Stable Coin

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1 Introduction

Cryptocurrencies have gained a wide application after Bitcoin was first introduced in Satoshi Nakamoto's (pseudonymous) 2008 whitepaper [7]. For Bitcoin and any other cyptocurrency to function as money, they need to fulfill a set of properties that determine the strength and adoption of them *i.e.,* they are expected to serve as a medium of exchange, a unit of account, and a store of value. However, due to high fluctuations in their prices, majority of the cryptocurrencies do not meet these properties and hence they cannot be adopted as money [4].

Having said that, the volatile nature of cryptocurrencies (*e.g.,* Ether, Bitcoin) has raised the interest into what is known as stablecoin. Stablecoins (*i.e.,* cryptocurrencies with stable price) ensure that the fluctuation in the value remains low. Figure 1 illustrates the volatility of Bitcoin's value, when compared to fiat currencies, and the change of values of EUR, GBP, CAD, and BTC with respect to USD over time. Monthly values between January 2016 and November 2018 are shown. According the figures, while fiat currencies show stable behaviour, Bitcoin's value changes drastically over time, which makes it a non-stable cryptocurrency.

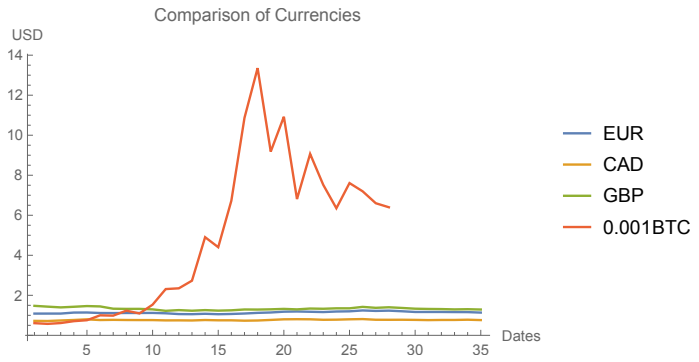
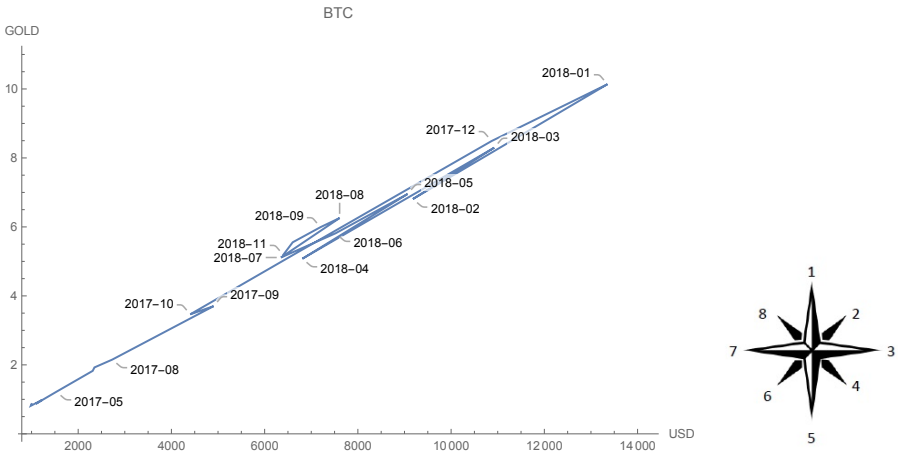


Fig. 1: Comparison among fiat currencies and Bitcoin: The values are retrieved on the first day of each month. A fraction of Bitcoin (1/1000 BTC) is plotted.

Figure 2a shows the change of value of Bitcoin with respect to USD and gold. The value changes happen in directions 2 and 6 (Figure 2b). The part of

plot in direction 2 means that Bitcoin is gaining value against gold and USD. This can also be interpreted as both gold and USD are losing value relative to Bitcoin. Also, the fact that the plot is located on the diagonal shows that Bitcoin gains/loses value against both USD and Gold at the same time. This indicates that the changes in the values of USD and gold are highly correlated.



(a) Bitcoin's value with respect to USD and Gold (b) Legend

Fig. 2: BTC

Considering these facts, there is a desire to design stablecoins with the stable nature of the fiat currencies together with the decentralized nature of the blockchain which is the underlying technology of cryptocurrencies.

2 The current state of the stable coins

Stablecoins have a market value of $3 billion and this corresponds to the 1.5% of the total market value of the cryptoassets [2]. Each proposing different properties, stablecoins can be categorized into three groups based on the way they achieve stability: fiat-collateralized, crypto-collateralized, and non-collateralized.

