GETCoin

An Algorithmic Monetary System Based on Universal Basic Income and Demurrage

Abstract

Bitcoin has shown that a purely rule based monetary system can be implemented using blockchain technology. The benefits of such a system for its participants include long term predictability of the money supply and no need for human intervention to control the supply. However, Bitcoin's simple rule of a hard limit on the long term total money supply leads to deflationary economics resulting in unstable pricing of goods and services as the number of participants in its economy grows. Price volatility leads to difficulty in using Bitcoin for everyday transactions. A system that preserves the rule based predictability of the money supply while allowing for stable prices would be useful for global commerce and trade. We define the money supply rules of the GETCoin monetary system which is designed to be self stabilizing such that there is no inflation or deflation. By giving individuals a universal basic income and applying a demurrage rate to the money supply, it is able to maintain stable prices even when the number of participants in the economy grows or shrinks. We also define a temporary peg rule to help reduce the price volatility when the number of participants using the system is small. The system can be implemented using distributed ledger technology so there is no dependency on any single entity.

1. Basic Concepts

Prices

There are two components to the prices of goods and services. The first is dictated by the market based on the supply and demand of the particular product. The second is due to the aggregate money supply and affects the price of all products. Changes in the money supply are experienced by consumers as inflation or deflation. The goal of a monetary system should be to minimize the impact on prices due to changes in the money supply so that prices reflect only the supply and demand signal of the market.

Cryptocurrency

It has been demonstrated by the Bitcoin project that it is possible to use a peer-to-peer network to implement a trustless payment system [1]. We propose a decentralized implementation similar to Bitcoin in that it allows coins to be transferred from one account or person to another by the owner creating a digitally signed transaction. Unlike bitcoin, where the coins are created by expending energy to win a lottery, this system uses a different method for creating coins as discussed later. The cryptocurrency in this system is called GETCoin which is short for Global Electronic Trading Coin. However, the economic rules of GETCoin could also be implemented in a centralized system such as a multiuser online game.

2. Economic Rules

Creation

The GETCoins are created and distributed such that once a day all independent accounts receive the same number of coins, **D**. These are new coins brought into existence and are not transferred from any other account. A child may be considered a unique individual and may have a verified account created with the help of a parent or guardian. However, for the purpose of receiving coins we require not only a verified account, but also the unique individual being of at least a specified age, **A**, commonly considered to be independent. For example the age at which one may obtain a driver's license. An account that is verified and meets the age criteria is called an **independent account**. The daily distribution is given only to independent accounts. This distribution can be viewed as Universal Basic Income, but without the need to determine where the funds will come from [2].

Destruction

Over time the continued distribution of GETCoins to independent accounts would lead to an ever increasing money supply. To limit the supply, once a day, a small fraction, **R**, of the balance of all accounts is removed. This applies to all accounts and not just independent accounts. The amount removed is destroyed and not transferred to any other account.

All physical commodity money has the property of natural decay. When this property is deliberately applied to paper or digital money it is referred to as demurrage. The idea of applying demurrage to paper money was first proposed by the economist Silvio Gesell [3].

Temporary Peg

When a new form of money is initially introduced it is critical to tie its value to an already accepted form of money [4]. The price of each GETCoin will initially be pegged to the XDR which is a weighted basket of international fiat currencies. At some time when the number of participants using GETCoin is very large (like 100 million) the peg will be removed and the price of GETCoin is allowed to float. The peg is achieved by

increasing or decreasing the daily distribution amount. It is expected that GETCoins will be traded on exchanges for fiat currencies. The price of the coins can fluctuate over time based on supply and demand. Let's say that P is the average price of GETCoin against the XDR across a number of exchanges and over some number of recent days. The amount of GETCoins given to independent accounts once a day will be:

$$D_{n+1} = D_n \times P$$

where D_n is the most recent amount that was given and D_{n+1} is the amount to be given on the next iteration. The initial distribution amount will be: D_o. This causes the distribution amount to increase if the price is above the desired peg. This increases the supply and causes the price to come down. If the price is below the desired peg it decreases the distribution amount, thereby decreasing supply and causing the price to increase.

Community

An organization account is an account that does not belong to any one individual and requires approval from two or more independent accounts to spend the funds. If C_1 or more independent accounts nominate an organization account, it becomes a community account and maintains that status unless the number of nominations falls below C_o. If the community account status is lost, it can be regained once the number of nominations reaches C_1 or more again. Once an independent account has given a nomination it cannot be revoked or changed for a period of C_r days.

Once a day, all community accounts receive coins equal to:

$$D \times N$$

where N is the number of independent accounts nominating the community account.

