

Why gold became money, and water did not. What kind of evolution can we expect to emerge from crypto-technologies?

Some people claim that the main reason why gold became money was that women liked it. Others claim that it is the faith that makes us use a certain good as money. By that logic, even water could become money just by virtue of us having faith in it. In this article, we will attempt to find a reason why water will never be money, and conversely, what actually can become money. We will begin by examining how and why we assign goods their value, then we will look at the historical context and demonstrate why gold became money and how banks helped it there, and lastly, we will describe a potential evolution through crypto-technologies.

“Use Value” and “Exchange Value” of goods

People assign to goods so-called *use value* and *exchange value* by putting them into their preferential scale as Menger teach us. We can obtain goods on an individual basis – I can build something for myself, pick something from a tree, grow something, find something... In this context, I care about *use value*, which is assigned based on the utility the good provides, how it makes life easier, nourishes us, etc. But the human being is also a social animal and can obtain goods through exchange too. When it comes to exchange, it is important to imply that in order to exchange something, I have to first have something that I can use as a subject of the exchange. Say’s law therefore applies – satisfying my needs necessitates satisfying the needs of others. In the context of exchange, we assign goods an *exchange value*. We want them in order to exchange them with other people for goods that they have – goods that we may want in the context of their *use value*. This means that I will exchange an apple for a pear if I have an apple, but I would like to eat a pear. In this case, the apple has an *exchange value* to me, but no *use value*. And conversely, the person I am exchanging it with assigns a *use value* to the apple and *exchange value* to the pear. However, if I exchange my apple for a pear, which I want only to subsequently exchange it for a spade, the pear has an *exchange value* for both me and my exchange partner. Even though both sides have maybe assigned the exchange value to the pear for different reasons – me because I wanted a new spade, and my partner because he felt like eating an apple. And when a good gain a universally assigned *exchange value*, it becomes a medium of exchange.

Historical context – barter vs. debt

A medium of exchange makes barter exchange easier. It solves a problem of a so-called “*double coincidence of wants*” first formulated by Jevons in 1893. In a barter exchange, the subjects face a problem where it is not certain that one party of the exchange will want what the other is offering. So, in order for the exchange to take place, they use a third good. However, as the anthropologist Graeber in his book *Debt: The First 5000 Years* points out, people in a community could have also solved the “*double coincidence of wants*” problem in a different way – with time. That means that even though I do not want the pear you are offering for my apple today, I will exchange the apple with you under the condition that you will, after some time, eliminate the debt arising from this exchange with a different good, which I will want, and which does not necessarily have to be a pear. In other words, people can solve the problem formulated by Jevons through credit relationships (IOUs).

This statement is logical. Why would the members of a prehistoric group not use this type of “exchange”? Especially if we realise that the subjects know each other, live with each other

and the group is “governed” by certain rules. These rules can also include recognising of mutual debts and enforcement of their repayment on the basis of punishment or some prehistoric religious morality. These rules could emerge as evolutionary tools of pre-historic groups. Both barter and IOU have the characteristics of an exchange. The difference between them is the time and method of eliminating debts. In a barter exchange, the “debt” is eliminated instantly – one good is exchanged for another. With an IOU, a commitment is created, and the debt is eliminated later in time. At the same time, the way the debt is eliminated depends only on the entity’s future activity. That means that by definition, what we exchange during barter must exist when we exchange it. With debt, however, we can use productive activity in time, i.e. I will create (in very broad terms) something tomorrow, or in a year, and use that to eliminate the debt.

Graeber also backs up his logical argumentation for a proto-existence of IOUs with historical artefacts, at least in societal organisations known to us after the year 5000 to 3500 B.C. Everything before that time is an estimation. These estimations, however, again suggest the existence of debt (IOU). Discoveries of so-called tally sticks (accounting records of payables and receivables used almost to this day - 20th century - in Swiss regions, and until the 19th century in Great Britain) are among the main historical artefacts that support this argumentation. Likely the oldest of these are the Wolf Radius (25-28 thousand years B.C.), the Lebombo bone (35 thousand years B.C.), or the Ishango bone (18-20 thousand years B.C.), which are speculated to be among the first depictions of mathematical and societal relationships, or potentially among the first records of “something” at all.

