WHITE PAPER

Rules and Behavior of Tokens Issued by Producers as Legal Promises of Commodities

Commodity Vouchers as Ricardian Contract Smart Tokens on Ξthereum Protocol

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Abstract

The purpose of this paper is to study the usage of vouchers or "tokens" representing commodities like gasoline, fuel, communication fees, crops and other agricultural products, food, services, and all kind of consumables. A commodity good or service has full or partial but substantial fungibility; that is, whose individual units are essentially interchangeable, and the market treats its instances as equivalent or nearly so with no regard to who produced them. We focus on Consumables (also known as consumable goods, nondurable goods, or soft goods) are goods that are capable of being consumed; that may be destroyed, dissipated, wasted, or spent, and in many cases have an expiration date.

We do not treat tokens representing goods that can be uniquely identified, like real estate, land, pieces of art, in most cases having an owner and a property document.

It is no other than the implementation of the concept that "Anyone who offers goods and services for sale in the market is qualified to issue currency"[1], trying to minimize the role any government or monetary authority, or law enforcement, has to play in the system. The term token highlights that these tokens are meant to be an intermediary tool for barting, exchange of goods. The tokens are implemented as Ξthereum tokens.

We recover some of the ideas of Paul Grignon by which "Credit Coin is a contract backed by promises of future productivity" [2] [3]. We take strictly the principle that the promise of the producer has to be a legally binding contract to deliver the goods. The role of the state should be no other than enforce the fulfillment of these freely issued contracts by the producers with the holders. The system should work and stabilize without any further monetary intervention.

To standardize and make the contract legally binding, we propose to use the Ricardian Contract format for the commodity vouchers. embedded in the token. A Ricardian contract is a document which is legible to both a court of law and to a software application. Its purpose is to provide digital trading systems of various kinds the solidity of legally binding claims on goods or property [4] [5].

We describe how small producers can associate in cooperatives or associations and the Ricardian Contract collectively signed and used as a common framework for the promises. Something like the widespread Marketing Agreements used, for example, by farmers. However, the model also works for a big company issuing its own vouchers.

Such tokens are basically a self credit of the producers based on their reputation. We will study the monetary mechanics and the cases of over and underproduction, the effect of voluntary or involuntary nonperformance of producers, its consequences in stock and value of the token, and reputation of the producers community. We will follow the evolution of the debt of the producers along the cycle. We will study how to deal with tax and profits.

Finally, we highlight how block-chain technologies with smart contract functions is the technology of choice. As technology, we propose Ξthereum ERC20 tokens. The Ricardian is stored in swarm, and the hash embedded in the token. To ensure liquidity between commodity vouchers we propose the so called Bancor [6] method.

1. Conceptual framework

We propose a monetary system in which the main medium of exchange is vouchers that are legal documents representing the production promises of the producers. These vouchers are a self-credit of the producers to finance their inputs, and redeemed at the end of the production cycle of the product on delivery.

1.1. Monetary sovereignty

Monetary Sovereignty is understood as the ability of citizens to issue the currency needed for the economy and the management of the Commons, and to keep records of transactions directly, without Intermediaries. Sovereignty involves controlling the money supply in circulation, and sovereignty to issue currency.

Of course not enough, the monetary system must be well designed for the Economy and well managed. The sustainable economy will have the principle of subsidiarity as one of its most determining pillars.

The first sovereignty is that any person or business that offers goods and services for sale on the market is able to issue currency. E.C. Riegel puts it this way in "Flight from Inflation" [7] : *"An aspiring money issuer must, in exchange for goods or services purchased on the market (with money), put their own products or services on the market. This simple rule of equity is the essence of money"*. Since no one is obliged to accept that currency, their acceptance will depend on the credibility of the producer.

The second is the sovereignty (or control over the issuance) of the legal currency that is used for the financing of the Commons in a given community, the tax money, the legal tender. That is, controlling the money supply of the currency used by the governing body of a community to pay for common services and to collect contributions or taxes (wich is what legal tender should be in a 100% Reserve Banking). By Community we can understand a state, a republic, but also a regional government, a municipality or any charity organization.

The paper focuses primarily on voucher "money" for the market.

1.2. Localization and monetary subsidiarity

We leave a model for the interrelation of different scale commodity vouchers as in a "Great Localization and Engagement scenario", when the power relation of monetary systems has turned upside down, pending for a future elaboration.

We propose an ecosystem of commodity vouchers, vouchers, issued by the main local production sectors as promises of their future production, expressed in production units. These currencies can be freely traded with each other at the local monetary market.

- we introduce a special subgroup of commodity vouchers intended to be able to buy long lasting property that have a property title with property shares and property usage rights. They are in fact property titles on non-fungible goods. We call them "slow" currencies. This article does not cover these.
- we propose a special public sector commodity voucher which is used to collect taxes and has special rules. We do not expand on thee.
- we propose a self-credit with no other authorization than the producers themselves, consisting in the the issuance of signed vouchers on their future production, legally valid.

The vouchers are denominated in units of production of that special product. The vouchers can be issued at any time before product in the market, and must have a validity start date and end date, corresponding to their product at the market and expiration dates. Start means the moment when the product is ready for sale. End means the moment when the product perishes.

- There is no assumption of a monopoly of any entity (business or association) over any currency of a productive sector at this local community. Milk producers could associate into one or several cooperatives, each of them with their own currency or vouchers, competing each other. In that sense, commodity vouchers resemble trade mark bonds, competing with each other.
- As all the money in the system is already self-credit, the system works with no other form of credit or loan.