1) Fiat-collateralized stablecoins: These types of stablecoins are backed by fiat currency and backing by USD is one of the most common types. Generally, there is a 1:1 peg between the fiat currency and the stablecoin that indicates a convergence between their values [3]. USD being one of the most common choices for the fiat currency to back the stablecoin with, IBM states that they are also interested in projects that use other national fiat currencies, as they will be helpful for IBM's blockchain integration [5].

Tether and TrueUSD are prominent examples of USD pegged tokens. Some projects like Digix Gold Token prefer to use gold to back their stablecoin, as gold has a relatively slow increase in its value compared to fiat currencies.

Discussion about centralization: Backing up with fiat currency means that there is a need for third party. The amount of money to back the stablecoin with, should be held in an account [10]. Centralization ensures that the peg can be attained. However, involvement of a third party causes controversy, as the third party can just deny giving money to the users. Tether explains this point as follows [8]:

> "Redemptions will not be unreasonably denied, but we reserve the right to selectively deny redemption and creation of Tethers on a case-by-case basis."

2) Crypto-collateralized stablecoins: These types of stablecoins use other cryptocurrencies as a back up value rather than a fiat currency. Over-collateralization is needed this case as the underlying cryptocurrency is also volatile [3]. MakerDAO and Reserve use this approach – utilizing a smart contract to back the stablecoin with another cryptocurrency [5].

If there is a black swan event [1] where the underlying currency loses its value and does not worth anything, the stablecoin also loses its value [11]. Due to the over-collateralization in this type of stablecoins the loss of value will be drastic. This is the reason that a group of experts strongly discourage this approach.

3) Non-collateralized stablecoins: Unlike the previous types, this group of stablecoins are not backed by fiat currencies or another cryptocurrency. Here the stability is achieved algorithmically [3] which helps to provide better scalability [2]. Basis is one of the first projects that use this approach.

Basis and Carbon use the dual-token model [8]. Is the following sentence explaining the approach used in Basis or Carbon, if not let's bring them upThere is dynamic adjustment of the existing supply of the stablecoin. While one token is stable, the other is used to achieve the stability of the value. If the value of Basis increases (an increase over $1), more Basis tokens are produced to increase the supply which will lead to a decrease in the price and if there is a decrease in the price, a bond that is worth a Basis token is issued and some Basis tokens are bought to decrease the supply. [6]

seigniorage shares method is the one to achieve stablecoin? Another approach is the seigniorage shares method [4]. Here, the smart contract automatically adjusts the supply based on the algorithm to achieve stability in the value.

3 Issues that stablecoins address

As mentioned in the 1, currencies have to serve as a store of value, a unit of account, and a medium of exchange [12]. To do so, they have to denote a minimum level of value stability. In this regard, stablecoins are proposed to fulfill these properties, due to their non-fluctuating value compared to fiat currencies or any other alternative*e.g.,* commodity. In addition, they purport to solve a

[1] A black swan event is characterized as being unexpected, random and having significant effects to the current situation. this type of an event is hard to predict [**?**].

group of critical issues that were introduced by cryptocurrencies. In this section, we discuss these issues.

3.1 Cryptocurrencies as Medium of Exchange

Despite the fast growth of the cryptocurrencies and decentral applications, there is still little deployment of them in the daily payment procedures of businesses. The main reason is that these assets are volatile in the price and hence highly risky to be deployed by merchants and retailers *i.e.,* it is impossible for a company employer to provide the employees' incomes in a volatile cryptocurrency *e.g.,* BTC that has a high level of future value and price uncertainty. On the other hand, having a stable price over the time, stablecoins can serve as a true medium of exchange, while they preserve all the advantages of using cryptocurrencies as opposed to fiat currencies.

3.2 Cryptocurrencies as Unit of Account

Money has to serve also as a unit of account– the common measure that sets price to goods and services. Fiat currencies *e.g.,* USD, EUR *etc.* serve this functionality correctly, so they are used as units of account in the US and Europe respectively. Unfortunately, cryptocurrencies such as BTC, not having a stable price, do not seem to be used as a unit of account, hence will not be able to serve as money. However, given the price stability that stablecoins offer, they have a higher chance to be used as a digital representation of a unit of account.

3.3 Cryptocurrencies as Store of Value

Any asset, commodity, or money that maintains its value is called a store of value. As mentioned in Section 1, highly volatile cryptocurrencies (*i.e.,* Bitcoin) cannot fulfill this property of money, as they cannot maintain their purchasing value for long-term. In contrast, stablecoins can be accepted as a store of value as their price remains stable over the time.