It is logical that barter and IOU, be it within a group or outside a group, precedes the existence of a universally used medium of exchange, because a medium of exchange is a more sophisticated way of eliminating debt (IOU) and a replacement of barter.

Money – medium of exchange and a societal unit of accounting

During an exchange that utilises a generally accepted medium of exchange as a replacement for barter, an exchange is realised, and the business relationship ends as soon as the exchange takes place. Debt is different. Because it is realised over time, it is a dynamic phenomenon. That means that we use the medium of exchange not only during calculation when the debt is created, but also during elimination in a different moment in time. It is also the case that over time, we can exchange a debt for a different debt with the same timeframe (clearing a debt by a different debt), but also with differently overlapping timeframes (clearing a debt over time – so called rolling over of debt). It is apparent that a medium of exchange will face different requirements in the context of barter than in the context of debt. A universal medium of exchange has to be useful in both cases – barter and IOU. However, what is the basis of that? It is something that has always motivated people – a narrower spread. Both sides of an exchange are reducing the spread they are facing by utilising a third good as a medium of exchange.

Utilising wheat, salt, furs, cattle, coco-nuts or other goods that have been used as a medium of exchange is connected to their objective characteristics such as divisibility, portability, durability, or ease of storage. The reason this helped people solve the ‘*double coincidence of wants*’ problem during an exchange is that if they for example used a good that was not divisible or portable enough, their exchange spread must inevitably become wider. Therefore,

using a good that is divisible, portable, or durable is useful for narrowing the spread in an exchange. With debt, however, things get a little bit more complicated.

Let us start by examining how wide was the actual spread people faced in the past? Compared to the contemporary 'modern' world, it was vast and caused people problems. Graeber, for instance, shows this with different examples – slavery as an option of eliminating debt, drastic historical practices of enforcing repayment, using family members as collateral, or transferring debt to other family members across multiple generations – both due to a shorter average lifespan and socio-moral principles of communities. Societal institutions of morality and religion were supposed to keep creditors 'in check', for example in the context of interest rate height, method of calculating interest rates, enforcing payments, or even forgiving debts. On the other hand, however, they were also supposed to 'socially influence' the debtors to repay their debts. This illustrates the *complexity of societal phenomena* connected to the problem of debt versus a barter - exchange at a particular point in time. And apart from what we described above, the credit exchange spread could have been affected by other relationships and factors.

Interest in a time continuum

We have come to an economic question that will need to be explained in economic terms. Why did iron or water not become money? Why was it gold? The theory I am trying to build is that it was because gold enabled people to best reflect the interest rate, which is a part of the exchange in time or debt (IOU). The interest rate is a criterium based on which people decide which goods they will produce using already existing savings. Simply put, *if* the production of steel cannot provide at least a 10% return for example, the owners of capital goods (machines, land, labour) will prefer *either* using them in a different production *or* they will keep the goods as savings or consume them, as points out Hülsmann in his Theory of Interest.

In my theory of the interest rate, I claim that the interest rate is a mathematical variable which we use to value the future. Because it is a mathematical one, we can use it smoothly in different times when we do valuations, because mathematics is time-independent. The goods themselves are value-variant in time. Therefore, we cannot derive the interest rate from a preference to a specific good (e.g. steel) and our future expectations for this good. Rather, we derive the interest rate from how e.g. steel will affect our portfolio of goods – i.e. if today I use some goods to make steel, how will steel that I will gain from someone else, let's say after a year, affect my portfolio. Creating a portfolio of goods as a way to prepare for the future is nothing unusual. People acquire goods – e.g. I will make a bow and some arrows, build a hut, gather some wood, store some apples and wheat... and prepare for the future. By owning a portfolio of goods, I am somehow prepared for the future. However, people came up with exchanging acquired goods for goods that someone else will give me in the future. For example, I decide that I want to have wood for the winter and I plan that someone else will give it to me (he declares that he will have wood) once the winter come if I lend him my bow and arrows today in summer. We made an exchange over time. It is related to a certain good, but it was realised in the context of my portfolio that I use to prepare for the future. This exchange also contains an interest rate. I do not compare wood over time, but I compare *Portfolio 1* – my goods without lending the bow and arrow and facing a potential shortage of wood, with *Portfolio 2* – my goods without a bow and arrows today vs. my goods including the returned bow and arrows and the gained unit of wood. I therefore compare a portfolio (a mathematical construct) in time, while applying an interest rate (a unit of wood that represents the amount of the interest rate)

