A Rosetta Stone of "stablethings" and other financial instruments

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This paper may contain errors of fact, logic, reasoning and history. Please send comments to: nathan@newworldeconomics.com

This paper discusses a wide variety of financial instruments that are "stable" vs. some benchmark. These include: currencies stabilized against some parity, whether another currency, gold, currency baskets, commodity baskets or CPI targets; currency board systems; money market funds; mutual funds; bank deposits; exchange-traded funds; and cryptocurrency "stablecoins." This discussion largely mirrors chapters 2 and 6 in my 2013 book, *Gold: The Monetary Polaris*.

Many Americans do not know today that, especially before the Civil War, the United States had hundreds, and eventually thousands, of independent USD-based "stablecoins." These were banknotes issued by independent commercial banks. For example, the Smith Bank of Dry Gulch, Texas, would issue its own banknotes, with its own design. These banknotes were redeemable for a dollar (which was then a silver coin) at the bank. In 1860, there were about 1,800 banks issuing their own banknotes. This was the only paper money system at that time, as there was no Federal Reserve (founded in 1913), and the U.S. Treasury was not involved. By 1930, this system expanded to over 8,000 banks (comparable today to over 8,000 "USD stablecoin" issuers) that issued their own banknotes. However, by that time it had become a somewhat marginal industry since Federal Reserve Notes and U.S. Treasury gold and silver certificates dominated the currency system. By 1940, the Federal Reserve had an effective monopoly on banknotes in the U.S., ending a long tradition of multiple independent banknote issuers. The system of multiple currency issuers ("free banking") lives on in small scale in Hong Kong (USD-based) and Scotland (GBP-based).

Actually, the design, or balance sheet structure, of these many commercial bank issuers was much more complicated and aggressive than anything available in the crypto space today. Their note issuance was integrated in their regular commercial bank lending activities. For example, you could borrow $1,000 from the bank, and they would give you $1,000 of their own banknotes in return. It will be interesting to see if these innovations come to the crypto space at some later date. In the paper banknote world, this model appeared in the West in the mid-seventeenth century, although I think there were precursors dating back to the original central bank of Sumer, around 2500 B.C. (Banking, and central banking, are about 2000 years older than coinage.)

The point is, this is all very old.

The "Appledollar"

Let's say we want a banknote (or "stablecoin") based on apples. The basic process is:

You give me one apple, and I give you one "apple dollar" (A$).
You give me one A$, and I give you one apple.

The currency issuer "makes a market" (offers to buy or sell) in unlimited size, on a continuous (daily) basis. I am using a paper banknote here, but you could just as well use a crypto "stablecoin", some sort of token coin, an entry in a data ledger, or a stuffed racoon. The only requirement is that it is not counterfeitable. These banknotes can trade among third parties.

It should be clear that, as long as the issuer is able to buy and sell, in unlimited size, at the "parity" of one apple:A$1, then the market price can never vary much from 1:1.

The use of apples may seem fanciful, but actually there have been "warehouse receipt" systems based on such commodities. In the eighteenth century, the colony of Virginia had paper currencies based on tobacco held in a warehouse. Egypt had a whole nationwide banking system based on wheat for hundreds of years, around 600-100 B.C. (This system was entirely "digital," recorded on ledgers, and eventually payments could be made throughout the whole country.) In 1850, Japan had over 1,500 paper banknotes from independent issuers, many based on gold and silver, but also others based on rice, Chinese coins, umbrellas, string, and potter's wheels.

We can see that it is not very hard for the issuer to take apples and give A$. A$ can be created costlessly in near-infinite size. In effect, the issuer gets something for nothing, which is always a lot of fun. The problem is usually when the issuer is obligated to give an apple for an A$. The issuer must have an apple available to make this trade. If the issuer "defaults" on its obligation to give an apple, problems arise.

The issuer could take and apple and give one A$. Then, the issuer could eat the apple. No more apple. Now, when the A$ holder comes back and wants to trade the A$ for an apple, there is no apple. The issuer defaults. (The issuer actually has some other options, like borrowing an apple, which can arise with more complicated balance sheet structures.)

To prevent the risk of default, the issuer commonly holds a "reserve" (this is the traditional central bank/commercial bank terminology, although the crypto people seem to like "collateral," which arises from structured finance terminology). Let's say that the reserve is apples, kept in a basket. The issuer keeps one apple in the "reserve" for each A$ outstanding.

The balance sheet looks like this at the beginning:

Assets	Liabilities
none	none

Now, someone comes to the issuer and asks for some currency. Maybe this is because the banknotes (or cryptocurrency; but let's use banknotes for now) are easier to keep in one's pocket than a bunch of apples. They can also be subdivided, sent in the mail, etc. These apple-linked banknotes are useful, and thus someone wants some.

The issuer takes 100 apples and offers 100 A$:

Assets	Liabilities
100 apples	100 A$

Then, someone who is hungry comes to the issuer, and since you can't eat a banknote, offers two A$ in trade for two apples:

Assets	Liabilities
98 apples	98 A$

Now there is a rumor (not true) that everyone who has an A$ will, in the future, be able to cash it in with the issuer for two apples, instead of one. They can buy an A$ for one apple today, and sell it for two apples tomorrow. The A$ becomes extremely popular, and people obtain another A$1000 in trade for 1000 apples:

Assets	Liabilities
1098 apples	1098 A$

When people discover that the rumor is untrue, they dump the A$1000 they bought back on the issuer and take their apples back:

Assets	Liabilities
98 apples	98 A$

Although this process is simple, this single act (of selling apples, taking A$ in return and canceling or "burning" them, reducing their supply) has at least three important aspects:

> 1) There is a transaction at the parity price of A$1:1 apple, which establishes a market price at the parity.
>
> 2) The supply of A$ is reduced. A reduction in supply naturally supports the value of the A$.
>
> 3) The outstanding liabilities (A$) are reduced, in line with the reduction in assets from the sale, so that there is never a mismatch between assets and liabilities, leading to the failure of the issuer to perform on its obligations.

Sometimes there are similar-seeming transactions that are missing one or more of these three elements; and problems arise as a result. In this example, the system has withstood tremendous selling of A$1000 out of a total supply of A$1098, with no difficulty whatsoever.

The provision "in unlimited size" is included because, even if the issuer is willing to buy and sell at the parity price, if some market participants cannot trade with the issuer at the parity price, they will be forced to find other counterparties, and a secondary market with variable prices will develop. In the above example, if A$ holders wish to reduce their holdings by A$1000 at the parity price (receiving 1000 apples in return from the issuer), and the issuer offers only 500 apples for the first A$500 and then shuts its doors, then the holders of the other A$500 must find another market counterparty to satisfy their desire to disacquire the asset. The value of the A$ will then float, even though the issuer is indeed active in the market, in limited size. (In practice, if an issuer "gates" the size of its involvement due to the difficulty of processing large demand, but promises that everyone will be satisfied in due time, then holders are usually willing to wait. There is usually no need to liquidate the A$ at 0.75 apples today if the issuer will offer 1.00 apples in three days' time.)

Now, the rumor gets out that some of the apples were stolen (not true), and there is a "run on the bank" as everyone wants to dump their A$ and get apples. A$80 are redeemed for apples, and disappear from circulation, leaving A$18 remaining:

Assets	Liabilities
18 apples	18 A$

The A$ continues to be rather unpopular, perhaps because its circulation is now so low that nobody is familiar with it, so eventually all the existing A$ in circulation is returned to the issuer for apples:

Assets	Liabilities
none	none

This is a rather unfortunate outcome for the issuer. However, we can see that the issuer was able, right to the very last A$ and last apple in reserve, to "make a market" in apples and A$, in unlimited size and at the 1:1 parity. The market value of the A$ never deviated from one apple.

Thus, we can see that there is really no danger from "speculators" in this simple system.

Speculators, currency boards, and "currency pegs"

A currency board is the same system as the "appledollar" applied to two currencies, for example with the USD as the "apple" and HKD as the "A$." In practice, there are complications when a currency board is combined with a sophisticated banking system. However, even then, the system holds. The Hong Kong currency board withstood tremendous speculative attack in 1998 (which I believe literally included George Soros), and emerged unharmed. EUR-linked currency boards in eastern Europe (Latvia, Lithuania, Estonia, Bulgaria, Bosnia and Herzegovina) were unharmed in the 2008-2009 crisis, while currencies based on other mechanisms (the ad-hoc "peg" of Ukraine for example, or the looser system of Russia) had major problems. Steve Hanke, a currency board expert at Johns Hopkins (he was personally involved in the establishment of the currency board systems in Estonia, Lithuana, Bulgaria, Bosnia and Herzegovina, and Argentina), has looked into the history of currency boards since 1849. He found that they functioned without failure in 70 out of 70 instances. This included even the extreme case of a British pound-linked currency board that operated in the "White"-held region during the civil war that followed the Bolshevik Revolution in Russia in 1917. That system too functioned properly, in the middle of a literal civil war; and on the losing side!

Probably you are wondering now: if that is the case, why do we see so many "pegged" currencies worldwide fail on a regular basis? Are the central bankers managing these currencies idiots? Don't they understand these things? It doesn't seem very difficult.

The answer is: yes, they are idiots. If they weren't idiots, they would use the system that has been successful in 70 out of 70 instances, over a period of 170 years; namely, a currency board. There is a good deal of evil too, and hidden agendas. So, now you know more about it than they do, which is a pretty interesting feeling actually.

Failure to observe these principles was the actual cause of the devaluation of the British pound in 1931, and also the abandonment of the gold parity at $35/oz. for the U.S. dollar in 1971, which were the two most important monetary events of the twentieth century. So, it is not a trivial matter. Since the typical "stablecoin" enthusiast, commonly from a background in computer science, is far more talented than the typical economist, I think we might see a situation soon in which these computer scientists start to tell the economists what's what, and then we can finally have a worldwide gold standard system again.

In the words of Robert Mundell, called the "grandfather of the euro," and 1999 Nobel Prize winner in economics:

> **Mundell:** The distinction between fixed and pegged rates that I find useful refers to the adjustment mechanism. Under a fixed rate system, the adjustment mechanism is allowed to work and is perceived by the market to be allowed to work. Whereas under “pegged” rates or “adjustable peg” arrangements, the central bank pegs the exchange rate but does not give any priority to maintaining equilibrium in the balance of payments. There is no real commitment of policy to maintaining the parity and it makes the currency a sitting duck for speculators. ... But when economists attack fixed rates they nearly always focus their attention on “pegged rates.” I have never nor ever would advocate a general system of “pegged” rates. Pegged rate systems always break down.

