

BLOCK CHAIN - INTEREST OF CENTRAL BANKS IN
VIRTUAL/CRYPTO CURRENCIES

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BROAD VIEW

Innovation enables (cheap) alternatives to traditional currency instruments

Some CBs evaluating possible involvement with “e-cash.”

- Not here to tell you if and how CBs will eventually proceed
- I will tell you *what* may motivate this interest & lead to active role

Goal: understanding the role of currency in a society
(through the lens of economic science)

ROADMAP FOR THE NEXT 15 MINUTES

1. Why societies need money to function
2. Three sources of possible inefficiency in currency innovation
3. Currency systems in controlled environments: two key lessons

Literature & references: e-mail me if interested

WHY SOCIETIES NEED MONEY TO FUNCTION

THE FUNCTIONS OF MONEY IN A SOCIETY

- *Society*: a group of people who benefit from trading with each other
- *Currency* (money): **symbolic** object that circulates to enable payments
- Money supports economic activities via the usual three functions

Take-away: currency value reflects value of activities it enables

But why is money needed to generate value? Could we do without it?

THE NATURE OF MONEY

Money is a social convention

Concept: the most valuable trades in a society are **impersonal** (strangers)

- Impersonal interactions prevent reciprocity, the basic ingredient of **trust**
- Lack of trust prevents mutually beneficial trades (**cooperation**)
- Monetizing trade enables cooperation among strangers, generates value

Take-away: monetary trade convention resolves underlying trust issues

THREE SOURCES OF POSSIBLE INEFFICIENCY
IN CURRENCY INNOVATION

#1. COORDINATION PROBLEMS: MONEY IS LIKE A LANGUAGE

The more people speak a language, the more valuable it is to them

So, instrument coordination helps maximize value of currency instrument

- But achieving coordination difficult when many instruments compete
- Instrument fragmentation a source of inefficiency (network effects)
- Coordination especially problematic when incentives are mis-aligned

Take-away: coordination problems loom large in currency innovation

COORDINATION FAILURES IN INSTRUMENT SELECTION

Players' interest are *perfectly aligned* here ...

	e-cash A	e-cash B
e-cash A	90, 90	0, 0
e-cash B	0, 0	180, 180

... but not here (I've simply redistributed wealth)

	e-cash A	e-cash B
e-cash A	180, 90	0, 0
e-cash B	0, 0	90, 180

A coordination "device" valuable in this case (a *trusted* CB?)

#2. BUILD/KEEP PUBLIC CONFIDENCE IN CURRENCY

A currency's value reflects the level of public confidence in it

Object becomes currency if no-one can personally gain from refusing it

Idea: accept a symbolic object if trust that others will do the same, so

- acceptability depends on the **future** value of the instrument
- future value depends on trades the instrument **expected** to support
- a circular argument hinging on **beliefs** (self-fulfilling value)

CONFIDENCE IN A CURRENCY \approx CONFIDENCE IN THE ISSUER

- *Historically*: confidence = quality of the coins issued
- *Nowadays*: confidence = quantity issued

The problem: issuer earns spread btwn assets acquired & liabilities issued

- Opportunism: temptation to overissue currency instruments
- Externality: currency value may become unstable or decline
- *Eventual* decline in issuer's payoff (an inter-temporal tradeoff)

Take-away: confidence easier to build if issuer has a *long-run horizon*

#3. CURRENCY SYSTEMS ARE PUBLIC GOODS

Currency systems similar to clean air or national parks

Theory: private contribution to public goods is inefficient

- Inefficiency = excessive emission of currency instruments
- This damages confidence in a currency (hence value & stability)

Take-away: public good aspect suggests role for public provision

CURRENCY SYSTEMS IN CONTROLLED ENVIRONMENTS:
TWO LESSONS

WHY CONTROLLED LAB ENVIRONMENTS CAN HELP

Can test theories & develop new insights

Let me emphasize one particular advantage of this methodology:

- Can manipulate the lab setup to establish **causality** (*this* \Rightarrow *that*)