to the exchange (if it occurs). This unit of wood represents a number of things at the same time. First, at least the debtor *a priori* assigns it *exchange value* in time. For the wood, he will receive a bow and arrows today. This unit of wood also represents what we call the interest rate. If I subsequently burn the wood (use it in the context of its *use value*), the information about the interest rate will naturally disappear. However, if I use the wood in the future to exchange it for some apples that I just ran out of while having enough wood, I assign the unit of wood *exchange value* as well. It does not matter whether I planned it, or whether I decided to do that only in the moment of exchanging the wood for the apples. The unit of wood then still carries the information about the interest rate. Because it was used in another exchange, we used it to connect one value time period with another. At the same time, the unit of wood enables us to express the extent of the first exchange (bow and arrows for wood), and do the same thing later in time with the second exchange (wood for apples). In these exchanges, the unit of wood has therefore become a *unit of account*. We use it to calculate two exchanges in different times. This is possible because the connection of two time-periods is realised using an interest rate (a mathematical variable), expressed by the unit of wood. That is why we can use it to compare two time-periods, i.e. record a loss or a gain expressed as the unit of wood. In our example, the wood has therefore become a medium of exchange used to reflect the interest rate.

The question is, why did we not end up calculating in wood, but in gold?

The answer is again the width of the spread. Let us imagine a hypothetical society in which gold, silver, copper, wheat, cattle, wood, and even water are all used as a medium of exchange. It is not completely unfathomable. Why should gold logically ‘win the race’ in this society? In order to narrow a spread, it is required to know the alternatives offered by different goods used as media of exchange. The debtor/creditor relationship also comes into play. Both sides of an exchange must agree on the *unit of account* in the form e.g. of *water*. Presuming that this community has a relative abundance of water, this would mean that the debtor would have a significant advantage to the creditor, or in other words, the creditors spread would be too wide and, conversely, the debtors spread would be significantly narrower. This is because the debtor can repay his debt very easily – he could simply go to the river and fill some buckets (remember the relative abundance of water here). An exchange must be reciprocal in the meaning that it is individually preferred by both sides of the exchange. In our example, water is too abundant to be used as a medium of exchange in time – the debtor would have access to the creditor’s savings at a too low cost. It is therefore important that it is a relatively rare good that also expresses the risk connected to the creditor’s waiting for repayment, the uncertainty that the creditor faces, or the entrepreneurial skills of the debtor that are supposed to manifest over time. Since gold has, from a physical standpoint, a slow and continuous flow to the market, and is relatively rare, it reflects these requirements. Also, when interest in the society changes, it is possible to add/subtract a new/old unit of gold and thus reflect the change in interest rate. These attributes are useful when dealing with an exchange in time, is that all though? A second important factor of the above-mentioned goods is how people assign them *use value*. As we have shown earlier, the more a good is consumed, the more the information about the interest rate expressed in the good disappears. Simply put, gold also won because it is less useful to people in the context of its *use value* compared for example to cattle or salt, which were competing with gold. The subjects simply ate them more often than used them in exchange, which inhibits the option of future calculation of exchange in time which includes interest. If we considered water again but now assumed that it is relatively rare in the community, it would

again not 'beat' gold, because the community would need it more in the context of its *use value*. Once the water is rare within the society humans would simply drink it, not use it as medium of exchange.

