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Reserve Backing for Stablecoins *by Warren Weber*

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Reserve Backing for Stablecoins

Warren Weber¹

A stablecoin is a native token that intends to maintain a 1:1 exchange rate against the USD at all times. Issuers of stablecoins, ones either presently available or proposed, are taking two different approaches to achieving the 1:1 exchange rate. One approach is *promised redemption*. The issuer promises holders that they can redeem their coins directly from the issuer 1:1 for USD. The other approach is *pegging*. The issuer puts in place protocols with mechanisms that the issuer claims will keep the market value of the coin within $1 \pm \delta$ of 1 USD, where δ is some small number.²

For stablecoins, either those that promise redemption or those that peg, upward pressure on the price is easy to offset. The issuer simply has to issue more of the coin. Combating downward price pressure is much harder and is the more important issue to focus on. This paper is the first of two in which I discuss and evaluate mechanisms that are, or potentially could be, in place to achieve stability by relieving downward price pressure on stablecoins. In this paper, I discuss the role that the reserves/insurance can play in achieving stability. I also describe some of their limitations.

Reserves are the total resources *readily available* to the issuer of a stablecoin to either redeem the amount of its stablecoin in circulation or to provide support for the price of its stablecoin in the market. The resources have to be readily available in the sense that they are highly liquid; that is, they can be converted to USD very quickly without a huge hit to their price. However, the resources only have to be available to the issuer; they do not have to be owned by the issuer or pledged to (held by) the issuer. The resources could be owned or held by an entity other than the issuer. In such cases, the stablecoin issuer would be said to have access to insurance. In other words, insurance is a form of reserves.

Stablecoins with Full Reserve Backing

Stablecoins for which the issuers maintain **100% *guaranteed* reserves of USD** against are said to have full reserve backing. Maintaining the price at 1:1 against downward pressure will never be a problem for such stablecoins. If the stablecoin issuer promises redemption, the issuer will always have enough USD to meet all redemption demands at 1:1. Therefore, holders of such stablecoin will not have any incentive to all demand redemption from the issuer at the same time (run the issuer). If the stablecoin issuer pegs, the issuer will always have enough USD to buy up in the market all of their coins that are in circulation at 1:1 if

¹Owner, Webereconomics and former Senior Research Officer at the Federal Reserve Bank of Minneapolis.

²Note that the discussion here is about achieving a 1:1 price of a stablecoin in terms of some national currency, which I assume is the USD although it could be any national currency or basket of national currencies. It is not about achieving stability in terms of some index of goods prices (think Consumer Price Index). That would be an entirely different discussion; one that has received a great deal of attention in the economics policy literature. What determines a country's rate of inflation and the relation of a country's inflation rate to the rate of growth of its money supply and its unemployment (or employment) rate are questions that are still far from settled.

the protocols intended to maintain 1:1 fail. As a result, fully reserve backed stablecoins will not be subject to downward price pressure.

It is critical, of course, that the 100% reserves are guaranteed to always be there. The requirement of a guarantee raises the question, How can the holders of the coins be certain (verify) that the issuer is in fact holding 100% reserves as claimed? If the holder wants to verify the issuer's reserves, how can she determine where they are being held and whether they actually being held in USD?³