Two findings revealing nature & value of currency system to a society

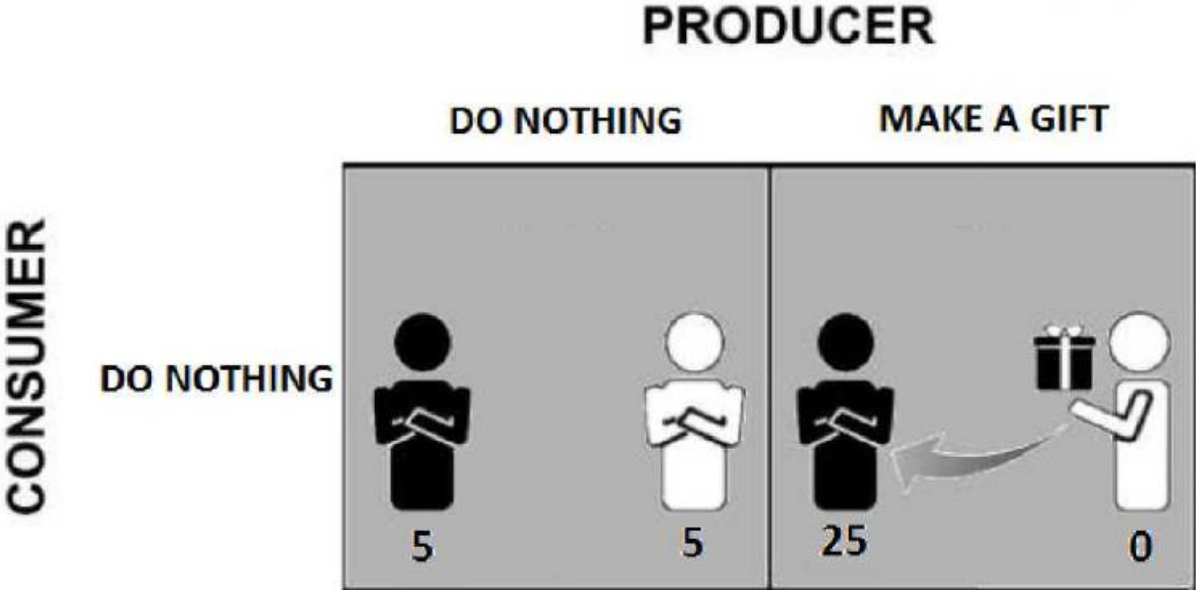
Note: focus on *peer-to-peer* fiat instruments

1—CURRENCY SYSTEMS EMERGE SPONTANEOUSLY
& PROMOTE TRUST AMONG STRANGERS

LABORATORY SETUP

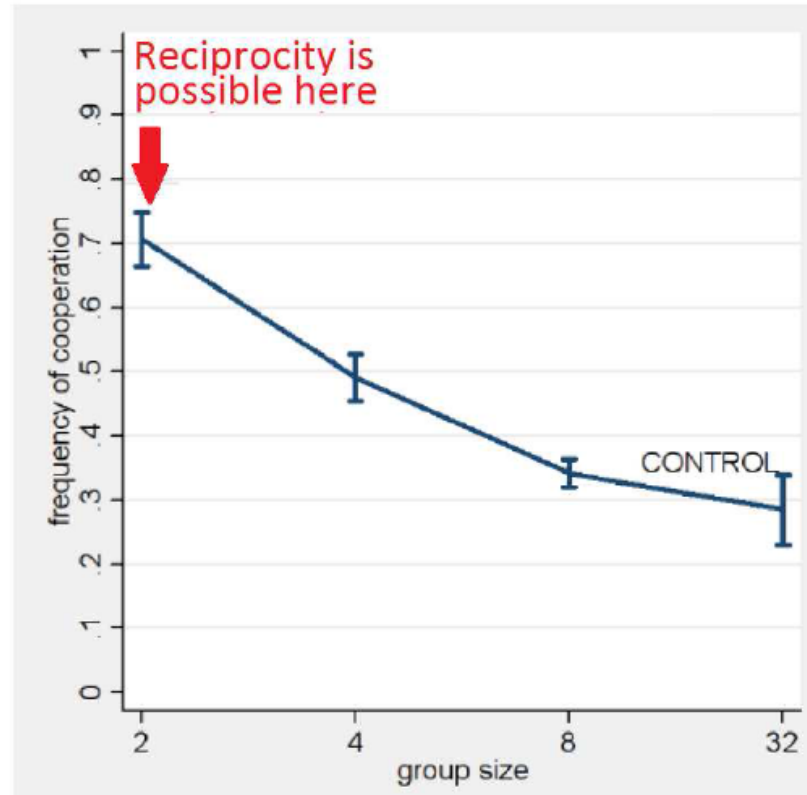
- Society= a group of producers+consumers (even numbers)
- Horizon: expect many pairwise encounters (producer-consumer)
 - Strangers: roles alternate, no ID, hidden past conduct
 - Trade motive: consumer values production a lot more than producer
 - Optimum: producers always make a gift (= max welfare)
- Challenge: producer must trust strangers will reciprocate her gift