That the issue of a *unit of account* is about narrowing the spread (rather than faith), is also indicated by the fact that historically, many different goods were used as units of account. People were trying to find out which good works the best for them, and as Graeber points out, it wasn't always goods but also human labour and people as such (e.g. slavery). The width of spreads connected to credit exchange is therefore also dependent on the societal environment, legislative framework, morality, and other factors.

The banking system – an 'attack' on even narrower spreads

In some case, let's say when the interest rate is falling – i.e. there is a higher degree of optimism about the future in the community – money must reflect the changes in interest rate. In those cases, there is a demand in the market for a much quicker supply of new units of gold that is supposed to facilitate new credit exchanges. The need for a higher amount of gold is more pronounced especially in the case of a progressively developing communities that can, on the one hand, accumulate enough savings and, on the other hand, are optimistic about the future in the context of ensuring it through credit exchange. Massive and quick addition of new units of gold has its objective limitations, however. Which is of course 'good', as we have demonstrated earlier.

The debt (credit) exchange, i.e. an indirect satisfaction of subjects' needs *in time*, is a dynamic phenomenon, where time enables the utilisation of multiple ways of mutual recognition and clearing of the debt. On one side we therefore have an objective limitation of the amount of gold which facilitate this exchange, and on the other side, we have interest rate as value phenomenon which advise us about demand for new economic activities in time and supply of capital resources and also the option to perform debt (credit) exchange in a dynamic way with no direct using of gold. *This creates an entrepreneurial opportunity for further narrowing of the spread through banking activity that facilitates the current shortage of money stemming from a lower interest rate by enabling the clearing of various trades, which would otherwise have to be settled directly in gold.*

Within the free fractional banking activity, the settlement is done in a bank's IOU – currency that is derived from the bank's gold reserves (we skip over examining the fiat system for now). Economic activities that are expressed in the currency will be paid for using the same currency, or a currency of a different bank created against other economic projects in space and time by necessarily productive (!) economic activity expressed in the bank's currency, or in a different bank's currency. For such activity to be possible, productive activity must, of course, be sought after. It is nothing else than an institutionalisation of the competitive process of discovering the interest rate by banks (as a sector), seeking for productive economic projects and a standardisation of the conditions of facilitating credit exchange.

Banks and their product - IOUs.

Banks create currencies which are a liability (IOU – actually currency is a debt with zero maturity or it is a liability of the bank to deliver good/service at the time of its submission)

offset against some receivable (asset). Initially, these payables were only offset against gold. Although, the character of IOUs implies, that it is possible to create an IOU against other assets, not just gold. Gold is then used only as a *unit of account* so that debts (their amount) is correctly defined and can be recognised in the context of other debts and in time. If a currency is exchangeable for gold, and at the same time, the clients voluntarily accept lower rates of gold reserves than 100% and the system is not regulated by a government, a competitive banking clearing has no reason not to function.

It is an accounting system of liabilities that include a final eliminator of debt – gold, while the creation of credit activity (IOU) is self-regulated by the amount of reserves in the form of gold. In a case of a decrease of the reserves to a lower rate that is acceptable by the clients (the banking portfolio starts becoming too risky), it is necessary to either supply more gold to the system through new mining (which will decrease the risk of the bank's portfolio), or increase the interest rate (which will attract gold that is currently outside of the banking system into it), and vice versa. We therefore have two basic economic situations in a community.