In this discussion, "fixed" rates mean systems that operate according to the principles outlined here (in the currency world, this is similar to a currency board), while "pegged" systems have a policy of maintaining a 1:1 parity, but no effective means to do so. It amounts to something like crossing your fingers and hoping. This difference is called the "adjustment mechanism," and failure to have a proper "adjustment mechanism" leads to "balance of payments imbalances" ("problems we don't understand") and eventual failure of the system. It is rather obtuse terminology.

Many variations on the same idea

The same system (simplified) is used in a gold standard system:

Assets	Liabilities
1000 £1 gold sovereign coins	£1000 in banknotes

It is the same as a currency board, such as is used by Hong Kong (USD-based) or Bulgaria (EUR-based):

Assets	Liabilities
1000 USD	7,800 HKD at a parity of 7.8:1

It is the same basic system that is used by a money market fund:

Assets	Liabilities
$1000 in short-term debt instruments	1000 shares outstanding at $1/share

Money market funds do not trade in a secondary market. But, it is easy to see that, if the money-market fund continued to make a market in its shares at $1.00 (which it does), then the secondary market price would not vary much from $1.00. There are some exchange-traded funds (such as SHV, a T-Bill fund) that are very close to a money-market fund, and do trade in a secondary market.

Assets	Liabilities
$1000 in T-Bills	1000 shares outstanding

It is the same system (perhaps stretching a bit) that is used in regular bank deposits:

Assets	Liabilities
$1000 in loans, bonds and cash	$900 in bank deposits $100 capital

It is also the same basic mechanism at work in a mutual fund, with the new complication of a "Net Asset Value" that describes the value of the fund assets in terms of currency, such as dollars.

Assets	Liabilities
$1000 in an SP500 basket of equities	100 shares outstanding at an NAV of $10

When the value of the assets changes, the NAV changes, thus preserving the balance of assets and liabilities.

Assets	Liabilities
$1500 in an SP500 basket of equities	100 shares outstanding at an NAV of $15

Just like all the above examples, mutual funds also provide unlimited two-way liquidity on a daily basis; or, they "make a market" in their fund shares. In other words, you can either invest or withdraw an unlimited amount, on a daily basis. In practice, a mutual fund might choke on a very large investment or withdrawal, but this almost never happens. Let's withdraw 50 shares from the mutual fund. The fund sells $750 of assets and pays out $750.

Assets	Liabilities
$750 in an SP500 basket of equities	50 shares outstanding at an NAV of $15

Now, let's invest $750 in the fund. The fund receives $750 and buys $750 of assets.

Assets	Liabilities
$1500 in an SP500 basket of equities	100 shares outstanding at an NAV of $15

It's basically the same process. Mutual funds do not trade in a secondary market, but if they did, their market value would not vary much from the NAV, as long as the fund issuer was willing to make a market at the NAV. ETFs do trade in a secondary market, and work in much the same way, although there are some important differences which will be discussed later. We can see that the values of ETFs do not float compared to their NAV. This is because both are willing to buy and sell in unlimited size at the parity price, i.e., the NAV.

"Underreserved" and "overreserved" conditions

Now let's look at a variety of situations where the reserve assets are not matched to the liabilities. Here is our appledollar:

Assets	Liabilities
1000 apples	1000 A$

Now someone comes and steals 200 apples.

Assets	Liabilities
800 apples	1000 A$

What happens next? A number of things may occur. The first thing we should notice is that the market value of the A$ is not necessarily 0.80 apples, which might be implied by the decline in asset values. If the issuer continues to make a market in apples:A$, in unlimited size at the 1:1 parity, then the market value of the A$ will still be 1.00 apples. This is not because of "market confidence" or "faith." It is because the issuer is still making a market (buying and selling in unlimited size) at 1:1. (However, the fact that A$ holders don't take advantage of this, despite the underreserved condition, can be attributed to "confidence" or "faith," or, perhaps "indifference.") Let's say that some people get nervous about the underreserved condition, and sell A$300 back to the issuer for apples.

Assets	Liabilities
500 apples	700 A$

But, other people are unconcerned. They are using the A$ to buy coffee and groceries, and don't particularly care about the condition of the balance sheet. In this case, the issuer does not have a problem. In practice, central banks have occasionally had underreserved conditions for an extended period. The Bank of France was apparently slightly underreserved between 1871 and 1914, possibly arising from an episode where it printed banknotes to help fund the Franco-Prussian War in 1871. Nevertheless, the franc banknotes continued at their unchanged gold parity.

Eventually, the A$ becomes popular, and actually expands its issuance even despite the underreserved condition.

Assets	Liabilities
1500 apples	1700 A$

This actually causes the underreserved condition to moderate.

On the other hand, the fact that the bank is underreserved might make a lot of people nervous. They want to get out before the bank is unable to meet its obligation to trade apples for A$ at a 1:1 parity, due to its lack of apples in reserve.

Assets	Liabilities
200 apples	400 A$

Eventually, the issuer runs out of apples.

Assets	Liabilities
none	200 A$

At this point, the issuer is no longer able to trade A$ for apples in unlimited size at the parity of 1:1, and thus, the value of the A$ floats. Presumably, it drops a lot. But, it is worth noting that this situation is not reached until the issuer stops buying at the 1:1 parity; and this did not take place until the supply of A$ outstanding dropped by a very large 80%.

Note that we will see the unpopularity of the A$ in the statistics for quantity (A$ outstanding), not in the statistics for price. The selling by private holders results in a shrinkage of A$ outstanding, not a change in the price of the A$ at 1.00 apples. This is different than a freely-floating asset where selling will produce a difference in price, but no change in quantity.

This is no different than, for example, a money-market fund or mutual fund that has big outflows, but its NAV is unchanged (or continues to reflect the market value of its assets).

There are other options. The issuer, recognizing the theft of apples, could "devalue" the A$ to 0.80 apples. In other words, the issuer makes a market (buys and sells in unlimited size) at 0.80 apples rather than 1.00 apples.

Assets	Liabilities
800 apples	1000 A$ at A$1:0.80 apples

This resolves the asset/liability mismatch. The issuer now has reserve coverage for all 1000 A$ outstanding, at a new parity price of 0.80 apples. This is actually no different than the mutual fund, which also has a "parity price" (makes a market) at the NAV, or asset value per share. In this case, the "NAV" declined due to theft, not a decline in the market value of the SP500. But, it amounts to the same thing.

Another option would be to widen the trading band, perhaps to 1.00/0.80 apples. In other words, instead of buying and selling at A$1:1.00 apples, the issuer buys A$/sells apples at 0.80 apples, and sells A$/buys apples at 1.00 apples. Here, the issuer maybe hopes and prays that the market value of the A$ will remain around 1.00. But, they are not obligated to buy A$/sell apples except at 0.80, so they have 100% reserve coverage at that price. In practice, the market value of the A$ is no longer fixed at 1.00, but floats between 0.80 and 1.00.

Both of these outcomes probably wouldn't make the issuer or the A$ very popular.

Now let's take an overreserved situation. This is actually the normal operating condition of central banks.

Assets	Liabilities
1200 apples	1000 A$

There are now 1200 apples "in reserve," against 1000 of A$ outstanding. The issuer could pay out 1000 apples against 1000 A$, and still have 200 apples left over.

Assets	Liabilities
200 apples	none

To make the balance sheet balance, this excess of assets over liabilities is normally recorded as "shareholders' equity" or "capital."

Assets	Liabilities
1200 apples	1000 A$ banknotes outstanding 200 A$ capital Total: 1200 A$

Sometimes there are losses on the assets, not necessarily due to theft. For example, assets consisting of bank loans might have some defaults. This "capital" thus serves as a "loss reserve," which can maintain 100%+ reserve coverage of liabilities even when there are some "losses" on the assets. Let's say 50 apples go rotten, leading to a loss of 50 apples of assets.

Assets	Liabilities
1150 apples	1000 A$ banknotes outstanding 150 A$ capital Total: 1150 A$

Today, central banks generally hold very little capital. This is, in part, because they don't really have any concrete "liabilities," or obligations to perform for anyone at any time. Their currencies float. The Federal Reserve recently had $45 billion of "other liabilities and capital" against assets of $3,897 billion.

At other times, central banks have had quite a lot of capital. In 1745 (a random year) the Bank of England had £10,146,071 of capital against £16,705,084 of assets.

Assets		Liabilities	
Government debt	10,700,000	Notes in circulation	3,343,182
Government securities	4,816,021	Deposits	3,093,657
Other securities	381,105	Capital	10,146,071
Coin and bullion	807,958		
Total	16,705,084	Total	16,705,084

Here too, the market price of A$ does not somehow reflect the overreserved condition by, for example, trading at 1.20 apples. The holder of the A$ has no claim upon those excess assets, which effectively belong to the equity shareholders. The market price of the A$ remains 1.00 apples, because the issuer continues to make a market at 1.00 apples. Even if some misguided "speculator" imagined, incorrectly, that he was entitled to 1.20 apples by holding a banknote, and thus was enthusiastic about buying a banknote for 1.00 apples, the issuer would simply sell him a banknote for 1.00 apples and quietly wait until the "speculator" came to his senses.

From "fixed" to "floating"

When the issuer stops making a market (buying and selling in unlimited size) at the parity, the unit beings to float. Let's take the example of those instruments that are not normally traded among third parties on a secondary market, such as: money market funds, mutual funds, hedge funds or private equity funds. It might seem improbable that they could "float," since they do not normally trade among third parties at all. But we often find that, as soon as the issuers stop making a market, their values indeed "float" and a secondary market emerges. For example, when a hedge fund is "gated" and refuses to accept redemptions, sometimes investors looking to exit the fund will sell their holdings to third parties at a discount to NAV. In a crisis situation (as was the case in 2008-2009), holders of illiquid instruments like private equity investments, facing a sudden need to liquidate, sometimes look for third parties to which they can sell their holdings in a hurry. Other funds with unusually good performance are closed to new investors. Third party investors are willing to pay a premium to NAV for access to the fund; this could take the form of "feeder" funds that charge additional fees for access.