PRODUCER'S OPTIONS WHEN MEETING A STRANGER



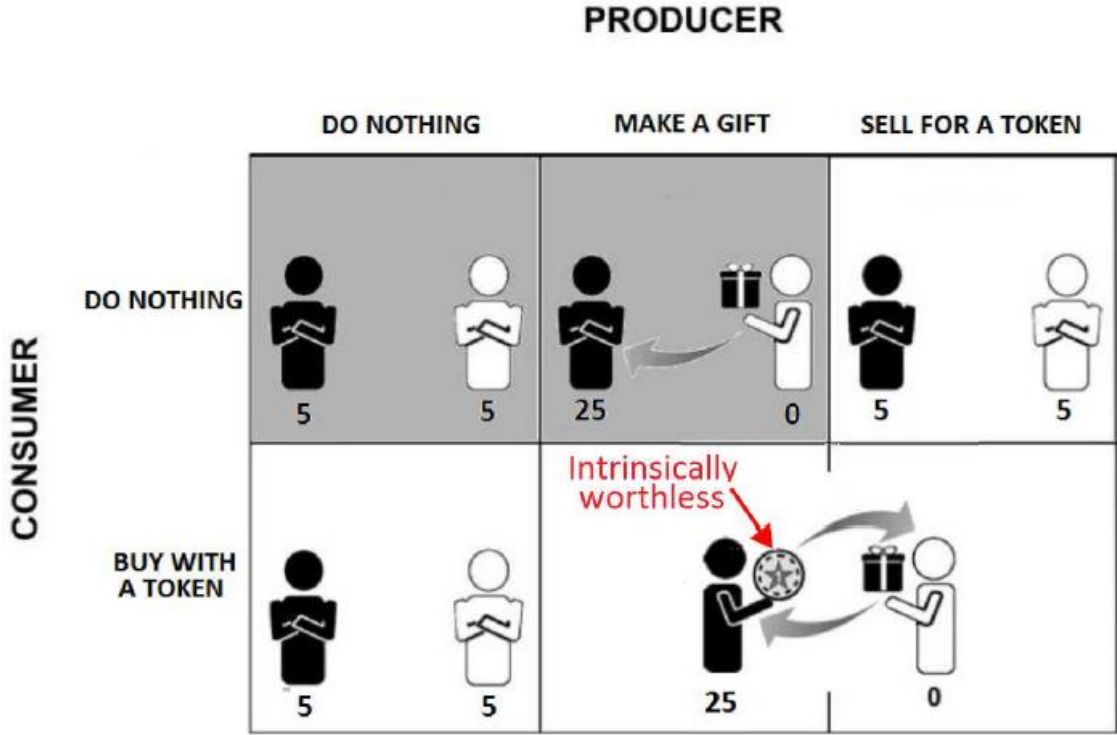
Points cumulate, are exchanged for \$\$ at session end (cash payments)

EFFICIENCY DECLINES AS GROUPS GET LARGER



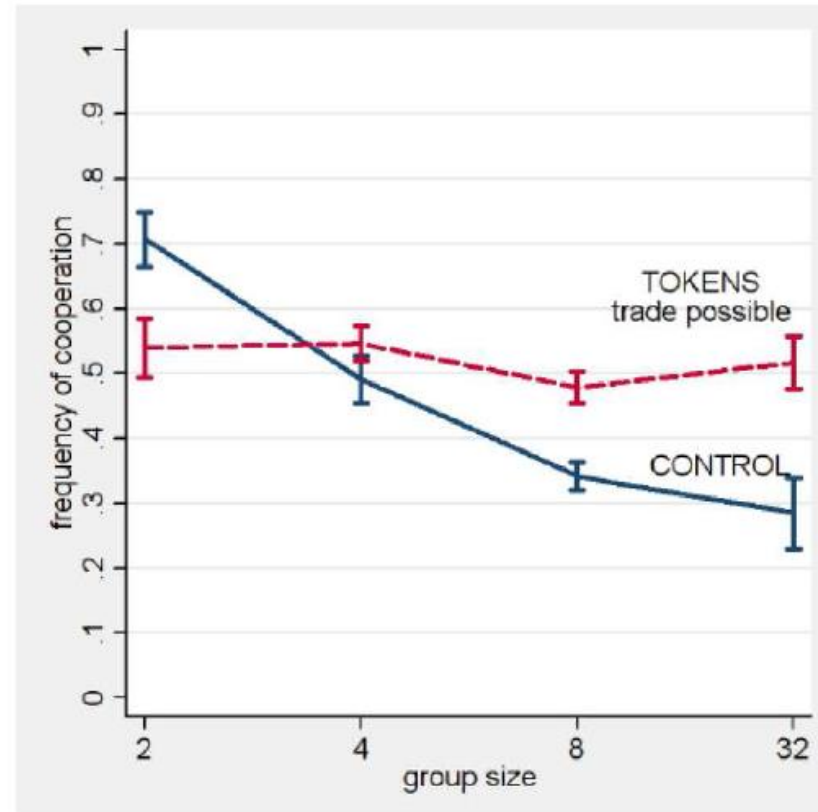
Take-away: low trust in others \Rightarrow trade difficult \Rightarrow macro inefficiency