First – banks are discovering that the interest rate is falling, i.e. the society is optimistic. It is possible for them to see this in two ways: A) through the decrease in reserves in the banking systems and the creation of new IOUs against new economic projects and not against gold, and/or B) gaining of gold on to the general market outside of the banking sector or through the supply of newly mined gold into the banking system. The way of discovering the interest rate is dependent on how clients react to the banker's estimations. If a lowering of reserves will not cause a heightened perception of the risk of banking activity, the bank will lower the reserves. It will not lower them if it starts facing withdrawals of gold (withdrawing gold by the clients would imply a higher interest rate). In case the marginal clients are prone to withdraw gold, while the interest rate is still lowering, it means that the demand for gold is increasing. A higher demand for gold is a signal for a mining company to supply new gold – this is because that in this situation, the economics of the marginal mine changes through the relative decrease of costs and a relative increase of demand – higher profitability of mining projects will attract new capital resources. New gold will then be deposited in the bank by its new owners, who accept a lower interest rate and who are gaining gold for goods provided in the past, or by existing debtors, who use it to eliminate their old debts. In this situation, economic projects backed by the bank should be profitable, and debts are being repaid.

The second situation is that banks are discovering that the interest rate is rising – i.e. the society is pessimistic about its economic future. The bank will reduce the issuance of new IOUs against existing, or already low, reserves, and increase the interest on deposits and subsequently on the issuance of credit. The higher interest is supposed to incentivise the marginal saver to deposit gold which is currently outside of the banking sector into the bank. If the bank is not successful with gaining new reserves, it has to reduce its activity. In this situation the backed economic projects should still be profitable, and debts are being repaid. The problem arises when the bank does not reduce its activity. Over time, it will face a loss that is connected to the perception of a higher interest rate in the community, while it is providing credit with lower interest. Resources are not allocated correctly, projects backed by the bank will incur a loss and bank is going out of the system.

Banks live off of the spread between the interest they have to provide for the deposited gold / currencies to their clients and the interest for which they issue credit. During a reducing of reserves, they widen this profit spread. IOUs will be created in principle with zero cost, while they demand the market interest for issuing credit. The spread is, however, influenced by competitive activity of other banks and the potential for client's reacting by withdrawing their gold from the system. In case that a bank (or multiple banks) doesn't do business properly, i.e. it is artificially widening its profit spread, e.g. at the expense of riskiness (in principle, it estimates the lower level of the interest rate too much), they will not thrive in a competitive environment and eventually will go bankrupt. Why? Because artificial lowering of the rate creates room also for projects which should be otherwise not supported and this creates higher risk in the system and the projects against which they created currencies, could go bankrupt. Debts will not be repaid, and the system of mutual accounting of economic activity will crumble. However, prudent behaviour on the market is ensured by competition, same as in every other business sector. What will happen, though, if a bank makes a genuine and natural mistake when estimating which projects are worth of support, and it does so without any mal-intent?

From the bank's point of view, the option to stay on the market is connected to the necessity of proving its solvency. This is possible to achieve in a number of ways. With its own resources - i.e. the bank will increase its gold reserves at the expense of its own profits, or by selling its own assets held on its balance sheet – which will provide it with new resources in the shape of gold or a more trustworthy currency issued by a different bank. If it fails and further increases its losses, a bankruptcy will follow unless it utilises one more option. Socialisation of losses. Meaning that it will apply a value discount to the already existing emission of its IOUs – the bank's currency, i.e. it will issue IOUs against non-existing assets. This will then cause a loss of the purchasing power of the IOU (currency inflation).

All these options – replacement of resources at the expense of profits, bankruptcy, or socialisation of losses, have the same impact from an economic point of view. Some kind of a value discount. Either this discount will be applied to the value of goods (at least those that would fall under the bank's liquidation balance, or those that were used for bad entrepreneurial projects, or those needed to replace the bank's reserves at the expense of the bank's profit), or it will be applied to the purchasing power of the currency that the bank issues. And if the bank stays in the market, it is apparent that the clients accept some degree of socialisation of losses.

A fractional system as pure evil? Voluntary socialisation of losses

Is this a proof that a fractional banking system is purely evil? After all, we are explicitly, and with complete seriousness, talking about a 'voluntary' socialisation of losses. Before coming to any conclusions, let us examine the alternatives we are facing: A) a system with a 100% backing of a bank's currency and B) a system without any banks or banking activity. What will occur in these cases? We should start by the very fact that people demand credit and widening of the production structure is a positive societal characteristic.

