Analysis on the Current State of Stablecoins

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1 Introduction

Give a brief introduction on Bitcoin and crypto-currencies and the state of stablecoins in general.

1.1 Motivation

In this section we talk about volatility and what does stability mean, and we make argument that we're not economist and everything is explained in our own language Cryptocurrencies have gained a wide application after Bitcoin was first introduced in Satoshi Nakamotos (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.
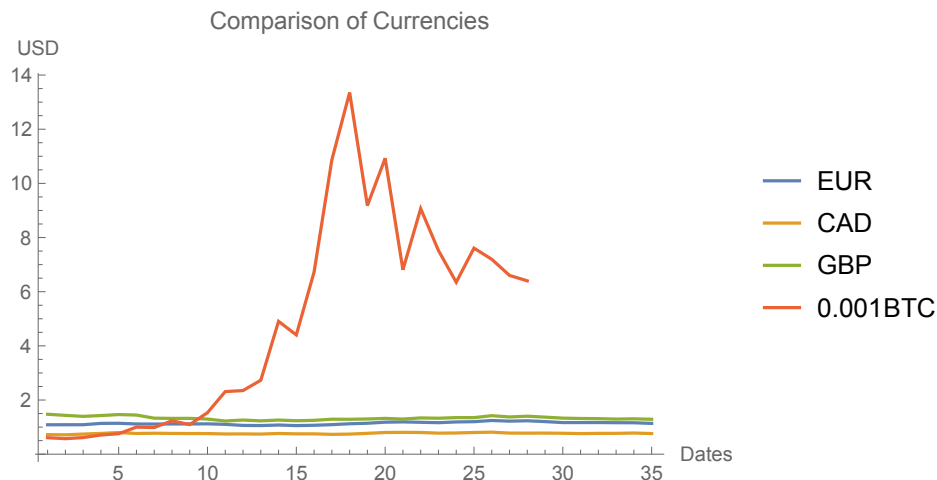

Fig. 1: Comparison among fiat currencies and Bitcoin: The values are retrieved on the first day of each month. A fraction of Bitcoin (1/1000 BTC) is plotted.

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.

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   Preliminaries

2.1   Valuation

How do we assign value to something? how do we establish what something is worth? The value is usually given in some units of account (*e.g.,* CAD). When we establish a value for something, we do. not really claim what the value and what it worths, instead, we establish a value of its exchange. For example, today Alice is willing to pay 500 CAD for Bob's phone, whereas tomorrow, she will pay 600 CAD. What happened in this case? It could be (i) the value of money (CAD) going down or (ii) the value of good (phone) going up. Thus, in order to establish how much value something has, we should think of it in terms of being an exchange rate (the exchange rate between that asset and some other valuable assets). In other words, if Bob is willing to offer his phone for 1000 CAD, does it mean that it worths 1000 CAD? What we know about is that the value of Bob's phone is somewhere between 500 CAD (which Alice is willing to bid) and 1000 CAD (which Bob is willing to accept/ask). Therefore, the value of an object is not a single number and we can think of it as an interval between a least amount somebody wishes to sell for and the most amount somebody wishes to pay for that object, this interval is called bid-ask. If an ask comes below a bid, then the transaction happens and that amount is recorded as the final price, we call this *crossing*.

What actually happens when they cross? Assume that they cross in such that Bob wants to pay (bid) 600 CAD for Alice's phone while Alice wants to sell (ask) it for 500 CAD. What happens in the real world is (i) either one party goes first and advertises a bid or an ask and when it crosses with other party's complimentary bid or ask, she accepts it. (ii) both parties advertise and they do not know about each other's price, so when they cross, the market decides (usually they pick the midpoint between the two).

When there is a cross, you have a price that is used for selling the object, that price is a last transaction price. So three values are actually important: 1) What is the most somebody is willing to pay for the object, 2) What's the least somebody is willing to accept for it, and 3) what was the last price this object is sold out. The value we see in the newspaper is always the last price, although it does not represent how much the object worths. In fact, we cannot actually say that and the best way to say that is when the bid-ask interval is really small. Assume that the interval is only 1 cent difference, in this case we can make sure what is the value and we are sure down to a cent. When the market changes so fast, the last price gives a lot of information on how much something worths, however, the last price that belongs to 30 years ago does not reveal a lot of information.

