8 | Algorithmic Stablecoins

COLLATERALIZED stablecoins provide a safe haven to offshore your assets when turbulent tides affect crypto markets. Even so, they are arguably either too centralized (off-chain collateral) or not scalable enough (on-chain collateral) to be a viable long-term option for truly decentralized finance. Algorithmic approaches attempt to get the best aspect of both worlds by establishing economic incentivization mechanisms that coordinate participants towards stability. Essentially they encode a monetary policy in a smart contract through which they hope to stabilize the token just like a central bank would - but more transparently. They are the holy grail of stablecoins as they could potentially combine the benefits of decentralization with a virtually infinite supply using economic theory.

Two influential papers in this space have been Ferdiando Ametrano's "*Hayek Money: The Cryptocurrency Price Stability Solution*" and Robert Sam's "*A Note on Cryptocurrency Stabilisation: Seigniorage Shares*", both published in 2014. In it, they propose schemes to build such algorithmic stablecoins on-chain. We will cover each in depth as they still underpin some of the largest stablecoins to date. But first, a quick refresher on the macro-economics of money.

8.1 MACRO-ECONOMICS OF MONEY

THE QUANTITY THEORY OF MONEY

The value of money is determined by the link between money and the prices of the things you can buy with nominal amounts of money. The demand for money comes from (a) a transactional need - you want to pay for things right now and (b) other motives such as short-term savings or your personal piggy bank. What balances are required to support just our transactional needs? Assume for the sake of simplicity that you receive a paycheck every Friday and that you spend that paycheck over the course of that week. On Friday morning companies hold the paychecks and on Friday evening the balances are transferred to the wage-earners. As the week passes, the money balances will gradually siphon back into the companies' accounts as consumption proceeds. In this way, money is reused over and over as it changes hands from producers to consumers and back.

The Quantity Theory of Money states that the total amount of required money to settle these transactions (the demand) can be stated as:

$$M_d(k, T, Pr) = k \times T \times Pr$$

Here, $M_d(k, T, Pr)$ is the quantity of money in circulation, T the number of transactions made and Pr the average monetary value of a transaction. What this equation is saying is that the amount of money in circulation *demanded* to support our needs is equal to the transactional need ($T \times Pr$) times a factor. The factor k accounts for the fact that we have other needs (such as storing money in our piggy bank). If, e.g., firms and households want to store balances of about 1 month's worth of purchases, k would be equal to $1/12$. For our purposes here, we will assume that it's a constant whose exact value is not important.

The amount of money supplied $M_s(k, T, Pr)$ is controlled by central banks but neither households nor firms have any control over it. A focal point of study in macroeconomists is the equilibrium point at which the market (society) settles M_d (through the number of transactions it makes and pricing dynamics) to a situation in which supply and demand balance out $M = M_d = M_s$.

THE VALUE OF MONEY

The value of money P, is the number of goods we can buy with a fixed nominal amount. It is inversely correlated to the quantity of money in circulation as we know from the QTM that money is simply a means of transaction with no other inherent value.

> **Example:** If the demand for pizzas is 100 per year, and there is a total quantity of \$1,000 of money in circulation for pizzas, the value of the currency would be $P = 100/1000 \frac{\text{pizza's}}{\$}$. If the central bank decides to increase the money supply to \$1,200 and no other real value is created in society, the value of the currency would decline to $P' = 100/1200 \frac{\text{pizza's}}{\$}$.

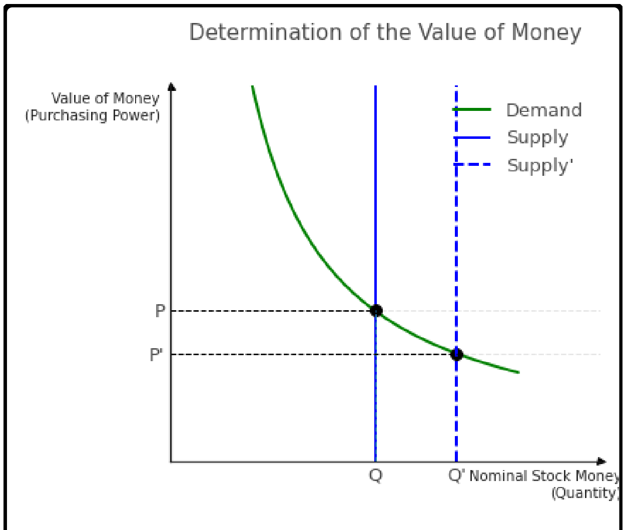

Figure 1: The value of money is correlated to the quantity of money in circulation as shown by the demand line.

Thus, we arrive at the correlation between the quantity of money and the value that money:

$$P \sim 1/Q$$

where P is expressed as the value of goods you can purchase per monetary unit. We typically measure the value of money as the global purchasing power of the money using a basket of goods or an index thereof like the CPI (Consumer Price Index). The actual value of Q is determined by market forces in QTM as is more easily seen through the lens of supply and demand curves:

The x-axis shows the (nominal) *quantity* of money which is simply all the money that is currently in liquid circulation (remember our discussion on M1 and M2). The y-axis shows the value (*purchasing power*) of the currency. Our equilibrium point equation ($Q = M = k \times T \times Pr$) is represented as a black dot and indicates what society settled on as the right balance between nominal quantity Q and purchasing power P of the money under study.

The green *demand curve* represents the correlation between the quantity of money and how much money people want to hold. Here, "want" doesn't mean how much a person wants to own in some idealized future, but rather what they think an appropriate level of money to hold is if the quantity were at a certain level. Note also, that these curves don't offer any insights (yet) on external factors like a raging pandemic, rising inequality, income dynamics, the cost of holding money, or other things that could affect this relation. The only thing this curve states is that all else being equal (*ceteris paribus*), if the quantity of money increases, society is going to want more of it on average and its value is going to be diminished.

The *supply curve* (blue) shows the correlation between the stock of money in circulation and the price level as determined by the market. As we know already, the market has little to say here with central banks and their subsidiaries having a monopoly on the supply of money. That is, a change in price level is not going to affect the quantity being supplied directly. We, therefore, assume that it is constant as represented by the vertical line. Of course, if a central bank does decide to print more money, we can account for that by moving our constant vertical line to the right.

> **Example:** Let's warm up by seeing what happens when a central bank prints money. If a central bank prints money (move from Supply to Supply′), goods will become more expensive and therefore, the purchasing power will go down (from P_0 to P_1). Hayek's problem with governments was not that inflation happened (as inflation in and of itself does not reduce wealth), but rather with how wealth was redistributed in the process of the minting of new currency (unfairly).

The demand curve (green), can change as well. We know from historical examples and economical theory that:

- An increase in the GDP increases income, which in turn causes the demand curve to shift to the right.
- Higher transaction costs will lead to fewer transactions being made (people being more illiquid) and therefore typically causes an increase in demand for money.
- Risk attitudes can affect demand in either direction.
- Falls in the nominal interest rates can cause the demand curve to shift to the right.

WHY BITCOIN IS NOT A SUITABLE HAYEK CURRENCY

Hayek critiqued gold for not being a good store of value, in his 1977 paper he stated that: "*It would turn out to be a very good investment, for the reason that because of the increased demand for gold the value of gold would go up; but that very fact would make it very unsuitable as money. You do not want to incur debts in terms of a unit which constantly goes up in value as it would in this case, so people would begin to look for another kind of money: if they were free to choose the money, in terms of which they kept their books, made their calculations, incurred debts or lent money, they would prefer a standard which remains stable in purchasing power.*" Bitcoin, often incorrectly called the digital gold, does suffer from the same fatal flaws - but worse.