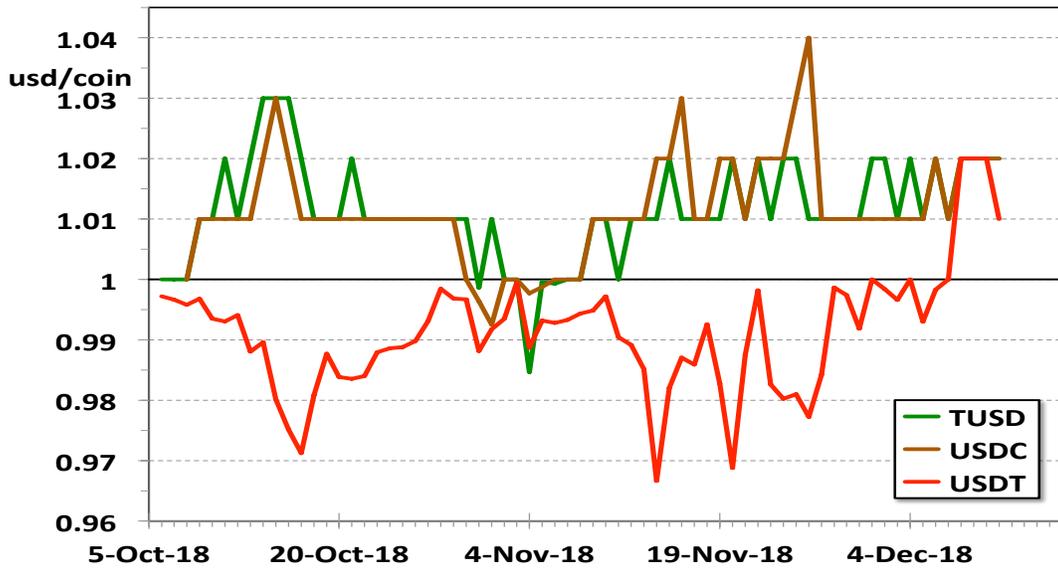
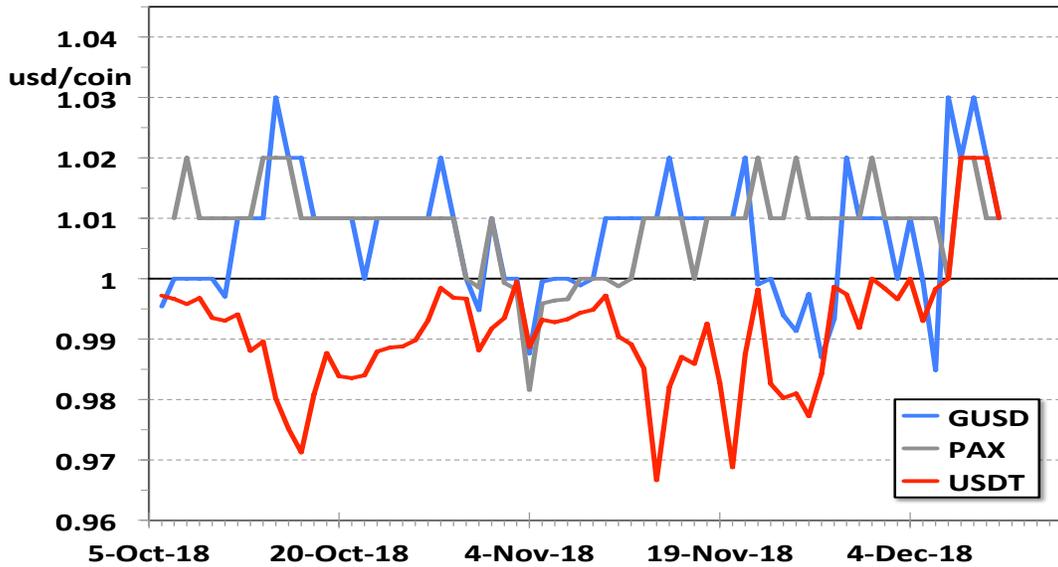
It seems unlikely that a stablecoin issuer will keep the USD received for its coins in a vault somewhere and forego the possibility of earning interest on the USD holdings. It is more likely that the stablecoin issuer will hold the USD reserves in some financial institution or institutions, a third party or third parties. The question then becomes how trusted are these third parties. Can these third parties come up with enough USD should the stablecoin issuer demand the necessary quantity to support the market price? It is for these reasons that it is critical that the 100% reserves are truly guaranteed in all circumstances.

The importance of trust that an issuer of a fully-backed stablecoin does in fact hold the promised reserves on the price of a stablecoin is shown in the figure below, where the prices (closing prices from coinmarketcap.com) of five fully backed stablecoins are plotted beginning on October 6, 2018. Over that time period there have been concerns about whether Tether (USDT) does in fact have 100% reserves against all of its coins in existence. These concerns have arisen because Tether has failed to provide audited financial statement and because of concerns about the bank, Deltec located in the Bahamas, where Tether says the reserves are held. Over the time period, Tether has mostly been trading below par.

Four other stable coins are shown in the figures below. They are TrueUSD (TUSD) issued by Trust Token, USD Coin (USDC) issued by Circle, Gemini Dollar (GUSD) issued by Gemini Trust Company, and Paxos Standard Token (PAX) issued by Paxos Trust Company. In contrast to Tether, the 100% reserve backing of all of these stablecoins can be trusted either because they have audited financial statements or their reserves are held in escrow accounts in trust companies. The figure shows that the market prices of these stablecoins were almost uniformly higher than the market price of Tether and were above par for most of the period. The figure also shows that at the times when there was the most concern about Tether's trustworthiness, October 16-17 and November 14, there were spikes in the market prices of the other stablecoins. Overall, the price of Tether is essentially uncorrelated (the range is -0.17 to 0.11) with the prices of the other four stablecoins. In contrast, the correlations between the prices of the other four stablecoins with each other are all positive, between 0.23 and 0.74.