2.2   Exchange

2.3 No-Seignorage Theory of Money

To explain Bitcoin's exchange rate with fiat currencies, an oft-repeated theory has emerged that attributes Bitcoin's value to the hydro consumed by blockchain mining. While imprecise, the theory suggests that if a valuable resource x is consumed to produce y, the value of x is imparted into y. Setting aside the nuance that the hydro contributed to the Bitcoin system only indirectly produces new coins (it produces blocks, and blocks produce coins only for now), there is no economic principle underlying this transfer of value.

If Alice goes to Peter Luger's in Brooklyn, consumes a \$100 ribeye, and mints a literal shitcoin out of the result — is that coin worth \$100 because it is "backed" by \$100 worth of steak?

3 Systemization of stablecoins and Justification

The main meat of the paper where we place the table and explain it.

Category	Sub-Category	Examples	Rank
Backed	Directly-Backed & Redeemable	**USDC**	20
		TrueUSD	26
		Paxos	38
		Gemini Dollar	52
		StableUSD (USDS)	685
		Stronghold USD	891
		Petro	1210
		Ekon, WBTC, emparta	$\bot$
	Directly-Backed	**Tether**	6
		EURSToken	95
		BitCNY	304
		Terracoin	1280
		Saga	1495
		GJY, Novatti AUD, UPUSD	$\bot$
	Indirectly-Backed	**Dai**	57
		BitUSD	398
Intervention	Market	Nubits	892
	Algorithmic with subjective external information	Nomin*	$\bot$
	Algorithmic with objective external information	Carbon*	1262
		Ampleforth*	$\bot$
	Algorithmic with only internal information	Basis	$\bot$

Table 1: Systemization the current stablecoin projects on January 11, 2019. The Projects that are in bold are discussed in this paper.

4 Backed

4.1 Redeemable and Directly-Backed.

4.2 Non-Redeemable and Directly-Backed.

4.3 Non-Redeemable and indirectly-Backed.

4.4 Redeemable and indirectly-Backed.

5 Intervention-based

5.1 Currency Board

5.2 Algorithmic with subjective external information

5.3 Algorithmic with objective external information

5.4 Algorithmic with only internal information

We performed a search query on `coindesk.com` and found the following projects which are mostly used in every articles published about stablecoins until January 11, 2019. [1] Table 1 represents these projects and the methods they apply to achieve stability. (we should mention the search term that we used to extract our resources from coindesk)

Distribution of articles speaking about stablecoin: 2014: 2, 2017: 4, 2018: 112, 2019 (up to Jan 11): 4.

6 Investigation of gas volatility

it would be nice to have a chart : Ether, Electricity (Global energy index), and Gas

Our analysis in Section 1 shows that cryptocurrencies exhibit less stable behavior compared to fiat currencies. Hence, we aim to analyze the price stability of *Gas*. In Ethereum blockchain, every transaction contains a number of operations and there is a precise amount of gas unit associated with each.[2] Since Ether is volatile, this concept is introduced to have fixed cost for operations. Thus, even though the price of Ether changes, the amount of Ether corresponding to a unit of gas decreases; so that users pay the same price for the transactions on the Ethereum blockchain. Hence, the notion of gas is yet to be investigated to find out whether it exhibits behavior similar to fiat currencies or cryptocurrencies.

Figures 4- 11 illustrate how the values of EUR, ETH and Gas change with respect to BTC and gold. EUR plot in Figure 4 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 6 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 and Gold.

Compared to Figure 4 and Figure 6, gas plot (Figure 11) 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. Also, it worths mentioning that gas is changing over a small scale in x-axis (USD), when compared to Ether's plot over the same axis in a larger interval.