The supply of Bitcoin is inelastic, meaning that a change in price does not incur a change in supply:

$$\eta = \frac{\Delta Q}{\Delta P} = 0$$

This lies at the heart of why it is so volatile. In general, products with inelastic supplies will tend to be very sensitive to demand shifts as is illustrated above (left). The green dotted line shows an increase in the demand for BTC. As the quantity is fixed, we move up to a new price point P'. Had the supply line (blue) been more elastic (i.e.., $\eta > 0$ like the gold supply line on the right), the price jump would have been much more moderate for a similar shift in demand.

The empirical production curves are plotted below, each dashed line shows the start of a year and its corresponding supply line (note that as we go from left to right, the quantity jumps become exponentially smaller). The demand lines are similar to our prior ones and the equilibrium points are annotated with the black dots. The purchasing power was measured using the Consumer Price Index for All Urban Consumers from the St. Louis FED database. We observe that Bitcoin's real purchasing power has steadily increased over time. Of course, this is simply a reflection of the increased demand as we showed in the previous plot (green dotted line moving right).

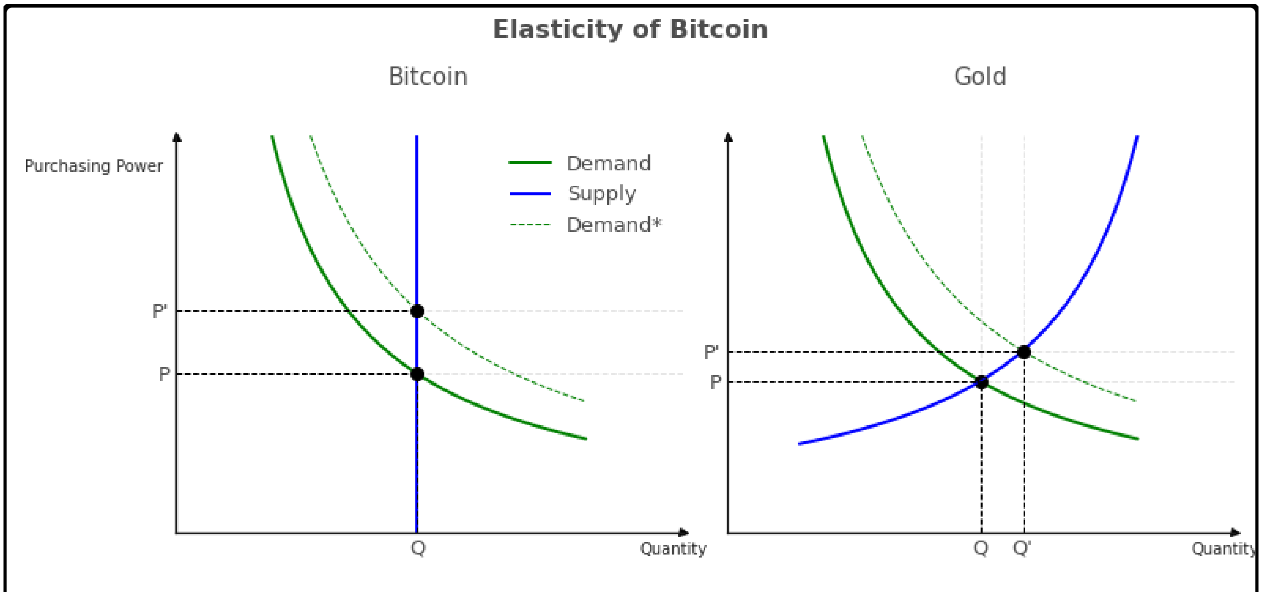

Figure 2: production-bitcoin

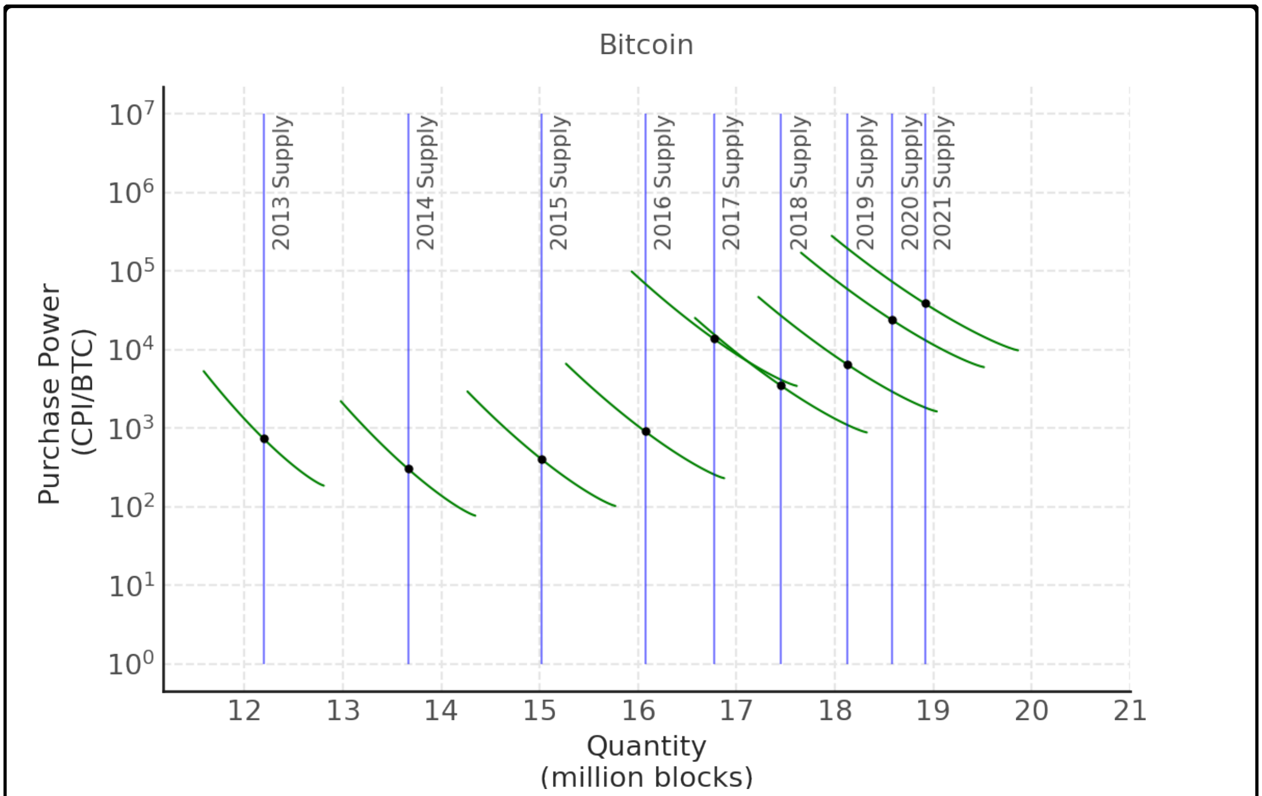

Figure 3: Empirically measured value of Bitcoin

8.2 PROPOSALS

ELASTICITY OF SUPPLY THROUGH REBASING

Monetary Policy

Ferdinando proposed to solve Bitcoin's inelasticity issue by simply inverting the supply-demand curves' logic to our advantage. With the usage of smart contracts, it is easy to program a monetary policy that keeps the purchasing power of the underlying token stable by "rebasing" the token. Rebasing means that we expand and contract the supply of the token to maintain price parity. As is shown in the schematic below:

At the start of the process, Alice pays \$100 to own ฿100. A shift in demand causes the price to go down by 5%. The monetary policy then specifies that the supply of base-tokens must be changed proportionally by 5%. Alice now owns ฿95 which she can exchange for \$100, and the price peg is maintained. Note that any gains/losses are distributed proportionally to the base token holders.

