

Financial incentives for open source development: the case of Blockchain

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Plan for today

- a novel way to finance open source software development: [seignorage](#).
 - ▶ specific to [blockchain](#)-based open source protocols.

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- a novel way to finance open source software development: **seignorage**.
 - ▶ specific to **blockchain**-based open source protocols.
- is seignorage effective at
 - ① generating **incentives** to innovate?
 - ② **channeling funds** from investors to developers?

Blockchain

How the “old” internet works

Internet Protocol Suite (TCP/IP)

Protocol allowing for the decentralized transmission of data.

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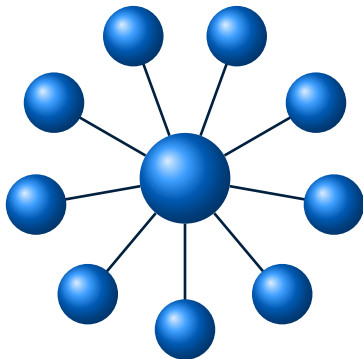
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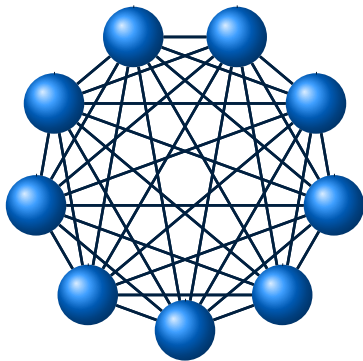
Second-layer protocols

- HTTP for webpages
- SMTP, POP, IMAP for emails
- FTP for files
- ...

Transmission of information before internet



Transmission of information after internet



Blockchain: a new wave of disintermediation

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A new way to finance innovation: Seignorage.

Financing innovation via seignorage: an example

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How blockchain enables seignorage:

- allows for the creation of the protocol,
- fixes the supply of tokens,
- links the protocol with the token.

Financing innovation via seignorage

- USD 7B raised via Initial Coin Offerings (ICOs) in 2017 by Blockchain startups,
- ... vs USD 1B raised from VCs (in 2017 by Blockchain startups)
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Literature:

- on ICOs: Catalini and Gans (2018); Sockin and Xiong (2018); Li and Mann (2018).

Innovation and Seignorage: a Model.

A model of seignorage.

- **A developer** alive between period 1 and T

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- **At ICO (Initial Coin Offering)**: in period $t_o \in [1, T]$ he sells some tokens to investors via an auction.
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- **On the market:** In every period post-ICO period a market for tokens opens—the developer can buy/sell tokens on the markets (subject to a budget constraint).

A model of seignorage.

- **Users:** in each period *in which the market for tokens exists* they use the protocol to transact goods/services of value