Use Cases are Food producers, farmers, agriculture, Proximity distribution and shops, Flee and Citizens markets, Large stores, Hypermarkets, Fidelity points, gift vouchers, On-line shops, Waste and Recycling, Petrol and other goods at petrol stations, Electric Power, Distributed Renewable power generated by Prosumers, Communication fees in Community P2P mesh networks, Transport, miles, vehicle sharing, Tourism, Hotels, Restaurants, Sports and Activities, Skilled Services, Knowledge.

With the exception of Power, all use cases can be treated with our model.

Power is a special case:

- given the unpredictability of solar and wind, promises can only be “intentional”. Certainty can only be given very shortly before delivery.

- the product cannot “stay in the shop”, it is consumed instantly. The sale has to be done beforehand.

Therefore, a more complex solution is required. The project MIRABEL called it flexi-offer[8]. Probably with at least two more tokens, one representing a flexible intention of production, another a flexible intention of consumption.

2. Issuing promises of production and delivery

The producers issue vouchers on their own token to finance their production cycle.

The issuance is of a token defined by their association as a Ricardian Contract and used collectively. Large corporations may use exclusive tokens.

It has a given period of validity, starting with month S from the signing of the contract, when the producers start making promises, and ending at month E, when products are supposed to perish and withdrawn form the market.

They pay their providers with the vouchers they issue. Typically these costs consist of:

1. Labor.
2. Utilities (heating, fuel, communications, electricity).
3. Any other type of working capital.
4. Taxes.
5. Contingencies or reserves. Some vouchers may be issued but not released to circulation.
6. Margin, meaning the ROI, a reserve for amortization of long term production means, new capitalization or investment in productivity increases, contingency reserves and profits.

We name VTS vouchers following the Voucher Trading System (VTS) conventions. [9]

It seems a safe approach to issue vouchers progressively, may be monthly, in a quantity as required by the production costs, plus the margin, to also sequentially filling the delivery curve at a future time. The production costs curve and the delivery curve may have different shapes. This approach minimizes the monetary mass in circulation.

For example, farmers may have a peak of costs in two weeks of plow, while harvest, packaging and selling span over two or three months.

$$\Delta VTS = P_p(n,m)$$

P is the value of the promises made by producer p at month n (now) for products to be delivered at month m, being n > S, and m < .

$$P(m) = \sum_{all\ producers} \sum_{S}^{m} P_p(n,m)$$

That is, the production expected for month m is the addition of all promises made by all producers since the start S for month m.

However, the real stock of goods G delivered may be different to the promises, there may be under or overproduction:

$$G(m) = \sum_{all\ producers} G_p(m) \neq P(m)$$

The monetary mass issued and put into circulation until month m is:

$$VTS = \sum_{S}^{m} P(m)$$

At each business or sales S, the VTS vouchers are redeemed and extinguished, so that the remaining monetary mass at month m is:

$$vts = \sum_{S}^{m} P(m) - \sum_{S}^{m} S(m)$$

Table 2 provides a simulation for a production cycle of one year, the product delivery follows a strong seasonal curve (as it could be agricultural) while production costs have only moderate seasons and most is steady costs.

However the system gives ample freedom for businesses to design their own issuance policy.

The main freedom is at the policy to issue the quantity corresponding to the margin. We will devote a section to this problem.

The system is as simple as explained above. However, we will explore different parts of the monetary circuitry to watch for possible hidden side effects.

The pillar law that should be enforced by authority is that the vouchers issued as a promise for a period has to be able to buy the whole production put in the market that period.

3. Market and Prices

3.1. Pricing at the market

We said that the vouchers are denominated in units of production of that special product. That would be liters, kgs, units, meters …

3.1.1. Base Units

However, any producer produces a wide range of products under a main header. Farmers of a poor region not jet under intensive mono culture may grow a wide range of crops, a long list like Rice paddy, Cow's milk whole, fresh, Cattle meat, Pig meat, Chicken meat, ..., etc. The variety can be huge. Imagine a hardware store, just the list of screws. Issuing a special voucher for each of them is unnecessary and very cumbersome. Subsets of these products can be covered under the same commodity voucher umbrella, following probably more farmers territorial grouping than a precise portfolio of products.

At another variant, the range of products could cover the full recycling cycle, like food, restoration, food waste collection, composting and urban or near rural farming. In this case the token covers different products of the same cycle.

The only condition is that the Ricardian Contract makes it clear. The fields MERCHANDISES, DEFINITIONS or DESCRIPTIONS, and CONDITIONS provide the necessary fields as usual merchant contracts do.

3.1.2. Pricing

Pricing can be done the way we are used to for example in travel MILES. MILES is the generic denomination, anchoring into real travel miles at some specific (base) type of trip. Then each real travel mile will have a specific price in MILES depending if it is a first class transoceanic flight or an economy class local flight. LETs operating on services may use the HOUR as the unit of exchange, but the services of high level lawyer may cost you several HOURS per hour.

There seems not to be necessary that producers specify further how much they will produce of each, other than making public the numbers issued of their vouchers (the monetary mass), nor what price they commit to put at each of the articles.

Free market and competition seems to be enough to guarantee the appropriate reaction of the customers against unfair prices or scarcity of products, as at any shopping center today.

What has to be clearly specified in the Ricardian Contract is the range of products against which the vouchers can be redeemed, and the value of the total production promised for a given month, expressed in the base unit of that currency (in the farmers example above, for example in KgCROPS). Value distribution

The producers will aim that the customers perceive fair and stable prices.