The revaluation of the token is best analyzed using the curves as before. Like before, we are working with a demand curve (green line) that encapsulates the correlation between quantity Q and an associated price level P. We add infinite elasticity to obtain even better responsiveness than gold:

$$\eta = \frac{\Delta Q}{\Delta P} = \infty$$

Visually, this means that the supply curve is flat, effectively responding to any changes in demand.

Rebasing means that we increase the quantity by printing more money in the underlying smart contract to increase. Simply put, if at the end of some period (the *rebase period*) the price has increased by an average X%, all we need to do is change the coin supply by an average X%:

$$\Delta P = \frac{P' - P}{\bar{P}}$$
$$\Delta Q = \frac{Q' - Q}{\bar{Q}}$$

Note that we measure price and quantity changes (ΔP and ΔQ) as relative to the "settlement averages" ($\bar{P} = (P' + P)/2$ and $\bar{Q} = (Q' + Q)/2$ in the denominator). This convention allows us to more easily analyze changes as is shown in the following example.

> **Example:** let's say that we simply used the face value price change $\Delta P = \frac{P'-P}{P}$. A price change from \$1 to \$1.4 would translate to $\Delta P = 40\%$, whereas a price change back from \$1.4 to \$1 would translate to $\Delta P = \$0.6 - \$1 = -28\%$.
>
> If we use the settlement average price change as suggested before, we would get a 33% change in both directions.

Setting $\Delta P = \Delta Q$ we find the solution to the target quantity[1]:

$$Q' = \frac{2Q + Q\Delta P}{2 - \Delta P}$$

Assuming that we have a mechanism to both increase and decrease the quantity of our currency proportionally to their current holdings, we would be able to rebase our currency fairly while keeping the price of the currency. As can be seen from the plot on the right, this monetary policy allows us to shift the increase in price due to higher demand to an increase in supply. We have thus obtained our original goal of keeping the price stable.

> **Example** : Let's say that we want to peg our stablecoin to the dollar so that it's always worth exactly 1 USD. We start by minting $Q =$

[1] In the original paper the quantities are changed using the starting price as denominator resulting in $Q' = Q \times \frac{P'}{P}$.:

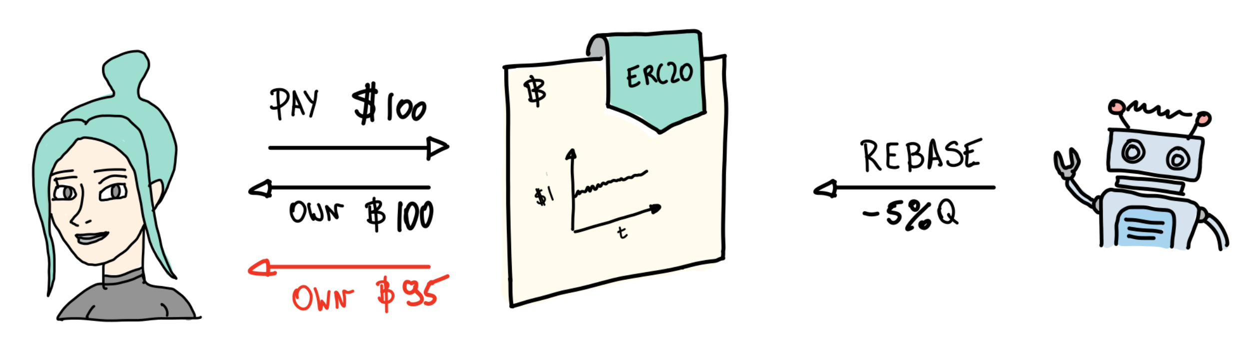

Figure 4: Rebasing mechanisms in essence change the token ownership of the user to ensure price stability of the token.

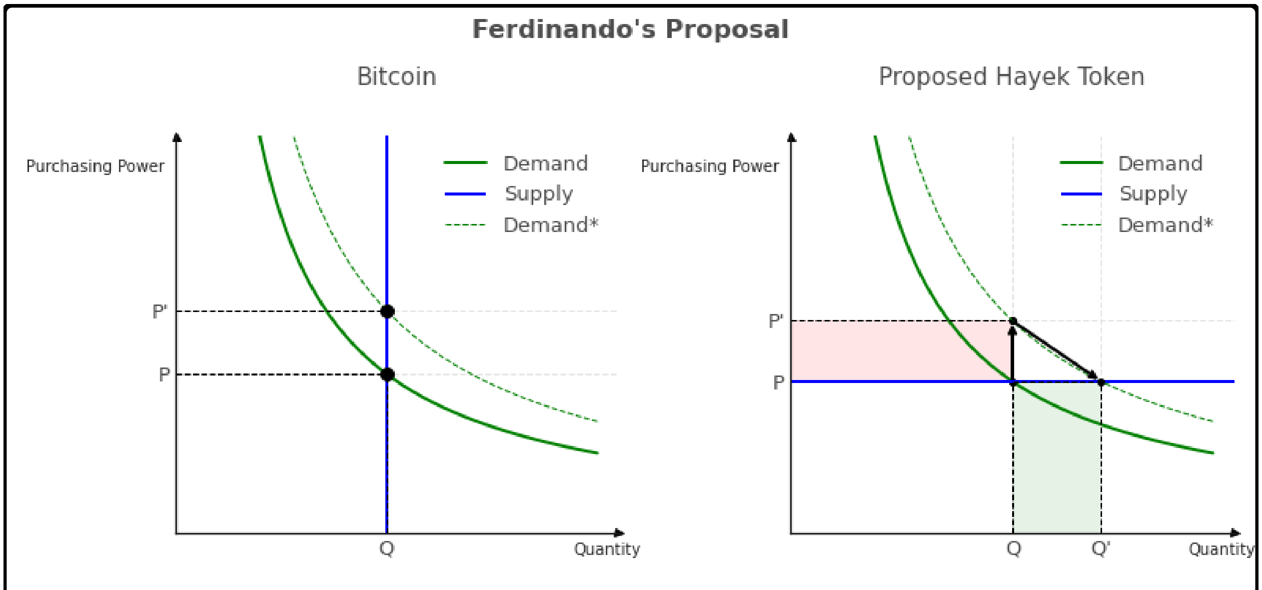

Figure 5: Hayek proposal

> $1,000,000$ of our tokens. If our currency becomes popular, increased demand will move the demand curve to the green dotted line with an associated price move to P'. The increase in the stablecoins demand is shown by the red area:
>
> $$\begin{aligned}\Delta M &= (P' - P) \times Q \\ &= (1.4 - 1) \times 1,000,000 \\ &= 400,000\end{aligned}$$
>
> Ceteris paribus, we would see that our stablecoin's price would jump to $1.4 USD due to this demand. In order to counter this effect, the smart contract would need to change the supply by $\Delta Q = \frac{1.4-1}{(1.4+1)/2} = 33.33\%$ to $Q' = 1,400,00$ in this case. Indeed, the demand increase remains intact as at this price level we get that (green area):
>
> $$\begin{aligned}\Delta M &= (Q' - Q) \times P \\ &= (1.4 \text{ million} - 1 \text{ million}) \times 1 \\ &= 400,000\end{aligned}$$

We see that rebasing effectively replaces price volatility for quantity volatility. Most algorithmic protocols use a similar idea, but they differ in how they manage the elasticity of the supply.

