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Platforms, Tokens, DeFi, Smart CBDC

Jonathan Payne
Princeton University

09. June 2022
Markus
Brunnermeier

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Trends

- Social networks for **Citizens** with token
- Supply chains B2B for **Industry 4.0**
  - With payment rail + token
  - Explosion of (**programmable**) payments
  - Smart contracts token (with automatic execution)
- Info extraction: AI, deep learning, big data
- Exclusion power: Low default rates
  - Interoperability limits it

- **US:** **Stablecoins** in US $
  - programmable tokens of social networks/industry 4.0
  - Challenge: regulating stablecoins, platform **interoperability**
- **Europe:** **Digital Euro** (CBDC)
  - Consumer (not industry 4.0 focused)
  - Challenges:
    - Programmable/Smart contract integration is limited
    - CBDC as legal tender undermines smart contracts further
- **China:** **AliPay** and **WechatPay** + Digital Yuan
  - Consumer (convenience) + medium of exchange focused
- **EMDE:** Domestic CBDCs to fend off **digital dollarization**
  - Challenges: loss of monetary sovereignty and cheap funding

Political Economy

- US: ICO to create private seigniorage
  and then get regulatory stamp and guarantees

- Europe: use CBDC as a catalyst to
  modernize banks (EPI), competition to credit cards

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Poll

1. What makes digital money different?
   a. Need for a digital ledger
   b. Programmability
2. Which statements about DeFi do you agree with?
   a. Banks are not needed and disappear
   b. Banks are not needed but stay
   c. Banks are essential
3. Will firms be willing to put all their transactions on a public ledger/platforms?
   a. Yes
   b. No
4. What's the most important role of CBDC?
   a. Provide digital cash
   b. Compete with private digital currencies
   c. Catalyst for modernizing banks
   d. Integrate digital transactions in a universal ledger
   e. Monitor criminal activity

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   a. Banks are not needed and disappear
   b. Banks are not needed but stay
   c. Banks are essential
2. What is the biggest impact on Africa's growth?
   a. Education
   b. New forms of governance
   c. New Tech (incl. FinTech)
   d. Global trade
   e. New entrepreneurship
   f. Others
3. African demographics is more of a
   a. Opportunity
   b. Challenge

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Tokens, DeFi, Platforms, and Smart CBDC

Jonathan Payne
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Markus Academy Webinar

9th June, 2022

Questions

- ⋆ Q. What is different about digital money and ledgers?
- ⋆ Q. Can financial services move from banks to "decentralized finance" ("DeFi")?
- ⋆ Q. Can tech firms exploit new synergies to extend credit services and market power?
- ⋆ Q. How should a regulator respond? Open banking? CBDC??
- ⋆ Draw on Brunnermeier & Payne (2022), *"Tokens, Platforms, and Interoperability"*

Many Varieties of Digital "Money"

- ⋆ Digital reserves at the Fed.
- ⋆ Digital dollars in bank accounts and digital wallets.
- ⋆ Bitcoin, Ether, and other "cryptocurrencies".
- ⋆ USDC, Tether, and other "stablecoins".

Digital Monies Differ in Ledger Structure

		Digital Monies			
	Cash	Reserves	Bank Account	Crypto	Platform Tokens
Issuer	Govt.	Govt.	Bank	Algorithm	Platform
Ledger?	✗	✓	✓	✓	✓
Central ledger control?	-	✓	✓	✗	✓
Transparent ledger?	-	✗	✗	✓	✓
Anonymous payment?	✓	✓/✗	✓/✗	✓	✗
Public access?	✓	✗	✓	✓	✓

New Ledger Technologies

- ⋆ Digital currencies require ledgers!
- ⋆ And introduce new design challenges.
- ⋆ Has led to emergence of transparent, programmable ledgers with:
  (E.g. Ethereum, Solana, Avalanche)
  - ⋆ Token accounts: that record net token wealth, and
  - ⋆ "Smart" contract accounts: with user-defined, and computer programs that automatically executes the transactions (and other terms) specified in the contract