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[1] https://www.coindesk.com/

[2] http://ethdocs.org/en/latest/contracts-and-transactions/account-types-gas-and-transactions.html#what-is-gas

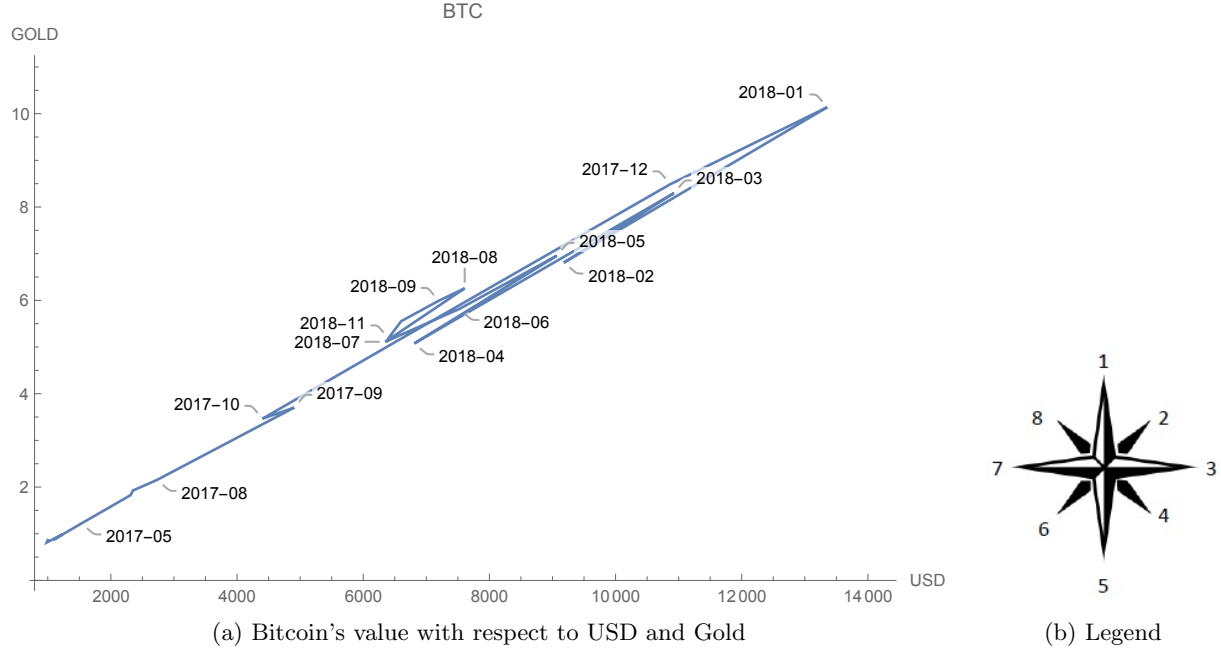(a) Bitcoin's value with respect to USD and Gold

