

Basecoin FAQ

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Can a crisis of confidence cause a death spiral in the system?

The Basecoin mechanism is designed to be heavily resistant to death spirals and positive feedback loops. Our stability analysis, which will be made public soon, explores this question from many angles, but here we will discuss the most common misconception around crises of confidence in Basecoin.

When the bond queue is very long, people become less willing to buy bonds and bond prices are lower because a long bond queue means it will take a long time to get paid, and increases the chance that your bond will expire worthless. From here, the misconception is that during a crisis of confidence, the bond queue will grow, causing bond prices to drop, meaning the system has to issue more bonds at lower prices in a positive feedback loop. This analysis is incorrect because of two key design choices in the Basecoin system: A bond price floor and a bond expiration.

When a crisis of confidence occurs, the bond queue gets longer and bond prices drop-- but this does not mean that a death spiral will ensue. Rather, once bond prices drop below a threshold, called the bond price floor, the protocol simply stops issuing bonds. When this happens, coin price dips below \$1 for a period of time because demand has decreased but supply has not contracted. Then, as bonds expire, the queue gets shorter continuously until the bond price rises above the floor and supply can contract again, causing coin price to return to \$1. Note that restorative effect of bond expiration is continuous. To see this, suppose that the protocol has not issued bonds for a whole week. This means that all of the bonds that are currently in the queue

will expire in 4 years and 51 weeks at most. If you buy a bond when the queue is in this state, you will have a full week, after 4 years and 51 weeks have passed, where all the bonds have expired and all of the Basecoin expansion is paid to you. Because of this, the payout of a bond recovers over time, and becomes more and more attractive as more time passes. In fact, this “expiration window” effect can allow bond prices to start recovering even on the next reconciliation just after bond prices have dropped below the floor.

How does this compare to existing monetary systems? What’s interesting is that existing monetary systems that rely on fiscal debt don’t have an expiration on that debt. Rather, when they reach a situation in which they have to run a fiscal deficit for a prolonged period of time, they finance that deficit by issuing more debt, effectively kicking the can down the road. The issue with this is that when a large enough crisis of confidence eventually does occur, people suddenly lose faith in the government’s ability to pay everyone back. When this happens, the currency effectively dies and people are forced to switch to a new one. This is not only a catastrophic outcome for the citizens of countries in which this happens, it is also one of the chief ways governments and monetary systems fail (see [this interesting survey post](#) on how currencies fail and how long they typically live).

Basecoin’s approach of having an expiration on bonds allows the system to “default” transparently by de-pegging temporarily, and then gracefully re-pegging as bonds expire (or as Basecoin demand returns), rather than staying pegged for a while and then catastrophically failing. This is an amazing property because the lack of a catastrophic failure mode means that people don’t have to switch to new currencies all the time, and deal with the tremendous costs such a switch imposes on their economy. What’s also interesting is that there is actually a trade-off in setting the expiration. Having a lower expiration makes bond prices lower because bonds are more likely to expire worthless, which makes the system more likely to de-peg during a crisis of confidence. But, at the same time, a lower expiration allows the system to recover from de-pegs faster because bonds expire from the queue more quickly. For example, if you set the expiration to 1 month, the system would de-peg all the time-- but it would likely also re-peg fairly quickly after every de-peg. On the other hand, if you ran Basecoin with an expiration of infinity, it would stay pegged for as long as possible, but a crisis of confidence would kill the system (similar to what has happened to monetary systems historically). For this reason, the expiration in Basecoin is one of the deepest and most interesting design choices, and something that we think makes Basecoin a material improvement over existing monetary systems. The reason we talk about a 5 year expiration in our white paper is because 5 years was a “sweet spot” in our experiments. At 5 years de-pegs were highly unlikely, but when they did occur the system recovered relatively quickly. As future research, we are looking into having a dynamic expiration on bonds.

