse "to be".

In essence, therefore, an entity just 'is'. It cannot be captured in the traditional accounting view of an asset which is derived from 'means' that are 'put to use'.

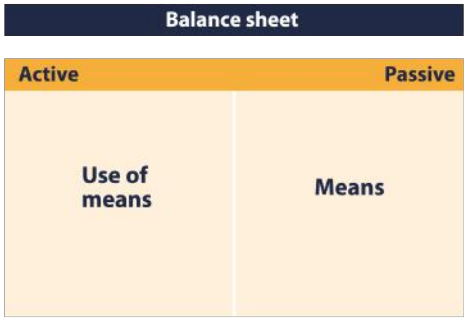

Exhibit 9. Traditional accounting view that describes 'means' as the origin of money and the use of means of how that money is put to use.

Digital entities as such cannot be captured from a value perspective on either side of the balance sheet. Fundamentally, they do not possess or are derived from that dualistic nature.

Entities are best captured in a 'one-sided balance sheet' that can state whether they are (exist) or are not (don't or no longer exist). Their (relative) value can be expressed as a number of other entities. This means that there can be a (potentially quantifiable) relation with other entities. This relation however is an independent relation. The creation or destruction of the entity does not have dependencies on respectively the simultaneous creation and destruction of other entities.

At most, if non-dualistic digital entity currency is exchanged into another digital entity currency, destruction of the former may take place simultaneously with the creation of the latter according to the proportions of their exchange rates so that the digital entity money supply as a whole maintains constant.

This again stresses a fundamental difference between non-dualistic 'one-sided balance sheet' money and dualistic monetary concepts. Money creation and destruction in a non-dualistic context may be completely different than in a more traditional context.

Obviously, digital entities can represent dualistic concepts, by representing two separate concepts, but they do not have that essential dualistic nature. An entity essentially can be created independently from other entities.

Consequently, digital money can take two forms. First, it can represent existing fractional reserve money (and for that matter, it can also represent debt with debt amounts) or any money that is created in a dualistic accounting view.

Secondly, digital money can also represent non-dualistic value concepts. In this sense, money just 'is' and it may exist independently and autonomously. As a result, dynamics of money creation and destruction would be fundamentally different as will be its valuations.

Non-dualistic money may be full reserve-currency, when it is backed by some underlying value, but it need not be. Non-dualistic money can also exist in the form of digital tokens that can be created or managed as virtual scarcity.

In the context of non-dualistic concepts, it is important to realise that also fully equity funded activities can be interpreted and represented in a non-dualistic manner.

In fully equity funded activities, equity titles 'are' or can be seen as (unconditional) ownership. This differs from the notion of debt, which represents a (dependent) claim on something (else).

Also in the case of for instance full reserve bank notes, the bank notes 'are' (unconditional) ownership.

Of course, accounting-wise, we are used to register full equity ownership and full reserve bank notes as claims and we could continue to do this. Still in digital entity representations, we could most definitely also see ownership in its non-dualistic 'being' state, just like digital entities represent people, organisations and rules that just 'are'.

A digital token could just be, independently and autonomously and from that potential, so could be 'undisputed' monetary ownership, an option that fractional reserve banking does not provide and which could prove to be a very attractive and competitive feature of new (non-dualistic) digital currencies.

5. Systemic demand for non-dualistic digital entity money

With the arrival of the internet of (digital) entities, fundamentally, everyone and everything can connect and interact with each other, also money. Interactions will to a very large extent be managed or organised in smart contracts or 'group chat' contexts. In these group chat contexts, several parties or legal entities will exchange assets, information, products and services simultaneously. They also share intentions. On the basis of the same information and aligned intentions, the smart contract will be executed.

Exhibit 10. UETP smart contract example where different stakeholders collaborate on the same transaction, fulfilling several functions and services.

It is essential in an ecosystem that operates with so many different types of entities representing titles, values, conditions and statuses that all is clear to everyone.

A monetary entity for instance cannot and should not be spent twice in two different contexts in overlapping time periods. This means that the status of the monetary entity should always be clear. Monetary entities that are bound to enter into a smart contract or group chat context are not already part or cannot enter into other smart contracts or group chats simultaneously. Some constrained entities that for instance represent physical ownership or money, can only clear and settle in the context of the smart contract or group chat and not in multiple contexts at the same time.

