Money in the Digital Age

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Based on joint work with Harold James, Jean-Pierre Landau, Dirk Niepelt, Jonathan Payne

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Rethinking Money in the Digital Age

- Ubiquitous digital money, M-Pesa, Alipay, Libra
  - So far: digital inside money (liability of issuer)
  - Now: digital outside money/“currencies”

Questions:
- Will private digital money drive out cash?
- Will central banks lose their grip on monetary policy?
- Will platforms “steal” the seigniorage benefits of governments and private banks?
- Digital Dollarization and Digital Currency Areas
- Will CBDC be the answer?
- Should BigTechs be forced to be “narrow banks” and platforms to be interoperable?
Roadmap

- Technological trends and the inversion of IO of Finance
- New currency competition
- IMS: Digital Currency Areas & Digital Dollarization
- Monetary Sovereignty: Public versus Private Money
Technological Trends

- Smart phone
- Digital platforms/ecosystems - “digital lifestyle” (COVID)
- Big data, AI, deep learning, recommender systems
- Smart contracts and value chains:
  - contingent payments to minimize credit risk
- Internet of things: payments from machine to machine
- Token (instead of account-based) – DLT
- Micropayments
Tech Trends: Inversion of Power - “Inverse Selection”

- Information advantage
  - for customer
    - Borrower
    - Insurance client, ...

- Customer knows her multiple attributes, but platform only platform can connect them
  - Traditional example:
    - I like a red car
    - Insurance companies knows (from big data) that drivers of red cars are more accident prone

Soon, for seller/platform
- Lender (platform)
- Insurance company
- Asset managers, ...

“will know more about me than I know about myself”
Privacy regulation

From Adverse Selection to “Inverse Selection”
(with Segura-Rodriguez and Lamba)
Tech Trends: Big Data, AI, Machine/Deep Learning

- Economies of Scope
  - Unstructured data, textual data
  - Social media data
  - Payment system data
  - Diversity

- “Bigger is better”

  PLATFORMS
  (transforms IO of finance)

- Scale
  - Diminishing returns to scale?

  SIZE
  Bigger data
  More customers
  Better Recommender system
  Self-reinforcing
Technological Trends

- Digital platforms/ecosystems - “digital lifestyle”
  - Data advantage – who controls the data?
  - Change of IO of financial activities
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Currency competition

- Bundling reduces competition
- Unbundling the 3 roles of money
  - Unit of account
  - Store of value
  - Medium of exchange
- Convertibility, Gresham’s law (gold vs. silver)
- Declining switching costs ⇒ declining network externality
  - Language analogy (speech translation software)
- Re-bundling with platform/ecosystem
  - Discounts on digital eco-system
  - Smart contracts, recommender system
  - “Money product differentiation” (e.g. “privacy currency”)

Closed ecosystem (incl. payment instruments)
Platforms have greater “control” over digital currencies (better able to monitor, restrict or punish usage)
- New IO perspective on Money from “environment friction” to “strategic choices by platforms”

Platform strategy/design:
- Entry costs/subsidy
- Using costs/subsidy, i.e. trading mark-ups, privacy (possible negative)
- Exit costs (“Berlin wall”)
- Growth rate of money/token supply

Platform/currency competition
- With public money (no digital convenience, no exit cost, MoPo based on macro shocks,...)
  - Digital dollarization (is public money at a disadvantage?)
- Across private platforms/currencies
  - Regulation: interoperability (like EPI), convertibility, narrow banks approach
  - Behavioral biases of customers

“lure you in, lock you in, and inflate value away”
“Digital Dollarization”

- Loss of “unit of account” role of money
  - Via medium of exchange (invoicing) vs. store of value (reserves)
  - Sudden and highly non-linear (Chang & Velasco 2006)

- Vulnerable countries: small, socially open
  - Small, open economy, large informal sector (traditional dollarization)
  - Inefficient electronic payment system
  - No own social media presence

- Defense lines:
  - LOLR and taxing power + taxes in local currency
  - CBDC since, (Public) Cash is poor substitute for private digital money
  - Private “stable coins” via 100% narrow bank (whole sale CBDC)
  - Regulation of private platforms: convertibility, interoperability, ...
  - Let private platforms explore and invent and government appropriates later
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Monetary Sovereignty

- Seigniorage rents from money creation
  - Store of value role of money
  - Financial repression