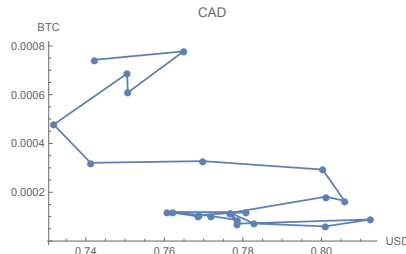(b) Legend

Fig. 2: BTC

6.1 new graphs
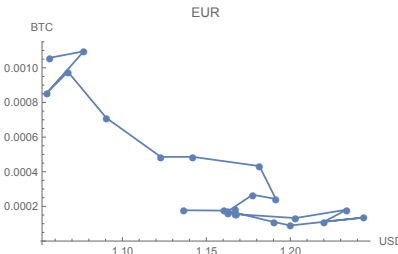

Fig. 3: CAD with respect to BTC and USD

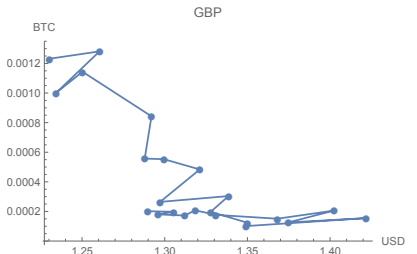Fig. 4: EUR with respect to BTC and USD

Fig. 5: GBP with respect to BTC and USD

7 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 stablecoins would address. According to the charts represented in the paper, gas is relatively stable in price, while Bitcoin and Ether show volatile behavior. The reason could be the fact that how users interact with the interface to set the gas price when sending transactions to the Ethereum. By analyzing the properties of gas together with the existing methods to create stablecoin, we can later propose what properties stablecoins should attain.
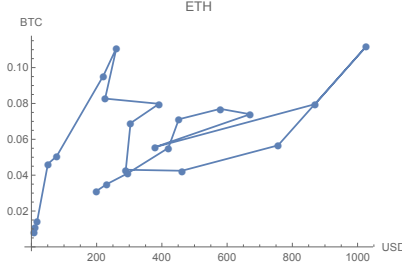
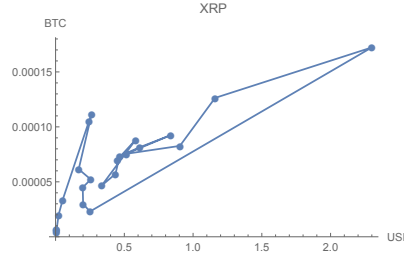Fig. 6: ETH with respect to BTC and USD
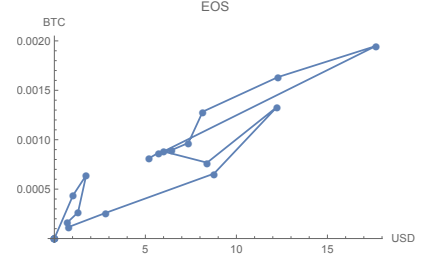

Fig. 7: XRP with respect to BTC and USD
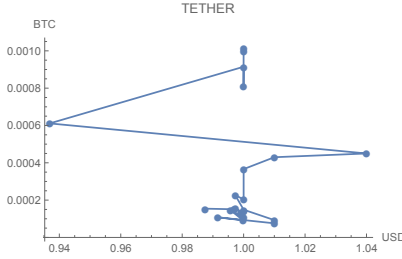

Fig. 8: EOS with respect to BTC and USD

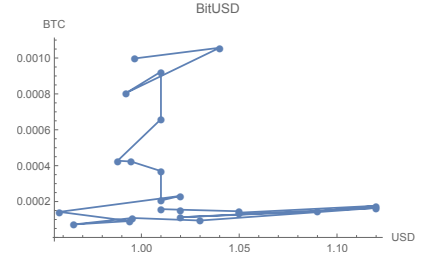Fig. 9: Tether with respect to BTC and USD
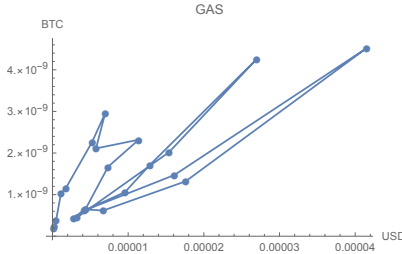

Fig. 10: BitUSD with respect to BTC and US
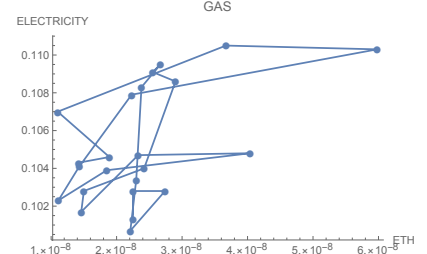

Fig. 11: Gas with respect to BTC and USD

Fig. 12: Gas with respect to BTC and USD

8 The current state of stablecoins (might be needed for the paper)

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. Generally, there is a 1:1 peg between the fiat currency and the stablecoin that indicates a convergence between their values [3]. While USD is currently the most common choice 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 their blockchain integration [5]. Tether and TrueUSD are prominent examples of USD pegged tokens.

