

Fiat and Crypto Currencies

Invesco Seminar, Cambridge University

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Fiat Currency

- A form of money that is neither **redeemable into** nor **backed by another asset**.
- Issued by a **central bank**.

Crypto Currency

- A form of money that is neither **redeemable into** nor **backed by another asset**.
- Issued by a **protocol**.

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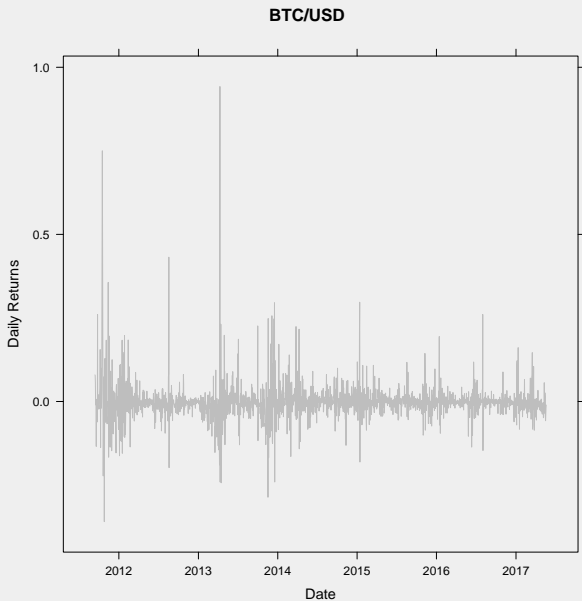
Main difference? Rules-vs-discretion

Three functions of money

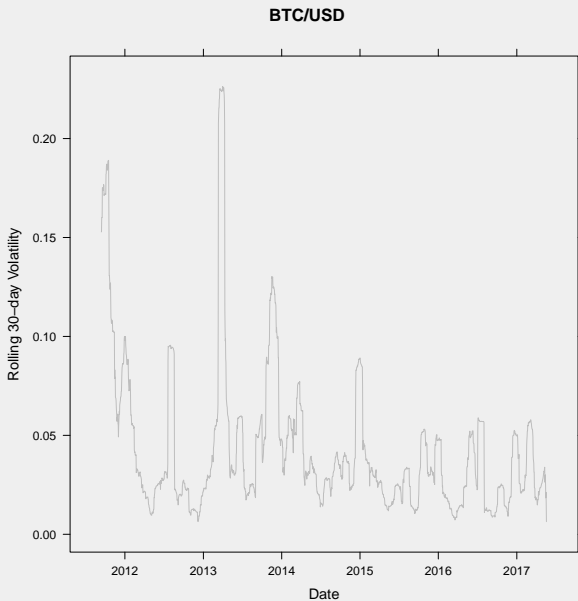
- Medium-of-Exchange
- Store-of-Value
- **Unit-of-Account**

Cryptocurrency performs two of the three functions. Whether it does so well or badly depends on one's perspective.

Bitcoin Volatility



Do you see a trend?



Will Bitcoin Volatility Decline?

Short answer No.

Longer answer No, unless future demand becomes more predictable.

And, no, a more liquid BTC market will not make Bitcoin's price more stable...

The main volatility in bitcoin comes from variability in speculation, which in turn is due to the genuine uncertainty about its future. More efficient liquidity mechanisms don't help reduce genuine uncertainty.

Nick Szabo

What is “deterministic coin supply”?

The growth rate of coin supply is completely specified in advance and is not influenced by facts outside of the system.

- This is *not* “digital gold”
- Even gold has a supply that responds to its price
- Bitcoin is more like a “digital collectable”

Transactional Coin Demand CD_T Desire to hold a certain quantity of coins for the purpose of making transactions.

Speculative Coin Demand CD_S Desire to hold a certain quantity of coins to speculate on future increases in coin price / purchasing power.

Coin demand made up of both transactional and speculative motives

$$CD = CD_T + CD_S$$

Coin demand is a quantity of **purchasing power**

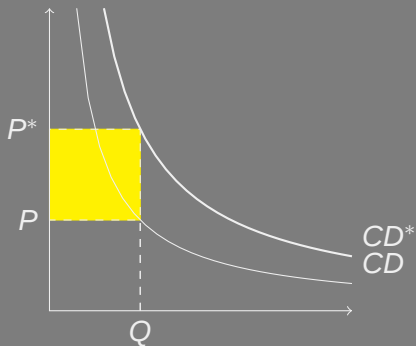
$$CD = P \times Q$$

P purchasing power, coin price of a broad basket of goods and services

Q quantity of coins demanded given P

Coin Demand Curve (and fixed supply)

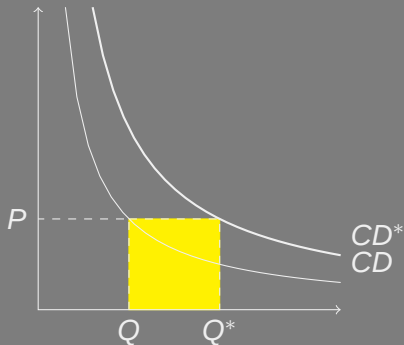
CD Change with Fixed Supply



With a deterministic supply protocol like Bitcoin's, an X% increase in **demand** (CD to CD^*) causes an X% increase in **coin price** (P to P^*) because supply is fixed in the period.

