A Discussion of **"Making Money"**

by Gary Gorton, Chase Ross, and Sharon Ross

Wenhao Li

USC Marshall

March 12, 2022

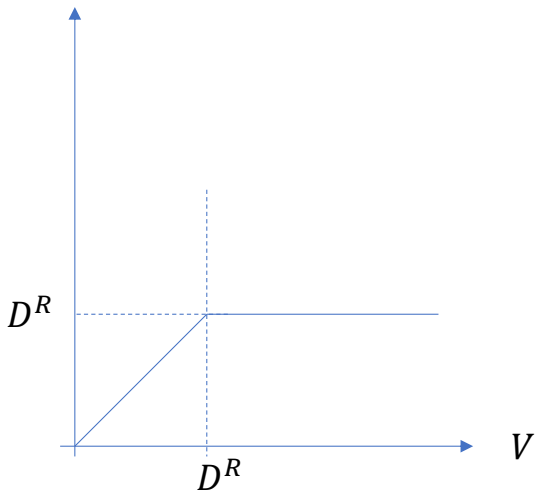
Overview

- Money (or more broadly, "liquidity") creation is a central function of the financial system.
- How to measure the "moneyness" of different assets, and what makes them more or less money-like?
- This paper:
  - An empirical analysis that formalizes the "no question asked principle" (Holmstrom 2015; Dang, Gorton, and Holmstrom 2017).
  - Moneyness can be summarized by a simple distance measure d. Pricing money as risky debt claim.
  - Technology and reputation are important determinants of moneyness.
  - Two cases of private money: pre-Civil War banknotes, and modern stablecoins.

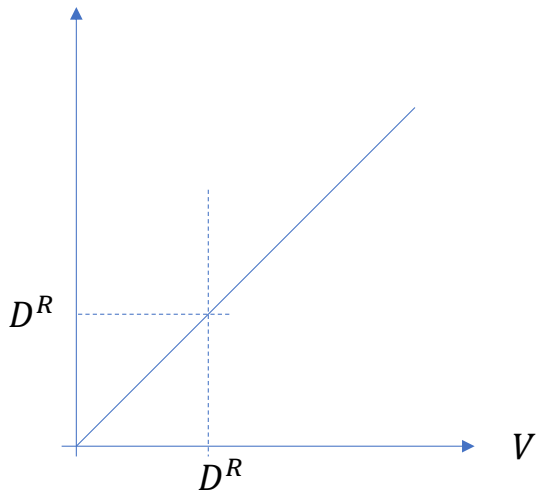
Pricing Bank Notes (and Stablecoins) as Risky Debt

- Think of bank note as senior debt claims on bank assets. Consider D^R unit of bank note that is most senior.
- Payoff of bank note = payoff of all bank asset - payoff of a call option

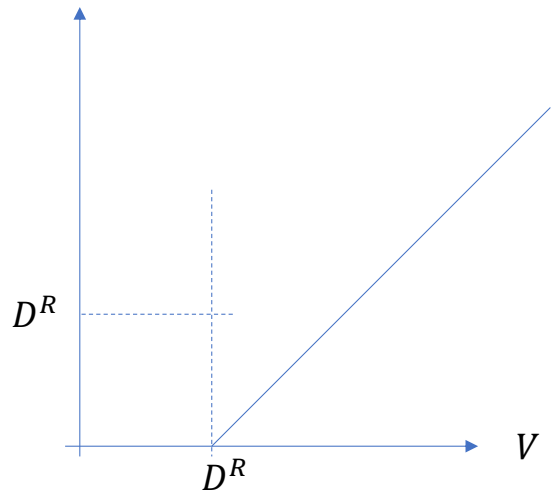
Security Payoff of Bank Note



Security Payoff of All Bank Assets



Security Payoff of a Call Option



Pricing Bank Notes (and Stablecoins) as Risky Debt

- Debt price $P_t = (V_t - \text{call option with strike } D^R \text{ maturing in } d \text{ periods})/D^R$.
- The latter according to Black-Scholes formula is:

$$C(V_t) = N(h_D + \sigma\sqrt{d})V_t - N(h_D) \cdot D^R \cdot \exp(-r_f d)$$

$$h_D = \frac{\log(\frac{V_t}{D^R}) + r_f \cdot d}{\sigma\sqrt{d}} - \frac{\sigma}{2}\sqrt{d}$$

- Assumption: no more deposit claims before d; yearly volatility of bank asset growth is σ (Geometric Brownian motion); no bankruptcy costs.
- **Solve** d by equating P_t with actual debt price.
  - Input: bank asset value V_t, volatility σ, risk-free rate r_f, and bank note face value D^R,