Discussion about centralization: In order to back up with stablecoins with fiat, one needs to place trust on a third party. Centralization ensures that the amount of money to back the stablecoin with, is held in an account [10] and the peg is attained. However, involvement of a third party causes controversy, as the third party can deny giving money to the users. Tether explains this point as follows [8]:
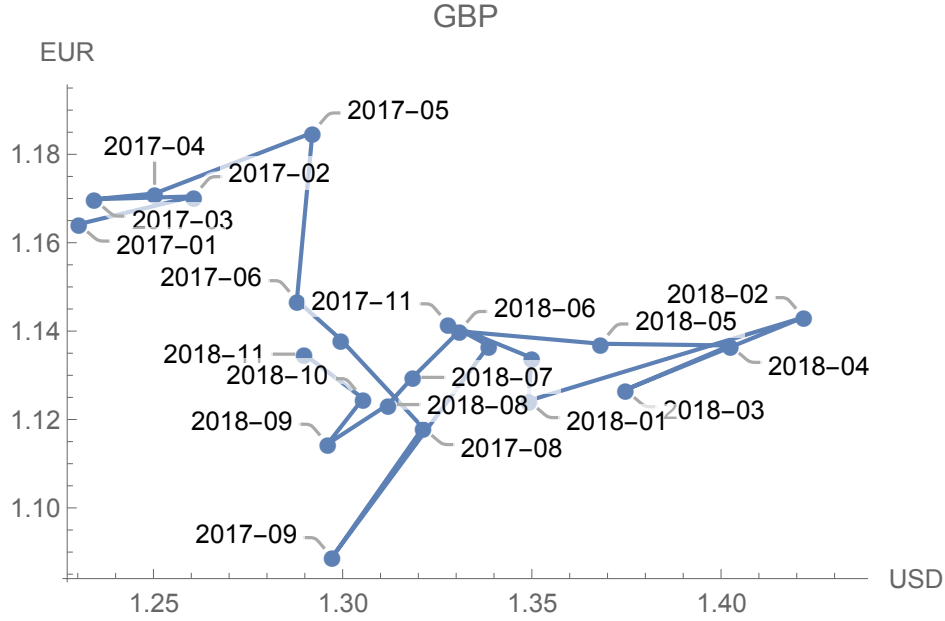
Fig. 13

"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 fiat currency.

Over-collateralization is needed in 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 [3] 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 which helps to provide better scalability [2].

Basis is one of the first projects of this type that achieves price stability using the dual-token model [8]. In this method, 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].

9 Issues that stablecoins address

As mentioned in Section 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

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[3] 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 [?].

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.

9.1 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.

9.2 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.

9.3 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.

9.4 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.

9.5 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.

References

1. Bitmex. A brief history of stablecoins (part 1). `https://blog.bitmex.com/a-brief-history-of-stablecoins-part-1/`, 2018. Accessed: 2018-09-02.
2. Blockchain. The state of stablecoins. 2018.
3. S. Dhillon. Stablecoins vs. govtcoins: The race to solve cryptocurrencies price volatility problems. `https://www.linkedin.com/pulse/stablecoins-vs-govtcoins-race-solve-cryptocurrencies-price-dhillon`, 2018. Accessed: 2018-10-29.
4. C. Durr. Overview of stablecoins. `https://hackernoon.com/overview-of-stablecoins-2e4ffef82a73`, 2018. Accessed: 2018-01-15.
5. M. Huillet. Ibm backs new us dollar-pegged stablecoin that runs on stellar network. `https://cointelegraph.com/news/ibm-backs-new-us-dollar-pegged-stablecoin-that-runs-on-stellar-network`, 2018. Accessed: 2018-07-17.
6. P. Lee. Forget bitcoin: stablecoins will change how money works. `https://www.euromoney.com/article/b1bbk5rb8gp227/forget-bitcoin-stablecoins-will-change-how-money-works?copyrightInfo=true`, 2018. Accessed: 2018-10-29.
7. S. Nakamoto. Bitcoin: A peer-to-peer electronic cash system, 2008.
8. C. O'Higgins. Stablecoins - everything you need to know. `https://cryptoinsider.21mil.com/stablecoins-everything-need-know/`, 2018. Accessed: 2018-07-09.
9. M. C. Okoye and J. Clark. Toward cryptocurrency lending.
10. M. Orcutt. "stablecoins" are trending, but they may ignore basic economics. `https://www.technologyreview.com/s/611370/stablecoins-are-trending-but-they-may-ignore-basic-economics/`, 2018. Accessed: 2018-07-06.
11. L. Schor. Stablecoins explained. `https://medium.com/@argongroup/stablecoins-explained-206466da5e61`, 2018. Accessed: 2018-10-29.
12. J. Smithin. What is money? introduction. In *What is Money?*, pages 11–25. Routledge, 2002.