Coin Demand Curve (fully elastic supply)

CD Change with Elastic Supply



An $X\%$ increase in **demand** (CD to CD^*) causes an $X\%$ increase in **coin quantity** (Q to Q^*) because supply can change in the period.

Deterministic Supply Causes Volatility

- If demand growth exceeds pre-programmed supply growth, coin price will increase.
- But if we **expect today** that this will happen in future, then price increase will happen today (“**Law of Iterated Expectations**”).
- Therefore, bitcoin price reflects today's expectations of future demand growth.
- ...and deterministic supply **creates speculative demand** CD_S .

A prediction market on itself

So bitcoin price is a like a prediction market on the growth rate of its own future adoption. Price volatility reflects irreducible uncertainty about its future.

“So it’s like a growth stock, right?”

Transactional coin demand CD_T is inversely related to coin volatility.

The more volatile the coin, the less useful it is as a medium of exchange.

- Volatility raises **transaction costs** for merchants.
- Volatility renders coin useless as a **unit-of-account**.
- Volatility increases need for **re-balancing**.

No, it’s not like a growth stock

The stock price of a young, high growth company is also volatile. But the volatility of the a growth company’s stock **does not influence the demand for its product**. But the volatility of bitcoin *does* influence the demand for bitcoin as a medium-of-exchange.

Stablecoin

At the end of some pre-defined interval of time (the *rebase period*, every n blocks), if the change in coin price of the interval is $X\%$, change coin supply by $X\%$.

$$Q_i = Q_{i-1} \times \frac{P_i}{P_{i-1}}$$

$$\Delta_i = Q_i - Q_{i-1}$$

, where i is the i -th rebase period, Q is coin supply and P is coin price.

Bitcoin

- Gold standard
- Austrian Economics

Stablecoin

- Milton Friedman's "k-percent rule"
 - Irving Fisher's "Dollar Stabilisation"
-
- Both favour "rules over discretion" w.r.t. money supply.
 - These theories assume fractional reserve banking.
 - Differing opinions about nature of money demand.
 - Ironically, Bitcoin gives rise to very "Keynsian-like" money demand.

Two Hard Problems

1. **Coin distribution.** How is Δ_i distributed?
2. **Data representation.** How can P_i be represented inside the network in a way that requires minimal trust?

Solution attempts

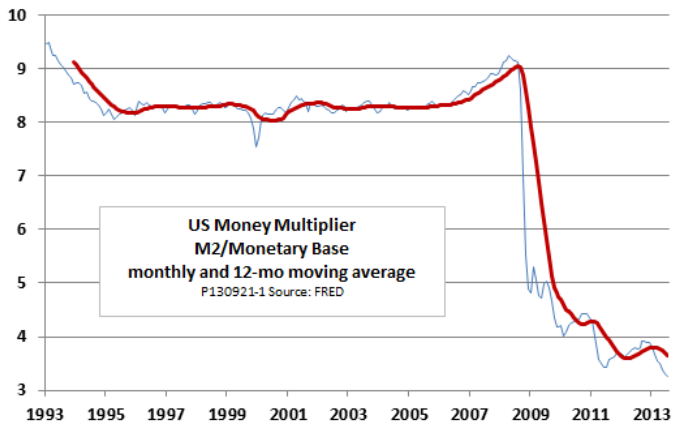
- Robert Sams, *A Note on Cryptocurrency Stabilisation: Seigniorage Shares*
<https://github.com/rmsams/stablecoins>
- Vitalik Buterin, *The Search for a Stable Cryptocurrency*
<https://blog.ethereum.org/2014/11/11/search-stable-cryptocurrency/>

Two Types of Money

Attribute	CBM	CoBM
Who issues it?	central bank	comm. bank
Who can own it?	banks, some FMI	everyone
How is it transferred?	CB RTGS system	various systems
How is it created?	asset purchases	bank loans
Does it have credit risk?	no	yes
What does it yield?	policy rate	LIBOR +/-

Why can't you open an account at the central bank?

- CBM accessible only by banks (mostly)
- Competition with bank deposits, macro stability risk



- Central Bank Digital Currency

OR

- Cryptocurrency (Stablecoin) Base Money