It is useful to ask ourselves: What is Basecoin like when it’s in a de-pegged state (i.e. when Basecoin is trading at below \$1)? Well, it is like any fixed-supply currency (e.g. Bitcoin), only it’s contracting continuously as bonds expire from the queue to bring its value up to par. So it’s effectively a more deflationary version Bitcoin.

With all of the above as context, let's consider Basecoin against the status quo in a third-world country with rampant hyper-inflation (inflation >10%). First, Basecoin doesn't hyper-inflate to serve a political agenda. Second, while de-pegs are very unlikely, even if Basecoin does de-peg, it can gracefully re-peg soon after. The worst-case outcome for Basecoin is that it drops below \$1 and becomes a more deflationary version of Bitcoin, ideally temporarily, whereas a third-world country's currency, on top of its hyper-inflation, can cease to have value if the local government defaults on its debt.

Obviously, no monetary system can remain stable under all possible circumstances. But looking at Basecoin as compared to the currencies that underlie most third-world countries, and even developed ones, Basecoin seems to not only improve on the status quo, but the fact that it behaves like a deflationary version of Bitcoin when de-pegged, and the fact that it can gracefully re-peg in the face of crises of confidence, we think, makes it fairly robust, and possibly more robust, when compared to any monetary mechanism that has existed up to today.

Won't Bitcoin eventually have zero volatility in the long run?

No. Bitcoin is a fixed-supply currency, which means it can't respond to fluctuations in demand without a corresponding fluctuation in the value of each unit. Put another way, if demand for Bitcoin doubles and supply stays the same, the price of Bitcoin must increase. Thus, because demand is never static, Bitcoin's price, or purchasing power, will also never be static.

While Bitcoin volatility will likely go down over time, it will never be zero volatility against the dollar (or against a basket of goods). A good example of this is Gold, which, in spite of being used as a store of value for thousands of years, still has roughly 15% volatility against the dollar. While 15% annual volatility might be low enough to do "quick" transactions, such as purchasing something at a store, it is far too high to do payments that involve a non-negligible amount of time to settlement, such as loans, salaries, or many of the most basic financial contracts in our economy. In fact, in many ways, 15% annual volatility is worse than having predictable hyper-inflation.

As an example of why contracts over time don't work with volatility, suppose you wanted to do a salary on top of something that had 15% annual volatility. For example, suppose you want to pay someone 1 Bitcoin per month. If you did this, one of two things would happen over time.

- Either the purchasing power of the currency would go up, in which case the employer would feel like he was paying the employee too much and want to renegotiate or fire them.
- Or the purchasing power of the currency would go down, in which case the employee would want to renegotiate or quit (or maybe they'd even go hungry).

You can get around this problem by hedging every contract that involves time against a basket of goods (or something both the employer and employee care about). But this would be inefficient, as you'd have to hedge every contract, or else package contracts together to hedge them. Basecoin solves this issue by "pre-hedging" the currency against a basket so that nobody has to worry about this. To use an analogy, hedging every contract is like powering a city by giving each home its own power generator, but hedging the currency itself is like having one giant power plant leverage an economy of scale to produce energy for the whole city. This is one of the main reasons that most monetary systems in place today elect to have an elastic supply rather than a fixed supply: to maintain zero volatility against a frame of reference, usually a basket of goods.

How does the system respond to someone maliciously trying to break the peg (aka a [Soros attack](#))?

The system was explicitly designed to make a Soros attack unviable.

Imagine the following scenario (a classic Soros attack).

- Someone is able to borrow a large number of coins for the purpose of short-selling them.
- That person then starts using the borrowed coins to flood the market, pushing prices down in an attempt to break the peg.
- If the attacker is successful and the peg breaks, he can then buy back the coins he sold short at a steep discount and return them to the lender, pocketing the spread between the coin price at the beginning of his attack and the coin price after his attack.

There are a few reasons why such an attack would most likely be unsuccessful.

