

Initial coin offerings and platform building

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Startling growth

In 2017: Nearly 800 ICO deals, \$5 billion in global proceeds (CB Insights)

- Compare to \$1 bn in equity investments to 215 blockchain startups.

How to interpret this startling growth?

- Valuable new innovation in entrepreneurial finance?
- Dangerous irrational exuberance?

Many ICOs clearly aim only to exploit gaps in regulation.

- What constitutes a “good” ICO? When do they make sense?

Examples: Storjcoin



Peer-to-peer platform for sharing disk storage space

Examples: Ethereum



Peer-to-peer platform for sharing processor capacity

What characterizes viable ICOs?

Viable ICOs seem to be connected with the launch of *platforms*.

Examples include:

- Sharing storage space: Storjcoin, Filecoin.
- Running applications: Ethereum.
- Prediction and betting markets: Unikrn, Augur.

Quality is largely driven by **interactions** of participating users.

We show that an ICO can be helpful to launch such a platform.

Two aspects of user participation / interactions

Network effect:

- Users directly benefit from each others' participation.
 - Strategic complementarity in participation decisions.
- ⇒ How to avoid an equilibrium with no participation?

Wisdom of the crowd:

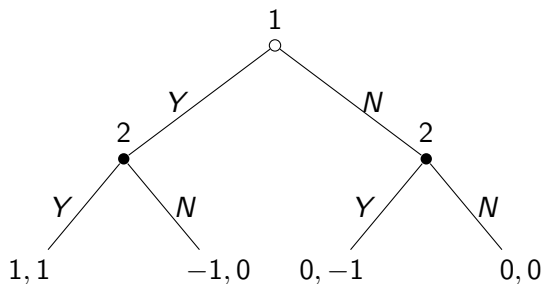
- Platform quality depends on individual users' valuations.
- ⇒ How to aggregate this private information?

Resolving the coordination problem: Two players

	<i>Y</i>	<i>N</i>
<i>Y</i>	(1, 1)	(-1, 0)
<i>N</i>	(0, -1)	(0, 0)

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More than two players

A user's payoff to joining is based on a critical mass requirement:

$$\begin{cases} 0, & \text{if he does not join the platform} \\ -P, & \text{if he joins the platform but fewer than } M \text{ users do} \\ S - P, & \text{if he joins the platform and at least } M \text{ users do} \end{cases}$$

(Later we will microfound this payoff function.)

Launching the platform

A risk-neutral entrepreneur has two ways to launch this platform:

1. Immediate launch, and charge a per-capita cost P to join.
2. Postpone the platform launch and conduct an ICO:
 - ▶ Users purchase tokens within T periods following a price schedule.
 - ▶ Tokens serve as internal currencies within the platform. may be redeemed several periods after platform launch.
 - ▶ Number of tokens sold is public knowledge at all times.

ICO resolves the coordination problem

When $T < M - 1$, “no users join” is an equilibrium.

But when $T = M - 1$, all users join immediately:

Theorem (ICO as a self-selected sequential game)

If the entrepreneur announces an ICO lasting $T = M - 1$ periods, following a price schedule of $\frac{P}{(1+r)^{M-t}}$, then all users join immediately.

Implications: rapid uptake and escalating price schedule.

AI platform raises \$36 million in one minute during ICO

SingularityNET, creators of Sophia the Robot, has built their platform with the aim of allowing anyone to capitalize on this lucrative industry. In a testament to AI's popularity, the platform reached their ICO cap of \$36 million in just one minute.



ethereum

ether sale ends in:

41 : 11 : 33 : 43
Days Hours Minutes Seconds

Total ether purchased:

7,393,449 ETH

Current price:

1 bitcoin buys 2,000 ether

Buy Ether

time remaining at current price:

13 : 11 : 33 : 43
Days Hours Minutes Seconds

next price: 1 bitcoin buys 1,970 ether

Private round pre-ICO

Common practice: Discounted or free tokens given away in a pre-ICO.

Suppose the entrepreneur gives away m coins up front to a *selected* group.

PV(funding proceeds)

$$(N - m) \times \frac{P}{(1 + r)^{M-m}} - \frac{K}{(1 + r)^{M-m}}.$$

⇒ it might make sense!

Using tokens on the platform

- Assume users come in two types, A and B. N within each type. Each date is divided into day and night.
- Type A gets utility s from the platform's service in the day, and can supply it at cost c in the night. Type B: opposite.
- Network effect: buyers get s only if $\geq M$ transactions per day/night
- Entrepreneur specifies that trade on the platform must use tokens.
- Then how to ensure that the supplier always accepts the token?

Using tokens on the platform, continued

How can the worthless token sustain trade on the platform?

Theorem (Token sustains platform)

- Tokens redeemable for $\tilde{p} > c$ beyond V periods after platform launch.
- $V = \left\lceil \ln \left(\frac{s-c}{s-c-rP} \right) / \ln(1+r) \right\rceil$ based on forward induction.

Intuition of proof: Type A requires first V periods of trade to break even.

He only buys during the ICO if he intends to trade for the first V periods.

Forward induction: Type B concludes that A will participate for V periods.

Redemption: sustains trade beyond V .

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Tokens have value *within* a platform exactly because of no value *outside*!

Wisdom of the crowd

Theorem (ICO aggregates wisdom of the crowd)

When users have dispersed signals about platform quality, ICO revenue is higher when tokens are sold over two separate stages.

- Mechanics:
 - ▶ Users with high signals pay a low price to join early.
 - ▶ Their decisions reveal platform quality.
 - ▶ Then other users join and pay a high price.
- As before, the ICO introduces valuable *dynamics*.
- Allows us to discuss speculation and celebrity endorsements.

Implications: Regulation of ICOs



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Regulators have been unsure how to treat these transactions.

- Hostile: China and South Korea banned ICOs in September 2017.
- Permissive: Gibraltar to introduce a regulatory framework for ICOs.
- Case-by-case: SEC has warned investors of potential actions.

A rules-based framework would distinguish valuable from worthless ICOs.

But what makes an ICO valuable? This is our contribution.

- Network effects: Attract sufficient user base.
- Dispersed signals: Reveal positive valuations.
- Allows analysis of deal structure and governance.