Another possible form of reserves for stablecoin issuers is insurance from some agent outside the protocol. Such insurance would be in the form of a promise to provide the issuer with USD should its coin come under pressure. If the amount of such insurance that a stablecoin issuer has is large relative to the quantity of stablecoin in existence, then its stablecoins are fully backed.

³The verification problem occurs with respect to any coin that promises redemption at a given rate of price regardless of whether the promise is in terms of USD, gold, or something else. The problem of verification, *Quis custodiet ipsos custodes?* (who guards the guards?), goes back at least to Roman times.



The question that arises with regard to stablecoins that have insurance backing their coins is whether the insurer has enough liquid resources to provide USD to the issuer to meet redemption promises or to buy enough of the stablecoin to keep the exchange rate at 1:1. It seems likely that stablecoin issuers would have to accept a cap on total circulation in order to obtain such insurance, otherwise the quantity of insurer resources required could be large and out of the insurer's control.

Some of the foundations and other entities issuing stablecoins have stated that they will act as insurers should their tokens come under attack. However, it is unknown at this point whether these entities hold enough USD. At this point, no stablecoin has insurance through an entity totally outside and unrelated to the issuer.

Of course, a government would have the ability to provide insurance for stablecoins issued with promises to redeem or peg in terms of its currency. A government could issue any amount of their own currency to offset a run or speculative attack on any such stablecoin. Thus, a government could be an insurer for a stablecoin. However, it is extremely unlikely that a government will choose to do so for any stablecoin unless that stablecoin can demonstrate that it is a systemically important component of that country's financial system. Nonetheless, there may be circumstances in which U.S. stablecoin issuers might be able to get some pass-through FDIC protection.

Stablecoins with Fractional Reserve Backing

The far more interesting and difficult problem of achieving a stable 1:1 price against the USD arises when the issuer of the stablecoin holds only fractional reserves of USD against the quantity of their coins in circulation. It might seem that for such coins, there is an amount of assets, other than USD, that the issuer could hold that would be large enough to guarantee that the issuer could always be able to sell these assets to obtain enough USD to redeem or support the market price of the coins they have in circulation.

However, this is not the case. There is always the possibility that in some circumstances the value of the non-USD assets will be less than necessary to cover the value of stablecoin outstanding no matter how large is the current value of these assets. Even though they may be extremely unlikely, "black swan" events are always possible, meaning that there is no guarantee that the value of the non-USD assets will always be large enough. This is especially true if the stablecoin issuer has to sell these assets in a hurry (a "fire sale"). In other words, for fractionally backed stablecoins, if the issuer is promising redemption, there is always the possibility that the issuer will have run out of USD when a holder attempts to redeem. Or, if the issuer is pegging, there is always the possibility that the issuer will have run out of USD and cannot support the price in the market. While these possibilities may be extremely unlikely, they always exist.

The above discussion has referred to the *reserves* backing a stablecoin. Collateral has not been mentioned. The reason is that collateral is assets pledged as security that a loan will be repaid. As such, collateral may not become the property of a stablecoin issuer unless the borrower defaults, and the default, if it even occurs, may not happen until well after the issuer needs the USD to keep its redemption promise or to support the price of its stablecoin in the market.

So, given this possibility exists, can a fractionally backed stablecoin maintain 1:1 against the USD? The answer: It depends on the beliefs of the holders of the coin. One possibility is that a holder of the stablecoin believes that other holders will not make extraordinary redemption demands or will not put an extraordinary amount of the coin on the market, so that the issuer always will not have enough reserves to maintain 1:1. In such a case,

there is no incentive for any holder to make extraordinary redemption demands or to put an extraordinary amount of the coin on the market. The result: the stablecoin maintains 1:1 against the USD.

The other possibility is that a holder of the stablecoin believes that other holders will make extraordinary redemption demands or will put an extraordinary amount of the coin on the market, so that the issuer will have enough reserves to meet all redemption demands or to support 1:1 in the market. If a holder has this belief, then she too will demand redemption for fear of getting nothing when the issuer runs out of reserves, or she will put her coins on the market, fearing that the market price will be lower tomorrow. The result: a “bad” outcome; the stablecoin does not maintain 1:1 against the USD.

Having a higher fraction of reserves makes the bad outcome less likely, because it makes the possibility that the issuer will run out of reserves less likely. Nonetheless, there is no amount of reserves, other than 100% backing, that will eliminate this possibility entirely.