A Different Enforcement Paradigm

- ⋆ Enforcement of "smart" contracts on a digital ledger requires:
  1. Access to information flow about transactions and other activities ("oracle" problem),
  2. Control of the payment flow.
- ⋆ Technological change: creates a "segmented" world of enforcement:
  - ⋆ Legal system: imperfect enforcement in a wide range of situations,
  - ⋆ Digital ledger: perfect enforcement on the ledger; no enforcement off the ledger.
- ⋆ Economic implication: need to incentivize agents to use the ledger
  - ⋆ Assisted by strong network effects, and
  - ⋆ The power to exclude

Different Attempts to "Reorganize" Financial Services

1. Decentralized Finance. ("DeFi", "Web 3.0", "decentralized internet")

2. Centralized, Programmable Ledgers.
   ("Industry 4.0", "Automated Trade/Finance Integration", "PlatFi")

3. Open Banking. ("Open Data", "Open Architecture")

4. Central Bank Digital Currency. ("CBDC")

"DeFi" Aims to Rebuild Finance Without Intermediaries

- DeFi uses smart contracts on a "blockchain" ledger to create financial instruments.
- Key features:
  - Decentralized control: DeFi uses blockchain ledgers that are updated by consensus protocols on a peer-to-peer network (without any centralized intermediary).
  - Decentralized governance: voting power is typically apportioned by "governance tokens", which are often allocated to users/creators.
  - Modular: smart contracts are used to create "financial primitives" (e.g. token creation, custody and swaps), which are then used as building blocks for "decentralized" applications ("DApps").

Goals of DeFi

- ⋆ Decentralize control of financial services and so eliminate rent-seeking intermediaries.
- ⋆ Provide anonymous, digital financial services.
- ⋆ Decrease barriers to entry in finance and increase innovation.
- ⋆ Increase financial inclusion.
- ⋆ Increase the interoperability of financial instruments and applications.
- ⋆ Increase the transparency of financial ledgers, so anyone can monitor the ledgers

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Q. How important is decentralization to these goals?

Q. Is Disintermediation Possible?

- Recent attempts at disintermediation have struggled (E.g. Peer-to-peer networking)
- Many possible reasons:
  - Lack of decentralization technology?
  - Regulatory barriers to entry?
  - Anti-competitive behaviour by banks and other financial intermediaries?
  - Economies of scale?

Need to understand interaction of digital ledgers with industrial organization!

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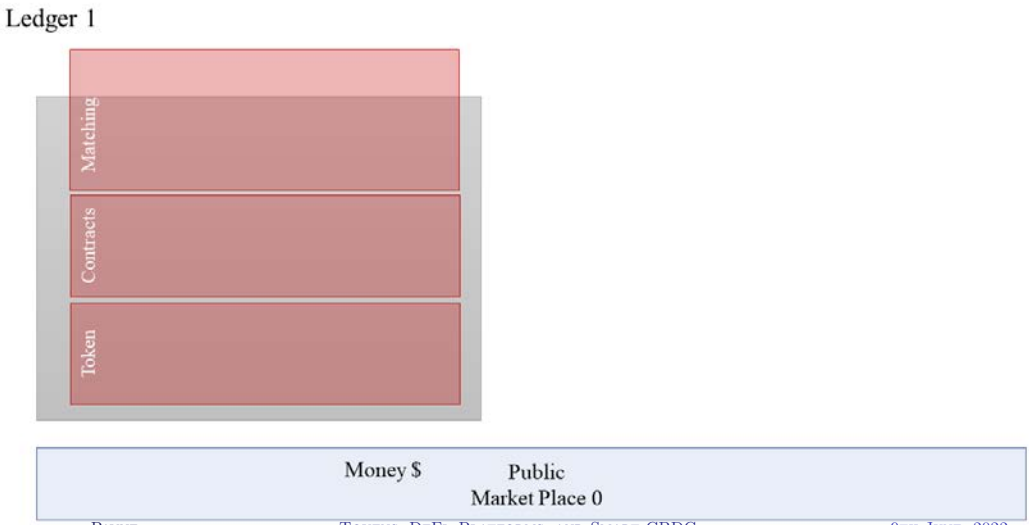
Supply Chain With Digital Ledgers