If the real production stock of a given month is

$$Stock(n) = real\ production\ made\ available\ at\ the\ market\ at\ month\ n$$

By the contract, legally binding, the total value of vouchers issued as a promise for that month has to be able to buy the whole production.

So that, by definition

$$\sum_{m=0}^{m=n} Stock(m)\,value \leq \sum_{m=0}^{m=n} VTS(m)$$

The prices of the different products are set in a way that

$$VTS(n) = \sum Price * Quantity$$

which is no other than the **Quantitative Money Law**.

This is the basic pillar rule, that ***the vouchers issued as a promise for a period has to be able to buy the whole production put in the market that period***, and occupies in the token system a legal positioning similar to anti-fraud or counterfeiting laws. All contracts should include that legal commitment.

Prices should be set in a way that customers perceive them fair, and expensive products accepted as expensive, and cheap as cheap. This does not need any further regulation as the market reaction, as it is today.

However, this is not enough. The customers should perceive that this corresponds to the expected Stock*(n)* when they accepted the vouchers in exchange of products or services. We analyze this closer at the Redemption Cycle section.

3.2. The redemption cycle

Table 3 provides a simulation of the redemption cycle.

3.2.1. Overproduction

Overproduction, for example, at getting an extraordinary harvest, is easily solved. Shortly before maturity, the business may issue the missing money, in order to offer more product at the same prices.

$$VTS_{final} = VTS_{initial} + \Delta VTS$$

The monetary circuit is guaranteed.

All production costs already passed, the increased issuance will be added directly to the margin quantity. It will probably translate into a decreased percentage of sales of the available stock, an increase of products that expire, and as a result into a not so brilliant margin increase, but otherwise the system manages the situation with the business as usual mechanisms.

4. Underproduction

Underproduction, for example, at getting a poor harvest because of bad weather (or, in the worst case, trying to cheat), is solved less easy.

With all issued money in circulation, the monetary mass in circulation cannot be decreased.

An approach could be to issue for the whole expected production

$$VTS = P$$

but keep some vouchers in reserve out of circulation until the last minute.

$$VTS = VTS_{circulation} + VTS_{contingencies}$$

The advantage is that the announcement of the total amount of vouchers issued is an indication of production expected. The drawback is that the cancellation of retained vouchers can only be done trough expiration, which is not transparent to what has happened.

Another approach is to issue vouchers for the amounts just needed to pay for the production costs and then treat all cases as overproduction. The expected production can be announced as a forecast by other means.

If things go worst, and there is a disaster production, and the only option, given the pillar law, is to increase prices, and take on the business shoulders the decrease in credibility, putting into risk the acceptance of future issuance of the business token. A dead sentence for the business in a normal situation.

But not so different as it works now. After a natural disaster, or a drought, agricultural products may sky-rocket. Everybody will damn the situation, but nobody will blame the farmers for it. However, customers will perceive a clear difference and react differently if it was a cheating trick. Sin carries penance.

But the overall model should work as it is, based on promises backed by credibility. No authority or regulation body should be required putting sanctions. We will see there is an embedded penalty at the uncleared debt of the producer.

The sections "Individual promises, collective promises" and "Debt Clearing" expand on it.

7.2.3. Insurance

The effects of production disasters can be mitigated by insurance. Insurance companies will certainly scrutinize the producers responsibilities.

However, it has to be pointed that reparations cannot be done in the producers VTS money. First, VTS means products. Customers cannot be compensated of missing products with fake vouchers. Secondly, after the validity end, no voucher is valid.

Producers can only be helped to pay their unremembered debt, and the money to be used is tax money.

Again, the sections "Individual promises, collective promises" and "Debt Clearing" expand on it.

7.2.4. Stock management

Our starting point is products that expire in a fraction of the production cycle, like, typically, agricultural products, say, months. Each industry would work with an average expiring period, and the vouchers would also have an expiring period and thus an expiring date.[10]

The model also applies for durable goods like electronics, hardware, computers, cars or even houses. However, the acquisition process is different. At consumables, the voucher buys the product or service to be consumed. You buy an apple, take it away and eat it. At durable goods there is an intermediate step that certifies the right to use it. This certification may range from a guarantee document for a home appliance, to a registered property document of a house. We will deal with the details in section “Durable capital goods”.

By definition, products on sale will not expire until the end of the valid period. That means that vouchers only expire if some customers have not shown up at the end to redeem them with products.

There are products, like milk derivatives, vegetables or meat that will physically expire. They are continuously supplied on a daily basis and there is no need to issue a voucher for each batch. They will be retired form the shelf's, and the total amount of issued VTS wont reflect these loses. There are marketing techniques that provide the adequate indexes to properly calculate the “effective” quantity of expected sales.

In this system, the expiration of products has economic implications, but not monetary implications. If the expiring period *exp* has been properly calculated, the vouchers will be expiring at the same pace as the products, and no monetary stress is produced.

Of course, the voucher holders that don't redeem the vouchers on time will have a loss. The impact should be similar to Silvio Gesell “demurrage”. It discourages any “storage” of vouchers, except for long expiration period vouchers (slow money).

7.2. Promise to Produce, promise to Sell

The system pivots around sales, not around production.

The promise is a promise to sell.

It means that, what counts is

$$VTS_{total}(S,E) = total\ promises\ of\ sales\ between\ S,E$$

We assume that, if there was a sale, its because the product was there.