Therefore, the same thing as described above will happen. In the case of excessive optimism during a realisation of some kind of credit, the individuals (in a situation without banks) or banks with 100% reserves face the same thing – a potential mistake of the entrepreneurial

activity. The debtor must then confirm his solvency by selling off other assets, offsetting the loss to the detriment of his own profit in a different entrepreneurial project, or if that is not possible, the creditor will apply a value discount on the utilised medium of exchange – gold, which will not be returned to him in the agreed upon amount. That is because that gold facilitated the preparation of a project that wasn't economically viable and realised a loss. An entrepreneurial error occurred. On an individual level (without banks), we would in this case likely see wider spreads of this exchange as well. Everyone would “insure” themselves, so that the other would repay their debt with certainty. It is of no surprise that Graeber describes different kinds of what can be, from today's point of view, only described as ‘bestial’ historical practices connected to enforcing credit exchange (slavery, family members as collateral, female slaves as a medium of exchange, etc.). In other words, the alternative causes in principle the same – some form of loss that is written-off and voluntarily received. On an individual level, the only difference would probably be in the amount of the collateral and therefore the width of the spread of the credit exchange. Making mistakes is normal even in the entrepreneurial area of credit exchanges. From the point of view of a fractional banking system, we are dealing with only a different form of realisation of this economic activity.

The fact that credit exchange is institutionalised is the result of the following options: A) higher spreads (more collateral, hard and in some cases extreme conditions of exchange) and therefore a lower intensity of credit exchange, which will cause a lower degree of development of entrepreneurial activity and a decrease in well-being; B) lower spreads (less collateral, standardised and relatively softer conditions of debt), higher intensity of credit exchange, which causes (as long as the state does not interfere too much) a much higher degree of economic well-being. The price? A potential acceptance of some socialisation of losses of the fractional bank. This assertion can be compared to H.H. Hoppe's paper: *How Fiat Money is Possible?*, where he claims that a *fiat system* is possible only because it is enforced by a government monopoly. Unlike Hoppe, the spread argument enables us to show that people's incentive to accept a *fractional* or a *fiat system* has also to do with comparing not only the impact of the economic spread but as well as social spread of the debt, where a voluntary acceptance of some degree of economic and social socialisation of loss is a more preferred state in the context of other conditions of voluntary credit exchange. A fiat system, which is not examined in detail in this article, is an alternative which faces the same argumentation, only from a different point of view. A fiat system is not a fractional system. It is a system without a final eliminator of debt – gold. It is therefore a system of sole liabilities (IOUs) against some economic assets, i.e. economic activities which liquidity could be very different compared to gold. Such system is, at the same time, regulated, and has a lender of last resort – a central bank, which even manipulates the interest rate. It definitely is not an ideal financial system. But, as is proven daily, it is a possible system. From an economic point of view then, there exists *no economic system*, that would ensure *zero (!) value discounting* of assets or of the medium of exchange in a community in a time continuum. We will always err when predicting the future. From an economic and societal point of view, we therefore face the problem of finding a system that incentivises actors to minimise the socialisation of losses as much as possible, while enabling the narrowing of the spread connected to credit exchanges. Can we expect a better future then? We will see, especially as crypto-systems are coming to the scene.