The clearing and settlement process as such, should therefore as much as possible happen in the context of the smart contract or group chat. Holding hold liabilities, open positions or claim based relationships outside the smart contract, will affect the 'complete' clearing and settlement. With the arrival of the internet of entities, parties will start to look at ways to trade with each other in irrevocable ways, clearing and settling the transaction completely.

If clearing and settlement are not complete, liabilities would be introduced into the ecosystem in between transactions and entities. From any future state, such

liabilities would be extremely difficult to identify and to backward-attribute to (originating) transactions and entities.

When we visualise the dynamics of interacting entities in smart contracts in a context of continuous high frequent trading, we get a view of the complexity of the ecosystem. As the following, simplified version of a small ecosystem will visualise, 'rolling back' the ecosystem to correct for errors is practically impossible. It will consume a lot of time and resources and while any investigations would happen, hard to quantify uncertainties would affect the ecosystem and its interactions altogether.

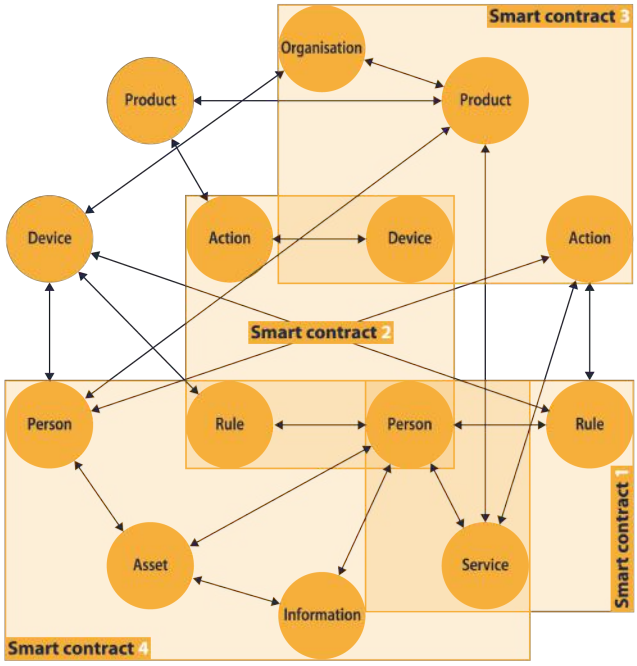

Exhibit 11. An ecosystem of interdependent entities, which interaction is (chronologically) arranged through smart contracts.

Case study: The flash crash of May 6th, 2010

The May 6, 2010, Flash Crash, was a United States trillion-dollar stock market crash, which started at 2:32 p.m. EDT and lasted for approximately 36 minutes. By 3:00 p.m., most stocks had reverted back to trading at prices reflecting true consensus values. Stock indexes, such as the S&P 500, Dow Jones Industrial Average and Nasdaq Composite, collapsed and rebounded very rapidly. The Dow Jones Industrial Average had its biggest intraday point drop (from the opening) up to that point, plunging 998.5 points (about 9%), most within minutes, only to recover a large part of the loss. It was also the second-largest intraday point swing (difference between intraday high and intraday low) up to that point, at 1,010.14 points. The prices of stocks, stock index futures, options and exchange-traded fund (ETFs) were volatile, thus trading volume spiked. A CFTC 2014 report described it as one of the most turbulent periods in the history of financial markets.

Aldrich, Grundfest and Laughlin (2016) suggest that weakness in the trade-

reporting infrastructure may have played a significant part. They use millisecond analysis both in terms of executed trades and, more importantly, in terms of data feeds as reporting of trades were being delayed by as much as 90 seconds.

The paper asserts that unsettled market conditions early in the day, combined with a huge sell order for the popular E-mini S&P 500 futures security by mutual fund manager Waddell & Reed helped trigger the sell-off. They point to and agree with a 2010 joint report by the Commodity Futures Trading Commission and the Securities and Exchange Commission that came to the same conclusion.

The authors say they are concerned that regulators will focus on spoofing activities as an effective substitute to avoid future flash crashes rather than a more fundamental restructuring of markets.

The flash crash of May 6th in 2010 (see above) occurred in a relatively simplistic ecosystem compared to the ecosystem that is currently about to evolve. Moreover, the market in which it occurred was predominantly organised centrally and not in a peer-to-peer fashion. Most flash crashes in current market contexts only occur in very specific domains, with a relatively limited number of parties. Roll backs can still to a certain extent be organised, albeit at great difficulty.