It has to be read the following way: I make a promise to sell for value VTS_{total} in that period. It is my business how I get it done. Either I produced the products enough, or bought the products enough to convince customers to pay me for them VTS_{total} in that period

Any other approach pivoted on the real production put on the shelf's involves an intermediate step of a trusted third party making an inventory of products. In our view, this complicates unnecessarily matters.

Apparently, we miss a clear cut register of expectations on unfulfilled promises expressed in product units. Something like I accepted y * v_{unit} (n) expecting y * kg Tomatoes, and I got less. It seems we deviate form the strict Commodity term in the token definition.

But we do not. At sales time, because of the basic pillar law, we converge again to a strict token definition. At promises time, there is anyhow an uncertainty factor to be build in into the system. If we follow punctually the products inventory path, we would need an external authority to translate it at the end to monetary terms, to impose at the end monetary penalties or rewards.

In this system, lack of product results in price increases that may result in less sales. In the end we get expired vouchers that the producer was not able to put into circulation or the customer was not interested to redeem. Pure monetary Debt Clearing mechanisms may penalize or reward expectations betrayed or surpassed.

The advantage is that it makes the system more flexible.

In the real world there is a mix of producers and sellers. Take a cooperative of crop growing farmers: it is normally the cooperative that puts in place the distribution.

The mechanics is the following:

1. The real producers issue their promises, at their selling price. However, if they circulate them to pay for their costs, they arrive at a unplayable debt, cause no redemption will be made at their name, cause they don't sell. Before circulating and spending, they need an agreement with sellers.
2. The sellers issue their own promises at their selling price. At this moment, we have around double vouchers than production will be. What the sellers do is to come to agreements with producers.
3. When production is ready, sellers redeem from the producers to get the products.
4. At public sales, customers redeem from the sellers.

	issuing	costs	redemption	Producers		Sellers	
				Debt	Liquid	Debt	Liquid
Producers issue	VTS_P			$-VTS_P$	VTS_P	0	0
Sellers issue	VTS_S			$-VTS_P$	VTS_P	$-VTS_S$	VTS_S
Producers spend		VTS_P		$-VTS_P$	0	$-VTS_S$	VTS_S
Sellers redeem			VTS_P	0	0	$-VTS_S$	$VTS_S - VTS_P$
Sellers spend		$VTS_S - VTS_P$		0	0	$-VTS_S$	0
Customers redeem			VTS_S	0	0	0	0
Total	VTS_P+VTS_S	VTS_S	VTS_P+VTS_S				

VTS_P = Vouchers issued by Producers

VTS_S = Vouchers issued by Sellers

8. Debt

8.1. Self credit debt

At making a promise at any month for products to be delivered at a future month, producers issue vouchers to make payments today, and thus acquire a personal debt with the system and at the same time, with the society. It is a self-credit authorized by the society.

$$VTS_{producerX} = D_{producerX}$$

The vouchers issued by producer X are annotated as a debt of producer X, in VTS units. This debt annotation should be produced automatically by the smart contract at the producers account.

The VTS themselves are anonymous ERC20 tokens and can be transferred without any identity of the issuer.

Once the producer X releases and circulates these vouchers as a payment for his costs in that commodity voucher, the vouchers become anonymous and can be used to *cancel* the redemption of any product at any other producer (or seller) associated to that commodity voucher. What remains private is the debt of producer X.

The vouchers used in cancellation do not go to the producers (or seller) pocket, or wallet or liquid account, where he can spend them. He has spend them already. These cancellation vouchers go to cancel this producers debt at his account.

Remember that **the promise is a promise to sell**. It means very clearly that producers cannot clear their debt by just delivering products. As explained above, they can only clear their debt by ensuring the sales either selling themselves or arranging a distribution channel that buys their production.

8.2. Individual promises, collective promises

The individual promises become individual debts. But once the vouchers start circulating in the market they become as well a collective promise.

We are now in a better position to explain how the system regulates the penalty of the unfulfilled expectations.

Unless there is a general natural disaster, underproduction comes usually from specific underperforming producers, not from all of them.

Normally, a seller will buy from a collection of producers who focus on production and not on selling.

A cheating or under-performing producer will come up with less products than expected. According the basic law, in order to buy these few products, the seller will need to use all the vouchers the producer has issued, cause the provider has to put them at a price covering his full issuance. It means this producer's products will be much more expensive than the other producers providing the same seller.

Example:

- A tomato farmer, part of a tomato cooperative, issues 10.000 vouchers denominated in the cooperative token, namely kgTomato. The cooperative public contract says that holders amy expect to get 1 kg tomatoes for 1 kgTomato voucher.
- At doing this, the IT system automatically anotates a 10.000 kgTomato debt to this farmer

- Instead of buying production inputs, the farmer spends most of these 10.000 kgTomato to have a good life and other improductive payments.
- When the harevest comes, this farmer has only 1.000 real kg of tomatoes to offer
- According the pillar law, the vouchers issued as a promise has to be able to buy the whole production put in the market. Therefore, he has to mark his 1.000 real kg of tomatoes as costing 10.000 kgTomato, 10 times more as his colleagues in the cooperative
- His harvest will remain mostly unsold, and his 10.000 kgTomato debt mostly uncleared
- Now all the penalties applicable to unpaid debt may fall on him

At taking these products from the provider, the seller will need to go down to the average prices, thus losing money. He will probably prefer to punish this particular producer by not redeeming his products.

The producer will remain with his full debt.

1 8.3. Debt clearing mechanism

Once the expiration period is over, it may turn out that

$VTS_{producerX} - Cancel_{producerX} > 0 \; ; D_{producerX} > 0$

By any of the reasons explained above, some quantity of vouchers stay not redeemed, and expire by themselves without canceling any debt, or alternatively, have gone to another producer.