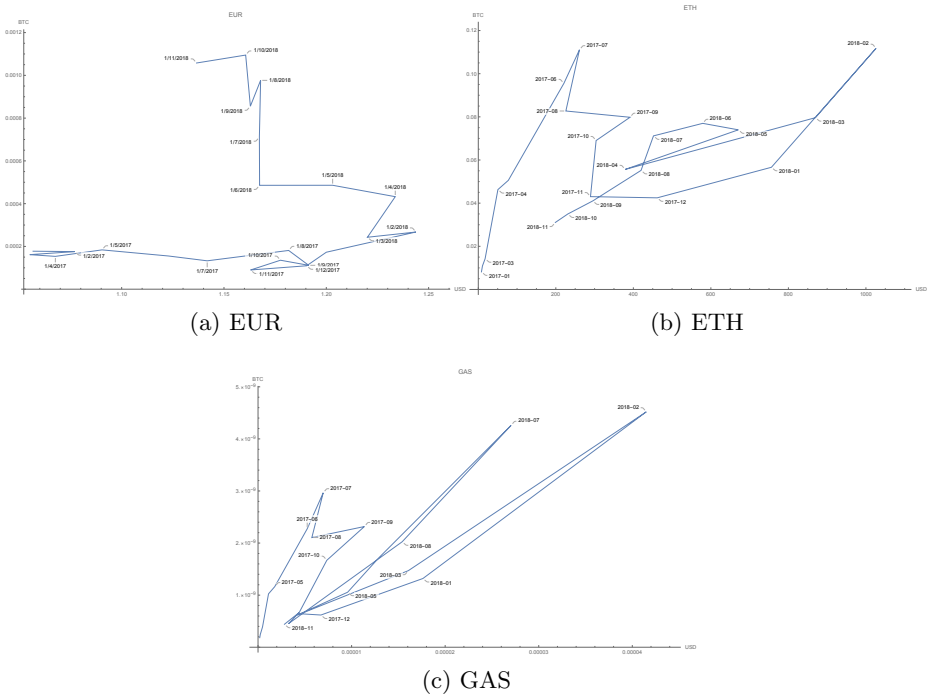
3.4 Lending with Cryptocurrencies

Despite quite a few blockchain applications in financial technologies, there has been little deployment of lending. Lending is difficult to be deployed on the blockchains, bdue to the monetary instability observed in the existing cryptocurrencies [9]. This volatility has led the cryptocurrencies to be used more as speculative investments instead of serving as store of value and unit of account. In a lending situation with volatile currencies, where their values are being depreciated or appreciated over time, the cash taker will eventually owe more than what he has borrowed or the vice versa. Therefore, the volatility in the value of cryptocurrencies causes serious concerns and difficulties both for cash takers and cash providers [9]. In contrast, lending perfectly works if a loan is done with a stable cryptocurrency, whose value remains stable over the time.

3.5 Remittance

Although cryptocurrencies, especially Bitcoin, play a revolutionary role in financial systems, they are yet not easy to transact with due to their volatile characteristics. Therefore with stablecoins, one can benefit from decentralized nature of the token, while there is no price volatility risk. In addition, stablecoins make the cross border payments, remittances, easier.

4 Investigation of gas volatility in Ethereum



(a) EUR (b) ETH

(c) GAS

Fig. 3: Comparison of change of value in EUR, ETH and Gas with respect to gold and BTC

Figure 3 illustrates how the values of EUR, ETH and Gas change with respect to BTC and gold. EUR plot in Figure 3a tends to have more movements in the directions 1-5 and 3-7 suggesting that while the value of EUR stays the same according to one axis, it changes according to the other. For instance, between June 2018 and August 2018, the value of EUR increased with respect to BTC, while it stayed the same according to USD. This type of movement suggests that

EUR-USD exchange rate is going under less change, whereas BTC-EUR rate is subject to high volatility. On the other hand, in the first half of 2017, while EUR retained its value against BTC, EUR to USD rate went under change.

ETH plot in Figure 3b illustrates more volatility against BTC and gold, as there are horizontal, vertical and diagonal changes. The fact that the points are spread in a large range of values indicates drastic changes in ETH price with respect to BTC, which is also a volatile cryptocurrency, and Gold.

Compared to Figure 3a and Figure 3b, gas plot (Figure 3c) has mostly diagonal changes, spread over a smaller range. There are less number of changes compared to ETH. Except from the changes between May 2018-July 2018 and January 2018-March 2018, the gas price changes in a smaller range. Even though there are fluctuations in the gas price, it can be inferred that gas price is less volatile than ETH.

5 Conclusion and Discussion

In this paper, we analyze the current state of stablecoins with the various options that have been so far proposed to achieve price stability. We also discuss various issues that if the righteousness stablecoins are designed, would address them. According to the charts represented in the paper, we hypothesize there are two options to achieve stablecoin, that is, pegging the stablecoin to a (i) currency (*i.e.,* USD) or (ii) commodity (*i.e.,* gold). In the first case,

This report analyses the current state of stablecoins and investigates the gas price in Ethereum to understand how gas price behaves. Stablecoins have a high a potential to offer a wide range of applications due to their price stability.

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