

Digital Money and Finance: What's New?

Fintech and Digital Currencies RPN Webinar

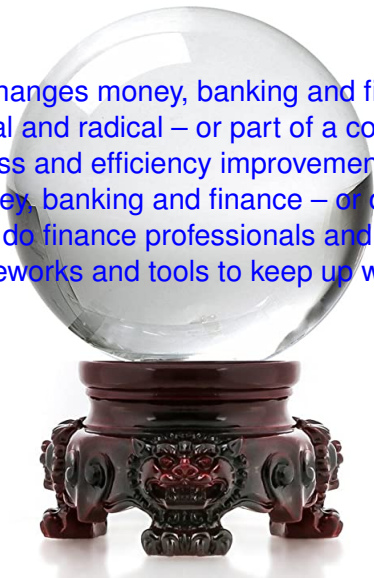
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The Future

Digitisation rapidly changes money, banking and finance. Are these changes fundamental and radical – or part of a continuous process of technological progress and efficiency improvement? Do academics have to re-think money, banking and finance – or do conventional theories apply? And do finance professionals and regulators need to re-assess their frameworks and tools to keep up with the transformation?



The Landscape

- Privately issued cryptocurrencies:
 - ▶ Bitcoin: since 2008. Nakamoto paper.
 - ▶ New technology: the blockchain.
 - ▶ Today: 10.000+ active cryptocurrencies. 300 million users.
 - ▶ Entry by “big players”. FaceBook-Libra failed, but won't be the last.
- “Traditional” means of payments:
 - ▶ Cash, Deposit accounts.
 - ▶ Credit cards. ApplePay.
 - ▶ PayPal.
 - ▶ Fast retail payment systems. Venmo, Pix (in Brazil), . . .
- Retail Central Bank Digital Currencies or rCBDC:
 - ▶ Gov. Chris Waller: “a solution in search of a problem”.
 - ▶ Response to the competition of private cryptocurrencies.
 - ▶ Go with the times, make things digital!
 - ▶ Financial inclusion. Enhance banking competition.
- Privacy vs criminal activity. **No clean resolution.**
 - ▶ KYC, “know your customer”.
 - ▶ Cryptocurrencies offer a way out. Should they? Tornado cash.
 - ▶ Respect desire for privacy! Anon movie: *“It is not that I have something to hide. I've got nothing I want you to see.”*

Bitcoin Price

Bitcoin to USD Chart



Source: <https://coinmarketcap.com/currencies/bitcoin/>

Bitcoin Price in logs

Bitcoin to USD Chart



Source: <https://coinmarketcap.com/currencies/bitcoin/>

Schilling - Uhlig, “Some Simple Bitcoin Economics”

Key Questions:

- 1 What determines the Bitcoin price Q_t ? $NPV(\text{Dividends}) = 0$.
- 2 Can Bitcoin serve as medium of exchange, despite price volatility?
- 3 What are monetary policy implications?

Key Insights:

- 1 A **novel model** of an endowment economy with two intrinsically worthless currencies (Dollar, Bitcoin) as medium of exchange.
- 2 “Fundamental pricing equation”.

$$Q_t = E_t[\mathcal{M}_{t+1}Q_{t+1}]/E_t[\mathcal{M}_{t+1}]$$

Special case: **Bitcoin price Q_t is martingale;**

KAREKEN AND WALLACE (1981), MANUELLI AND PECK (1990).

- 3 “**No speculation**” theorem. Why “hodl”?
- 4 **Volatility does not invalidate medium-of-exchange function.**
- 5 **Monetary policy implications:**
 - ▶ **Bitcoin block rewards are not a tax on Bitcoin holders: they are financed with a Dollar tax:** $(D + QB)V = PY$.

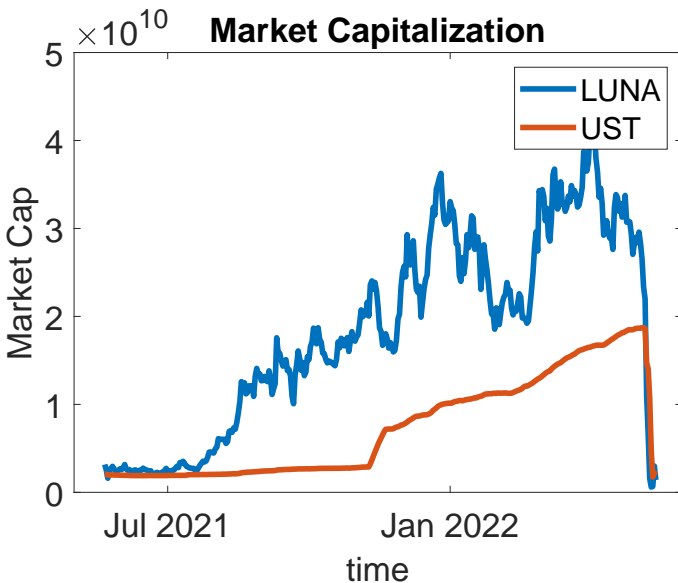
Digital currency: private competition to central banks.