Example: AMPL

The most popular protocol that implements straightforward rebasing at the time of writing is Ampleforth. They try to follow the CPI and rebase the supply to do so. This means that if you hold AMPL tokens in your wallet, you may hold more or less of those tokens a week later. For this inconvenience you get two big advantages:

- Everything is done proportionally as described before, meaning that everybody wins/loses the same.
- A pizza will cost about the same amount of AMPL now as it will in the future - except for any shocks that would make pizzas super expensive (e.g., a huge strike by the Italian community).

Ampleforth is constantly tweaking its algorithms, but the most important changes to the above mechanism are that:

- In the interest of stability, corrections are only performed if the price of AMPL depegs more than a certain percentage (e.g. 5%).
- The designers of Ampleforth introduce smoothing which spread price changes over time to avoid overcorrections of the price. This was actually suggested by both Hayek and Ferdiando's paper as well.

Verdict

As can be seen from the supply chart on the left, strong corrections have been needed as demand for AMPL caused high volatility over the period of 2020 to 2022. The real purchasing power of 1 AMPL that was purchased on January 1st 2020 is charted on the right. It takes into account (1) the rebasing of that AMPL, (2) the price of AMPL, and (3) the CPI as a proxy for purchasing power. For reference, we are also plotting the dollar value of AMPL in red. Notice how the purchasing power of our 2020 AMPL followed the price of AMPL almost 1 to 1. Almost every peak in the plot indicates a period in time where had you bought at that moment, you would likely have lost up to 50% w.r.t. the true purchasing power soon after. We conclude that for our 2020 AMPL token holder, AMPL has not been stable at all.[2]

While rebasing tokens effectively solves the issue of keeping the price of the token stable, it is not a comforting idea that your wallet balance could change based on factors outside of your control. Furthermore, this trick will - ceteris paribus - only rebase the currency's face

[2] Making things worse, huge amounts of AMPL have been allocated to insiders before AMPL was officially released on the market. Therefore, it could be argued that most of the upside that you see in the above graphs has been captured by the founders and speculative investors.

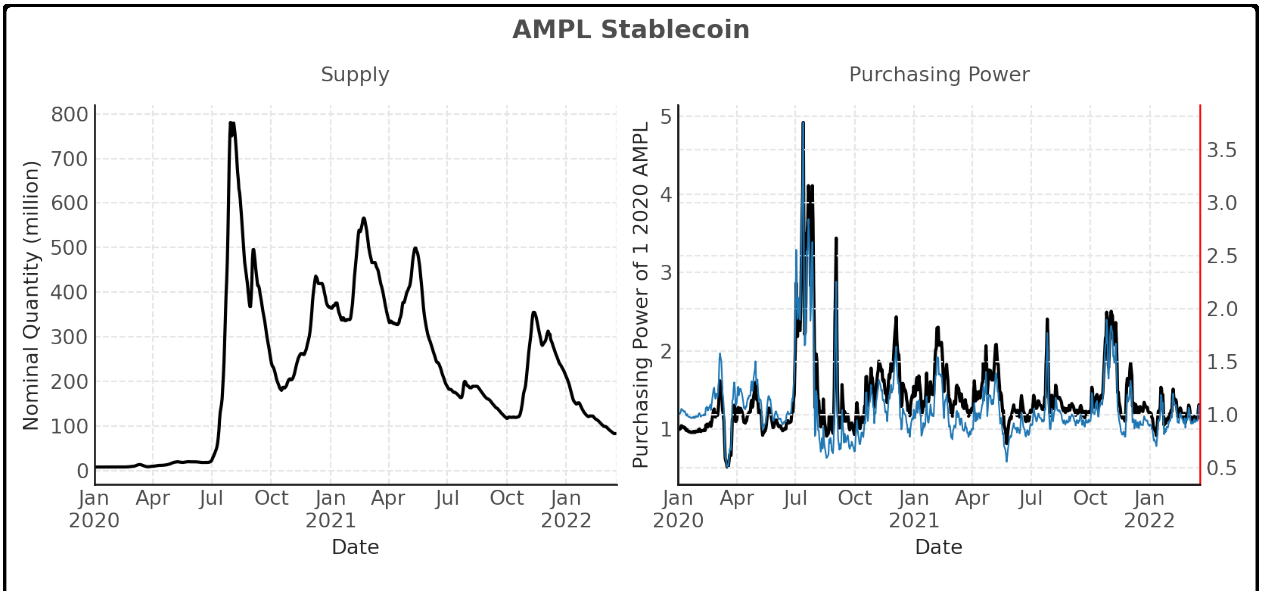

Figure 6: AMPL characteristics over the period of 2020-2022.

value. That is, it while it stabilizes the *purchasing power* of the currency, it does not stabilize the purchasing power of the holdings of the user which is what we really desire. Additionally, most popular clones of AMPL have depegged quickly (YAM = \$0.22, DEBASE=\$0.03, BASED=\$0.015). Time will tell whether AMPL is able to avoid the same faith but a similar loss in faith may very well lead to a similar outcome.

COIN-AND-SHARE SYSTEMS

Monetary Policy

The purchasing power of rebased tokens is as volatile as holding a cryptocurrency like Bitcoin from the perspective of the stablecoin holder. The key idea in Robert's paper was to bifurcate the stablecoin into 2 tokens, one which keeps purchasing power (the *stablecoin*) and one which captures any changes in purchasing power pro-rata (the *share-token* or *seignorage shares*). Holders who want to just have a stable store of value hold the stablecoins, whereas speculators who wish to speculate on the value of the stablecoin protocol through promised future dividend payments hold the seignorage shares. The price and amount of these shares and dividends are calculated precisely such that it ensures the stability of the stablecoin.

Let us assume for the sake of simplicity that we are pegging the stablecoin to the dollar. As long as the stablecoin is indeed priced at $P = \$1/\text{stablecoin}$ no action is required from the smart contract. Price deviations are resolved through minting more coins or share-for-coin swaps. Two potential scenarios unfold which require corrective action.

Scenario 1: expansion, the stablecoin is priced too high

We now have two actors in the ecosystem: Alice the stablecoin holder and Ray, the red-haired speculator. Just like before Alice paid \$100 to own her ฿100 and we observe a 5% increase in price. The monetary policy will then proceed by first minting more stablecoin, but instead of being distributed to Alice, these stablecoins are distributed as dividends to Ray. This has two effects:

- The value of Alice's holdings has remained

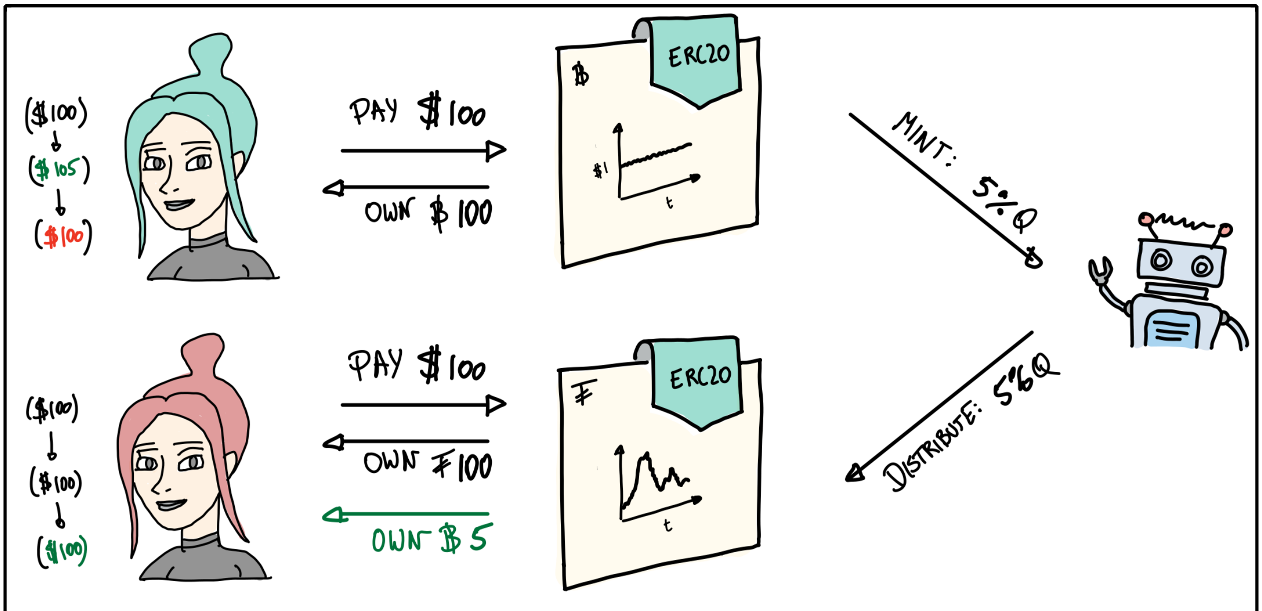

Figure 7: Expansion phase of a coin-and-share system.

stable at \$100.

- The value of Ray's speculative holdings has increased from \$100 to \$105 (\$100 from holding ฿100, and \$5 from holding ฿5)

Let's analyze this using our familiar curves:

The price has gone up, beyond the peg. We must devaluate the token by issuing $\Delta Q = Q_1 - Q_0$ more tokens and selling them at a clearing price of $\bar{P}$ which we will assume to be the average between the starting price (P_0) and the ending price at which the last token is sold (P_1). This puts downward pressure on the price due to inflation until the price is correctly pegged again. The ΔQ stablecoins that are created in this process are then given to the shareholders. Two prevalent mechanisms exist:

1. Just hand out the stablecoins *pro-rata* to shareholders through a dividend distribution. Shareholders can sell their tokens on the open market for \$ if they choose to do so.

2. Create an auction in which the protocol sells newly minted stablecoins to shareholders for a portion of their shares (right curve) which results in a value increase of the total shareholdings (a *share buyback*).

The latter mechanism can be visualized as (i) an increase in demand through the smart contract's purchase of tokens causing a price increase from P_0^S to P_1^S followed by (ii) the burning of those tokens from Q_1^S to Q_2^S. The final increase in wealth is then captured by the new market cap ($P_2^S Q_2^S > P_0^S Q_0^S$) and divided proportionally.

> **Example:** the stablecoin is priced at $P_0 = \$1.04$ and the total circulating supply is $Q_0 = 1,000,000$. We have $\Delta M = \$40,000$ demand that we need to adjust for in the protocol. The protocol mints $\Delta M / \bar{P}$ tokens in order for the market to rebalance the stable price to $P_1 = \$1.00$.

Situation	Q	P
Start	1,000,000	\$1
Appreciation	1,000,000	\$1.04
Sale @ $\bar{P} = 1.02$	1,039,215.69	\$1

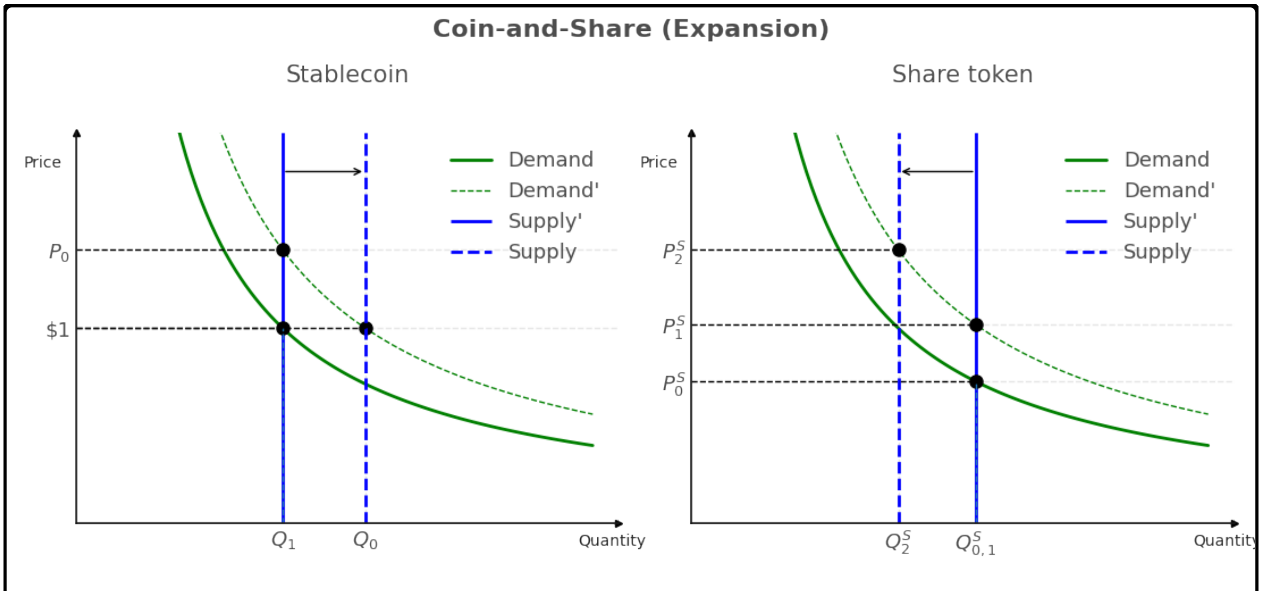

Figure 8: In coin-and-share systems, stablecoins are purchased by selling share tokens.

Either way, the net effect on shareholders is positive, as shareholders were paid out $40,000 worth of basis tokens pro-rata (an average 4% return). Furthermore, they still own the same relative amount of shares.

Share values

As the stablecoin protocol is faced with increasing demand, more value flows to the shareholders. Share tokens, therefore, promise a claim on a future income stream such that their Net Present Value can be calculated as:

$$P_T^s = \frac{1}{Q_t^S} \sum_{i=t}^{\infty} \frac{\Delta Q_i}{(1+r_i)^i}$$

where r_i is the discount rate applied to the rebasing periods in the future. This works so long as ΔQ_i is expected to be positive in the future. The reality unfortunately shows that the value of the shares and the token often tend to zero in current designs. Let's see what happens in a period of contraction.