Closed-end funds illustrate what happens when the issuer no longer makes a market directly in the shares in the fund. Instead of an open-end fund that has a fixed value (compared to the NAV) and variable quantity, a closed-end fund has fixed quantity and variable value (compared to the NAV). This structure has been becoming increasingly uncommon. It has been used where the securities held by the fund tend to be illiquid, such as emerging market equity funds or municipal bond funds, and thus buying and selling assets daily (as for an open-end fund) would be problematic. Also, regulations allow for greater use of leverage than is the case for open-ended funds. The fund's shares trade on the secondary market, and rarely trade exactly at the NAV. Discounts of 30% and premiums of 50% are possible. This illustrates that the fund's market value, on the secondary market, is not determined by the NAV of the fund. It is a matter of supply and demand in the secondary market. In practice, however, the market values of closed-end funds do trade closer to the NAV than one might expect. There are several reasons for this. A closed-end fund can buy and sell its own shares in the market, in addition to also being able to do tender offers and secondary offerings of its shares in larger scale. Thus, a fund whose shares are trading at a discount can buy those shares, supporting their price. This is accretive to NAV. A fund whose shares are trading at a premium can sell those shares, depressing their price. This is also accretive to NAV. Thus, it is in shareholders' interest for the fund to make a market in the shares of the fund, in a somewhat intermittent fashion. Also, shareholders in a closed-end fund have rights similar to shareholders in a regular operating corporation. They can attend shareholders' meetings, and vote for directors of the fund, who can in turn choose the managers of the fund. The directors of the fund, who must act in shareholders' interests, can take many actions such as converting to an open-end fund, or liquidating the assets and distributing them to shareholders. These provisions will tend to cause the market value of the closed-end fund to track the NAV more closely than might otherwise be the case.

"Debt-like" and "equity-like" balance sheet structures

Here I might point out the difference between balance sheets where obligations are "structured like debt" and those that are "structured like equity." The difference is in the nature of the "liabilities." In actual practice, there often isn't any real legal liability. A banknote or crypto "coin" is often just a generic token. There is no associated legal contract, as in an LP agreement, bank deposit agreement, or the prospectus for a mutual fund for example, that says that the issuer is legally obligated to perform for anyone. Nevertheless, there is a policy of making a market at 1:1, and if this expectation is violated, many disappointments ensue. Thus, in practice, the issuer has an "obligation" to continue to make a market at 1:1, even if there is no actual legal recourse for banknote holders if the issuer fails to do so. This is something like a "debt." This debt-like obligation creates the potential need for "capital" or a "loss reserve," which can make up for losses or variance in the reserve portfolio. This is the normal structure of commercial banks, which have "capital requirements" of about 10% of assets, to provide a cushion against potential losses on the asset portfolio.

You can also have a portfolio structured like "equity," in which there is no fixed obligation, but instead, a condition of shared ownership of the assets. In this case, there is no need for a "loss reserve" since the losses are shared equally among the shareholders. There is no "shareholders' equity." (Technically, it is all shareholders' equity.) This is the structure of mutual funds, for example. However, in this case, the value of the shares are not fixed, but "trade at the NAV" (that is, the issuer makes a market at the NAV; it is not traded freely in the market), and the NAV reflects those gains and losses. (In the banking world, this is the Credit Union model).

There has been some difficulty in instruments which attempt to combine aspects of both models. Primarily, this has meant money-market funds, which look a lot like bank deposits (a form of debt), but are actually equity (an Investment Fund corporate structure, the same as an equity mutual fund). For example, it may be the policy of a money-market fund to pay out $1.00 for each share, just like a bank. However, if there is a loss on the assets, then the NAV per share may be $0.95, but the fund may still be paying out $1.00 per share. There is no "shareholders' equity" or "loss reserve" to make up this loss, as there is in a bank. This can produce a "bank run" as fund investors are anxious to cash out their shares, with an NAV of $0.95, for $1.00 each before the fund is gated. And why not, since they can easily reinvest the money in another money-market fund without these problems, with a few clicks on their Ameritrade account? This happened in the 2008-2009 financial crisis, as some money-market funds' asset value fell below an NAV of $1.00. The most notable situation was the Reserve Fund, which was gated and entered a sort of limbo afterwards. The outcome of this was actions by the regulators to allow money market funds to pay out at their NAV instead of $1.00.

Arbitrage

Banknotes, etc. which trade among third parties (i.e., neither party in the exchange is the issuer), could naturally trade between those third parties at whatever price or ratio they agree upon. Thus, they could vary, in a secondary market (which just means that people had a transaction) from their "parity" price. For example, someone could buy an apple and pay A$1.20 for it, instead of A$1.00. (We will assume that all apples are the same.)

Normally, this is not a very sensible thing to do, because why would you pay A$1.20 for an apple, when you can buy one from the issuer for A$1.00? Normally, buyers like the lowest price. If you really wanted to get rid of your A$, you could dump it and get only 0.80 of an apple for A$1. But this also doesn't make sense, since why would you dump it and get only 0.80 of an apple, when you could take it to the issuer and get 1.00 apples? Sellers want the highest price.

This creates the opportunity for arbitrage. Arbitrageurs make themselves available to serve as third-party counterparties to transactions. They are willing to buy an apple at A$0.98, because they know they can sell it back to the issuer for A$1.00; and they are willing to sell an apple for A$1.02, because they know they can buy one from the issuer for A$1.00; and they make A$0.02 for their trouble. Often, they will simply buy at A$0.98 and sell at A$1.02, pocket the A$0.04, and never transact with the issuer. Competition between arbitrageurs will tend to limit the spread to the parity at which they are willing to transact. In a well-developed secondary market, arbitrageurs will tend to keep the market price near the parity price, for as long as they know they can transact with the issuer at the parity price.

ETFs work on the principle of arbitrage. The ETF issuer does not normally transact with the general public. It only transacts with large broker-dealers known as "authorized participants," who act as large-scale arbitrageurs. When the market price for the ETF is above the NAV, the dealers sell more shares into the market; when the price is below, the dealers buy shares from the market. The dealers transact with the issuer in large-scale "creation units" of tens of thousands of ETF shares. Unlike a mutual fund, which transacts in cash, the authorized participants actually transact in in-kind baskets of the underlying securities. Thus, the dealer will transfer a basket of SP500 shares to the issuer, and the issuer will transfer ETF shares to the dealer. This eliminates the need for the issuer to buy or sell its assets in the market, or maintain a cash reserve against withdrawals. Today, there are over 1800 ETFs.

It's worth noting that there is no arbitrage in closed-end funds, except on the larger and longer-term scale. For example, a large entity could buy up the shares of a closed-end fund at a discount, acquire influence upon the board of directors, and have the board decide to distribute the fund's assets to shareholders, or do a tender offer at the NAV.

Often, transacting with the issuer has certain costs or frictions. For example, it may be necessary to open an account with the issuer, reveal personal information, or the issuer is only active in one exchange. There may be regulatory hurdles, such as money-laundering regulations, taxes and fees, or transactions with foreign entities that are problematic. This produces a desire to transact in a secondary market with a dealer, rather than directly with the issuer. A specialist dealer may have already established all the necessary accounts and relationships to simplify this process, and can operate in large sizes, which reduces costs.

Characteristics of the family of "stablethings"

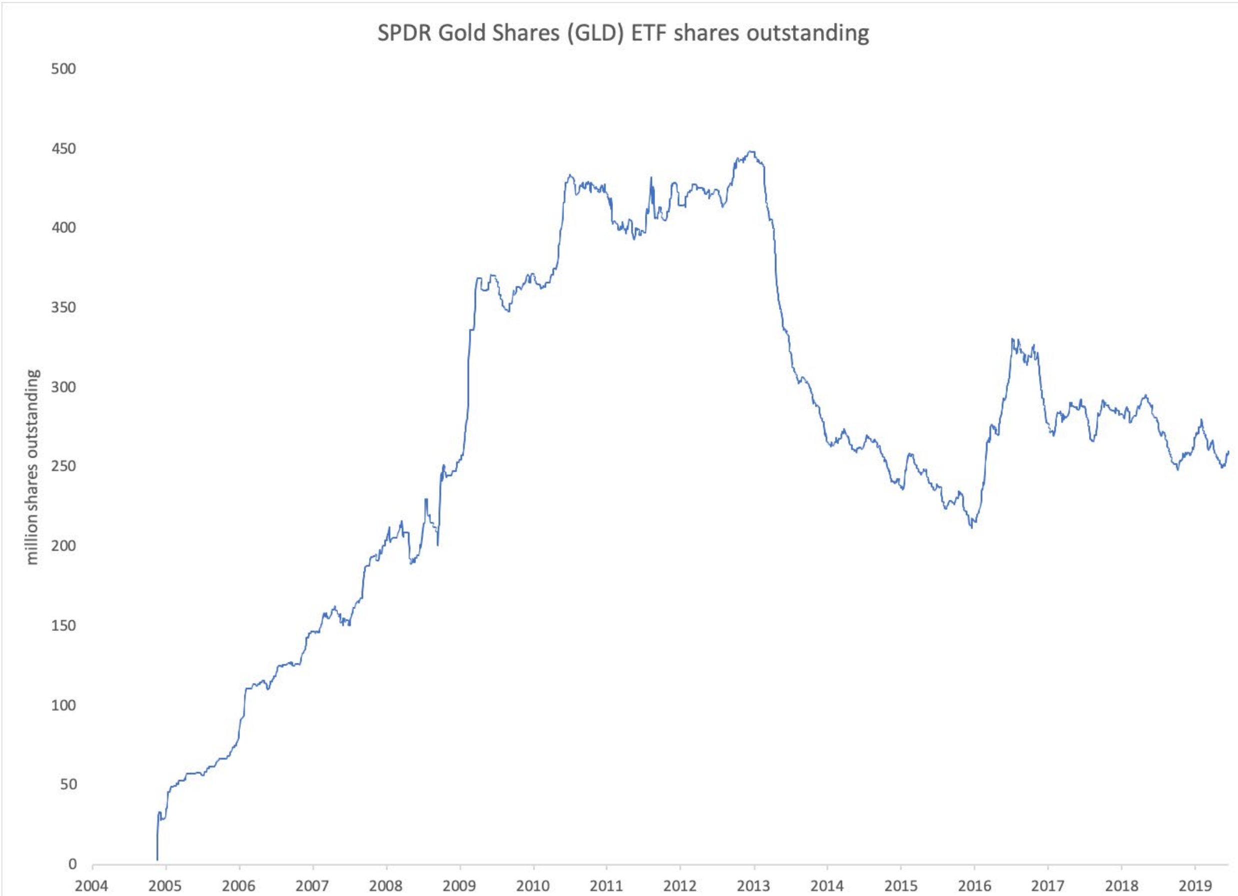
Let's reiterate some of the characteristics of all these instruments, which share the goal of maintaining a market value equivalent to some parity (whether it be gold, the euro, or the NAV of a portfolio of equities); which share very similar means of achieving this goal; and which, in centuries of experience with these instruments, have demonstrated that they indeed do achieve this goal.