Economic Parameters

We propose an initial set of values for the parameters defined above.
D_o = 10 the amount of coins given each day when the system starts
R = 0.00005   the fraction of the account balance removed each day
A = 18   the age in years at which an individual can begin receiving daily coins
C_1 = 1000   the minimum number of nominations to activate a community account
C_o = 900   the minimum number of nominations to keep a community account active
C_r = 30 the minimum number of days before the nomination can be revoked or changed
G = 1   determines if the temporary peg rule should continue or not

These and other parameters defined later can be changed through a voting process in which independent accounts can participate. Further details of the voting process are provided later.

3. Discussion of Economic Rules

To understand how the system works, assume that every participant in the economy can create an account with a Money Registrar. For simplicity, we can treat the Money Registrar as a central organization, but in actuality it will be a decentralized autonomous organization using a public ledger. The Money Registrar maintains accounts and balances similar to a bank, but unlike a bank it does not give loans, or use the money it holds on behalf of customers for its own benefit. Individuals, as well as companies or governments can create an account with the Money Registrar. In fact, multiple accounts can be created by the same entity since there is no cost to creating accounts, and the transaction fee to transfer funds between any two accounts is essentially zero.

Individuals who are of an independent age, for example 18 years old, can create an "independent" account with the Money Registrar. Although one can have multiple accounts regardless of age, only one independent account can be created by individuals who meet the age requirement. On a daily basis, independent accounts receive some amount of money; like 10 units. The amount can vary from day to day, but for any given day the same

amount is received by all independent accounts. This daily stipend received by independent accounts does not come from any source account; it is newly created money.

With just the above rule, the money supply would grow indefinitely leading to continuous inflation in prices. A money supply that is limited and proportional to the number of participants in the economy would be desirable. This can be achieved by adding demurrage to the money supply. On a daily basis, all accounts (not just independent accounts) have a very small fixed percentage of the account balance removed. For example, 0.005% of the account balance may be deducted each day. The amount removed does not go to any other account; it simply disappears.

Just these two simple rules of adding a daily stipend to all independent accounts and removing a small fraction of the total amount from all accounts are enough to ensure that the money supply within the economy will reach an equilibrium and be proportional to the number of independent accounts (or independent individuals) in the economy. For example, if **10** units are given each day and **0.005%** of the balance is deducted daily, an independent account would eventually reach equilibrium at **200,000** units if no other transactions occurred in the account. The annual percentage rate being deducted from the account would appear to be **1.81%**, and the annual stipend of the account would be **3,652** units. If the account was starting from **0**, it would take about **38** years for the account to reach **50%** of the equilibrium value and **126** years to reach **90%** of the equilibrium value. Likewise, if some amount was moved to an account which did not receive a stipend, it would take **38** years to lose **50%** of the original amount and **126** years to lose **90%** of the original value. Since the money supply is proportional to the number of participants, the money supply would grow and shrink with a rise or fall in population. If such a money supply becomes the one with the largest network, it can provide very stable prices. The prices of goods and services that are produced in proportion to the population size would remain stable, and there would not be any inflation or deflation. For example, the price of a loaf of bread, a car, or a haircut should stay about the same for decades and centuries and not perpetually increase as it does with current debt based currencies which require sustained inflation. Any fluctuation in the price of consumable goods and services would be reflective of actual supply and demand, and not due to changes in the money supply. The prices of commodities with a fixed quantity such as land or bitcoin would vary proportional to the population size.

When a new type of money is getting started, it typically has a very small network of users. The users are most likely using another type of money (such as the USD or Euro) with a much larger network as their primary medium of exchange. They may be attracted to the new type of money because it offers some features not provided by their primary money. However, until a vast number of users have adopted the new type of money, they will have to continually convert to and from the primary money. If the price of the new money fluctuates wildly relative to the primary money, it becomes difficult for these users to adopt the new money. Even though the new money may have better features, a user will fear that after converting some primary money to the new money, the price may fall and the user will have less primary money after converting back. In the case of GETCoin, the users will not have to convert primary money to new money since they will be receiving new money on a daily basis. This provides a significant advantage in terms of rapid adoption. However, since the network of the new money is much smaller than the network of the primary money, many users will still want to convert the new money to primary money as soon as possible, since it will be more usable and stable in that form. To further increase the rate of adoption during the early stage, it is necessary to peg the value of the new money as close as possible to the primary money rather than letting it float, so that users have less desire to convert to primary money and feel just as comfortable transacting with the new money.