These producers that have consumed goods from the society without returning the same value to society have incurred at an overspending. This overspending is unspecific, social.

The restitution of the debt cannot be a reduction of their capacity to issue new vouchers based on promises of their future production. This would punish the whole society with a reduction of the overall future production. The producer has to produce all it can, the products have to be sold, and therefore the vouchers have to be issued.

What we can do is to deduct it from their capacity to spend them for their purposes, by giving these new vouchers to somebody else. Instead of using them for their ROI, they go to somebody else.

The question is to whom these just issued vouchers should be given. It was a social defraud, it has to be a social restitution, and thus a social expenditure.

Lets assume there is an entity, that we call “authority”, to whom these vouchers are given. To see how the monetary system works, this is enough. It could be the same authority that collects taxes, it could be the producers association, it could be some other authority. Its pretty much a political decision to be taken by democratic means, with many variants possible.

In summary, who bears the costs of an expired voucher - ¿the society , the voucher holder or the producer?

There are several actors:

1. The holder (the last holder) bears initially the cost. As the voucher has circulated, its a random holder. If you consider many vouchers and many holders, its a probabilistic distributed cost, which we name “social” cost.
2. The issuer has an uncleared debt. ¿With whom to clear? With the probabilistic distributed creditors. That is, the anonymous random voucher holders, that is, society.

The issuer returns the debt as a tax to the government, and the government will return it to society as public goods or services.

8.4. Negative debt or excess cancellation

We can have also the contrary situation: by some reason, there where more sales than promised.

It has to be noted that the excess sales can only consist in redeeming vouchers issued by another producer.

Once the debt for month n of a producer X has been cancelled, any excess of $Cancel_{producerX}$ goes to the producers (or seller) pocket, or wallet or liquid account, where he can spend them before they expire.

8.5. Taxes debt

With regards the VAT debt, directly proportional to the sales, it has been advanced in tax currency, as the reserve at issuing the VTS vouchers as smart tokens using the Bancor protocol.

Once rescued, they can be transferred to the Community tax account.

2 8.6. Debt payment mechanics

As the whole system is quite transparent, and outstanding debts as well as tax debts are recorded, and these records can be made accessible to any designated authority, we would prefer to leave it as a voluntary action of each producer.

The authority, same as the Tax Authority now, can give a margin to the debtors, and could come up with ex-post sanctions if delays are not respected.

9. Margin and profits

We have now the concepts needed to deal with the mechanics of the margin.

As we said above, the quantity of vouchers to be issued beforehand has to be for the full price of the whole production, that is, costs plus margin or profit.

However, the real profit cannot be known until the sales have been done and we know how many vouchers have been really redeemed and how much has expired and production has been lost.

Profit is used for two main purposes:

One part goes to investments to improve productivity. It means we exchange our token vouchers for vouchers representing machinery, or buildings or any other fixed production means. It means **we acquire slow money**. It will not have expired by the time we do our sales.

Another part goes to pay the shareholders their ROI. To simplify, we assume it goes to pay their luxury life. It will have expired by the time we do our sales. Too late if the sales went bad!

The mechanics to deal with the sales uncertainty, and compensate shareholders with a ROI according to sales, is to preventively buy only slow money, and only convert it again to fast money to pay the shareholders once we know the real profit.

10. Community and Tax money

Tax money is a special commodity voucher. In a way, its a cycle that turns counter-clock the other cycles.

Governments deliver goods and services such as healthcare, education, security, infrastructure and others. But they are universally provided not according to payment but according to needs. Citizens provide the funding for these services not according consumption, but according to wealth and other taxes criteria.

It can be treated as a variant of token money, but it would deserves a full article to properly explain the mechanics. The token should run or have as input the public voting mechanism of the public expenses and incomes. It should have all gradations from public service as a job, to volunteering. It should have all gradations from compulsory taxes to voluntary funding of costs and crowdfunding of public work. We only provide the skeleton of the basics.

The product that is on the market is your citizenship.

The "state" (be it local, regional, national), discuses and approves the Public Budget and the Tax Policy through its democratic bodies.

Each year the "state" pays the public costs (teaches, doctors, police,…) costs by issuing a number of vouchers

$$VTS_{public} = \sum_{m=0}^{m=12} \square\, V(m) = PublicYearlyBudget$$

It splits it into the direct taxation and indirect taxation.

Then, it puts a price to each citizen according the Tax Policy with his part on direct taxation.

$$V_{directTaxation}^{citizenX} = \sum_{\square}^{\square} \square\, Price_{citizenCathegory} * Quantity$$

Each year every citizen has to buy the renewal of his/her citizen rights.

It has to be noted that the same procedure can be applied to the financing of other autonomous self-governance social bodies, like NGO 's. In this case, it is the volunteers that play the role of public servants.

12.1. Monetary liquidity

We propose to implement the tax currency as a Bancor smart token, with some modifiers to some functions, and bearing the connection of the full text of the General Budget. We propose, for clarity, to use as denomination **TX**.

12.1.1. Issuance, Conversion and Exchange of VTS's

We issue VTS as modified ERC20 smart tokens using Bancor protocol:

- adding some fields with some Ricardian Contract metadata, notably the hash where the human readable and human signed contract is stored in swarm, and with the start and end variables used as modifiers for some functions
- adding a modifier to the functions of issuing and redeeming. Only registered producers in the given association can use these functions. The rest of the accounts can use the rest of the functions.