Scenario 2: contraction, the stablecoin price is too low

In a contraction phase, stablecoins are bought by the protocol using shareholder's capital, after which they are burned. The resulting reduction in stablecoin supply makes its value appreciate. At the end of the process this should have the following effect on Alice and Ray's holdings if a 5% drop in stablecoin price was detected:

- The value of Alice's holdings has regained its stable value at $100 (up from a temporary $95).
- The value of Ray's speculative holdings has decreased from $100 to $95 (the price of ₮ dropped to 0.95$/₮)

Let's analyze this using our familiar curves:

The price has gone down, lower than the peg. We must decrease its supply to get price stability but we cannot do it by simply rebasing users' tokens. In order to do so, the protocol first mints tokens (essentially a *stock split*) which it sells on the market for stablecoin. The total number of shares required to be able to cover the purchase

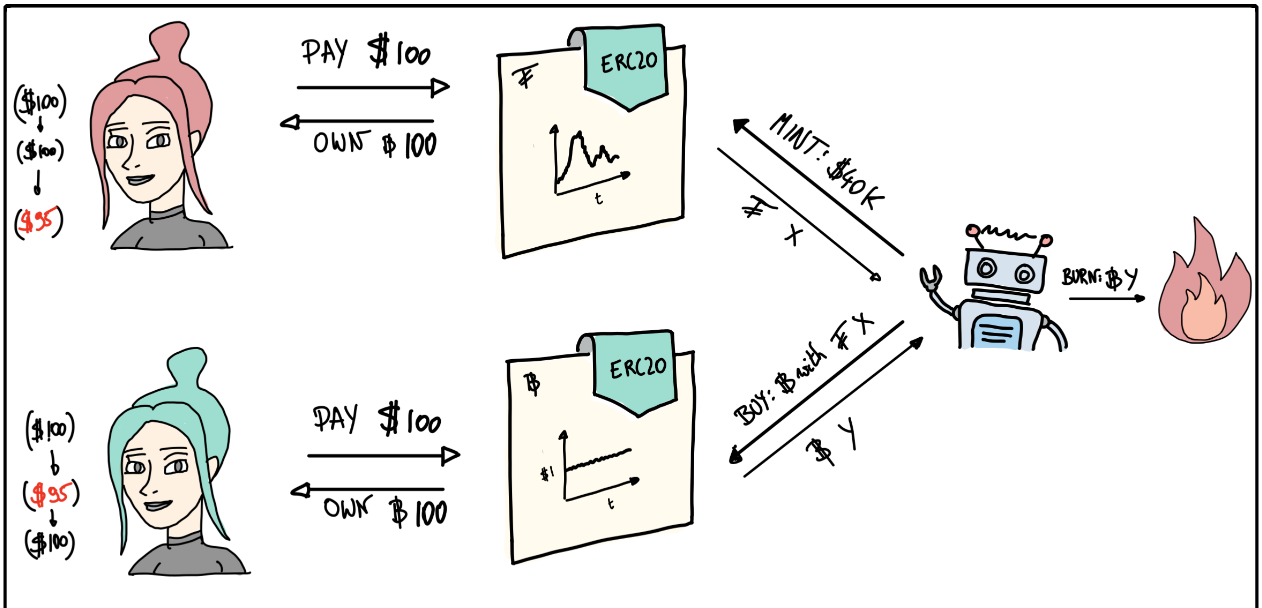

Figure 9: Contraction schematic

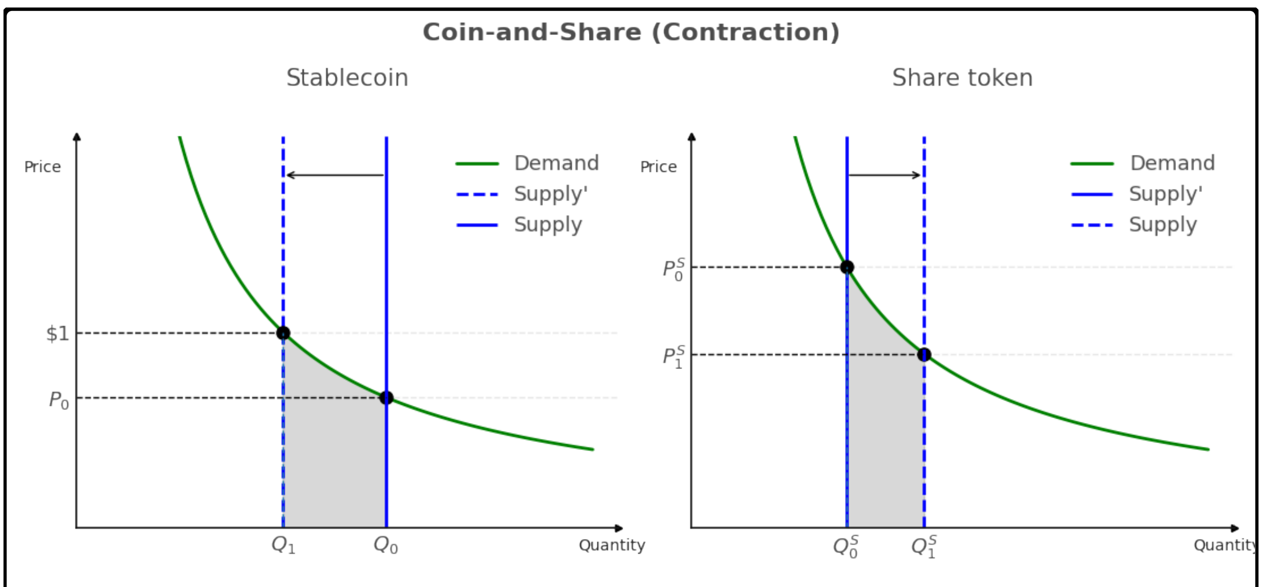

Figure 10: production-coin-and-share-down

of ΔQ is $\Delta Q^S/\bar{P}^S$ where $\bar{P}^S$ is the average sale price.

> **Example:** the stablecoin is priced at $P_0 = \$0.96$ and the total circulating supply is $Q_0 = 1$ million. The token shares are currently priced at 100$/₮ . with a supply of $Q_0^S = 10,000$. We have a decline of $\Delta D = \$40,000$ in demand that we need to account for in the system. We, therefore, mint $40,000 worth of shares first at an average price of $\bar{P}^S = 98$.
>
> | Situation | P^S | Q^S |
> |---|---|---|
> | (1) Start | $100 | 10,000 |
> | (2) Sale @ $\bar{P}^S = 98$ | $96 | 10,416 |
>
> Note how the total market cap of the shares remained the same, but the original shareholders lost $40,000 in value by holding onto their 10,000 shares. The protocol sells the additional shares immediately at a valuation of average price $\bar{P}^S$ to obtain ΔQ at an average price of $\bar{P} = 0.98$ $/฿, or converted to shares, 100 ฿/₮.
>
> | Situation | Q | P |
> |---|---|---|
> | (_) Start | 1,000,000 | $1 |
> | (0) Depreciation | 1,000,000 | $0.96 |
> | (_) Purchase @ $\bar{P} = \$0.98$ | 1,000,000 | $1 |
> | (1) Burn | 9,600,000 | $1 |
>
> The market cap of the tokens remains unchanged at ($960,000) which still reflects the lower demand, but the price peg has been restored to $1.

The net effect on shareholders is negative, as their existing shares are worth ~4% less. The new shares in the system were paid for by shareholders.

Death Spirals

This incentivization mechanism works as long as we are in a phase of expansion for the protocol and the market in general. If for some reason, investors lose faith in the token the incentive to buy shares may falter. This has led to so-called *death spirals* in contraction phases.

As we've seen before, in a contraction phase shares need to be sold off to increase the price which puts downward pressure on shares price (left plot). This is okay if shareholders are confident and hold their remaining shares regardless, but as it turns out shareholders tend to lose confidence in such a situation which in turn reduces the demand for shares (right plot). If no one wants to buy shares, this in turn means that we now need to issue many more shares to be able to prop up the stablecoin. This can quickly get out of hand until no demand is left for the shares and therefore, not enough reserves remain to be able to support the stablecoin's value. As we will see later, this is the rule rather than the exception in current designs, or as Catalini and Gortari 2021 state it: "*Ultimately, protocols highly exposed to death spirals will see one.*" .