"stablethings"	"floatingthings"
Fixed value: The issuer buys and sells at the parity price. This keeps the price tightly linked to the parity.	**Floating value:** The issuer is inactive in the market. The market price is determined by unrelated parties in the secondary market.
Variable supply: The supply of the item varies as the direct outcome of the policy of buying and selling ("investments and withdrawals") at the parity price. In more complicated situations, there are a variety of other options, but the resulting supply is the same as if this simple model was followed.	**Fixed supply:** Because the issuer is inactive in the market, supply doesn't change. In practice, supply often does vary, but in a way that is unrelated to the market price of the item, and does not arise as the consequences of buying and selling at a parity price.
Assets and liabilities in balance: The outcome of making a market is to keep assets and liabilities in balance.	**No real obligations:** Because there is no policy of keeping the market value at the parity price, there are no real obligations ("liabilities") to perform. Central banks are not responsible for the vagaries of floating fiat currencies, for example, except in an indirect sense.
Popularity is expressed in changes in supply: The popularity of the item (the "demand") is shown by the market's willingness to buy it or sell it at the parity price, thus increasing or decreasing its supply. The market cap ("AUM") arises from the (variable supply of units) X (unit price at fixed parity).	**Popularity is expressed in changes in price:** Popular items rise in price; unpopular items decline in price. The market cap arises from the (fixed supply of units) X (variable unit price).

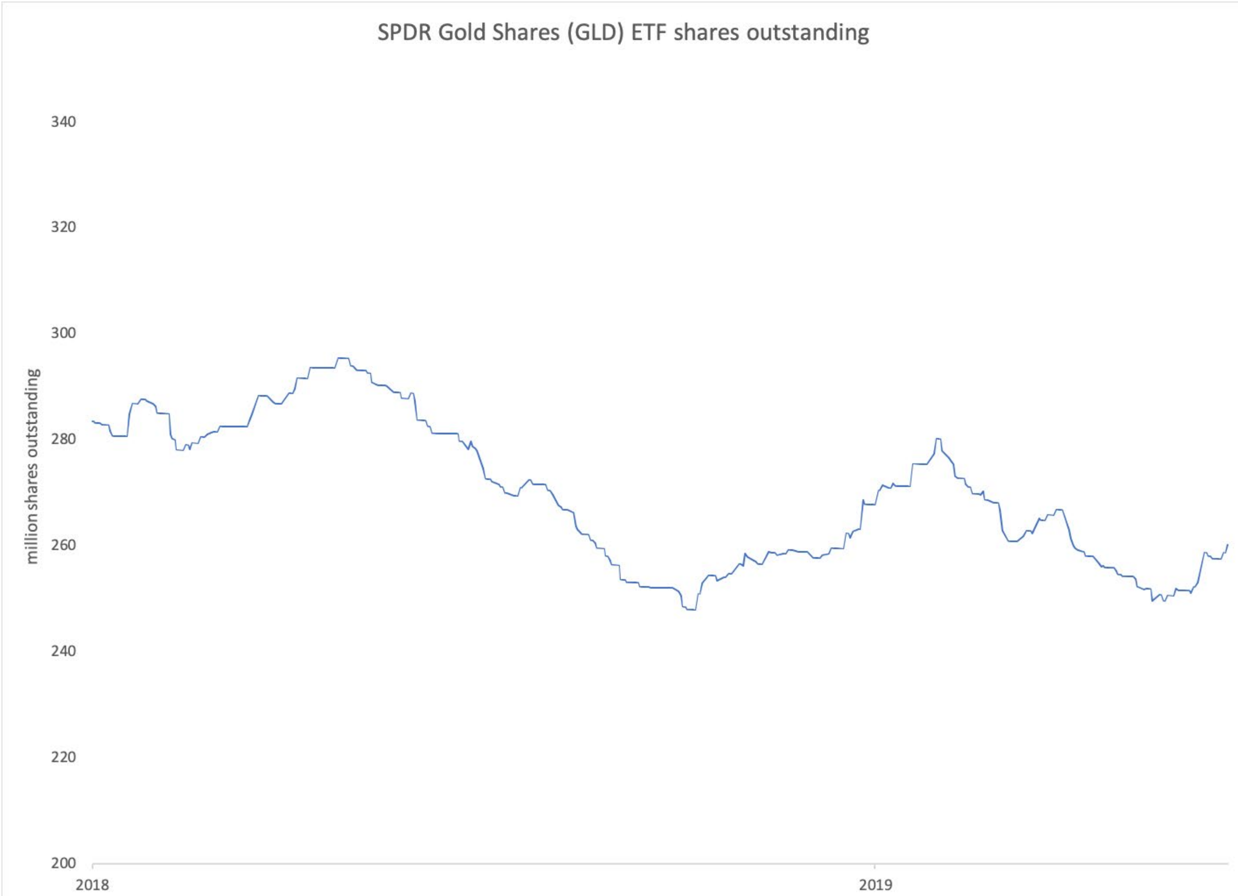
In practice, there can be quite a lot of variance in the supply of "floatingthings," especially fiat currencies. For example, the supply of "dollars" (USD base money) today varies daily. However, this variation in supply is unrelated to the operation of any fixed parity mechanism, but arises from other policies and goals. Corporations can increase or decrease their shares outstanding. Oil producers can increase or decrease production.

Let's see what it looks like in real-world examples.

Here we will take the example of the SPDR Gold Shares (GLD), a popular ETF with a recent market cap of about $33 billion. It tracks the market price of gold, and has done so quite effectively since its inception, with market deviation from its NAV generally less than 0.5%. Here is its history of shares outstanding:



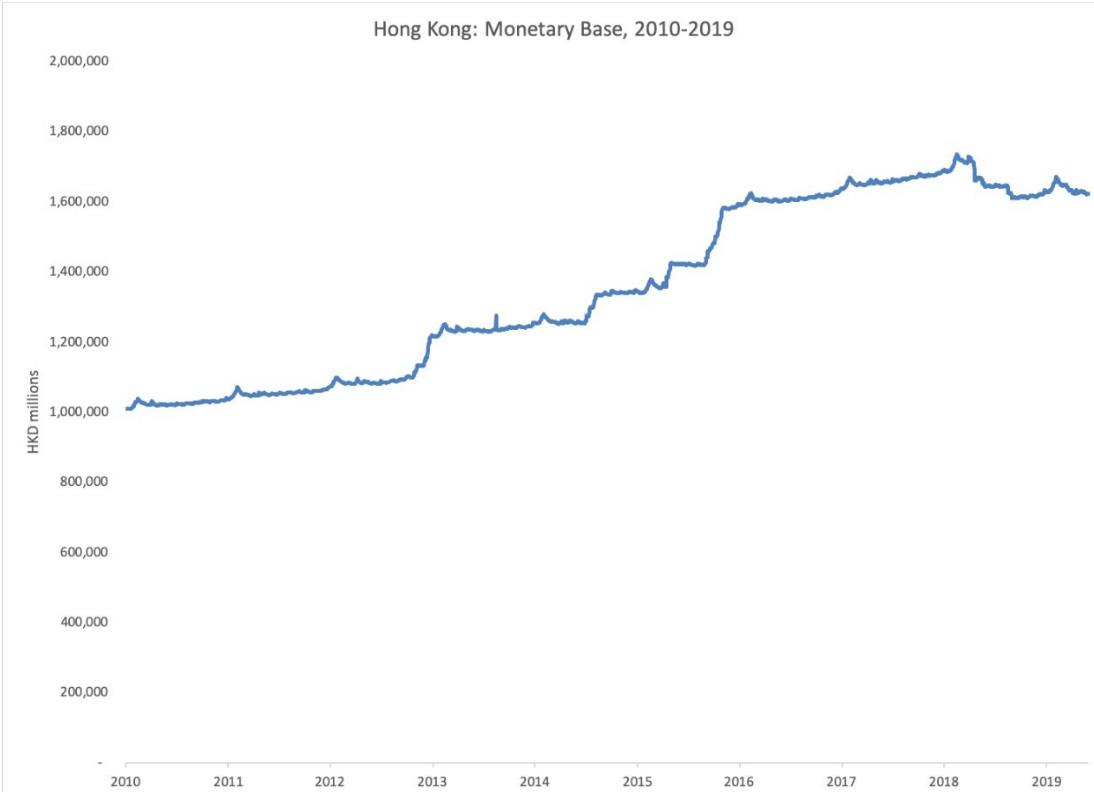
This outcome arises from the practice of buying or selling shares at the NAV (or actually taking delivery in kind), like any other ETF. We see that there was a very large decline in shares outstanding in 2013-2015, but there was no change in the value of the ETF vs. its parity. Here is how it has looked since the beginning of 2018:



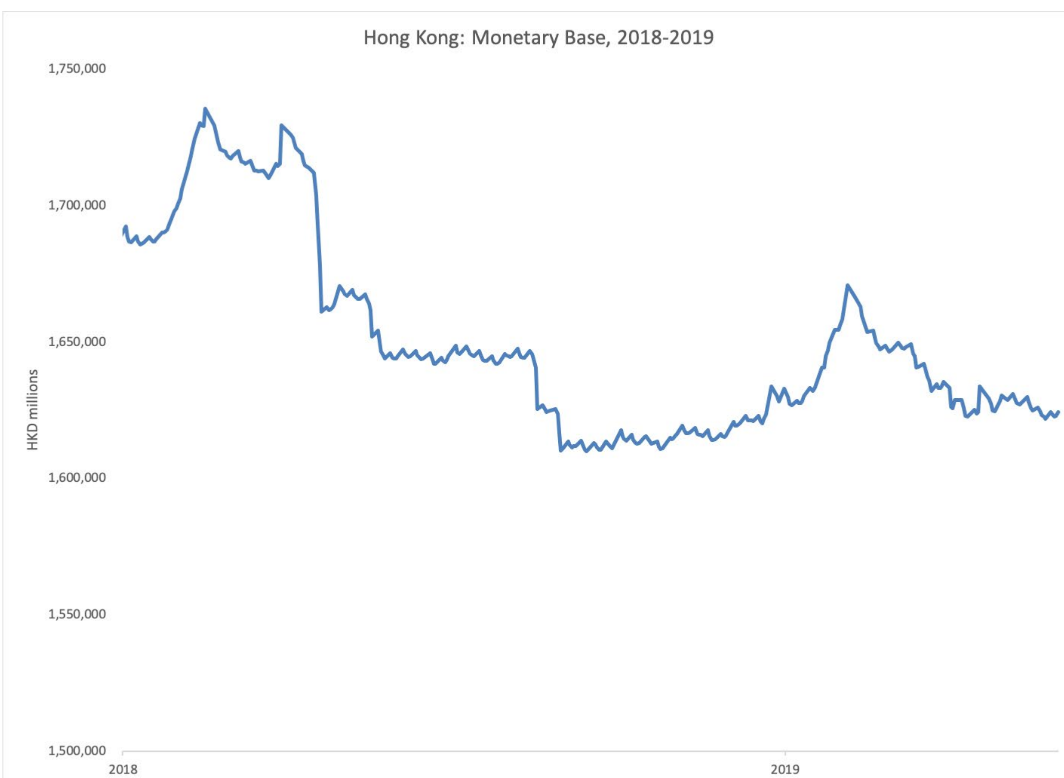
Here we see that, indeed, the shares outstanding has varied on a daily basis. It is worth noting that, like any ETF, this represents large block transactions with "authorized participants," (in the case of GLD, it is in blocks of 100,000 shares) not small-scale transactions with the public in general, as for a mutual fund for example. These "authorized participants" then transact in the secondary market (stock market) with the general public, acting in the function of dealers/arbitrageurs.

If GLD were transferrable generally, and could be traded in fractional amounts instead of unit shares, like a cryptocurrency "stablecoin," it would very closely approach a "gold standard currency." Like any ETF, it has been extremely reliable, and has not had any problems with "speculators."

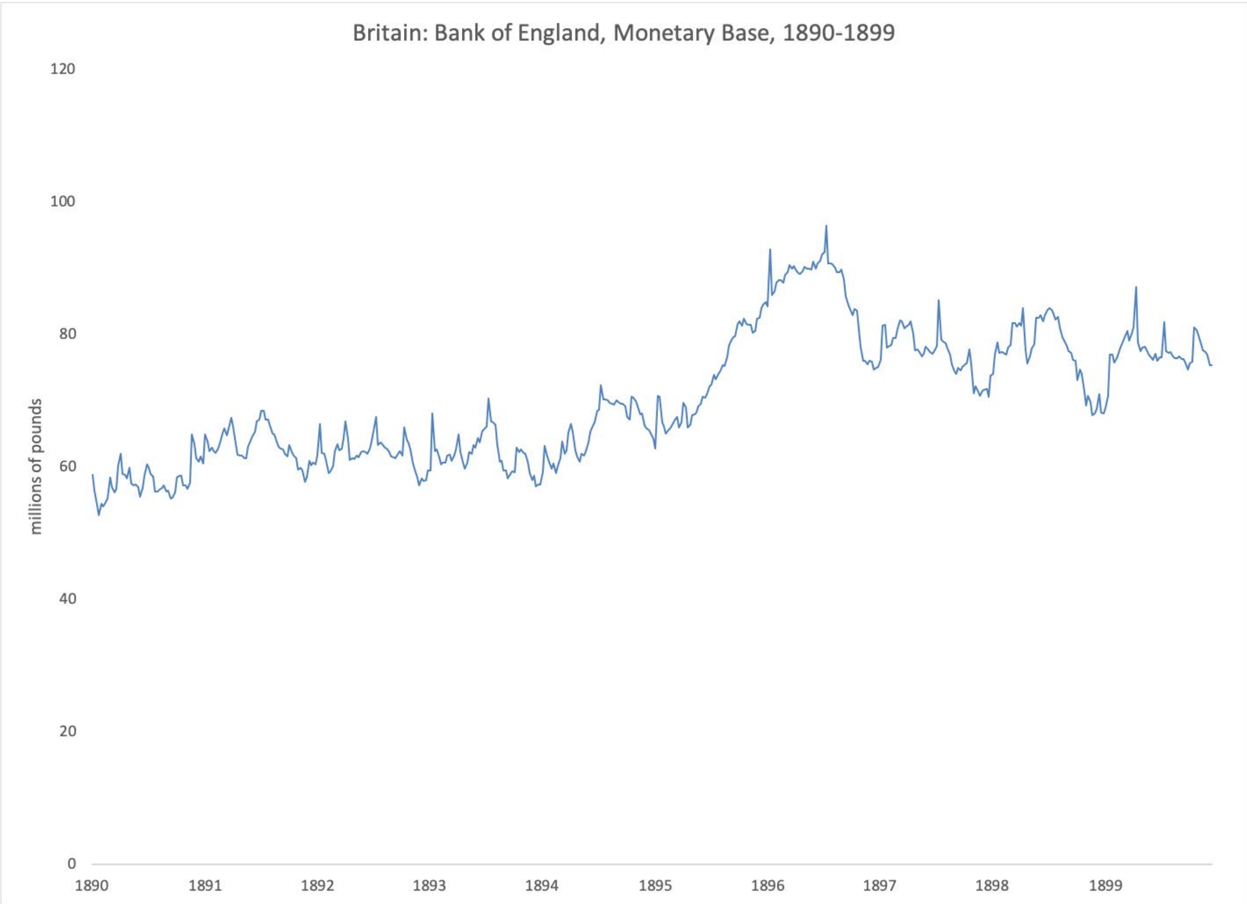
Now let's look at an example from the currency world, the Hong Kong currency board with the USD.



This shows the amount of HKD outstanding, the result of the process of trading USD1:HKD7.8 through the currency board system.



Here we can see that the HKD monetary base does indeed vary daily due to this process. In practice, a chart of the monetary base of a floating fiat currency might not look much different, since it too varies due to various central bank policies and procedures. But, in this case we know that Hong Kong has a currency board policy, so we know that the monetary base is the outcome of that policy. The currency board has been extremely reliable since its introduction in 1983. Between 1974 and 1983, the HKD floated.



This is a chart of the monetary base (currency in circulation and deposits) for the Bank of England during the 1890s. During this time, the British pound was reliably linked to gold at the famous £3 17s 10d parity. Here too we see quite a lot of variability, related to the process of maintaining the gold link. This was a time of some turmoil, including the Barings crisis of 1890, and crises in the U.S. in 1893 and 1896, related to threats to devalue the dollar by about 50% via "free coinage of silver," which, particularly in 1896, resulted in flows toward Britain as a safe haven. The British pound, of course, weathered these incidents intact. Obviously, the money supply under a gold standard system does not follow some smooth curve related to mining production, or other such idiot nonsense. It is basically the same mechanism as GLD and the HKD.

Common modes of failure

Now that we understand the common means by which a "stablething" maintains a fixed parity with something else, we can look at some examples of how deviation from this model can soon lead to failure of the system.

As previously mentioned, the act of trading a reserve asset 1:1 for the stablething-unit, for example an apple for an appledollar, has within it at least three interesting aspects. Let's give an appledollar back to the issuer, and get an apple in return:

1) It establishes a market price for the appledollar at 1.00 apples;
2) It reduces the supply of appledollars, thus supporting its value;
3) It keeps liabilities and assets in balance, ensuring that the issuer will be able to continue to make a market in A$ at the parity price.

Now, let's look at some ways in which these principles are violated. This almost never happens in the case of ETFs and other private-sector financial instruments, since that would be very, very bad for business. If you were to redeem your mutual fund shares for USD cash, but instead of reducing the number of mutual fund shares outstanding, the mutual fund manager took the shares in the mutual fund and traded it for a Corvette, thus rendering the supply of mutual fund shares unchanged despite the cash outflow, investors in the fund probably wouldn't like that. But, unfortunately, this is very common in the case of central banks.

Let's begin:

Assets	Liabilities
1000 apples	1000 A$

People take A$100 to the issuer, in trade for apples. However, instead of reducing the supply of A$ outstanding, the issuer takes the A$100 received in trade, and buys a Winnebago. The Winnebago dealer now has the A$100, and the supply of A$ outstanding is unchanged.

Assets	Liabilities
900 apples 1 Winnebago	1000 A$

We can see that Condition #1 (trading A$ and apples at 1:1) was maintained. Also, the Assets and Liabilities are still in balance, which is Condition #3. But, Condition #2, that the supply of A$ changes in accordance to the transaction, in this case reducing the supply, was not met. (In central banking terminology, the transaction was "sterilized.") The market price for A$ is still 1.00 apples, because we just did a transaction at that price, but the real value of the A$ has begun to float because supply was not adjusted accordingly. The supply has become disconnected from the process of trading apples and A$. (There was an A$100 trade but no change in the supply.) There is now a "disequilibrium" between actual supply/demand conditions and the parity price. Actually, it is worse than that: because people soon learn that the issuer is acting like a knucklehead, the demand for the A$ declines, because who wants a "currency" managed by a knucklehead? So, not only is supply in excess, but demand is also falling. Since there is now an even bigger excess of supply of A$, people continue to go to the issuer again and again to get rid of their excess A$, and take apples in return. The same thing happens again:

Assets	Liabilities
800 apples 2 Winnebagos	1000 A$

At this point, seeing an all-too familiar spectacle unfold, a speculator sells short A$300, expecting that continued mismanagement of the system will result in failure. The issuer buys the A$300 at the 1:1 parity, but now starts to complain about "speculative selling." The transaction is again "sterilized" with the purchase of three more Winnebagos.