- **Bond yields would increase.** As coin prices dropped, the system would begin to issue bonds at more and more attractive yields. As yields rose, speculators would become more and more incentivized to buy coins and convert them into bonds, creating significant upward pressure against the Soros attacker. Put another way, the system strongly incentivizes "anti-Soroses" to step in at precisely the right time to fight the bad actor by promising them a strong return if they participate in fighting the attack. Note that this is much different than the incentives the Bank of England provided (see discussion below).
- **The borrow rate would increase.** As bond yields increased, not only would "anti-Soroses" start to push against the downward price pressure, but the Soros attack itself would become more expensive. This is because the person lending Soros the coins he's using to short would begin to demand a higher and higher borrow rate as bond yields increased. The lender would think to himself "hey, since I can make a really high yield converting my coins into bonds right now I'm going to charge Soros more for this

short he's trying to pull off." Put another way, the more successful Soros is in pushing down the price, the more expensive he makes the attack on himself, and the less likely it is to succeed.

- **Difficult to short.** In practice, it is much more difficult to short an asset than it is to buy an asset. If a large enough short market exists for Soros to be able to pull off an attack, it stands to reason that the number of speculators ready to respond to "anti-Soros" incentives simply by buying high-yield bonds provided by the system would be even larger. In that sense, the assumption that a short market exists implies there will more than enough "anti-Soros" speculators around to respond to stability-promoting incentives, precluding the success of an attack.

It is important to note that the "anti-Soros" incentives the Basecoin system provides are precisely the opposite of what the Bank of England had when Soros attacked it. The Bank of England could have very easily prevented Soros' attack if they were willing to raise interest rates. By not doing this, they practically invited speculators to come in and break their monetary system. Imagine if the Basecoin system didn't increase bond yields in response to falling coin prices-- the system wouldn't work at all. Yet this is precisely what happened in the Bank of England scenario.

Why was the Bank of England reluctant to raise rates? In a lot of countries, central banks have a dual mandate: keep prices stable and keep unemployment low. The problem with this dual mandate is that sometimes the two are at odds. In particular, in the Bank of England's case, they were going through a recession, and raising rates would have exacerbated it, which would have been politically disastrous for the existing leaders, and probably bad for economic growth as well. This made them decide against raising rates until it was too late. Basecoin, unlike most central banks, gives up on the unemployment mandate, focusing solely on price stability, which makes the system much stronger against various bad actors, at the cost of potentially higher unemployment rates if the system ever takes over an economy.

As a final note, it is generally accepted in economic theory that a currency peg works as long as you obey a concept known as the [impossible trinity](#). This concept states that in order to maintain a peg, you can only choose two of the following three options:

- Free capital flow.
- A fixed exchange rate (i.e. a peg).
- Sovereign monetary policy.

For example, if you want to use monetary policy to reduce unemployment while also allowing the free flow of capital across your borders, it will likely be impossible to maintain a peg long-term. This is exactly what happened in the Bank of England scenario. Argentina is another example, where the government chose an inflationary policy with a fixed exchange rate and instituted capital controls to maintain their peg, an approach that failed mainly because their capital controls weren't effective enough. In our understanding of history, pegs break solely when central banks try to achieve more than two of the above options, often due to political perverse incentives, which is precisely what the Basecoin protocol protects against. Specifically,

it is impossible for political perverse incentives to corrupt Basecoin's adherence to its peg because its monetary policy is completely algorithmic, requiring no human discretion.

Can a system that isn't backed by any tangible assets be truly stable?

Yes, it is possible and the existing monetary system is one of the best examples.

After World War 2, the world adopted a new monetary system known as the [Bretton Woods system](#). At a high level, the system specified that the U.S. would back its currency with gold and every other country would keep USD as its reserve. As long as the U.S. maintained its backing to gold, every other country would also be implicitly backed by gold. This was fine until the 1970's when the U.S. decided to officially stop backing its currency with gold, a decision partially caused by bad discretionary monetary policy. Since that point, the U.S. money supply, and implicitly the global money supply, has not been backed by tangible assets. You can't go to the U.S. government and ask for a fixed amount of gold for your dollar-- the only thing that gives the dollar value is the circular promise that other people will continue to value it. While it is true that the U.S. government can use coercion to force its people to continue using dollars, nothing else stops the rest of the world from moving to, say, Bitcoin other than a very, very strong network effect based on trade between nations. This same network effect can keep a currency in a stable equilibrium in the absence of tangible backing, and is a phenomenon we refer to as the "medium of exchange monopoly."

