

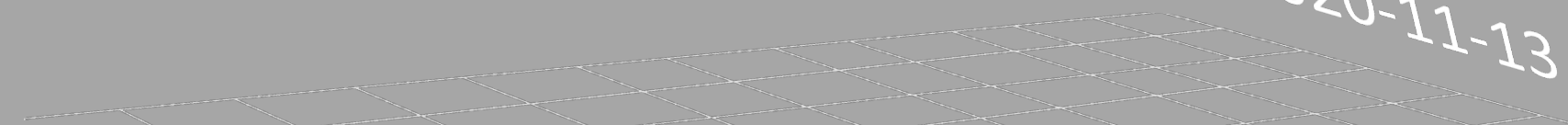
Money in the Digital Age

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

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European Banking Authority

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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
- New currency competition
- Monetary Sovereignty
- International Monetary System & Digital Currency Areas

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

 impacts money

Tech Trends: Inversion of Power - “Inverse Selection”

- Information advantage for customer

- Borrower
- Insurance client, ...

Soon, for seller/platform

- Lender (platform)
- Insurance company
- Asset managers, ...

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

Privacy regulation

- 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

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”

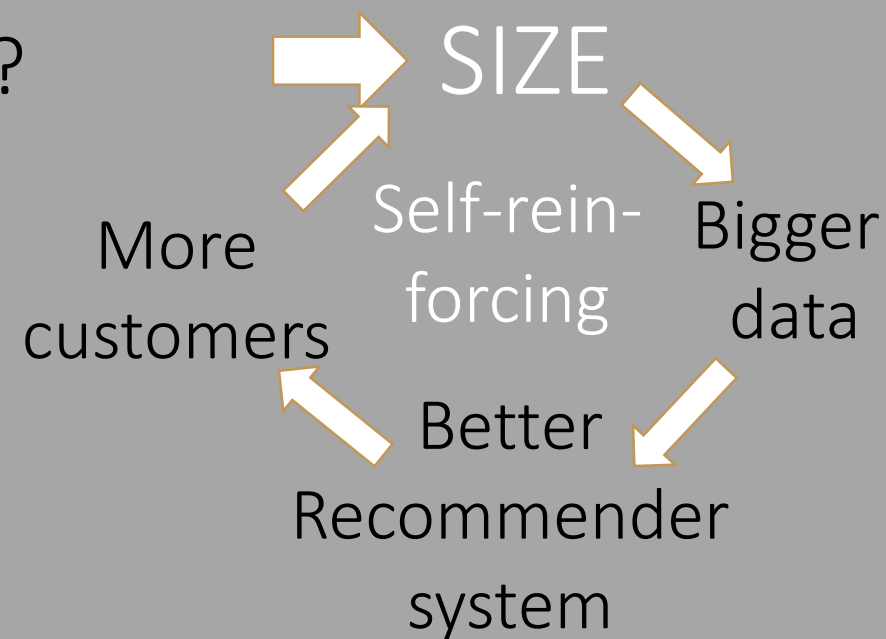


PLATFORMS

(transforms IO of finance)

- Scale

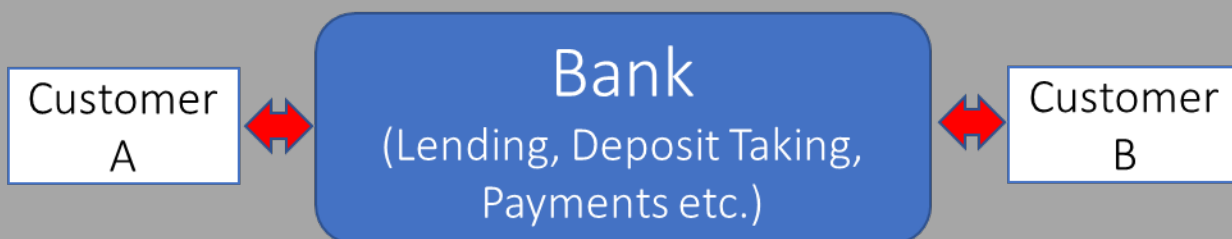
- Diminishing returns to scale?