An example of issuing parameters could be:

Smart Token Symbol	VTS	vat	17,00%
Reserve Token	TX		
Constant Reserve Ratio (CRR)	100,00%		
Initial Token Price	5,88 TX		
Initial Deposited Reserves	1.000 TX		

In this example we have used a vat of 17%, meaning that, for the producers within this token, for each advanced tax money unit they get 5,88 vouchers. To stick to this legally imposed exchange, the CRR has to be 100%.

Table 4 provides an example of issuance and redemption using the same figures of production and sales at Tables 2 and 3.

General public will use a generic Bancor Token Changer to get this VTS in exchange of another VTS.

The initial deposit is made to initially feed the Token Changer in a quantity proportional to the market shares of the different tokens.

14.2 Technology

The only technology able to scale up to numbers, has flexibility to build all functions and parameters, has low design costs and no investment costs, easy to implement home banking interfaces as well as easy to use smart phone Apps suited for the daily shopping, is Ξthereum https://www.Ξthereum.org/

14.2.1 Smart contracts

A contract is a mutually agreeable arrangement of rules among mutually suspicious parties so they may cooperate with limited risks to each other's mischief. It is a game both are willing to play because both expect to win. A conventional contract is passive paper interpreted at great expense by lawyers and courts.

A smart contract is written in program code, in which the logic of the program's execution enforce the terms of the contract. A smart contract is a computerized transaction protocol that executes the terms of a contract. The general objectives are to satisfy common contractual conditions (such as payment terms, liens, confidentiality, and even enforcement), minimize exceptions both malicious and accidental, and minimize the need for trusted intermediaries. Related economic goals include lowering fraud loss, arbitration's and enforcement costs, and other transaction costs.[11]

In the Ξthereum[12] technology smart contracts are pieces of code that live on the blockchain and execute commands exactly how they were told to. They can execute scripts to read other contracts, make decisions, send ether and execute other contracts. Contracts will exist and run as long as the whole network exists, and will only stop if they run out of gas or if they were programmed to self destruct. The most used language to write etehereum contracts is Solidity.[13]

However, not necessarily Ξthereum smart contracts include information to reengineer back the original (human readable) legal clauses and terms it does enforce.

14.2.2 Ξthereum Standard Tokens

Although Ξthereum allows developers to create absolutely any kind of application without restriction to specific feature types, and prides itself on its "lack of features", there is nevertheless a need to standardize certain very common use cases in order to allow users and applications to more easily interact with each other. This includes sending currency units, registering names, making offers on exchanges, and other similar functions. A standard typically consists of a set of function signatures for a few methods, eg. send, register, delete, providing the set of arguments and their formats in the Ξthereum contract ABI language.

ERC 20 is a standard for Transferable Fungibles, also known as tokens, coins and sub-currencies. It has a series of common methods that result in common interfaces, so that any client designed to read “tokens” will be able to read any token.

14.2.3 Ricardian Contracts

The Ricardian contract is a method of recording a document as a contract at law, and linking it securely to other systems such as accounting for the contract as an issuance of value.

A Ricardian contract is a document which is legible to both a court of law and to a software application. Its purpose is to provide digital trading systems of various kinds the solidity of legally binding claims on property, so that you and your partners can concentrate on the business opportunity. [14] [15]

It is robust through use of identification by Cryptographic hash function, transparent through use of readable text for legal prose and efficient through markup language to extract essential information.

Ξthereum Smart Contracts designed as Ricardian Contracts would fulfill all the original requirements of Nick Szabo. The Ξthereum technology swarm[16] would provide the original document storage plus the required hash.

An ancestor of vouchers written as Ricardian Contracts is the Generic Voucher Language data model.[17] However, in the original design, vouchers were conceived as numerated, and to propagate by transfers and splitting, like shares or lottery bonds. Here we move from "minted" VTS to "accounting" VTS.

14.2.4 Ξthereum Ricardian Tokens

The Ξthereum Standardized Contract APIs for Transferable Fungibles, ERC: Token standard 20, provides the basis for the executable part of a Ricardian contract. [18]

As regards the semantic part, the swarm protocol allows to bind any Ξthereum ERC: Token standard 20 token to a human readable and legal valid document through it swarm hash.[19]

Its the intersection of the two components that can create a blockchain based and legally valid currency that is a promise of a real world good. [20]

Conformance to the Ξthereum ERC20 Token standard

To be compliant with the standard, the token has to have functions that can be called trough the following methods

- function **totalSupply**() constant returns (uint256 totalSupply)
- function **balanceOf**(address _owner) constant returns (uint256 balance)
- function **transfer**(address _to, uint256 _value) returns (bool success)
- function **transferFrom**(address _from, address _to, uint256 _value) returns (bool success)
- function **approve**(address _spender, uint256 _value) returns (bool success)
- function **allowance**(address _owner, address _spender) constant returns (uint256 remaining)
- event **Transfer**(address indexed _from, address indexed _to, uint256 _value)
- event **Approval**(address indexed _owner, address indexed _spender, uint256 _value)

Conformance to the Ricardian contract

In order to be readable as a Ricardian Contract following fields should be present. However, only those used as variables need to become smart contract variables. Other informative fields could be stored into a single string (up to the available memory), ideally using an XML convention with a known namespace. [21] Others are not strictly necessary and stored as metadata in swarm.