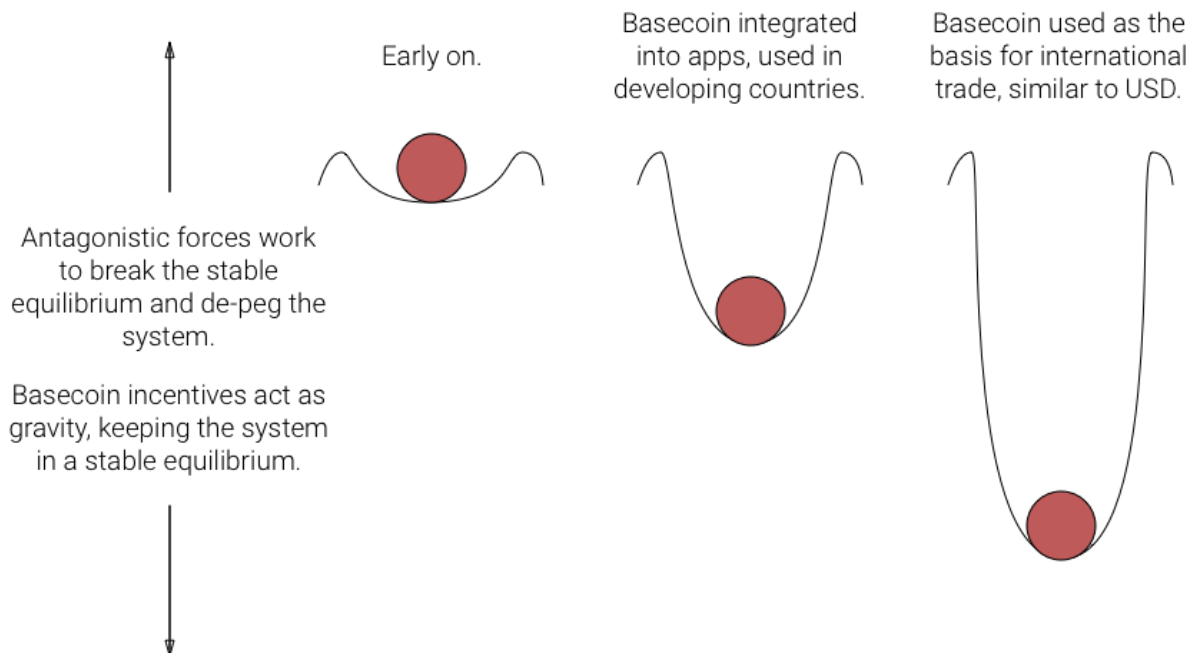
When a currency is used as a medium of exchange, it becomes very difficult for other people to stop valuing it. The currency stops being a purely speculative asset, backed by nothing, and transitions into an equilibrium where it is backed, effectively, by the immense pain people would incur from having to switch off of it. Students of game theory will understand this as a [Nash Equilibrium](#), where if everyone else believes a currency is valuable, the optimal strategy is for you to treat it as valuable as well. Once the USD established its medium of exchange monopoly on the world, and got other countries to use it for trade, it could safely transition away from tangible backing without fear of losing its abstract value. It could rely on a collective action problem, where it's too hard for everyone to switch to a new currency at the same time, to maintain its position as the dominant medium of exchange.

