Discussion of Tokenomics and Platform Finance

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Motivation

- Proliferation of multi-sided online platforms
  - Alibaba, Amazon, Uber, Airbnb, OpenTable
- Increasing use of native "tokens"
  - Kik, Ripple, World of Warcraft Gold
- Trust a central issue that blockchain can help address
  - permissioned (intermediary) vs permissionless (decentralized)?
  - rule-based monetary policy?
This Paper

- How should the owner of a two-sided platform conduct monetary policy when the platform has a native currency?
  - with discretion and commitment

- How does this monetary policy impact platform development and token price dynamics?
Review of Model
Platform Development

- Platform quality evolves according to:

\[
\frac{dA_t}{A_t} = L_t (\mu^H dt + \sigma^H dZ_t)
\]

where \( L_t \) is labor financed by token seignorage (risky augmentation)

- \( F (L_t, A_t) / P_t \) tokens for \( L_t \) of labor

- Tokens facilitate spot payments without long-term contracts
  - blockchain payments or "gig" economy
  - no unions or covenants to discipline seignorage (inflation)
  - although... smart contracts could potentially create very state contingent long-term contracts?

- In background: all workers willing to accept tokens as payment
Users

- User $i$ earns flow utility (or convenience yield):

$$x_{i,t}^{1-\alpha} (N_t^\gamma A_t u_i)^\alpha \ dt,$$

for $\alpha, \gamma \in (0, 1)$, $u_i \sim G(u)$, participation $N_t$, and fundamental $A_t$.

- User maximizes expected lifetime profit (flow dividend and capital gains) under risk-neutral measure:

$$\sup_{k_i,t} E_Q \left[ \int_0^\infty e^{-rt} dy_{i,t} \right]$$

which they optimize pointwise at a.a.t.:

$$dy_{i,t} = \max \left[ 0, \max_{k_i,t} \left( (P_t k_i,t)^{1-\alpha} (N_t^\gamma A_t u_i)^\alpha \ dt + k_{i,t} E_t [dP_t] - \phi dt - P_t k_{i,t} r dt \right) \right],$$

and $\phi$ is an instantaneous cost of participation.

- In background: all users well-diversified.
Entrepreneur}

- Entrepreneur maximizes firm value subject to a financing constraint:

\[
\max_{\{L_t, D_t\}_{t \geq 0}} E \left[ \int_0^{\infty} e^{-rt} P_t dD_t \left[ 1\{dD_t \geq 0\} + (1 + \chi) 1\{dD_t < 0\} \right] \right]
\]

- Sale has no immediate price impact

- Entrepreneur finances dividends and labor through seignorage

\[
dM_t = \frac{F(L_t, A_t)}{P_t} dt + dD_t
\]

- Market-clearing imposes that:

\[
M_t = \int_{i \in [0,1]} k^*_i, t di
\]

- Characterize discretionary and commitment monetary policies
  - Blockchain consensus & inflation schedule as commitment devices
Key Findings

- Coasian depletion of durable token rents
  - discretion impacts pricing and valuation (Basak & Pavlova (2004))
  - absorbed by lower convenience yield users (downward sloping demand over time)
  - managing expectations (capital gains from token appreciation)

- Burning helps counteract this effect

- Seignorage acts like dividends to owners (also labor bill)
  - new financing dilutes users in addition to debt / equity holders
  - Tobin’s $q \geq 1$ because of financial frictions (under-investment)

- More labor early on as platform is adopted and hump-shape in return volatility
Discussion
Private Tokens in Industrial Revolution

- Average wages in Britain < 1£ note and coins in short supply
- Coal firms, local governments, and transportation companies in Great Britain issued "scrip money"
  - part of the "truck" system used to pay workers until 1831 Truck Act (after only used to pay wages in advance)
  - non-interest bearing "tokens" consisted of "notes", "tickets", "lines"
- Scrip redeemable for goods at the company store but also honored by independent shopkeepers (collateralization)
  - goods in company store verifiable (stable exchange rate?)
  - even used to pay for a doctor’s midwifery services
Private Tokens in U.S.

- 20,000 coal company stores in the United States, Canada, and Mexico issued scrip during the early 1900s (Dodrill (1971))

- Several modern examples
  - U.S. firms, states, and municipalities during Great Depression
  - Ithaca Hours ($10 or 1 hour of labor): for paying labor and must be spent on local goods and services
  - Disney Dollars (printed until May 2016)
Private Tokens in Practice

- Experienced fraud and abuse by employers
  - U.S. employers often short-changed employees by discounting tokens at store (less than 1 to 1 parity with $1)
  - local merchants did not accept tokens of untrustworthy employers

- Reputation (commitment) important for employer seignorage
  - otherwise could not issue scrip or hire workers
  - backed by firm assets or state/municipality taxes

- Asymmetric information and advantageous selection
  - local citizens had better understanding of employer ability to honor scrip and natural holders

- Outlawed as wage payments in Britain because of loss of seignorage
Physical and Digital Tokens

- Why are they issued?
  - **scrip**: when shortage of legal tender and liquidity (denomination)
  - **digital**: spot payments, global scope?
  - arise during international banking crises? (Liquidity? Loss of trust?)
  - limitations: Gresham’s Law?

- What fosters trust (commitment)?
  - **scrip**: visible assets (taxes, balance sheet, company store)
  - **digital**: token retention, blockchain (smart contracts), store (Kik)
  - less clear inflation schedule / consensus rules provide commitment
    - Ethereum revised schedule with Ethereum-Improvement-protocol 1234 (3 to 2 Eth / 14 sec) and now moving to Proof of Stake
    - lightning network for off-chain transactions

- Implications for scope?
  - **scrip**: inherently local communities
  - **digital**: inherently global communities
  - competition for seignorage with central banks
  - competition for seignorage with other tokens
Two-Sided Platforms

- Conventional two-sided platforms (Visa, OpenTable) use two-sided fees (Rochet & Tirole (2003), Evans (2003))

- Tokens seem to dilute users, workers, and retaining stakeholders from equal priority (pari pasu) claims to future convenience yields

- Are the costs of giving seignorage to a discretionary firm outweighed by the benefits to users and workers over a fee system?
  - have firm set $\phi$ and accrue participation costs?
Two-Sided Platforms

- Online platform with native tokens
  - centralized (Kik, Alibaba) or decentralized (Ethereum, Filecoin)?

- Is commitment solution equivalent to decentralizing platform?
  - best to dis-intermediate two-sided platforms?
  - consensus planning can exhibit discretion (Krusell and Rios-Rull (1999), Garlappi, Giammarino, & Lazrak (2015))
  - perhaps smart contracts on such platforms act as commitment?

- Further issues that arise with online private currencies
  - privacy and user data rights (Libra?)
  - competition across tokens (scrip stayed at local level)
  - speculative attacks and reserves? (defend with balance sheet)

- Can past experience inform us about future potential?
Read the Paper!