Assets	Liabilities
500 apples 5 Winnebagos	1000 A$

At this point, panic ensues, and, to prevent any further loss of its "apple reserves," the issuer halts all sales of apples at A$1.00. The A$ is now a floating currency, and its value crashes to 0.50 apples. The speculator covers his short at A$=0.50 apples, which is a nice profit. The issuer yells and screams about "speculators," and maybe adds something else about "fundamental disequilibriums" and "balance of payments imbalances" or other such fantasy nonsense that central bankers commonly spew in a continuous stream whenever there is a risk of looking bad in public. Because, as we all know, no central banker has ever actually made an error, from Genesis to the present day.

This leads to one of the basic principles of these things, which is that anyone who is complaining about "speculators" is, actually, screwing up. We've noted ETFs, with thousands of examples trading on a secondary market (the stock market) where they are exposed to every conceivable speculative pressure; and yet, they never fail, and nobody complains about speculators. Currency boards such as Hong Kong in the Asia Crisis of 1998 have some legitimate gripes about "speculators," but nevertheless, the system was successful.

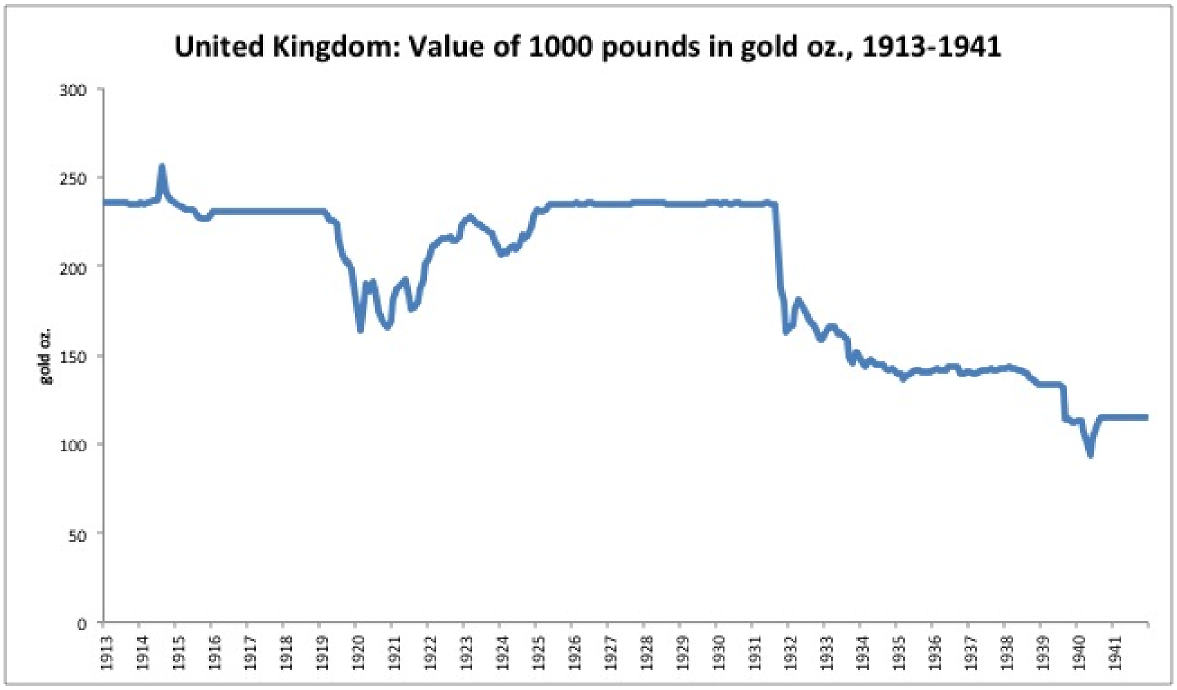
Now, if the issuer somehow realized its error, it might conclude that it would be worthwhile to sell the Winnebagos, thus reducing the supply of A$:

Assets	Liabilities
800 apples	800 A$

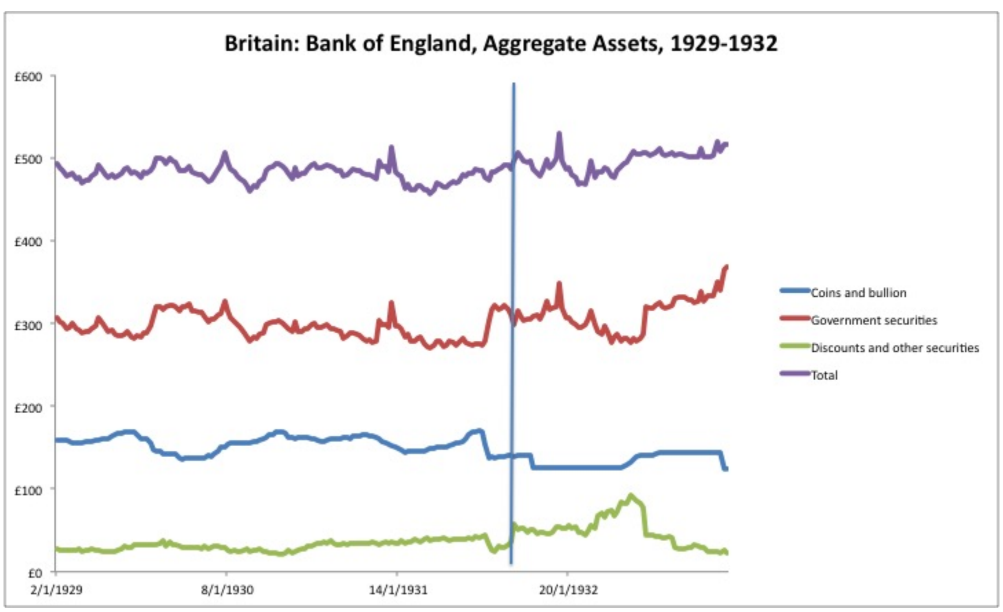
This accomplishes Condition #2 and Condition #3, but not Condition #1. It is an example of managing the value of A$, and also the supply of A$, without actually making a transaction in apples. However, without a transaction in apples, it might be difficult to maintain a very close parity at 1:1.

It is worthwhile to consider other such deviations from our basic model, on a theoretical basis. But, let's move to real-world examples. In the private sector, business is usually conducted with exemplary precision. One never hears of a mutual fund "blowing up" and unable to meet redemptions at the NAV. Money market funds have had some failures (discussed previously), but that is rare. Perhaps no ETF has ever failed. Commercial banks have had a higher failure rate, which has to do with their balance sheet structure (about 70% of assets typically consists of illiquid loans, which themselves can have considerable default losses. Perhaps it is no surprise that the biggest and worst blowups involve "the government" -- central banks.

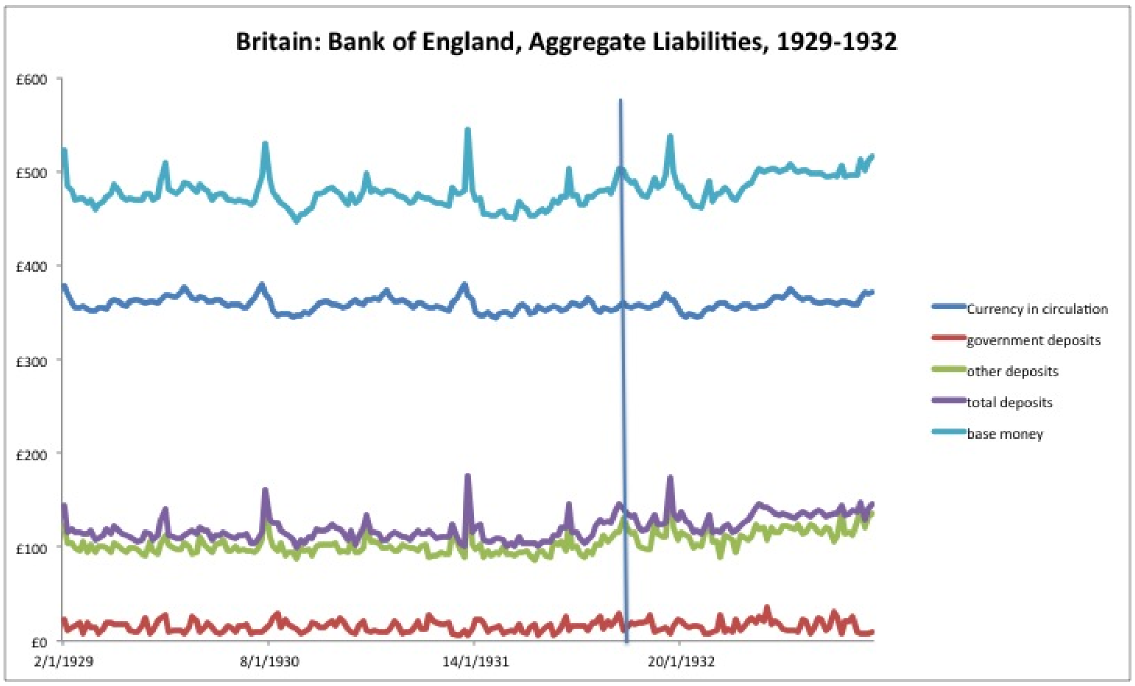
On September 21, 1931, in the middle of the Great Depression, the British pound was devalued.



The Bank of England naturally blamed "speculators" etc.