As an aside, gold also relies heavily on the concept of a Nash Equilibrium for its value: It's valuable in large part because other people value it. However, we believe this equilibrium is not as strong as the equilibrium a currency gets when it achieves a medium of exchange monopoly. For example, we are already seeing Bitcoin start to erode gold's position as a store of value-- but Bitcoin has had a much harder time eroding fiat currencies even though fiat isn't "backed" by anything tangible. Put another way, the equilibrium achieved by a medium of exchange monopoly can, in many ways, be much more effective at making something valuable than being

physically backed by something. Interestingly, this realization can make a medium of exchange a superior store of value compared to things that are designed solely for that purpose.

What does all this mean for Basecoin? Basecoin creates an ecosystem of incentives that keep the currency in an equilibrium, powered by network effects, where its purchasing power is constant. The stronger the network effects powering this equilibrium, the more stable the coin will be. What this implies at a high level is that if Basecoin is successful in getting a foothold initially as a medium of exchange, it can leverage that network effect to keep its value stable even in the complete absence of physical backing. That initial foothold can start with integrations into apps, but we expect the demand for a stable store of value will be big enough that we might end up "Dollarizing" or "Basecoinizing" a small-GDP country that hyperinflates, even in the early days, which would cement the equilibrium very firmly.

As an analogy, the Basecoin system can be thought of as a ball at the bottom of a hill. If the ball is sufficiently perturbed, it can roll above the crest of the hill, and down the other side. Imagine that the ball rolling over the crest represents our system de-pegging. Perturbations amount to volatility in Basecoin demand, with the Basecoin's incentive mechanisms acting as gravity pushing the ball back into its low-energy state at the bottom of the hill. In Basecoin's early days, the incentives that promote stability will be relatively weak. But as the system becomes adopted and network effects begin to form around the system's stability, the potential well grows deeper and deeper, eventually becoming so deep that no realistic amount of perturbation can de-peg the system.



Why do we distribute new coins to share token holders instead of to existing coin-holders?

Paying dividends to existing coin-holders doesn't work at all. It totally compromises the system's stability for the following reasons:

- **When people expect future growth, they'll buy Basecoin at prices far above \$1.**
When you pay expansion to coin-holders, the stable coin starts to have 2 sources of value: the stable coin itself and the stable coin's dividends. The stable coin itself is supposed to be pegged to \$1. But since the coin also earns dividends, Basecoin is actually worth ($\$1 + \text{value of dividends}$), irrespective of its supposed \$1 peg. This means that as long as people expect future growth, they will disregard its supposed \$1 "peg", be willing to buy Basecoin at prices far above \$1, and be unwilling to sell Basecoin unless its price is far above \$1. In fact, nobody would be willing to make markets on Basecoin at \$1—if market makers expect an expansion to happen soon in the future, with the new coins created during that expansion paid to coin-holders, why would they sell coins for anything less than ($\$1 + \text{value of dividends}$)? This dynamic causes Basecoin to de-peg during the periods between when the Basecoin algorithm reacts. And then, even when the Basecoin algorithm reacts, there will be far greater volatility—see the next bullet for what this implies.
- **Far greater volatility.** Because the fundamental value of Basecoin is no longer \$1, but rather ($\$1 + \text{value of dividends}$), people will rush to buy Basecoin for speculative reasons. This causes **prolonged periods of artificial upward pressure** due to people buying the coin not for its price stability but in anticipation of future dividends. The Basecoin algorithm will react to this inflated demand by printing coins to restore coin price to \$1, but it will be unclear whether these new coins are printed due to demand for Basecoin as a stable coin, or due to demand for speculation on future Basecoin growth. Likely, it will be largely due to the latter, which will bring about **dramatic collapses in Basecoin demand when speculators realize that too many coins have been issued and the dividend stream dries up**. This also makes it much more likely that Basecoin will de-peg in the downward direction.

At a fundamental level, Basecoin is valuable to its users because its users desire stability. If you don't look hard enough, it is natural to think that paying dividends to coin-holders would only add to Basecoin's value, since it creates a attractive speculative component that rewards people for adopting Basecoin. However, adding this speculative component, while it encourages short-term growth, actually undermines Basecoin's utility component because it jeopardizes the stability of the coin. This severely detracts from Basecoin's real, long-term value. **The only way to fix this is to decouple the speculative component and issue new coins to share token holders instead.**

What happens if Basecoin demand experiences zero-growth forever?