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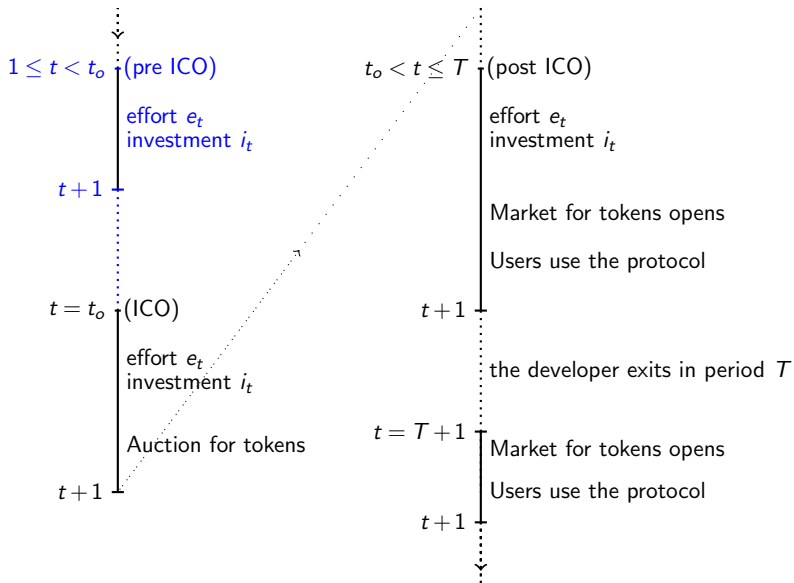
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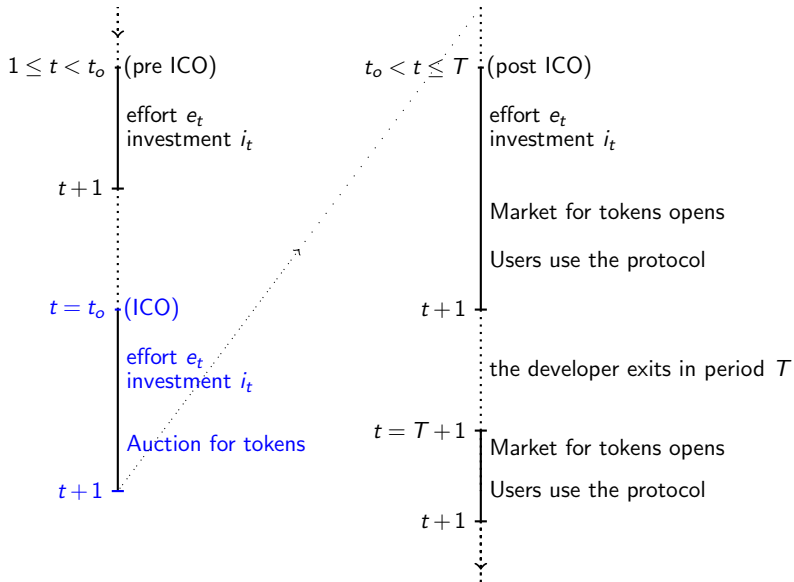
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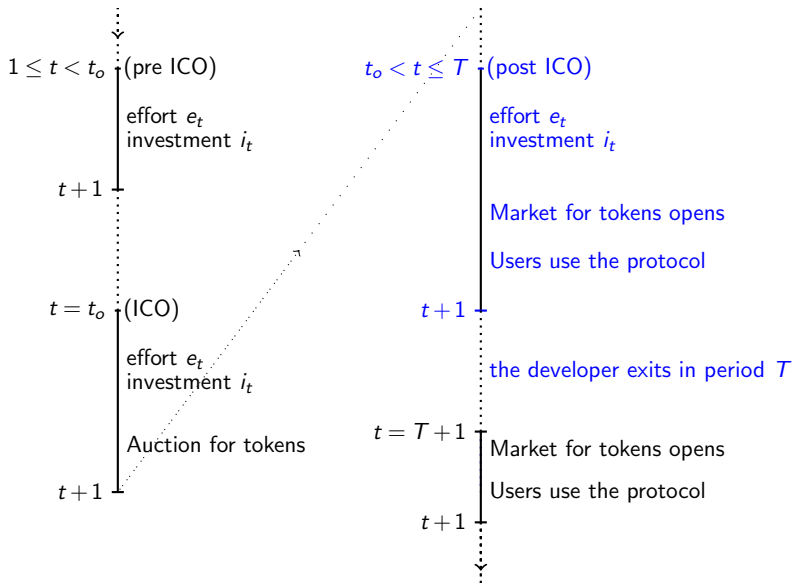
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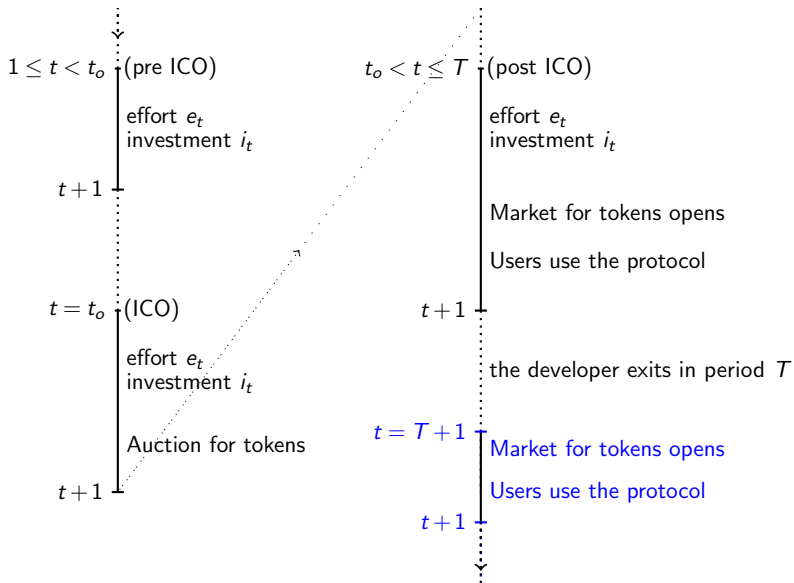
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 - ▶ They buy tokens from the developer at ICO,
 - ▶ in every post-ICO period they buy/sell tokens on a frictionless market for tokens.









Price of tokens

Assumption: from period T onward, $\gamma \cdot M$ stock of tokens held by investors

- $(1 - \gamma) \cdot M$ stock of tokens exchanged by users in every period
- “Velocity of token” normalized to 1 (for ease of notation)
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For ease of notation: No discounting

“rich developer:” the developer can use his funds to invest efficiently in every period

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- If the developer holds M tokens, in the following period his choice of effort/investment $M \cdot p_T$ (minus cost of effort/investment).
- No anti-coordination problem at ICO (i.e., the equilibrium is in pure strategies).

When to hold an ICO?

In equilibrium the developer holds the ICO in period T .

- Users are prevented from using the protocol until period $T + 1$.
- Effort and investment by the developer are positive,
- The level of effort and investment maximize V_T

“poor developer:” the developer may not have sufficient funds to invest efficiently in each period

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Coordination problem: in every period $t \in (t_o, T)$ there are multiple mixed strategy equilibria (and equilibrium price).

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- at ICO, there are multiple pure-strategy equilibria

Optimal ICO timing

Holding an ICO before period T :

- CONS: the developer will develop the platform in every subsequent period with probability less than 1,
- PRO: the developer acquires funds to invest in the development of the protocol,

The developer should first use his own funds to invest efficiently, then (maybe) hold an ICO.

Conclusions

Takeaway points

The two sides of seignorage:

- Seignorage generates incentives to develop the protocol.
- Seignorage can channel funds from investors to the developer.

There is a tension between the two sides of seignorage

If tokens are sold at ICO, then there will be a market for tokens, and the developer may sell all his tokens.

- Not holding an ICO has a cost because users cannot access the platform

Thank you!