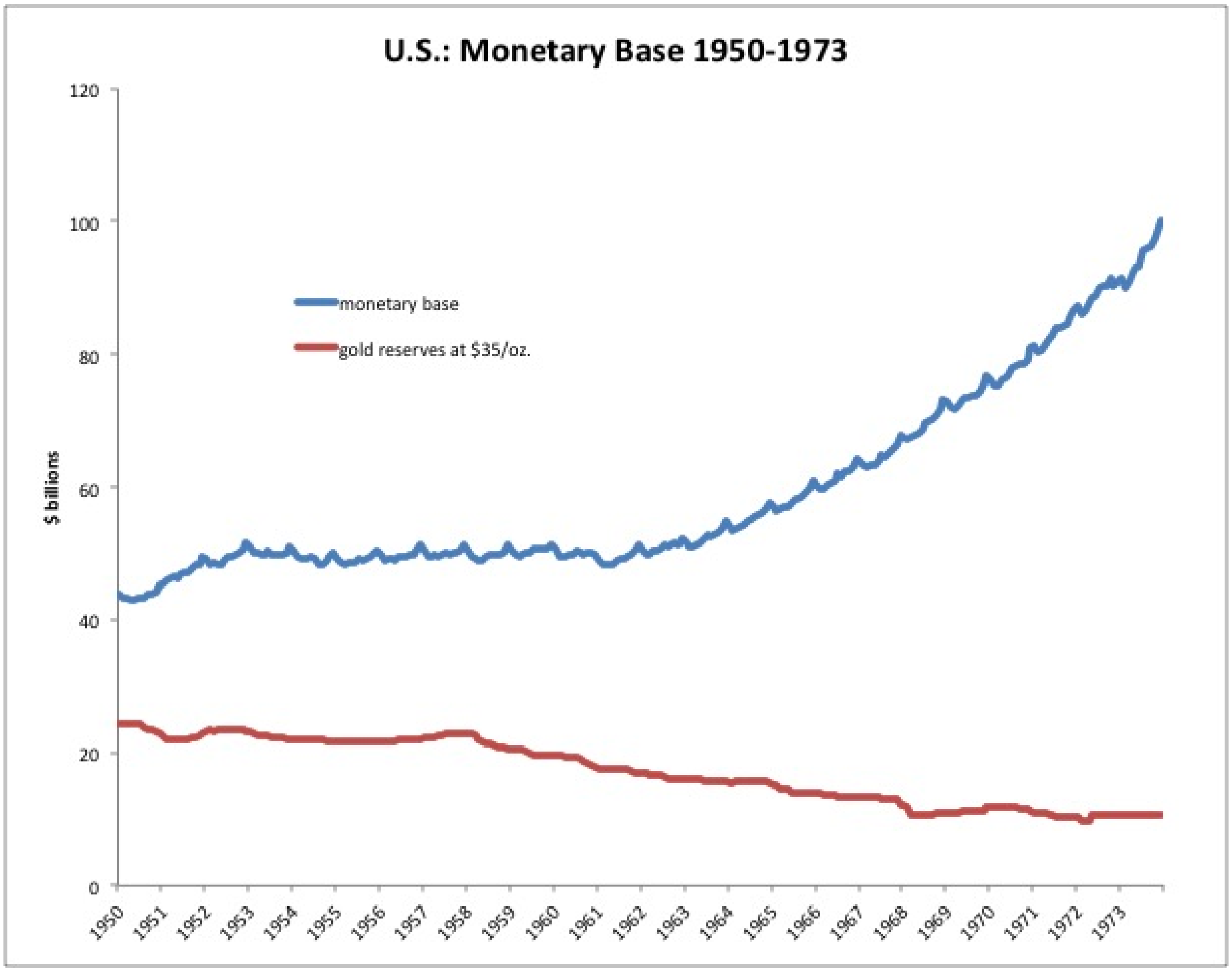
If we look at the balance sheet, we find that there were large gold outflows in the summer of the 1931, here amounting to about £50 million. Actually, they were larger than that, because the BoE borrowed at least an additional £50 million from the Federal Reserve and Bank of France, which doesn't show up in these statistics, producing gold outflows of at least £100 million (some have said as much as £200 million). Normally, according to our model and also the method the BoE itself used in the pre-1914 era, this would result in a reduction in the monetary base by the equivalent £100 million, or about 20% of the total. However, this was not done. The outflows were "sterilized" through the purchase of government bonds ("Winnebagos"). The monetary base was unchanged.



This outcome was not quite accidental. There were many in Britain (including John Maynard Keynes) who argued that a devaluation of the pound would help the economy, using various macroeconomic arguments. But, by having it arise "accidentally," the devaluers could avoid any political debate, and also all the blame from the negative consequences of the action, blaming it all on "speculators."

In 1971, the U.S. dollar was devalued against its gold parity at $35/oz., which it had maintained since 1934.

During this time, there were consistent outflows of gold from the Federal Reserve, as a result of the policy of buying and selling bullion at the $35/oz. parity. However, the USD base money supply had become divorced from this process. The gold transactions were "sterilized." It appears to me that there was a program of having the USD base money supply grow at a steady rate, according to the Monetarist principles that were popular at the time. There was, in Robert Mundell's terms, a "currency peg" (at $35/oz. of gold) but no coherent "adjustment mechanism" to maintain this parity.

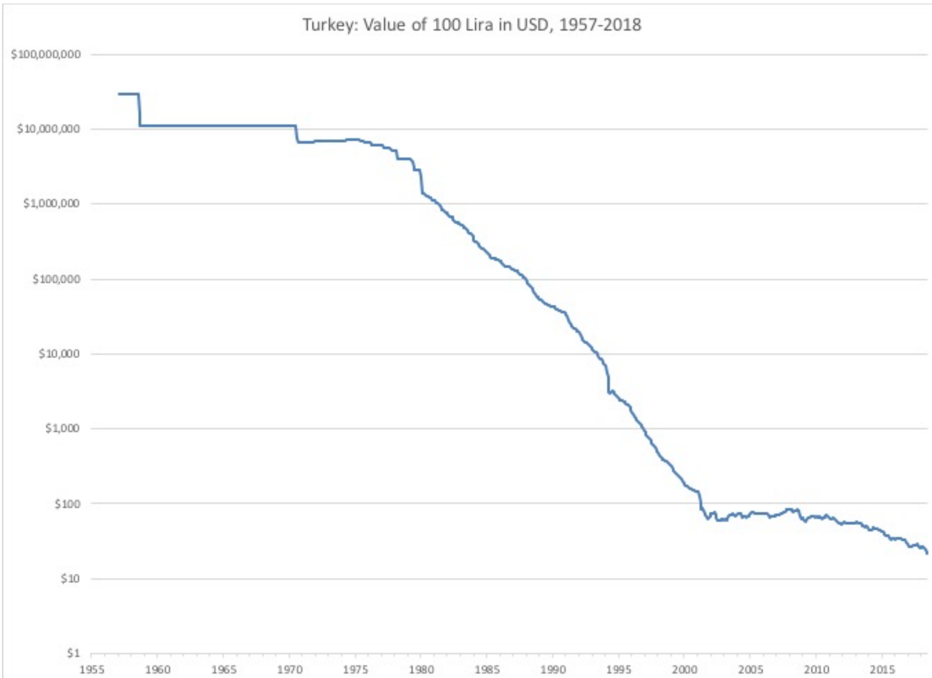


The outcome of this was the failure of the system, and the beginning of the floating fiat system which remains today. Of course "speculators" were blamed, along with "fundamental disequilibriums" and "structural problems" and "balance of payments imbalances" and whatever buzzwords that were helpful in baffling and confusing anyone who asked what the heck just happened. (The economists were, for the most part, just as confused as everyone else.)

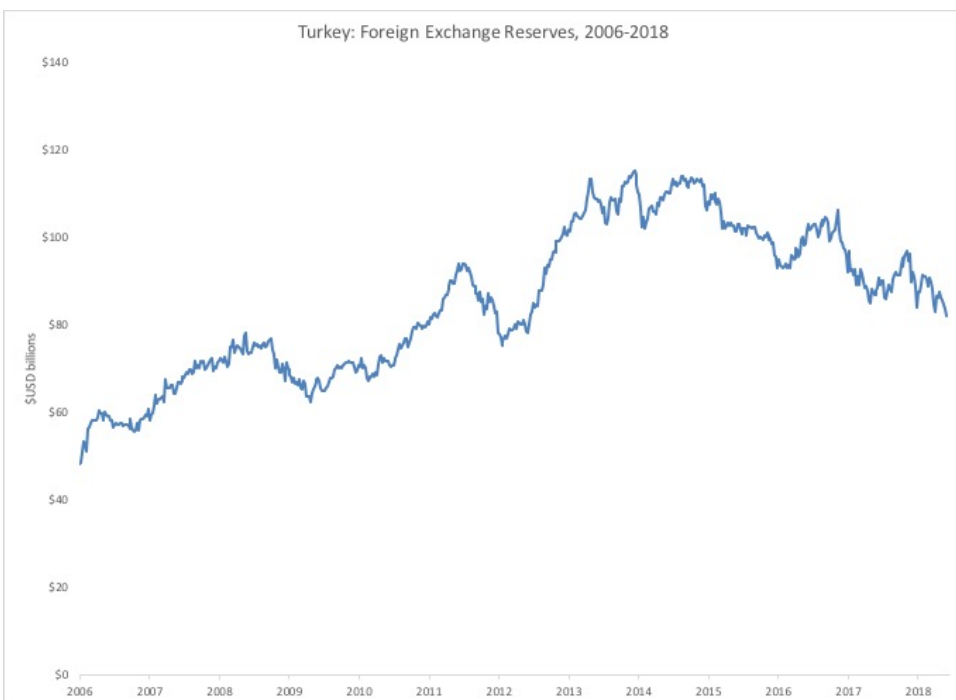
Of course, if governments, economists and central bankers are incapable of maintaining a currency link, to gold or to another currency, even if they want to -- as appears to be the case -- then we really have no alternative to floating fiat currencies. So, the ability to maintain a currency value at a specified parity, with high reliability, is actually a necessary condition to later desiring to do so.

A related condition arises commonly today, where a central bank, which may have a floating fiat currency but one that is falling in value more than the central bank would like, begins to "intervene" in the foreign exchange market by selling foreign exchange and buying the currency. This is comparable to "selling apples and taking A$ in trade." However, in our "appledollar" example, this transaction would result in a reduction of the A$ outstanding, in proportion to the trade. Instead, central banks today typically "sterilize" their foreign exchange transactions. The monetary base is independent of these actions. Just as in the U.S. in 1971, a common policy seems to be to have the monetary base grow at a steady rate according to Monetarist principles.