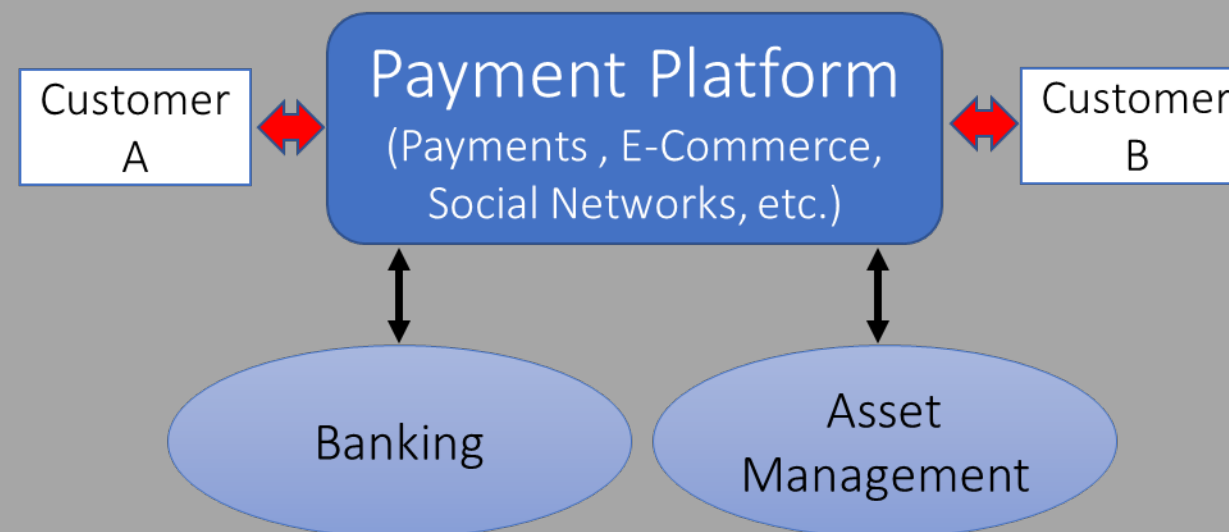
Technological Trends

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

Bank-centric



Payment-centric



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Currency competition

Hayek (1976)

- 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 \Rightarrow 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)

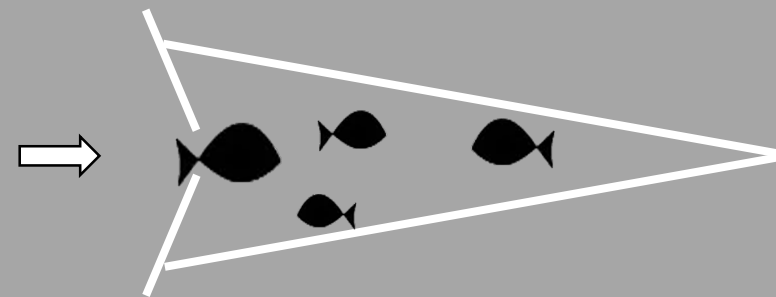
Private platform/currency competition

- 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”

With Jonathan Payne

- 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



“lure you in,
lock you in, and
inflate value away”
(Hotel California)

- 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

“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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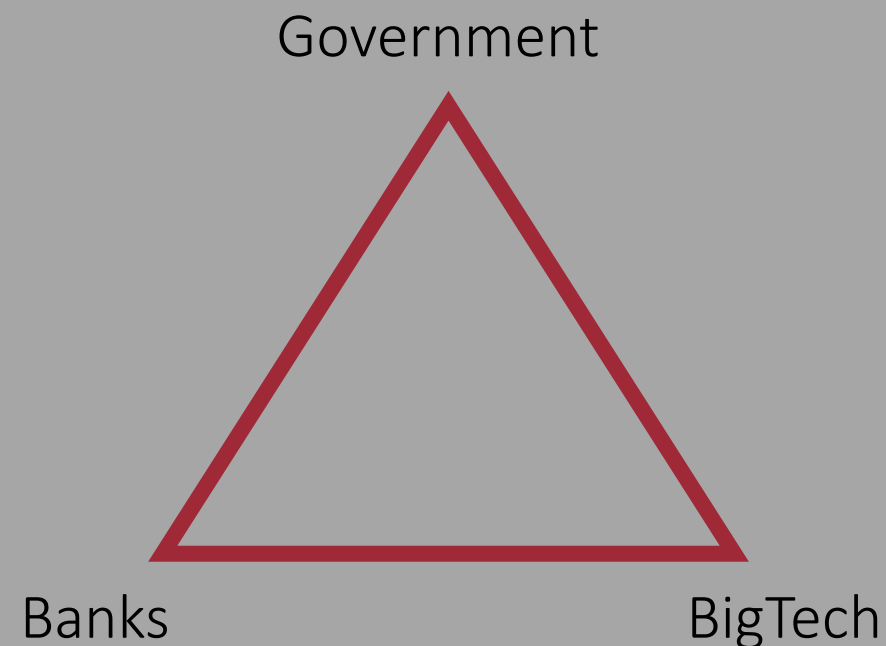
Monetary Sovereignty