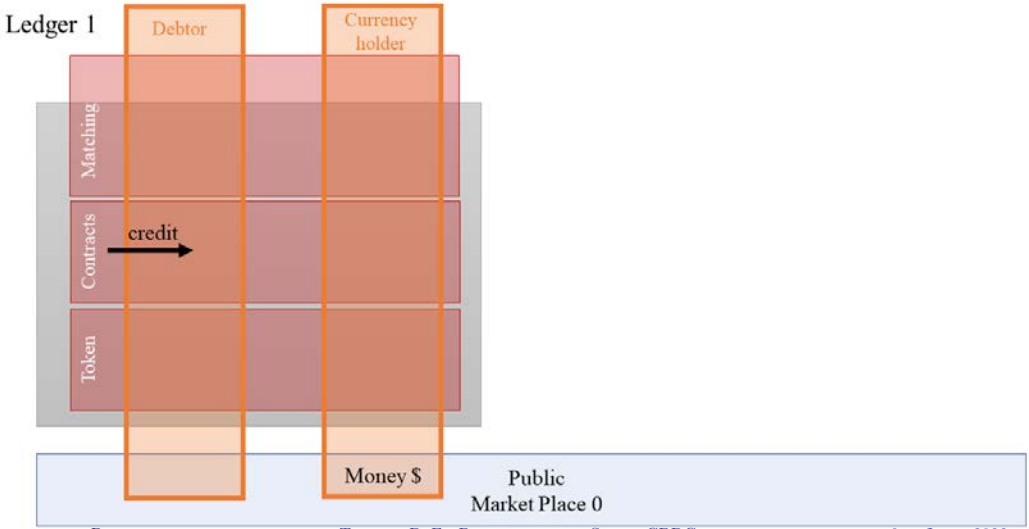
From Brunnermeier & Payne (2022)

- ⋆ Supply chain where agents transition from: producer → seller → buyer.
  - ⋆ Producers need to borrow to produce but lack (i) collateral and (ii) commitment
  - ⋆ Sellers and buyers must search for trading opportunities
  - ⋆ Buyers need currency for transactions
- ⋆ Incumbent private platform offers credit, matching, digital ledger. Competes with:
  - ⋆ An entrant private platform that offers same services ("contestable" markets model),
  - ⋆ A public market place that uses public money
- ⋆ Organizes payments and contracts through ledger; designs "interoperability":
  - ⋆ Exchange rate for moving tokens
  - ⋆ Portability of information to other ledgers

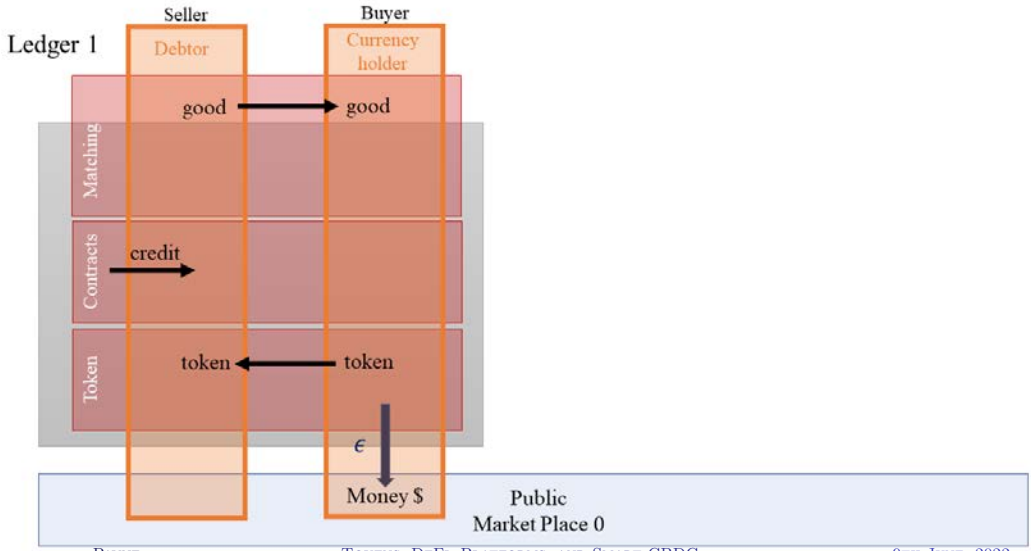
Ledger Structures: Different Accounts & Synergies