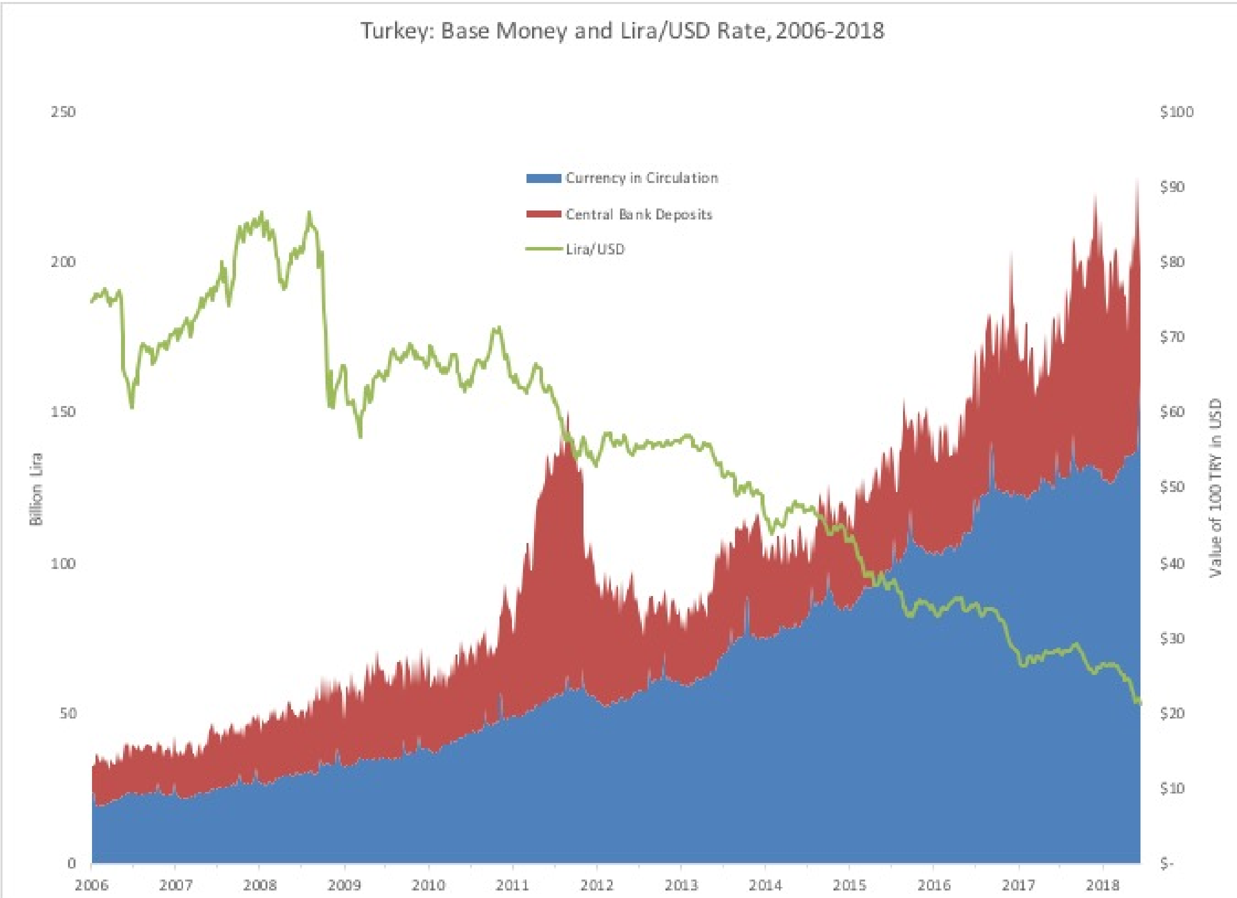
After a long period of hyperinflation, Turkey crudely stabilized the value of the TRY vs. the dollar, although this was not a hard fix, and the TRY still floated. However, the TRY's stability vs. the USD began to deteriorate again.



The central bank began to "intervene" to support the value of the TRY, resulting in a decline in foreign reserve assets.



However -- just as with Britain in 1931 and the U.S. in 1971 -- these "interventions" did not result in a change in the TRY base money supply, which continued to grow at a fast rate.



Need I mention that "speculators" were blamed? Unfortunately, the livelihoods of 82 million people living in Turkey actually depend on this.

Cryptoassets

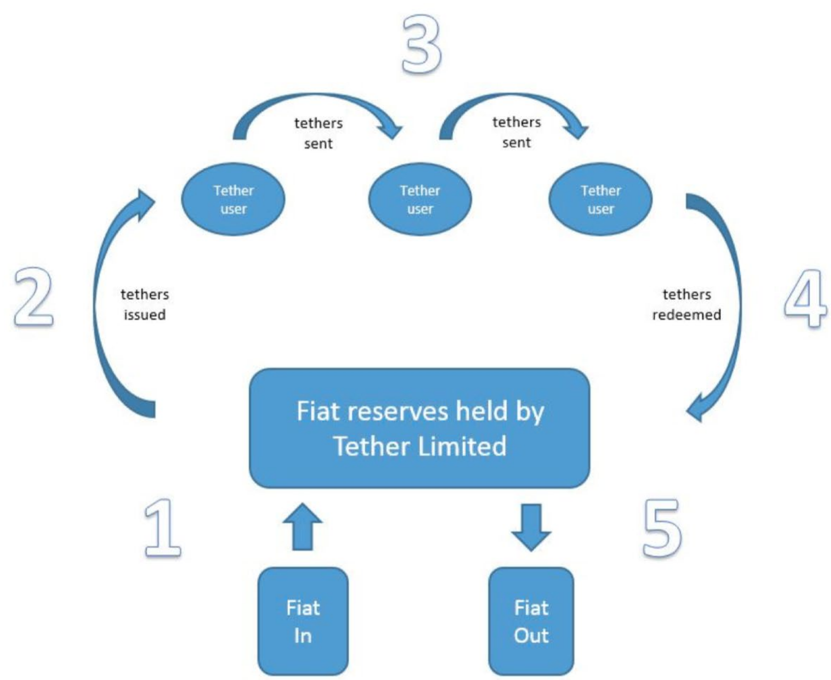
The development of blockchain technology has introduced a new way of transacting between parties. Given the high caliber of developers involved in this space, and the enthusiasm of investors, we will surely see dramatic development in this arena related to the financial instruments discussed here, and possibly new innovations, comparable to the explosive spread of independent paper currencies in the 1850s, the spread of mutual funds in the 1920s, or the spread of ETFs in the 2000s. Blockchain arises after centuries of similar systems based on paper tokens (banknotes, or paper share certificates), in addition to ledger systems, including the Automated Clearing House system used for monetary payments or the Depository Trust & Clearing Corporation (DTCC) system used for securities. Ledger systems are very old, and date back to the third millennium B.C. The "first modern central bank," the Bank of Amsterdam of the 17th century, was entirely a ledger system that had no banknotes. Although the computerized ACH system, which handles nearly all bank payment transactions, began on mainframe systems in the early 1970s, it could probably be run on a laptop today. The cost to banks for making payments on the ACH system today is a fixed $0.0032 per transaction.

Some of the new "stablecoin" offerings are dramatically innovative, but perhaps it is no surprise that the most successful, Tether, is characterized by its simplicity. Tether promises a simple 1:1 equivalency to the U.S. dollar. Its market cap was recently around 80% of all USD stablecoins, and it accounted for over 98% of all USD stablecoin volume, primarily due to its popularity as a trading pair with other cryptocurrencies on trading exchanges. Thus, it is not too much to say that, despite the profusion of offerings, it is the primary product that has yet emerged of significance; and this illustrates the still very primitive state of the cryptocurrency "stablecoin" space.

Here is how Tether describes its system, in the whitepaper available on its website.

Flow of Funds Process

There are five steps in the lifecycle of a tether, best understood via a diagram.



Step 1 - User deposits fiat currency into Tether Limited's bank account.

Step 2 - Tether Limited generates and credits the user's tether account. Tethers enter circulation. Amount of fiat currency deposited by user = amount of tethers issued to user (i.e. 10k USD deposited = 10k tetherUSD issued).

Step 3 - Users transact with tethers[8]. The user can transfer, exchange, and store tethers via a p2p open-source, pseudo-anonymous, Bitcoin-based platform.

Step 4 - The user deposits tethers with Tether Limited for redemption into fiat currency.

Step 5 - Tether Limited destroys the tethers and sends fiat currency to the user's bank account.

By now that certainly is familiar. It is identical to the "appledollar" model. Tether is basically a "money market fund on a coin."

We see that Tether has indeed been successful (with some slop) in maintaining the value of USDT vs. the USD -- evidence that they are doing something right -- and that Tether has indeed been involved in the market on something close to a daily basis, as shown by the changes in market cap

(=USDT outstanding at $1/coin). In other words, it appears that Tether has indeed followed the model that they presented in their whitepaper, at least tolerably enough to produce the expected outcome. This included a rather large drop in coins outstanding in late 2018. Tether purchased those coins and offered USD in return, as promised, resulting in no meaningful change in market value. (This was similar to the drawdown that GLD experienced in 2013-2015.)

This chart, of a few months in 2019, shows that Tether has indeed been active in the market on a daily basis (perhaps several times a day), as shown by the changes in market cap. The fluctuation of USDT vs. USD has moderated somewhat over time, perhaps evidence of increasing market maturity and the development of dealer/arbitrage participants.

There is not much need to go into more of the details of Tether, whose brief history has many exciting twists and turns (including, it appears, a period of significant underreserved status). In general, we should expect that, to the degree that they follow the basic model in their whitepaper, they will be successful; and to the degree that they vary from this model (whether from their own actions or external factors), problems will arise. So has it ever been, down through the centuries.

Postscript

In 2012, I testified before the U.S. Congress House Subcommittee on Domestic Monetary Policy and Technology, on the topic of "parallel currencies." (My written testimony is available at: newworldeconomics.com.) Naturally, I was in favor of USD alternatives based on gold, but why not have whatever you like? People can decide what they want to use without me telling them to. Around that time, I argued that one advantage of having a lot of people working on a lot of currencies, and the requirements of producing currency offerings that were attractive and successful in a competitive environment (as opposed to central bankers who have an effective monopoly), is that the principles of currency management would become widely understood. It would no longer be mysterious lore known only to a high priesthood of central bankers mumbling incomprehensible argle-bargle. In fact, people would discover (as I discovered while looking into these topics years earlier) that central bankers themselves seem to have little idea of how to do these things; and the consequences of that have been immense. I wrote three books to explain to people what I discovered; plus another, just released, on broader economic topics. Now that vision is coming to fruition. The kind of people with minds honed by the rigors of computer science, now found working on cryptocurrency "stablecoins" today, will have no difficulty with these relatively simple topics. In time it will dawn on them, as it dawned on me, the nature of the madness we live in today. I am looking forward to that.