In a dualistic monetary system, money holds a relationship with debt and this introduces uncertainty. To put it simply, a dollar in an account of a triple A rated bank in a triple A rated country may be valued differently than a dollar in an account of a defaulted bank in a defaulted country. Any virtual representations of dollars would therefore be incomparable with each other. Additional information would be required when introducing virtual dollars. If not, banks' deposits would always continue to exist and this would create major moral hazards.

The internet of entities that on a highly frequent basis interacts with each other, demands an operating ecosystem, as much as possible free of any open unsettled positions or liabilities. Smart contracts can (potentially) facilitate for legal clearing and settlement with competent authorities. Also fiscal clearing and settlement can be facilitated through smart contracts. Residual risks, such as performance risks can still be insured on the basis of equity sharing principles, so that liabilities can be avoided.[1] Parties that can offer liability-free and liability-insured propositions, are far more likely to be chosen as counterparts, than parties that cannot offer this. The risk of becoming 'stuck' in an ecosystem that cannot come to clear and settle positions is a risk that parties will want to avoid.

1 The creation of a liability free engineered ecosystem goes well beyond the scope of this paper. Still, liabilities and risks could be insured in a 'one sided balance sheet' nature through the use of equity participations in insurance policies. Such insurance policies exist in Islamic Finance under the practice of Takaful Insurance. Should parties mutually agree to such structures, positions in smart contracts can be cleared and settled without remaining liabilities.

In other words, the race to facilitate 'liability-free' smart contracts or transactions is on. Those parties and jurisdictions that can facilitate this best, are about to gain substantial advantages over others in an increasingly interconnected world.

The need for entity based money, that either 'is' or 'is not' can help to provide the monetary certainty that is required for an interactive (peer-to-peer) ecosystem to operate free of liabilities and open unsettled positions.

A lot more can be said about non-dualistic digital entity based money and money supply management, yet this goes beyond the scope of this paper.

6. Illustration of a disruptive virtual currency scenario

For illustration purposes, we discuss a disruptive scenario that the introduction of a new hypothetical virtual currency could bring. In this scenario, we introduce a new 'non-dualistic currency', which in traditional wording could also be seen as a 'virtual full reserve token currency'.

Creating a virtual non-dualistic (full reserve) token currency

When we take money out of an ATM, some remarkable money transformations take place. 'Money in the bank', that was previously held in digital form, as a claim on assets from the bank's balance sheet, changes into a (physical) value token, without credit-, interest-, liquidity- or market risk.

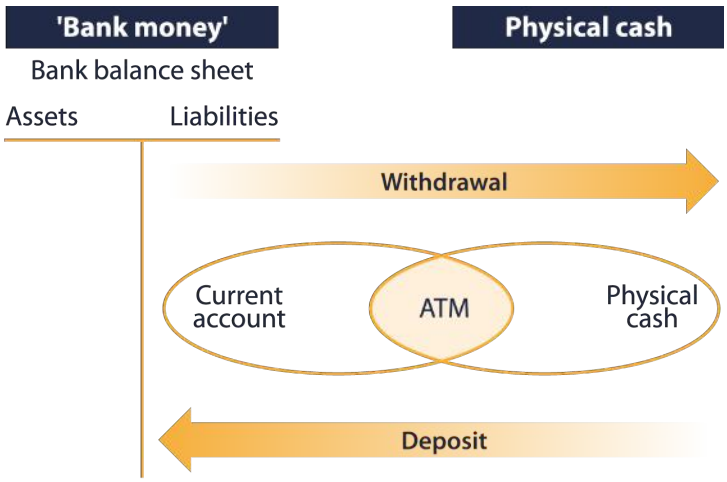

Exhibit 12. Money transformations between 'bank-cash' and physical cash

At the same time, the transformation results in the money's loss of interest rate returns. Also, the physical cash is relatively difficult or expensive to transfer in many transaction contexts and the risk of theft is likely to be considerably higher than the alternative of having 'money in the bank'. Finally, physical cash may be less subject to regulatory oversight and control.

A substantial part of these downsides can be mitigated by changing the physical cash into virtual token cash. Such secondary transformation can for instance take place, by using a token vault.