Applications to Bank Notes and Stablecoins

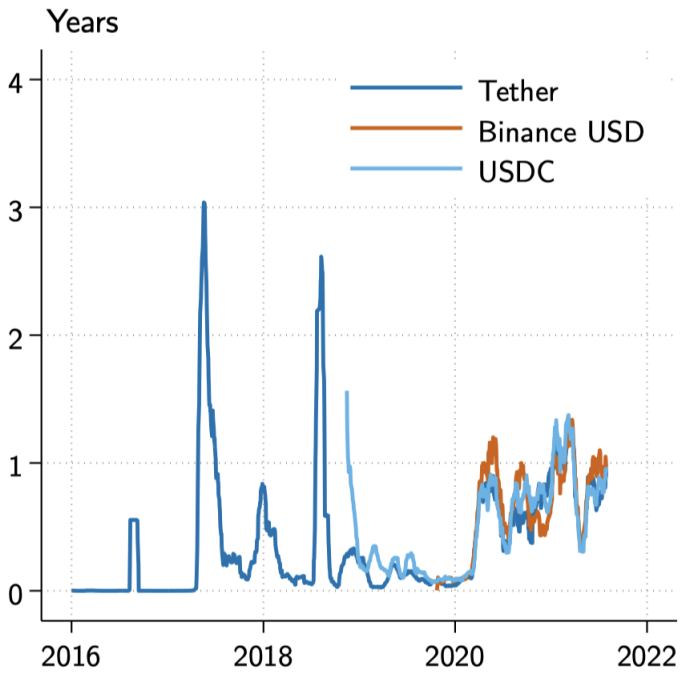
- Covenience yield $\equiv r_f - r^d$, with $r^d = 1/P_t - 1$.
  Comment: The yield of bank note definition should consider the implied maturity d. Thus,
  $$r^d = (1/P_t - 1)/d$$
- Bank notes: free banking period from 1937–1863
  - Traded in New York and Philadelphia.
  - Discounted due to difficulty of traveling to the bank location.
  - Use railroad network to test: (1) Implied d has physical meaning; (2) physical distance affects convenience yield.
- Stablecoins
  - Data: dollar prices of stablecoins and the lending rate on stable coins.
  - Reputational effect affect stablecoin moneyness.
  - Negative convenience yield, and the convenience does not increase over time.

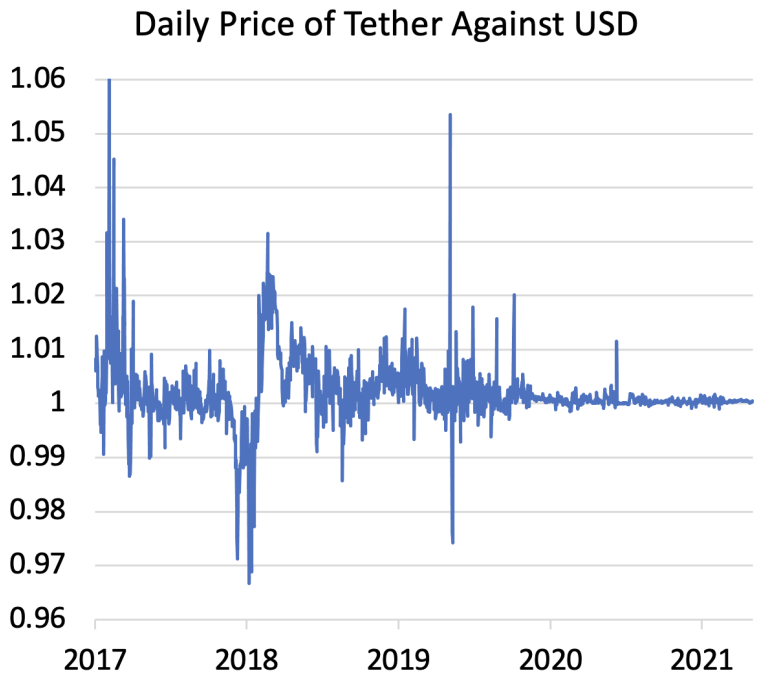
Comment 1: Negative Convenience Yield

- The model always implies $P_t < \exp(-r_f d) < 1$ and $r_f < r^d$, thus convenience yield is always negative.
  - Intuition: risky debt has higher yield than safe debt.
  - What is missing? – when both become safe, the difference is about liquidity.
  - E.g., Repo–Tbill spread (Nagel 2016), Refcorp–Treasury spread (Longstaff 2006; Scott, Li, and Song 2021).

- Suggestion: may add a "trip cost" term to debt pricing? $P_t - \beta \cdot d = \ldots$, so that we can have $P_t = \ldots + \beta \cdot d > \exp(-r_f d)$, and a positive convenience yield.

Comment 2: Measuring Volatility of Stablecoin Reserves





- Low volatility period leads to higher d and less moneyness. Why?
  - σ_t is low (measured as historical vol of stablecoin returns), any small price deviation indicates a large effective maturity d.
  - Solution: assume a constant σ, or measure it via underlying reserve assets.
- The dealing with $P_t^{Ex} > 1$ is not fully consistent with the model.

$$P_t = 1/P_t^{Ex} \quad \text{if} \quad P_t^{Ex} > 1$$

Comment 3: Convenience Yield of Stablecoins

- Median lending rate: Tether = 11%, USD = 18.8%, Bitcoin = 5.3%.
- Which one should be the benchmark to measure convenience? USD borrowing on crypto exchange, or Bitcoin borrowing rate?
- Anecdotes: the main use of Tether and USD borrowing on crypto exchange is to take levered positions on Bitcoins.
- Thus, spread between USD and Tether borrowing rate mainly reflects the convenience of borrowing via Tether to hold Bitcoin
  - Why not enough convenience of dollar borrowing? Not many investors are willing to lend actual dollars to levered Bitcoin positions.

Summary

- A very thought-provoking paper! Great analysis that reveals the nature of "making money"!

Could improve on three dimensions:

- Model always indicates a negative convenience yield.
- Measure Stablecoin reserve volatility in a different way to address the volatility-moneyness disconnect.
- Try alternative measures of stablecoin convenience.