Association and Producers fields

- string _brandname; // the name you are normally known by in the street
- string _shortname; // short name is displayed by trading software, 8 chars
- string _longname; // full legal name
- string _address; // formal address for snail-mail notices
- string _country; // two letter ISO code that indicates the jurisdiction
- string _registration; // legal registration code of the legal person or legal entity
- address _registryBzz; // swarm hash of the signer human readable registry document

Token fields (shared in the smart contract)

- uint256 totalSupply;
- string voucherTokenName;
- uint8 decimals;
- string voucherTokenSymbol;
- address voucherTokenLogoBzz; // swarm hash of the voucher icon or logo
- uint8 validity_start; // start date of the contract. Validity period of the voucher to redeem merchandises

uint8 validity_end; // end date of the contract. Provides restrictions on the validity period of the voucher

Contract fields

- address contractBzz; // swarm hash of the signer human readable contract
- string[] merchandises; // Provides restrictions on the object to be claimed
- string[] definitions; // Includes terms and definitions to be defined in a contract
- string[] conditions; // Provides any other applicable restrictions

14.2.5 Bancor Method and token price

The Bancor Protocol intends to guarantee continuous liquidity across ERC 20 Tokens. A smart token holds a balance of least one other reserve token , which (currently) can be a different smart token, any ERC20 standard token or Ether. Smart tokens are issued when purchased and destroyed when liquidated, therefore it is always possible to purchase a smart token with its reserve token, as well as to liquidate a smart token to its reserve token, at the current price. In this way liquidity can be guaranteeed between tokens using the same Relay reserve token.

Bancor Protocol smart tokens Contracts are tokens that follow ERC 20 Token standard and have additional functions and standard ABIs to manage token exchanges, namely ERC: Token Changer Standard, #228[22], in short ERC228.

However, we adopt only the general Bancor method but not necessarily the Protocol. Linking to the Bancor Protocol and platform is optional.

According Bancor method new smart tokens can be created simply by depositing an initial reserve/s at another trusted token, and issuing the initial token supply. Alternatively smart tokens can be initiated through a crowdsale, where a part of the proceeds is allocated as the initial reserve.

Price Discovery

According the Bancor White Paper[23] a smart token utilizes a method for price-discovery which is based on a “Constant Reserve Ratio” (CRR). The CRR is set by the smart token creator, for each reserve token, and used in price calculation, along with the smart token’s current supply and reserve balance, in the following way:

$$Price\ of\ token = Reserve\ Token\ Balance \div \left(Smart\ Token\ Total\ Supply * CRR \right)$$

This calculation ensures that a constant ratio is kept between the reserve token balance and the smart token’s market cap, which is its supply times its price. Dividing the market cap by the supply produces the price according to which the smart token can be purchased and liquidated through the smart contract. The smart token’s price is denominated in the reserve token and readjusted by the smart contract per each purchase or liquidation, which increases or decreases the reserve balance and the smart token supply and thus the price.

The CRR is used in ICO like sales, the token represents shares, but part of the initial deposit in reserve token is used to develop the project.

In our case we will use Ξther as reserve token, which has universal liquidity with all fiat and crypto currencies through the exchange gates. Once the tokens are redeemed, the reserve could be returned to the depositor to pay his VAT tax. As we will use as Relay holding the Reserve the owner of the account in control of the Ricardian Contract, that is, the Legal Entity creating the smart contract, the Association of Producers, we prefer that this reserve is liberated for the Legal Entity doing the tax payment.

There is no works the Legal Entity has to do with the deposit before it is unfrozen, therefore we use a 100% Reserve, CRR=1. This avoids any change in price.

The reserve is meant to be used to pay VAT, which may vary between 10% and 20% of the sales value. Therefore we will manage prices for the VTS tokens from 10 to 5 tokens per 1 Ξther.

Ecosystem of smart contracts

- a standard ERC20 token for the community token
- a smart ERC20 Ricardian and ERC228 per voucher, the community token as reserve
- a smart token as Token Changer between vouchers, with all vouchers as reserve

15. Conclusions

We have tighten the concept of money very close to the marxian concept of COMMODITY – MONEY – COMMODITY, by never allowing MONEY to become abstract or universal, always stranded to some description of the COMMODITY it represents, tied to the time this COMMODITY is in the market, and tied to the producer that will produce it.

As a drawback we have a tolerable increase in the effort to manage a Monetary plurality at the currencies exchange market. Blockchain technology lowers very much this barrier.

As benefits we have:

- Eliminated financial capital, the need for FRB, the need for banks and the need for interest.
- Provided companies with steady working capital and granted cash flow.
- Provided fixed capital manufacturers with tools to smoothly adapt for long terms market variations.

16. Tables

Table 1 Issuance cycle

					15,00%	
Month	Salaries	Utilities	Working capital	**Costs**	Margin	**Issued**
1	3.250 VTS	2.000 VTS	6.000 VTS	**11.250 VTS**	1.688 VTS	**12.938 VTS**
2	3.433 VTS	2.000 VTS	7.464 VTS	**12.897 VTS**	1.935 VTS	**14.832 VTS**
3	3.500 VTS	2.000 VTS	8.000 VTS	**13.500 VTS**	2.025 VTS	**15.525 VTS**
4	3.433 VTS	2.000 VTS	7.464 VTS	**12.897 VTS**	1.935 VTS	**14.832 VTS**
5	3.250 VTS	2.000 VTS	6.000 VTS	**11.250 VTS**	1.688 VTS	**12.938 VTS**
6	3.000 VTS	2.000 VTS	4.000 VTS	**9.000 VTS**	1.350 VTS	**10.350 VTS**
7	2.750 VTS	2.000 VTS	2.000 VTS	**6.750 VTS**	1.013 VTS	**7.763 VTS**
8	2.567 VTS	2.000 VTS	536 VTS	**5.103 VTS**	765 VTS	**5.868 VTS**
9	2.500 VTS	2.000 VTS	536 VTS	**5.036 VTS**	755 VTS	**5.791 VTS**
10	2.500 VTS	1.000 VTS	536 VTS	**4.036 VTS**	605 VTS	**4.641 VTS**
11	2.500 VTS	1.000 VTS	536 VTS	**4.036 VTS**	605 VTS	**4.641 VTS**
12	2.500 VTS	1.000 VTS	536 VTS	**4.036 VTS**	605 VTS	**4.641 VTS**