Example: Basis Cash Token

Basis token follows the original seignorage shares quite closely but splits the seignorage shares in two parts: shares and bonds. There are therefore three fundamental tokens that one can hold:

1. Basis Token (฿): stable token meant to be a medium of exchange.
2. Basis Shares Token (₮):
   a) A fixed supply of tokens with a volatile value that receives dividends when the price of ฿ inflates too much.
   b) Obtained by locking some ฿ in collateral.
   c) Can be redeemed back to ฿ at market rates.
3. Basis Bond Token (₲): bonds, sometimes called coupons and limited by an expiration date in other protocols):
   a) Variable supply of tokens

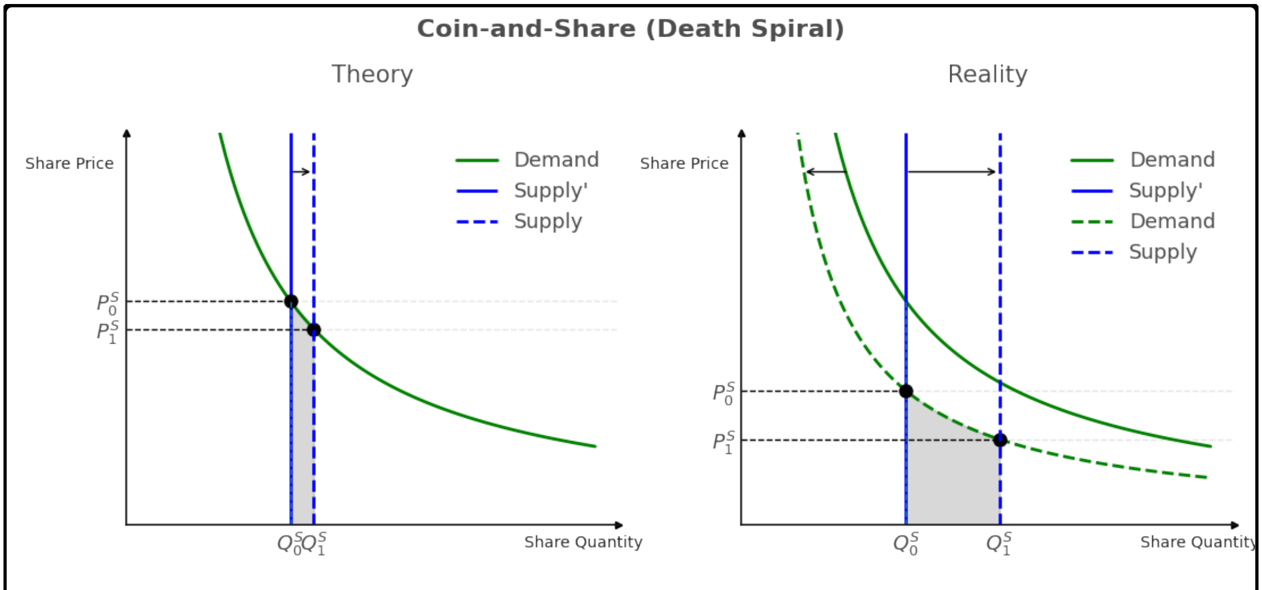

Figure 11: production-coin-and-share-spiral

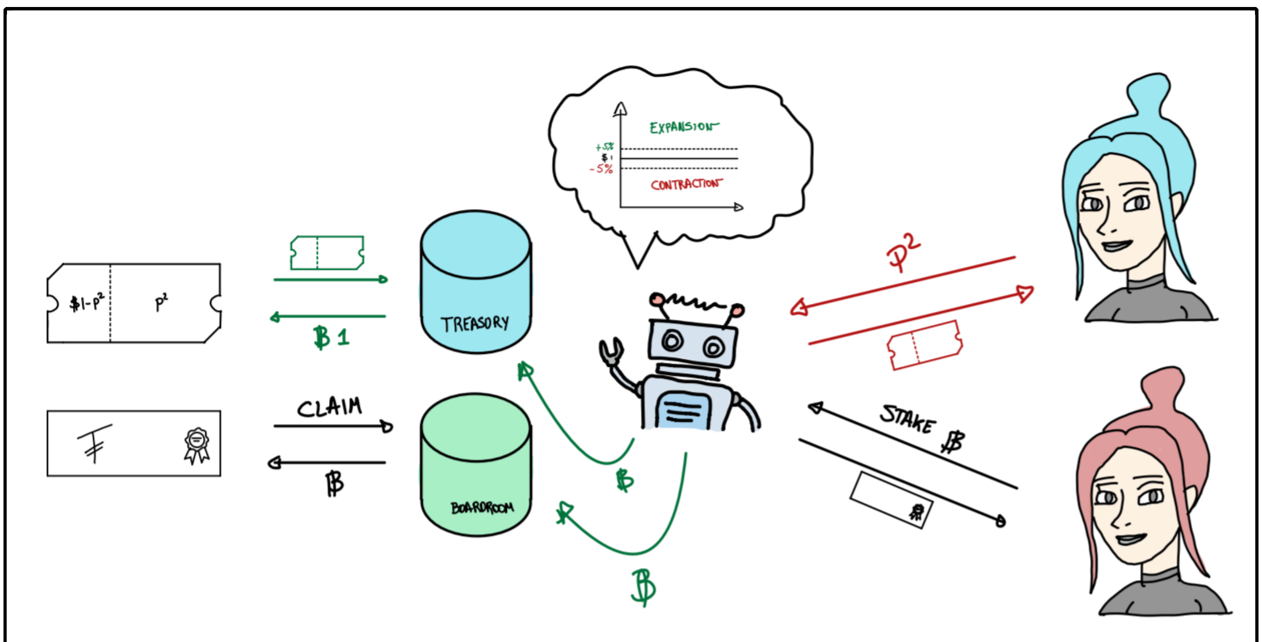

Figure 12: The bonds and shares model of Basis.

b) Obtained by paying P^2฿ to the protocol.

c) Can be redeemed back for 1฿, but only when ฿>1.

Let's investigate both correction phases:

- Expansionary: ฿ > $1.05
  - Mint more ฿, the price will drop.
  - Extra ฿ are deposited in treasury where *bondholders* can redeem them. (first buyers first in case of constraints).
  - Any left-overs are deposited in the Boardroom where *shareholders* can withdraw them as dividends.
- Contraction: ฿ <$0.95
  - The system starts selling *bonds* with a face value of ฿=1 at the price of $P^2 < 1$. Note that bonds are bought using ฿ thereby pushing up demand for ฿.
  - They hold the potential to be sold for exactly 1฿ when the supply expands again (see the previous scenario) thereby yielding a profit for its holders *in ฿ terms* (not necessarily USD).

The basic system is elegant but suffers from the same flaw as the original system. In the contraction phase, not all investors will be optimistic and some will be hesitant to buy bonds. With the peg not restoring itself, this could cause more downward pressure on the protocol which turns into a death spiral and the unavoidable collapse of ฿. The original project was not launched due to regulatory difficulties in the U.S., but a copy called Basis Cash was launched and included many anti-collapse mechanisms, including adding expiration dates to bonds and increased basis HODL incentives. In the end, all that's really protecting the peg are the collateral shares. The only real value for those shares is the belief in Basis as there is no outside utility for them (except for speculation). Despite a great reception and promising initial valuation by the investor, the protocol's demise was swift and ruthless.