- Benigno - Schilling - Uhlig, “Cryptocurrencies, Currency Competition, and the Impossible Trinity,” JIE 2022.
 - ▶ Focus on “medium of exchange” role of money.
 - ▶ Bare-bones model of two countries and three currencies.
 - ★ two national currencies (n.c.), issued by the two central bank.
 - ★ One global currency (g.c.). Perfect substitute in either country to n.c..
 - ▶ If nat currency drops in value rel to global; it will not be used.
 - ▶ Main result 1: mon. pol. synchronization or n.c. is no longer used.
 - ▶ **Crypto-Enforced Monetary Policy Synchronization** or **CEMPS** .
 - ▶ Main result 2: if g.c. is “asset backed,” narrow range for mon pol.
- Uhlig-Xie, “Parallel Digital Currencies and Sticky Prices,” draft.
 - ▶ Focus on “unit of account” role of money.
 - ▶ New Keynesian model, two currencies, one issued by central bank.
 - ▶ Firms set sticky prices in one of the two currencies.
 - ▶ Main result: martingale exchange rate fluctuations create new source of macro uncertainty. Challenge to central bank!
- **Upshot:** large privately issued cryptocurrencies will be competition and headaches for central banks.

DeFi, Smart Contracts and Stablecoins

- DeFi: “Decentralized Finance”.
 - ▶ “Smart contracts”: automatic execution of contractual arrangements encoded on a blockchain.
 - ▶ Ethereum. Solidity is “Turing complete”. ERC-20 tokens.
 - ▶ Key issue: making payments in Dollars or equivalent.
- Stablecoins
 - ▶ Stablecoins arrangements:
 - ★ as narrow banks
 - ★ as money market funds
 - ★ Algorithmic stablecoins
 - ▶ Terra-Luna crash in May 2022 wiped out (or better: redistributed) 50 Billion to 600 Billion US Dollars. Celsius Network.
- Policy
 - ▶ Threats to Financial Stability? Consumer Protection?
 - ▶ Stablecoin regulatory discussions in EU, US. Biden proposal.
 - ▶ Wholesale CBDC, CB-run blockchain as solution?
 - ▶ Better: [a supportive regulatory framework, enabling innovation as well as backstops for those that wish to pay for it.](#)

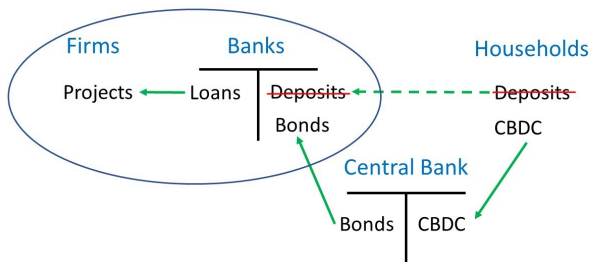
LUNA and TERRA UST market cap



Source: Uhlig, "A Luna-tic Stablecoin crash", BFI WP 2022-95.

Central Bank Digital Currency or CBDC

- A CBDC is an (interest bearing) account held by households at the central bank. (Barrdear and Kumhof, 2016)
- Likely to be introduced widely. Already in Bahamas, others.
- “Financial inclusion”: good!
- But **Disintermediation Threat**: if HH hold CBDC rather than deposits, banks cannot fund firms ...
 - 1 ... unless HH re-invest CBDC at banks (Duffie, others) or ...
 - 2 ... Central Bank re-funds banks or projects (Brunnermeier-Niepelt).
- **Schilling - Fernández-Villaverde - Uhlig, “Central Bank Digital Currency: When Price and Bank Stability Collide”**: 2nd option.



The CBDC Trilemma

In our model: Only HH, CB, projects. CB is financial intermediary.

Key Mechanism

- Nominal Diamond-Dybvig (1983) model for a CB and its CBDC.
- Central bank can always deliver on its nominal obligations.
- But: CB runs can happen: “spending run” on available goods.

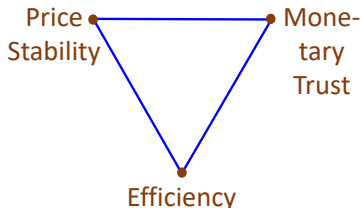
Three competing objectives:

- 1 Traditional CB objective: commitment to **Price Stability**
- 2 Social optimum, optimal risk sharing: **Efficiency**
- 3 Absence of runs, financial stability: **Monetary Trust**

Key Result:

CBDC Trilemma

Of the three objectives, the central bank can only achieve two.



An Assessment



- The currency landscape is changing dramatically.
- Crypto market cap is one trillion US\$. Can't ignore.
- Big players, foreign countries are interested, will introduce.
- Central banks face competition, will have to act: CBDC.
- Privacy concerns: not just criminals value privacy.
- Private crypto-currencies will continue to exist and flourish.
- Ecosystem and technological possibilities:
 - ▶ NFT: non-fungible token. Apps exist.
 - ▶ DAO: decentralized autonomous organization.
 - ▶ DeFi: decentralized finance.
- Challenges to monetary policy, financial stability and regulation.
- Challenges to research. Many new answers.
- But: do not be afraid! This will improve our lives.