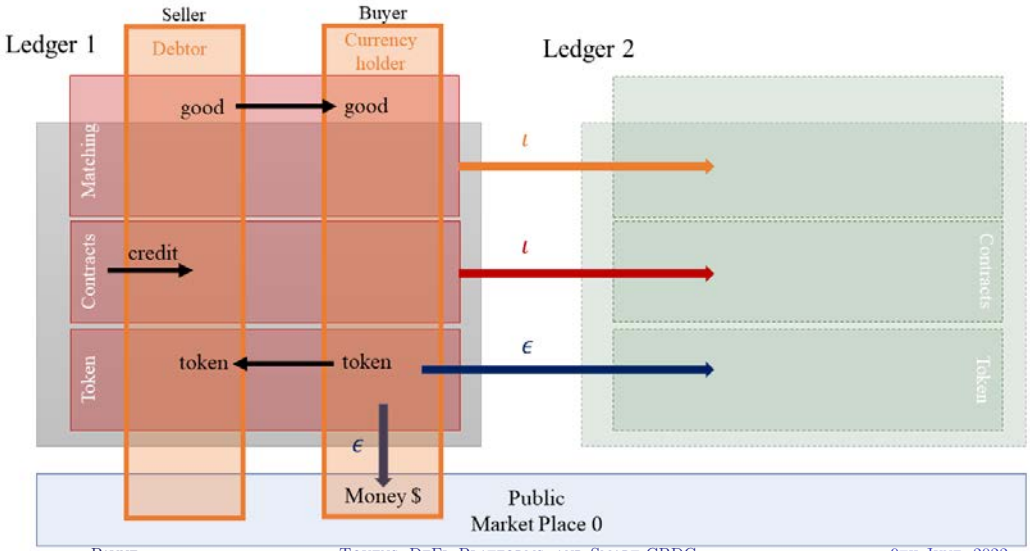
Ledger Structure: Credit



Trade, Credit, Token: Competition with Public Market



Contestable Markets across Private Ledgers



Digital Ledger Technology Creates Synergies

- ⋆ Platform has:
  - ⋆ Information about trades on their platform,
  - ⋆ Control of the token ledger, and
  - ⋆ Capacity to exclude agents from platform if they don't use the token ledger.
- ⋆ ⇒ Can incentivize agents to use their ledger and so enforce contracts.
- ⋆ ⇒ Platform can provide uncollateralized trade-credit

Tech platforms with digital ledgers can provide more credit than banks

But Platform Exploits Ledger to ↑ Market Power

- ⋆ Restricts movement of tokens by charging token exchange fees
  - ⋆ Makes it costly for token-holders to move to entrant platform
  - ⋆ (Although needs to balance this with keeping the currency attractive.)
- ⋆ Restricts portability of *some* information:
  - ⋆ Restricts portability of transaction histories so entrants have worse matching technology
  - ⋆ Promotes portability of contract information so contracts can be enforced even if entrant takes over market
- ⋆ Restrictions deter new platform entry and so allow incumbent to charge higher fees

Tech platforms + digital ledgers = higher markups! The DeFi fear!