Other examples that incorporate parts of this design at their core include: Elastic Set Dollar (ESD), DSD, SHARE, USDX, FEI, TITAN, FRAX, and Terra's UST[3]. In the end, the question to ask is always this: what is the value of the collateral backing the protocol? If the answer is the belief in the protocol itself, there is no rational basis for the protocol to not end-up in this scenario at some point in its lifetime.

NOTABLE MENTIONS

Floating protocols

Some algorithmic coins do away with a constant outsourced peg altogether and follow a floating peg instead. Examples include Float, RAI, and OHM. These resemble the design of MakerDAO more and should be viewed in the same light. In essence, most of these protocols use a basket of cryptocurrencies (ETH, BTC, …) as collateral which should avoid the issue of non-belief that results in a death spiral. To be credit-worthy, however, these protocols rely on speculators who are willing to collateralize the protocol in the hope to leverage price movements. In that sense, they resemble a set-up like MakerDAO. For investors, the most important aspect to follow is how over/under-collateralized the system is, as this will determine the risk of participating in the projects

Hybrids / Fractional Tokens

Fractional tokens like FRAX and TITAN/IRON collateralize their stablecoins with a mix of asset-backed stablecoins and algorithmic stablecoins. As we have seen in the example of TITAN/IRON,

[3] Since the time of writing, some of these have collapsed already.

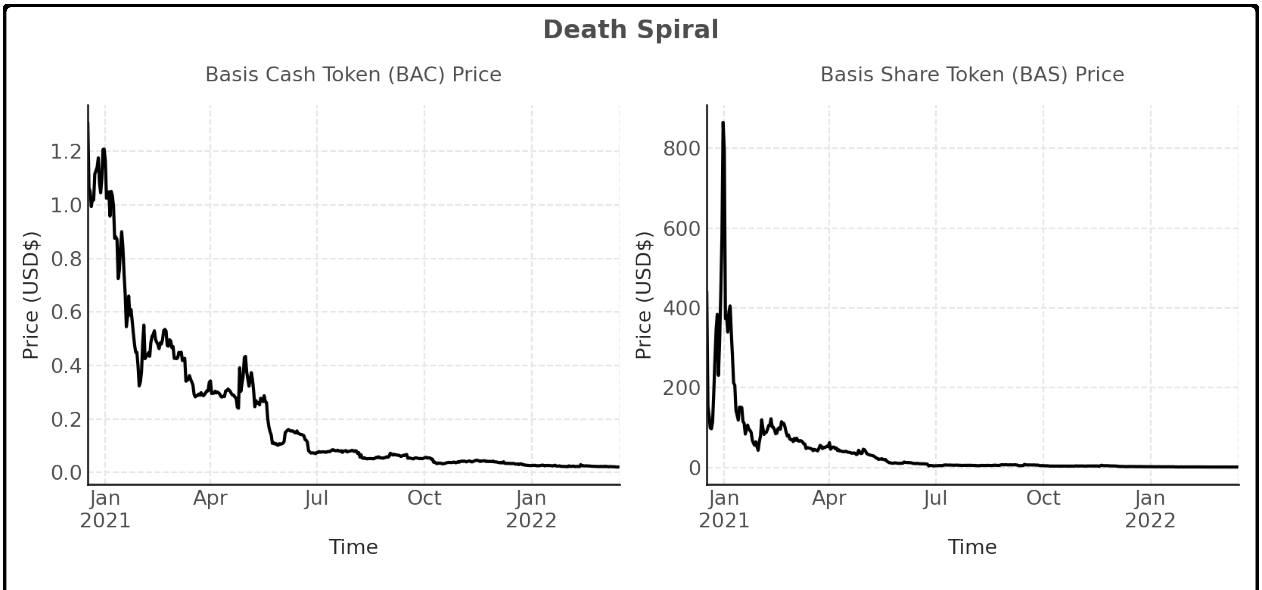

Figure 13: Basis token's spiral of death was swift and never recovered.

the risk of a bank-run still exists, but your exposure, in that case, relates to the mixing coefficient:

To compensate for the loss of confidence, the protocol started minting TITAN collateral at a rate that caused hyperinflation which results in the value dropping to $0. Protocols like FRAX add circuit breakers to avoid this issue but remain monetary experiments for the time being.

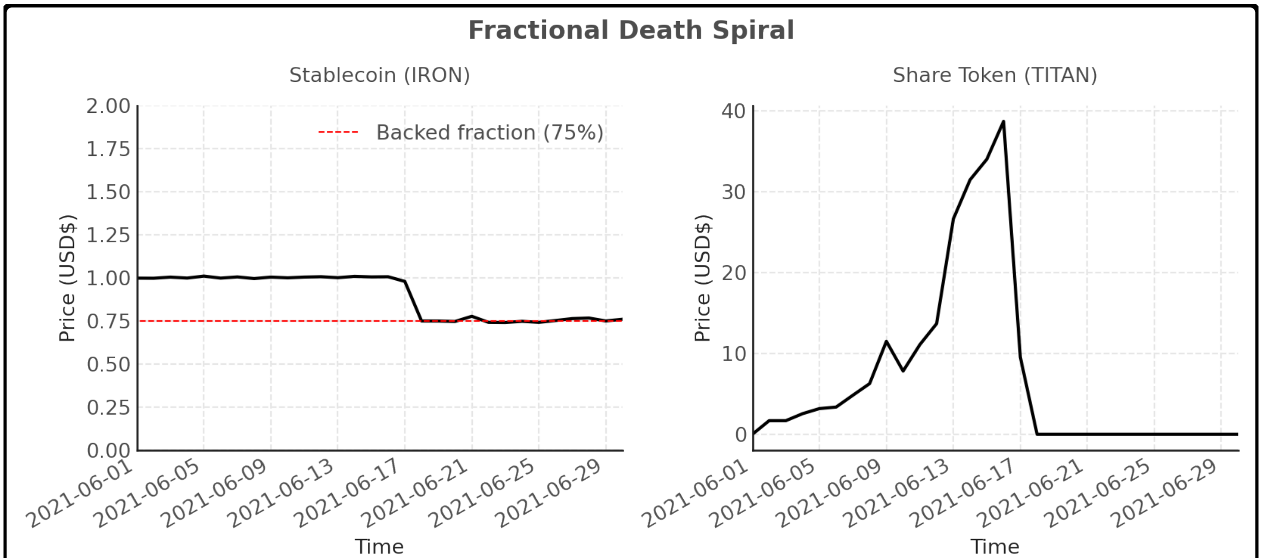

Figure 14: IRON's partial collapse

8.3 RESOURCES

- https://docs.google.com/spreadsheets/d/1hX0aDYDnFgZ_ZeN-BeGqEBe2MoRTYnbW2Zqtt71yeJL4/edit#gid=0
- https://threadreaderapp.com/thread/1393651168681676801.html
- https://www.cato.org/cato-journal/spring/summer-2021/ten-stablecoin-predictions-their-monetary-policy-implications#prediction-7
- “A Note on Cryptocurrency Stabilisation: Seigniorage Shares”, Robert Sams
- Beware the Coupon Clipper: The Insurmountable Flaws of so-called Algorithmic Stablecoins
- DAI collapse: https://blog.makerdao.com/the-market-collapse-of-march-12-2020-how-it-impacted-makerdao/
- Macro: https://www.economics.utoronto.ca/jfloyd/modules/nafm.html
- https://insights.deribit.com/market-research/stability-elasticity-and-reflexivity-a-deep-dive-into-algorithmic-stablecoins/