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 [?]. 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.
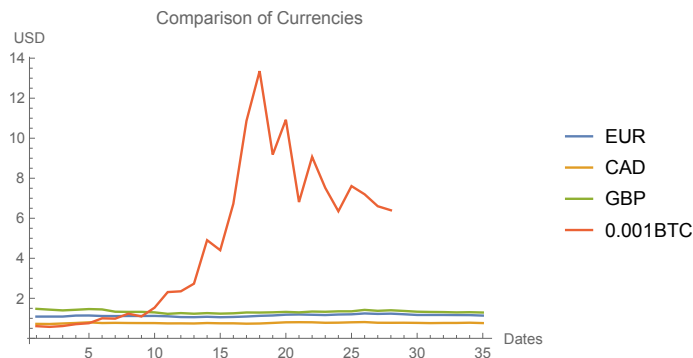

Fig. 1: Comparison among fiat currencies and Bitcoin: The values are retrieved on the first day of each month. A fraction of Bitcoin (1/1000 BTC) is plotted.

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. However, the first explanation is more likely to be the case, as only Bitcoin's value is changing compared to two values (USD and gold) changing. 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.

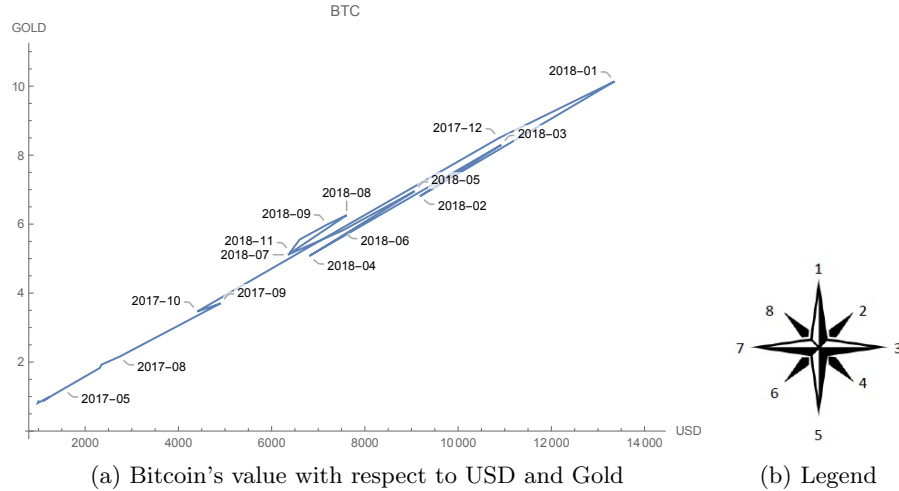(a) Bitcoin's value with respect to USD and Gold   (b) Legend

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 type of stable coins 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, 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 USD 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 up should be held in an account [9]. The involvement of a third party causes controversy in the community, as the third party can just deny giving money to the users. Tether explains this point as follows [7]:

> "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 type of stablecoins uses 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. Reserve utilizes 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 [10]. Due to the over over-collateralization in crypto-collateralized stablecoins the loss of value will be drastic.

In this case the loss-exposure would even be amplified for the stablecoin owners because of the over-collateralization. This is also why some experts are strongly discouraging this approach.

3) Non-collateralized stablecoins: Unlike the previous types of stable coins, these aren't back by fiat currencies of another cryptocurrency. The stability is achieved algorithmically [3]. This provides better scalability [2]. Basis is one of the first projects that use this approach.

Basis and Carbon use the dual-token model [7]. There 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]

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 [11]. To do so, they have to denote a min-

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[1] A black swan event is characterized as being unexpected, random and having significant effects to the current situation, hence it is hard to predict [?].

imum 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 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 [8]. 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 [8]. 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 Comparison Framework

Define the properties that are considered during the design of stable coins. Collateralization info from [1], decide which projects to choose that exemplify each category best.

Decentral price oracle and Schelling point [7] DAI and Bitshares [7] Feedback column from [2] Bitbay: One of the most unstable stablecoins [2].

Today, it would appear that prioritization of automation/transparency generally carries with it the trade-off of greater stability complexity (i.e., risk that the peg will be broken). In other words, the more decentralized the stablecoin design, the less likely it is to remain price stable against a peg like the US dollar. The success of Tether offers at least some evidence that so far the market has prioritized stability over decentralization (i.e., transparency and automation).Anyone who prioritizes decentralization already has the option to own arguably the most decentralized cryptoasset, bitcoin. [2] *A question to think about:* But does the broader world beyond the digital assets ecosystem really need (or want) stablecoins? [2]

5 Investigation of gas volatility in Ethereum

6 Critical Issues with Stable Coins

Combine with conclusion and discussion??

7 Discussion

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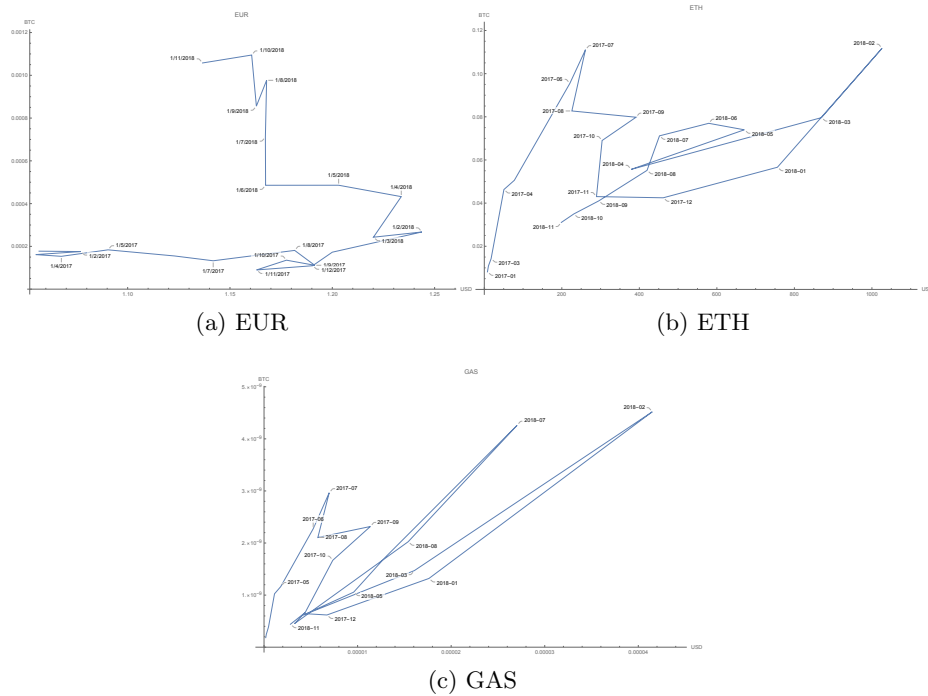
(a) EUR

(b) ETH

(c) GAS

Fig. 3: Comparison

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