A concern some have with this mechanism is that it relies on nonzero growth. In particular, if the growth rate of the economy ever becomes zero long-term, then it is a mathematical guarantee that the bond queue will fill, causing the system to chronically de-peg and re-peg (recall that it re-pegs because bonds expire).

The concern, the argument goes, is that the Basecoin system is not suitable for long-run use as a medium of exchange because economic growth eventually slows down, causing chronic de-pegs to set in. This argument is incorrect, however, for the simple fact that large zero-growth economies do not exist and, moreover, their existence would undermine our fundamental understanding of capitalism and human nature. Even if such an economy did exist, however, the Basecoin system could trivially compensate for the lack of growth with a simple money supply tax, as discussed below.

Why Zero-Growth Economies Don't Exist

The concept of a [steady-state economy](#), i.e. one that has zero growth, has been considered and critiqued for centuries. Put simply, it is the idea that one day the human race may reach a point at which its population is constant, its resource consumption is net zero, and the economy exists in what is effectively a stasis.

The issue with this concept is that such a stasis seems to go against human nature, and certainly goes against the foundation of modern society. To see this, simply consider what would happen if an economy were in a stasis while simultaneously operating under capitalist incentives. Unless the entirety of the population were rendered somehow catatonic, people would start researching ways to get more out of the resources at hand. Why? Because anyone who figures out how to increase resource utilization earns a profit over their next-best competitor. This incentive structure would naturally cause technological breakthroughs to occur, breaking the stasis and either expanding the population or making the existing population more productive, allowing them to accomplish more, hence undermining the initial assumption of zero economic growth.

The intuitive reasoning above is supported by the data on per-country GDP, and can be validated by the reader simply by browsing through the charts in [this database](#). It is reasonable to model our long-term steady-state demand as roughly the GDP growth rate (either real or nominal) of the countries in which we are used.

Of course, while we do argue that long-term economic growth is generally positive, that does not imply that short-term economic growth must always be so. Indeed, countries can still go through recessions and depressions-- but the key thing to understand is that no population of human beings ever keeps its output constant forever.

Money Supply Tax

Suppose that it were possible to have a zero-growth or negative-growth economy. The Basecoin system can still be augmented to handle this with the addition of a simple tax on coin-holder purchasing power. Concretely, a money supply tax can be implemented in one of two ways.

- The peg between coins and USD (or CPI in the long run) can [crawl](#), such that a fixed rate of inflation is imposed on coin-holders and redistributed to bondholders. This type of inflation tax is exactly what the Fed implements when it targets a 2% inflation rate per year.
- An alternative to a crawling peg is imposing a simple storage fee on coin balances. In this case the peg stays at exactly \$1 per coin forever, but account balances drop by some percentage every block. For example, if we have a 2% annual storage fee and you hold 1 coin today, you'll have .98 coins in your account a year from now ($.98 * .98$ two years from now). Such a fee has a very positive impact on system stability because it is mathematically identical to having a 2% constant growth rate in demand.

Note that because we peg to the dollar initially, we are already getting a 2% crawling peg in the form of USD inflation. Thus, we don't think a money supply tax is necessary in the short run. In the long run, if we go to the CPI we can carry the crawling peg over to the extent that we think that there are other reasons to prefer a tax on money, such as the fact that such a tax can incentivize purchasing and allow real wages to decline gracefully over time.

Can Basecoin only be pegged to the dollar?

No, the coin can be pegged to anything you can source an exchange rate for. For example, if in the long run people start using Basecoin to buy tangible goods, then we can compute a consumer price index denominated in Basecoin for those goods and target our monetary policy toward stabilizing the (Basecoin) <-> (basket of goods) exchange rate instead (aka the price level). In the long run if people start using Basecoin to buy things instead of USD, it will actually be necessary to do this. This is described in more detail in the section entitled [A Post-USD World](#).