Crypto-systems – the evolution of narrowing spreads continues

The advent of crypto-systems has caused many to think that new – ideal – money has been invented. However, what would a token of some crypto-system (e.g. BTC) do to the credit exchange spread and the interest rate? Exactly what we described in our water example. The difference is that the credit exchange would not take place from the point of view of the debtor – in the water example, it was the creditor. The tokens of crypto-systems are rigid – either they have a pre-set rigidity, or they have a set mechanism of adding new tokens, which is just a different form of rigidity. It is impossible for any crypto-token to reflect interest rate (increase or decrease), so we would not be able to facilitate demand for exchange in time. The owners of existing tokens would always be able to speculate for a higher interest rate, due to the *non-existence* of a natural counter-weight to their activity – new ‘mining’, i.e. flexible addition of new units. A healthy financial system must be flexible – sometimes it is necessary to add units of currencies quicker, sometimes slower. And whether it should be quicker or slower is a matter of discovering the necessity of realizing marginal indirect satisfaction of needs. Crypto-systems, from a monetary point of view, resemble more of a central bank commission deciding the quantity of a currency reserve. i.e. whether there will be 21 million or 22 million units, or whether new units will be added with exactly 0.3% ‘inflation’. It is only a different way of planning, rather than market-based discovery. For a correctly functioning financial system, we need automatically counter-acting ‘counter-forces’. Gold, for example, is not a creation of a free banking system – the system only utilizes it and its utilization is dependent on the decisions of clients who perceive the amount of the interest rate, and on the mining companies, not on banks as such. It is therefore indifferent to the banking system, and therefore can act as a self-regulatory mechanism in the system – money per se.

Does that imply that crypto-systems are useless? It does not. Crypto-systems can be technological infrastructure to facilitate credit exchange – automatically, using in advance agreed rules, and with very up-to-date information. A safe form of crypto-consensus of some kind of crypto-system (such as BTC, Ether, MaidSafe etc.), is, in principle, nothing else than a modern form of a tally stick, above which credit exchange can be recorded – smart contracts realized against real-world activity. This activity can be imagined as some form of using an application (a decentralized app – bank), which will facilitate credit (smart contract) for tokenized economic activity, while making decisions about granting credit based on some predictive mechanism (automatized or human-based, or their combination). The fulfilment of the contract will be realized automatically based on information gained from reality (IoT connected to a so-called oracle software and a sensor), while we can also think about using IoT to enforce sanctions for not fulfilling the requirements of the contract. Tokens of the smart contracts can be ‘packed’ (by apps – decentralised banks) into various portfolios with varying degrees of risk and diversification. Subsequently, the tokens of these applications can become new free currencies (in principle these would be modified versions of Hayek’s free currencies), while it is likely (but not necessary) that they will be tied to reserves expressed in precious metals. Utilization of reputational mechanisms, competition of predictive mechanisms, realization of automated measures of the decentralized app, for example by finding out a certain limit on the criticalness of the risk of the financial indicators of the smart contract portfolio, e.g. through an automatic change of a given portfolio from a more risky to a more conservative one, or automation of the manufacturing process and quick and up-to-date information about the economic development of the underlying assets, are only tiny speculations about how this type of activity could be ‘organized’.

In other words, the goal of the activity – exchange through the utilization of credit – will remain unchanged. What will change is the way of achieving it. By introducing this technology, we are reverting back to the state, where banking activity will be much less dependent on regulations and government power. Many more individuals and companies will be able to enter the field, and they will be able to compete with each other through better expectations about the future, and potentially utilize these applications (decentralized banks). What could also change is the creation of rules that will be negotiated among individuals when creating credit – smart contracts enforced through technology (IoT) without the need of state power intervention, while different types of rules and requirements of credit will, of course, be able to compete with each other.

What will not disappear, however? *The need for writing-off debt.* This need arises from incorrectly estimated entrepreneurial activity, for which smart contracts would be created too. To presume that only meaningful economic projects will ever be created is absurd. I.e. this system will also face a value discounting of currencies (tokens), but probably on a smaller scale. But who knows, interest rates, and estimating the future in general, are tricky. Whether we will revert back to some brutal ways of enforcing debts, only now through IoT (imagine for example that debt repayment will have automatic priority before buying food, or a sensor will lock you out of a property if you do not repay your mortgage), remains to be seen. It certainly cannot be completely ruled out. The narrowing of spreads stemming from such organization of exchange, however, will be taken care of by competition. We do not know what consumers will end up choosing. They could very well choose self-regulation through gold, but even a higher degree of socialization of losses if gold was not used as a reserve of these apps. They could also start favoring more radical ways of enforcing debts. The thing that is the most certain though, is that credit exchange will not disappear.

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