Table 3 The Redemption Cycle

Month	**New Stock**	% sold	**Sold**	Stock	Due Vat
1	**0 VTS**		**0 VTS**	0 VTS	0 VTS
2	**0 VTS**		**0 VTS**	0 VTS	0 VTS
3	**0 VTS**		**0 VTS**	0 VTS	0 VTS
4	**0 VTS**		**0 VTS**	0 VTS	0 VTS
5	**0 VTS**		**0 VTS**	0 VTS	0 VTS
6	**81.413 VTS**	30,00%	**24.424 VTS**	56.989 VTS	4.152 VTS
7	**7.763 VTS**	70,82%	**22.796 VTS**	41.956 VTS	3.875 VTS
8	**5.868 VTS**	73,19%	**20.978 VTS**	26.846 VTS	3.566 VTS
9	**5.791 VTS**	60,17%	**16.108 VTS**	16.530 VTS	2.738 VTS
10	**4.641 VTS**	55,77%	**11.571 VTS**	9.600 VTS	1.967 VTS
11	**4.641 VTS**	54,43%	**8.824 VTS**	5.418 VTS	1.500 VTS
12	**4.641 VTS**	65,53%	**8.824 VTS**	1.236 VTS	1.500 VTS

%sold is arbitrary numbers

Table 4 Issuing with a tax reserve

Smart Token Symbol	VTS	vat	17,00 %
Reserve Token	TX		
Constant Reserve Ratio (CRR)	100,00 %		
Initial Token Price	5,88 VTS/TX		
Deposited Reserves	1.000 TX		

	Activity	RESERVE		PRICING		VOUCHER	
Month	Create VTS	TX Received	TX Reserve	Effective VTS Price	Resulting VTS Price	VTS Issued (Redeemed)	VTS Supply
			6 TX		0,17 TX		35 VTS
1	Issue	2.199 TX	2.205 TX	0,17 TX	0,17 TX	12.938 VTS	12.972 VTS
1	Sales	0 TX	2.205 TX	0,00 TX	0,17 TX	0 VTS	12.972 VTS
2	Issue	2.521 TX	4.727 TX	0,17 TX	0,17 TX	14.832 VTS	27.804 VTS
2	Sales	0 TX	4.727 TX	0,00 TX	0,17 TX	0 VTS	27.804 VTS
3	Issue	2.639 TX	7.366 TX	0,17 TX	0,17 TX	15.525 VTS	43.329 VTS
3	Sales	0 TX	7.366 TX	0,00 TX	0,17 TX	0 VTS	43.329 VTS
4	Issue	2.521 TX	9.887 TX	0,17 TX	0,17 TX	14.832 VTS	58.160 VTS
4	Sales	0 TX	9.887 TX	0,00 TX	0,17 TX	0 VTS	58.160 VTS
5	Issue	2.199 TX	12.087 TX	0,17 TX	0,17 TX	12.938 VTS	71.098 VTS
5	Sales	0 TX	12.087 TX	0,00 TX	0,17 TX	0 VTS	71.098 VTS
6	Issue	1.760 TX	13.846 TX	0,17 TX	0,17 TX	10.350 VTS	81.448 VTS
6	Sales	-4.152 TX	9.694 TX	0,17 TX	0,17 TX	-24.424VTS	57.024 VTS
7	Issue	1.320 TX	11.014 TX	0,17 TX	0,17 TX	7.763 VTS	64.786 VTS
7	Sales	-3.875 TX	7.138 TX	0,17 TX	0,17 TX	-22.796VTS	41.991 VTS
8	Issue	998 TX	8.136 TX	0,17 TX	0,17 TX	5.868 VTS	47.859 VTS
8	Sales	-3.566 TX	4.570 TX	0,17 TX	0,17 TX	-20.978VTS	26.881 VTS
9	Issue	985 TX	5.554 TX	0,17 TX	0,17 TX	5.791 VTS	32.672 VTS
9	Sales	-2.738 TX	2.816 TX	0,17 TX	0,17 TX	-16.108VTS	16.564 VTS
10	Issue	789 TX	3.605 TX	0,17 TX	0,17 TX	4.641 VTS	21.206 VTS
10	Sales	-1.967 TX	1.638 TX	0,17 TX	0,17 TX	-11.571VTS	9.635 VTS
11	Issue	789 TX	2.427 TX	0,17 TX	0,17 TX	4.641 VTS	14.276 VTS
11	Sales	-1.500 TX	927 TX	0,17 TX	0,17 TX	-8.824VTS	5.453 VTS
12	Issue	789 TX	1.716 TX	0,17 TX	0,17 TX	4.641 VTS	10.094 VTS
12	Sales	-1.500 TX	216 TX	0,17 TX	0,17 TX	-8.824VTS	1.270 VTS

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