- 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

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

- Any asset price

$$p_t^j = E_t \left[SDF_{t,t+1} \underbrace{\frac{1}{1 - \lambda_t \frac{\partial \mathcal{L}}{\partial a^j}}}_{:= \Lambda_{t,t+1} \geq 1} (z_{t+1}^j + p_{t+1}^j) \right]$$

$$p_t^j = E_t \left[\sum_{s=1}^{\infty} SDF_{t,t+s} \Lambda_{t,t+s} z_{t+s}^j \right] + \textit{Bubble}$$

= Fundamental value + liquidity value + bubble

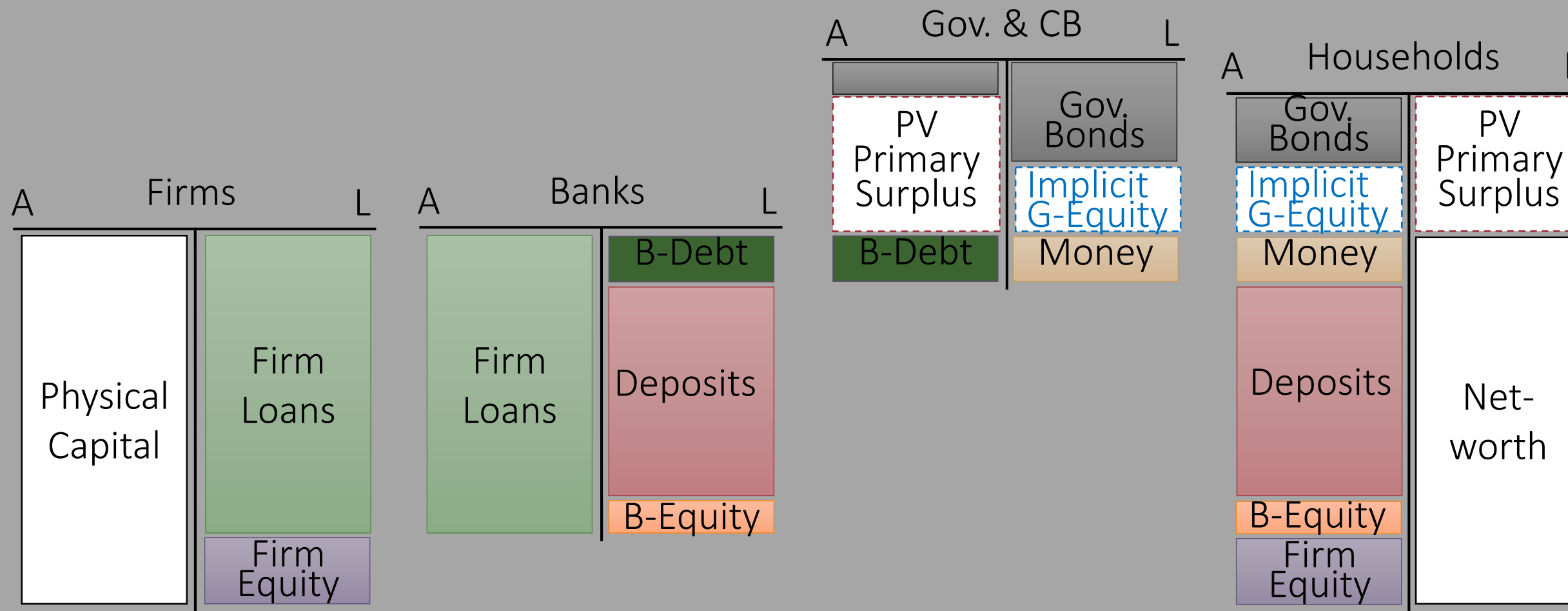
Seigniorage Rents from Money Creation: Public or Private