Our system achieves a peg by simply increasing or decreasing the daily stipend amount to increase or decrease the supply of new money creation and thus decrease or increase the unit value against the currency it pegs to. To avoid dependency on any one fiat currency, we suggest a pegging GETCoin to the weighted basket of international reserve currencies traded with the symbol XDR. If the exchange price is greater than XDR, the daily stipend is increased, and if it is less, the daily stipend is decreased. We suggest the amount of increase or decrease in the stipend to be directly proportional to the price across several exchanges averaged over the past 7 days. Once a stable peg has been established, speculators will actually contribute to helping maintain the peg by

buying the new money when the price falls below the peg and selling it when the price rises above the peg. In the very early stage when no exchange price has been established, the daily stipend is fixed at 10 units. Once the network of users for the new money becomes sufficiently large, for example 100 million independent accounts, the peg can be removed, and the value of the new money can float relative to other currencies. When the peg is broken, the daily stipend amount will no longer change from day to day, and will be fixed at whatever value it was when the peg was broken. Based on the fixed daily stipend amount and the daily demurrage rate, the equilibrium level, annual depreciation rate, and other values can be calculated. Eventually, the number of participants in the GETCoin network will grow to be larger than the network of any other medium of exchange, and GETCoin will serve as the basis against which the value of everything else is measured.

Protecting one's wealth from forced robbery and extortion adds a significant drain on an economic system. One could argue that a significant portion of the taxes collected by governments at all levels goes towards this type of expense [5]. National military, local police force, and defense spending can all be categorized as this type of expense. The proposed system provides for each independent account to nominate one community account. By nominating a community account, one allows it to receive an amount equal to the daily stipend of the independent account. The amount given to the community account is not taken from the independent account that nominates it, but rather is created as new money. Thus, it does not negatively impact one to nominate a community account. The funds received by these community accounts can then be used to provide protection to the members who contributed. In addition to protection, other services like garbage collection and maintenance of community property could also be provided through such community funds. Any remaining funds can be returned to the members.

In order for a community account to become active, it must first receive nomination from at least 1000 independent accounts. The community account begins to receive funds on a daily basis only after it has become active. Once active, the community account stays active, even if the number of nominations drops below 1000. Only if the number of nominations drops below 900 does it lose the active status and no longer receives funds on a daily basis. It can regain active status again if the number of nominations reaches at least 1000. One cannot withdraw or change the nomination to another account for at least 30 days after starting the nomination. These rules provide stability to the active state of a community account so that it is more likely to remain in the current state than switching states frequently. It also prevents an independent account from switching nominations between communities too quickly.

Although nominating a community account is voluntary and not required by the system, it clearly would be beneficial for one to nominate a community account and receive benefits from it. Community accounts may arise which do nothing else but return the funds they received back to the members. This in effect allows one to earn twice the daily stipend amount just by nominating such a community account. Since the system does not impose any geographic restriction on which community account one can nominate, individuals from diverse locations could meet over the Internet and create a community account based on mutual interest. However, to receive the benefits of physical protection, one would want to nominate a community account that is geographically local. In fact, some localities may even make it mandatory for individuals residing within its boundaries to nominate the localities community account. This is perfectly fine as long as it is voluntary to live in that locality. If one is not happy with the terms offered by the locality, they could always move out. Competition would be created between localities to attract individuals by efficiently using the funds received to provide services and returning the remaining funds back to the members.

4. The Proof of Individuality Problem

This paper is a sequel to the 2011 paper "[Sound Money Without Commodities](#)", where the rules for money creation and destruction were initially presented. This paper adds rules for a temporary peg and community funds. The main challenge of implementing this system is how to ensure each individual has only one verified account. In 2011, the suggested implementation used a Money Registrar that would be a brick and mortar

organization where individuals would go to create a verified account. Such an organization would need to be trusted with the accurate maintenance of balances for all accounts. In 2017, the problem of needing to trust a 3rd party can be eliminated using distributed ledger technology. The proof of individuality problem still remains. A possible solution for this problem will be discussed in the paper "GlobalVille Web of Trust".

5. The Scalable Distributed Ledger Problem

Using distributed ledger technology solves the 3rd party trust problem, but introduces the problem of scaling to handle the transaction volume and data storage of billions of people. This requires the system to be able to process millions of transactions per second. The system also needs petabytes of storage capacity to hold records for billions of users. To handle these kinds of scaling requirements we propose a distributed ledger that shards the transaction processing and data storage so that more nodes participating in the network provides more processing and storage resources. A distributed ledger based on state sharding called Shardus is being developed to address this problem.

6. Contributors

The following individuals provided ideas, comments, feedback and valuable discussions to make this paper possible. They are listed in last name alphabetical order. This list is not yet complete.

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7. References

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