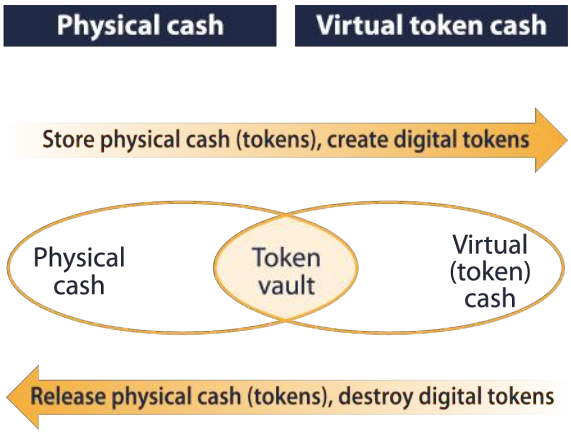

Exhibit 13. Money transformations between physical cash and virtual token cash

In the case of 'token vault transformations', the physical cash is stored into a vault. Upon storage, virtual tokens, denominated as another virtual currency, are being created or issued and they are brought into circulation. The two subsequent transformations would effectively change the fractional reserve currency into a full reserve currency, in case the monetary base that the physical cash in the vault provides, is not leveraged with credit growth in the alternative virtual currency's denomination.

The total virtual cash token amount in circulation could grow by more physical cash conversions. Still, the total relative value of physical cash (tokens) and virtual cash tokens remains the same, as the relative value of virtual cash token that is brought into circulation equals the relative value of the physical cash that is taken out of circulation. At least, this is true for physical cash that is changed into virtual cash tokens. This may not be true for the exchange of virtual tokens back into physical cash.

Virtual token currencies do not (tend to) remunerate interest. On the other hand, the token pool is not subject to token amount growth in the way the fractional reserve-currency money supply grows, for instance through credit growth or by inflation dynamics. In other words, assuming money supply growth being positive over time in fractional reserve-currency regimes, the same is less likely to hold for certain digital currency full reserve currency regimes. Some non-dualistic digital currencies may purposely not grow their money supply on the back of economic dynamics as they would intend to provide 'digital gold' as scarce resource. The debate is open as what constitutes monetary value in money. It will predominantly rely on society's trust and convenience.

As the scarcity of full reserve currency increases versus fractional reserve currency over time, so may the value of full reserve currency appreciate versus fractional reserve currency. The reverse exchange of (more scarce) virtual tokens back into (less scarce) physical tokens, would come at a real value loss, potentially preventing virtual cash token holders to change back into physical -currency. If this would become a self-fulfilling prophecy, real value appreciation may actually – to an extent - compensate for the loss in foregone interest returns. Also, the value of the (older) virtual tokens may become decoupled from the (older) underlying physical cash tokens.

Case study: The Bank of Amsterdam

In 1609, the Bank of Amsterdam was established to restore trust in the monetary system that existed in and around the city. There was substantial distrust in the value of the many currencies of trading partners that were in circulation. Debased and clipped coins were common.

The Bank of Amsterdam was founded with a monopoly to mint and exchange gold and silver bullion. It took in gold and silver, weighted the intrinsic value and issued paper that was backed by undebased and unclipped coins. Moreover, the Bank did not provide credit (also because equity and equity markets saw the light of day in 1602), effectively making the bank a full reserve bank, until the late 18th century, when it illegally -against its mandate- started to provide credit, amongst others for trade wars. This ended both its full reserve status as well as its importance on the global scene, as it rapidly lost balance sheet, strength and influence.

Amongst others, van Nieuwkerk (2005) and van Winden (2000) point out that inflation during the 1650 – 1750 period averaged around 0 percent (the CPI remained fairly flat over the entire period). The bank withstood asset bubbles, such as the infamous tulip bubble in 1637 and bank runs in the 1660s and 1670s. At the same time, the Dutch florin appreciated vis-à-vis other non-full reserve currencies, which benefited the Netherlands as a preferred trading nation, contributing to its 'Golden Age'.

7. Introducing instability

What is more relevant for financial-monetary stability however, is the potential for one-way physical cash flows out of the (existing) fractional reserve system into virtual full reserve currency tokens. The chances for such scenarios to occur become particularly probable in contexts of low or negative interest rates and higher credit- or systemic risks.