Interpretation: "Lock-in" and "Lock-out".

- ⋆ Agents have different ledger exposures
  - ⋆ Buyers (with currency) have a "positive" claim on the ledger:
    - ⋆ Positive token holdings
    - ⋆ Positive "information" position (their transaction histories enable better matching) (Like a "five-star" rating or a reputation.)
  - ⋆ Sellers (with inventory and loans) have a "negative" claim on the ledger:
    - ⋆ Negative token holdings
    - ⋆ Negative "information" position (their contract information enables enforcement)
- ⋆ Platform restricts interoperability where agents have positive claim:
  - ⋆ Restricts movement of tokens and transaction histories to "lock-in" the buyers,
  - ⋆ Makes contract information portable to mitigate "lock-out" of sellers

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Open Banking Regulation

- ⋆ Traditional finance: intermediary controls the portability of information
- ⋆ Open banking: users control the portability of information. In our model:
  - ⋆ Buyers control the portability of their transaction history (ι^h)
  - ⋆ Sellers control the portability of their loan contracts (ι^c)
- ⋆ Open banking has been trialed in the UK and other countries.

Open Banking Shuts Down Uncollateralized Credit

	Perfect Comp	Platform Control	Open Banking
Information Portability	-	$\iota^h = 0,\ \iota^c = 1$	$\iota^h = 1,\ \iota^c = 0$
Loan fee	Default rate	$\uparrow$	$\downarrow$
Incumbent Value	0	> 0	< 0

- ⋆ Buyers have positive information exposure ⇒ port their information
- ⋆ Sellers have negative information exposure ⇒ do not port their information

Uncollateralized Credit is Fragile

- Uncollateralized credit is required to initiate the supply chain.
- However, providing the credit makes the incumbent platform vulnerable because an entrant platform can enter and offer agents the opportunity to move and default.
- Incumbent only provides credit if they can compensate for this effect:
  - E.g. Forcing the portability of contract information
  - E.g. Restricting the movement of tokens or transaction histories

We should be careful about regulating "total" interoperability on tech platforms.

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Legal Tender CBDC May Reduce Credit Provision

- Consider legal tender CBDC on a disconnected, non-programmable ledger.
- No CBDC: platform forces sellers to only accept their token on their platform:
  - ⇒ Payments are made through the ledger
  - ⇒ Smart contracts can be automatically enforced
- With CBDC: agents organize side payments in CBDC to avoid smart contracts:
  - ⇒ CBDC "dollarizes" the private platform
  - ⇒ Platform must intermediate payments to provide uncollateralized loans
  - ⇒ Platforms either reduce credit or change market structure.

"Smart" CBDC May Increase Credit Provision

- Consider legal tender CBDC with a programmable ledger.
- The platform could use the CBDC ledger to write and enforce contracts if:
  - CBDC becomes the dominant currency
  - Other platforms/marketplaces provide information to the platform
- Would we expect platforms to share information?
  - Conditional on other platforms sharing, a platform gets a much larger benefit from sharing information.
  - However, there are potential coordination problems,
  - And platforms may prefer to intermediate payments,

Key Lesson About CBDC

- ⋆ Introducing CBDC can enhance or eliminate potential synergies:
- ⋆ Synergies come from bundling token creation with credit and matching services.
- ⋆ Unless the CBDC ledger is able to replicate (or improve) these synergies, it is unclear that the introduction of CBDC will be welfare improving.

Conclusion

- Q. What is different about digital money and ledgers?
  - **A.** Requires a digital ledger; has led to ledger innovation.
- Q. Can financial services move from banks to "decentralized finance" ("DeFi")?
  - **A.** Unclear that new technology overcomes forces generating intermediation.
- Q. Can tech firms exploit new synergies to extend credit services and market power?
  - **A.** Yes. But, they will also use ledger control to increase market power.
- Q. How should a regulator respond? Open banking? CBDC?
  - **A.** They should preserve synergies that come from integrating digital ledgers other platform operations.