- Control of monetary policy to manage macro economy/business cycle
  Should Facebook’s MoPo manage the macroeconomy?
  - Unit of account role of money
    - Intratemporal behavioral
    - Intertemporal due to MoPo’s redistributive and risk-shifting effects
      - New Keynesian: Stickiness in private/public money (invoicing)
      - Financial Frictions: Denomination of nominal debt
      - MoPo redistributive & risk transfer “The I Theory of Money”

- Power to bail out and to provide liquidity LOLR
  - Connected to taxing power, fiscal space, governance

- Power to exclude from monetary system
  - Weaponizing US dollar
Public versus Private Money

- **Current arrangement**: 2 tier system
  - Government: outside-money/unit of account/settlement among banks
  - Private banks: inside money

- **Future arrangement**

- Example: India Stack, PBC imposing narrow bank model
Seigniorage Rents from Money Creation

- \( \text{max } U(x) \) subject to Brunnermeier-Niepelt (2019)
  - Budget constraint \( B = 0 \)
  - Liquidity constraint \( L \leq 0 \) \( \text{Lagrange multiplier } \lambda \)
  - Cash in advance, MIU, shopping time, New monetarism

- Any asset price
  \[
  p_t^j = E_t [SDF_{t,t+1} \frac{1}{1 - \lambda_t \frac{\partial L}{\partial a^j}} (z_{t+1}^j + p_{t+1}^j)]
  \]
  \[
  p_t^j = E_t \left[ \sum_{s=1}^{\infty} SDF_{t,t+s} \Lambda_{t,t+s} z_{t+s}^j \right] + \text{Bubble}
  \]
  \[
  = \text{Fundamental value + liquidity value + bubble}
  \]
Seigniorage Rents from Money Creation: Public or Private

- Extreme form: issue bubbly liquid asset
  - No (social) resource costs Friedman ‘69

- More general: hold illiquid asset with high cash flow
  - issue liquid asset with low cash flow

\[
\begin{array}{c|c}
A & L \\
\hline
\text{High fundamental value} & \text{Low fundamental value} \\
\text{High liquidity value} & \text{Bubble}
\end{array}
\]

- Rents:
  - “free lunch”
  - Competition
    - Pass on rents to borrowers, but
    - Curse excessive supply, ICOs ⇒ inflation
Equivalence: CBDC vs. Deposits

**Physical Capital**
- Firms
  - Firm Loans
  - Firm Equity

**Firm Loans**
- Deposits
- B-Equity

**Banks**
- B-Debt

**Gov. & CB**
- Implicit G-Equity
- Money

**Gov. Bonds**
- Primary Surplus

**Firms**
- PV

**Households**
- Deposits
- B-Equity
- Firm Equity

**Gov. Bonds**
- Implicit G-Equity

**Money**

**Net-worth**
Equivalence: CBDC vs. Deposits

- **Key insight:** Central bank “passes through” funding
  - If banks are non-competitive, Central Bank’s supply function has to be such that banks set the same deposit rates
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- International Monetary System & Digital Currency Areas
- Monetary Sovereignty: Public versus Private Money
What defines a (separate) currency?

1. Same unit of account
2. Convertibility

- Convertibility
  - Maintain value
  - Uniformity of money (“singleness”)

- Account-based
  - Approval of payments
  - Verification of account owner

- Backing of a currency
  - Currency board
  - Stable coin

- Token-based
  - Finality of payment
International monetary system

- Digital Currency Areas
  - Def.: own unit of account or payment instrument only inside
  - Complementarity with digital platform (not geographic)
    - Price discounts, price discovery, transparency within

- Digital Synthetic World Currency
  - Symmetric supply of a safe asset
    (to avoid that flight to safety capital flows become cross border) (Brunnermeier & Huang)
... to sum up

- Digital platforms/eco-system, smartphone, tokens
  - Inversion of IO of financial activity

- New currency/platform competition – digital dollarization
  - Unbundling enhances currency competition
  - Re-bundling reduces
    - Interoperability, convertibility, limit product differentiation

- “Monetary Sovereignty” to manage macroeconomy
  - Private vs. Public Money – important role of CBDC/LOLR

- International monetary system – digital currency areas

Is Bitcoin/Libra is like Napster for the music industry?
Based on

- The Digitalization of Money
  - With Harold James and Jean-Pierre Landau
- On the Equivalence of Private and Public Money
  - With Dirk Niepelt
- Digital Tokens and Platforms
  - With Jonathan Payne