We currently do not see such dynamics take place with virtual coins, as the bitcoin, ether or ripple, apply different monetary dynamics than the token vault scenario. Moreover, real time clearing and settlement, scalability and legitimacy of current virtual currency transactions remain hurdles to wide-scale adoption and deployment of such systems. As a result, they cannot make a significant dent into the current stability of the system.

Recent distributed ledger initiatives however, address both real time clearing and settlement issues and scalability (with real-time transaction processing capacity reaching well over a million transactions per second). Also initiatives that include regulators, monetary- and fiscal authorities in real-time transaction contexts (i.e. smart contracts, such as with UETP) start to demonstrate that peer-to-peer networks potentially can reach higher assurance, legal and compliancy levels than current existing practices.

What is particularly relevant, is that virtual currency prototypes are being developed that are programmed in such a way that they may only appear in smart contracts that do not allow negative balances or interest (the smart contracts settle directly, not allowing for residual liabilities and risks beyond the context of the smart contract).

Should economic agents have the choice between 'digital bank money', 'physical cash' or 'virtual token coins out of a vault token, with full reserve status that can be maintained by immutable code', their choices would center around the following positive characteristics:

	'Bank money'	Physical cash	Virtual token cash[1]
Positively perceived characteristics			
- low risk (credit, liquidity, interest, market)		x	x
- returns interest	x		
- no money stock growth (real value appreciation)			x
- ease of (digital) transferability	x		x
- regulation and control	x		?

Exhibit 14. Scenario example of economic agents' money type preferences

It may be clear that the likelihood for digital bank cash to be converted into virtual token cash, backed by physical cash particularly emerges during times of stress and negative or low interest rates. These cash outflows themselves could trigger further outflows, as the outflows put a stress on systemic funding.

8. Introducing synzeris

With the arrival of new monetary and value concepts, new financial products and policy instruments can be introduced. Fundamental, may be the introduction of policy instruments that can link between different monetary and value systems. Synzeris are introduced as an example of such new policy instruments.

We basically can summarise the scenario as described above as two financial monetary systems that compete for the same pool of funding.

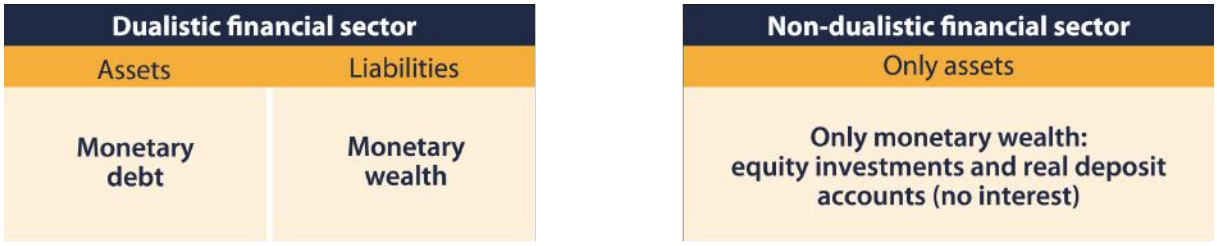

Exhibit 15. Two different regimes competing for the same monetary wealth

By definition, the dualistic regime requires that the funding side of liabilities and equities equals the assets side. Any outflow of funding, especially when brought out of circulation, into another monetary system, will put strain on the system. Moreover, if such funding would be placed in the non-dualistic financial sector, it would create further incentives for remaining funding in the dualistic sector to move out.

This could lead to systemic funding erosion with a potential system collapse as a result.

A unique scenario for parties to maintain their wealth, would be to consider a regime change altogether, from dualistic to non-dualistic.

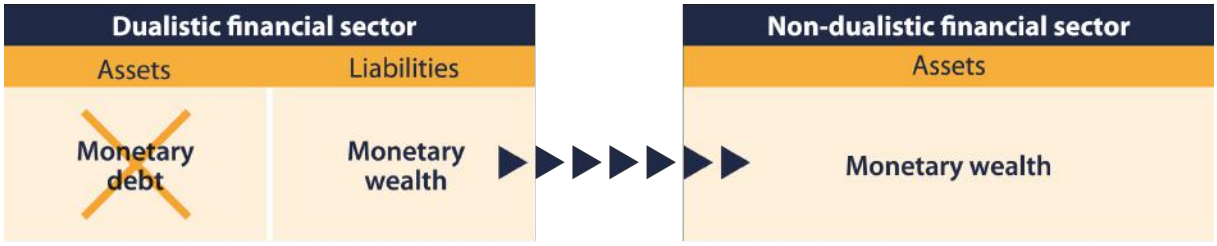

Exhibit 16. Systemic debt restructuring while maintaining monetary wealth

At first glance, such a scenario would seem highly unlikely, as everyone would have to 'jump together' in sync in order to make the change.

