Auctions with Tokens

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Blockchain makes it possible to create new currencies at no cost.

- It generates commitment to a given monetary policy
- It provides the infrastructure for exchanging the new currency digitally, almost instantaneously

The creation of new currency is now relevant for *microeconomics* (i.e., when studying a single firm / entrepreneur / seller).

This paper: selling an object with or without tokens

- Repeated auction: a seller needs to sell multiple objects over finitely many periods (one per period). The willingness to pay of the buyers is drawn randomly in every period and is private info → Revenues are maximized by holding an auction

- The seller / auctioneer chooses the auction format and whether to accept payments in fiat currency (dollars) or instead in a new token.
  - the initial stock of tokens is owned by the auctioneer.
  - the auctioneer also specifies a monetary policy.

This paper: selling an object with or without tokens

Tokens

- Can be exchanged for fiat currency once in every period
- Can be bought by (risk-neutral) bidders for participating in the auction or for speculative reasons

Fiat currency (Dollars)

- **Benchmark**: fiat currency = consumption = utility
- **Cash in advance**: fiat currency is exchanged for consumption goods at some specific moments

Results

Benchmark case

- Revenue equivalence: present discounted value of expected revenues are the same with or without tokens.
- Revenues in the auction with tokens are less variable and accrue earlier than in the auction without tokens.
- **Special case**: the auctioneer burns all tokens he receives as payments $\rightarrow$ the auctioneer earns the present-discounted value of the expected revenues in period 1 with probability 1.
  - Always weakly better than the auction with dollars, strictly so if the auctioneer is risk averse (and no insurance is possible) and if there are binding borrowing constraints.

Results

"Cash in advance" case

- Expected revenues (when measured in consumption) are **greater** in the auction with tokens than in the auction without tokens.
- Intuition: within each period, revenues accrue earlier if the auctioneer uses tokens.

Extension: infinite horizon (benchmark case)

- Multiple equilibria: self-fulfilling expectation imply that the price of tokens is not uniquely determined.
  - Equilibria where speculative demand is high (because it is expected to be high in the future) $\rightarrow$ price of tokens is high
  - Equilibria where speculative demand is low (because it is expected to be low in the future) $\rightarrow$ price of tokens is low
- If the auctioneer re-sell tokens that he receives for payment, then the revenue equivalence theorem holds: expected revenues with tokens are equal to expected revenues without tokens.
- If the auctioneer burns the tokens received as payments, then revenues in the auction with tokens may be greater (in a set sense) than in the auction without tokens

Extension: double auction (benchmark case)

- Double auction with tokens exists only if the horizon is infinite.
- Again, multiple equilibria: self-fulfilling expectation imply that the price of the token is not uniquely determined.
- Again, if the auctioneer re-sell tokens that he receives for payment, then the revenue equivalence theorem holds: expected revenues with tokens are equal to expected revenues without tokens.
- If the auctioneer never holds on to the tokens received as payments, then revenues in the auction with tokens may be greater (in a set sense) than in the auction without tokens
  - "never hold on": either burn tokens or forward them to the seller
  - if all tokens are forwarded to the seller, this is similar to a decentralized digital platform

Literature

- **Implementation theory and money**: Ostroy and Starr (1974), Kocherlakota (1998), Samuelson (1958), Townsend (1980).
- **Mechanism design and blockchain**: Holden and Malani (2019), Gans (2019), Lee, Martin, and Townsend (2021)
- **Tokens and ICO**: Catalini and Gans (2018), Malinova and Park (2018), Canidio (2018), Bakos and Halaburda (2019), Goldstein et al. (2019), Cong et al. (2020), Canidio (2020), Gryglewicz et al. (2021), Garratt and van Oordt (2021), Chod and Lyandres (2021).

Thank you!