- 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
-

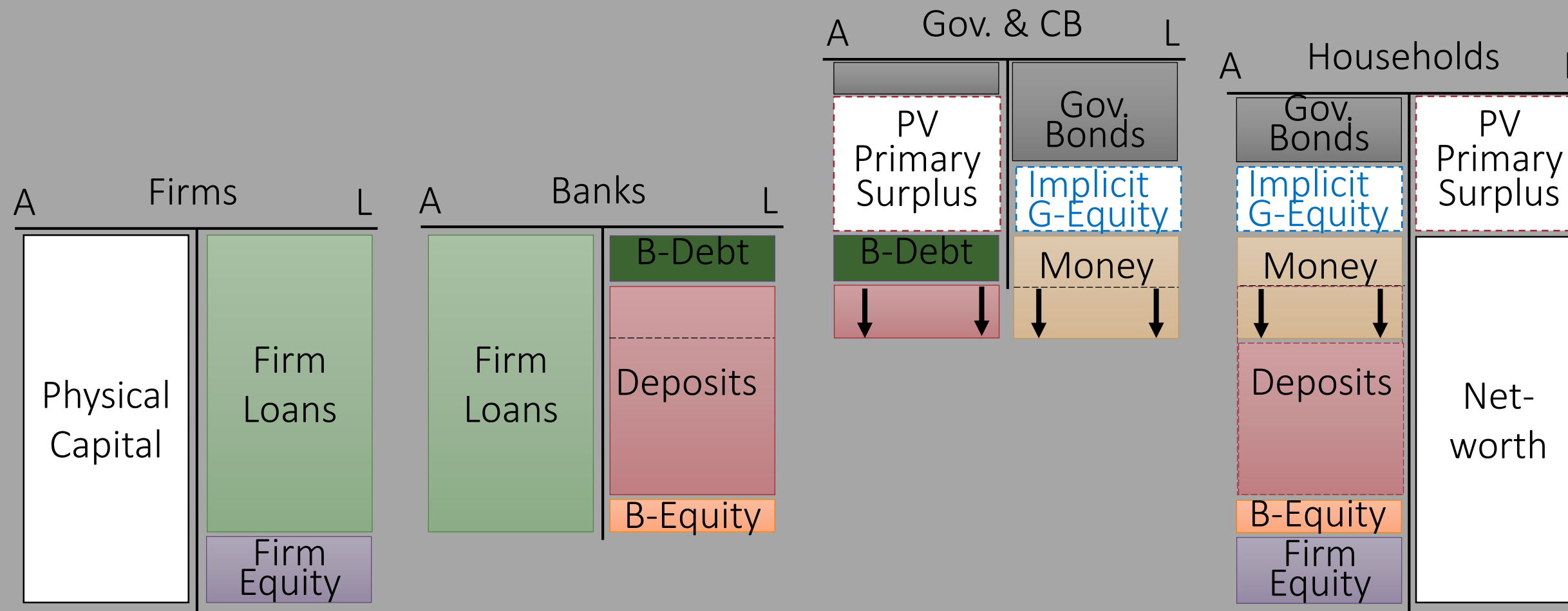
A	L
<i>High fundamental value</i>	<i>Low fundamental value</i>
	<i>High liquidity value</i>
	<i>Bubble</i>

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

Equivalence: CBDC vs. Deposits



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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What defines a (separate) currency?

1. Same unit of account
2. Convertibility

- Convertibility
 - Maintain value
 - Uniformity of money (“singleness”)
- ↔
- Backing of a currency
 - Currency board
 - Stable coin
- Account-based
 - Approval of payments
 - Verification of account owner
- ↔
- 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
- Inverse Selection
 - With Rohit Lamba and Carlos Segura-Rodriguez