However, with the use of synzeris, a gradual and controlled regime shift could be facilitated. Synzeris are temporary regime change instruments. They hold 'accounting value' during the regime change and are nullified after the regime change is complete.

Suppose, a bank could not attract sufficient funding means. If it could temporarily prop its balance sheet with synthetic zero rate instruments, the bank

basically indicates that it is no longer funded by traditional means, while with the new means, it remains funded and can provide liquidity.

The central bank could decide to either register the synzeris as off-balance sheet items, it could introduce a non-dualistic balance sheet in addition to its regular dualistic balance sheet and buy the synzeris synthetically or find other administrative ways to buy or register synzeris.

Please note that the 'synzeris' only appear on the right hand side of the balance sheet of (commercial) banks. In essence, they are non-dualistic instruments, placed in a dualistic balance sheet. As such, synzeris 'link' the dualistic system with the non-dualistic system.

The moment the central bank synthetically buys or 'registers' the synzeris from the bank, it can order the bank to stop charging interest on both sides of the bank's balance sheet, while prohibiting the bank to lengthen its balance sheet.

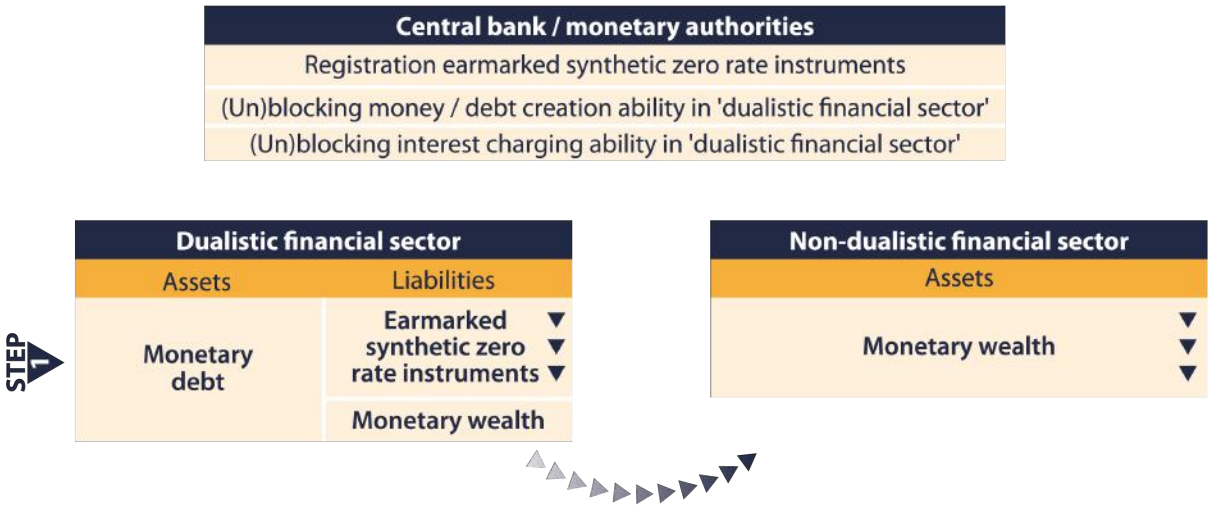

Exhibit 17. The use of synthetic zero rate instruments (synzeris) to maintain banks afloat in times of stress.

Obviously, if the bank would be able to (re)fund itself without the use of synzeris, it then could nullify the synzeris with the central bank or monetary authorities and resume operations as before.

If not, and with the imposition of zero interest rates on deposits, such would be very likely, the system can remain liquid and use a certain time frame, perhaps 3, 5, 7 or 10 years to shift from its dualistic status to its non-dualistic status.

Exhibit 18. After the regime change, both debt positions and synzeris are nullified

Further research on how to create and structure synzeris as well as policy actions and event triggers will be required to validate practical use and deployment of synzeris as new monetary policy instruments. Nonetheless, the author wishes to share these preliminary lines of thought to provoke thoughts, stimulate debate and aid in the development of new policy tools.

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