SO WE ADDED TOKENS (=WORTHLESS DIGITAL OBJECTS)



Fixed supply, no reference to real currency, no redemption, *quid-pro-quo*

NO LONGER EFFICIENCY DECLINE AS GROUPS GET LARGER



Take-away: symbolic objects became money, helped build trust

2—CONFIDENCE IN A CURRENCY REFLECTS
CONFIDENCE IN THE ISSUER(S)

SO FAR FULL CONFIDENCE IN THE ISSUER (FIXED SUPPLY)

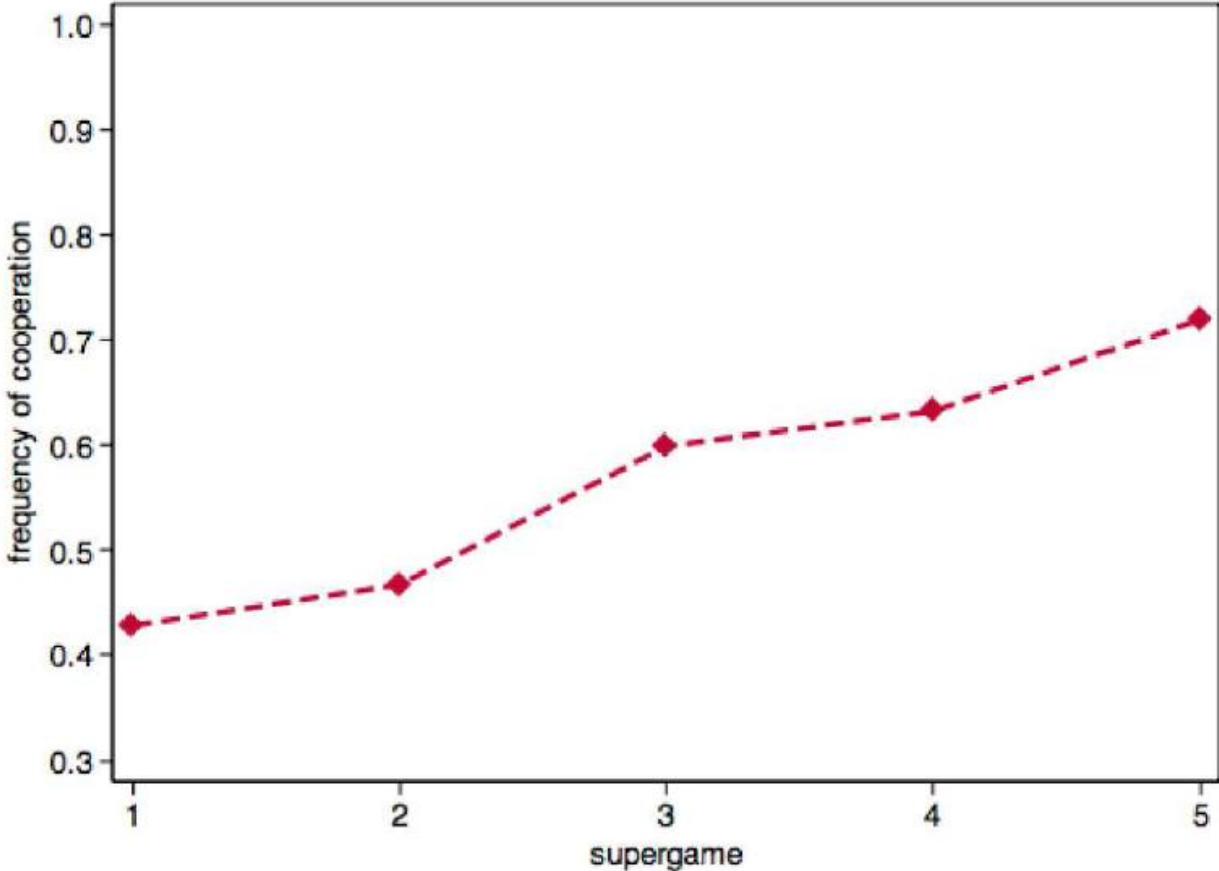
What would happen if private supply? Contrast two conditions

- *Control*: stable, exogenous supply of tokens
- *Treatment*: consumers can issue tokens, adding to existing supply

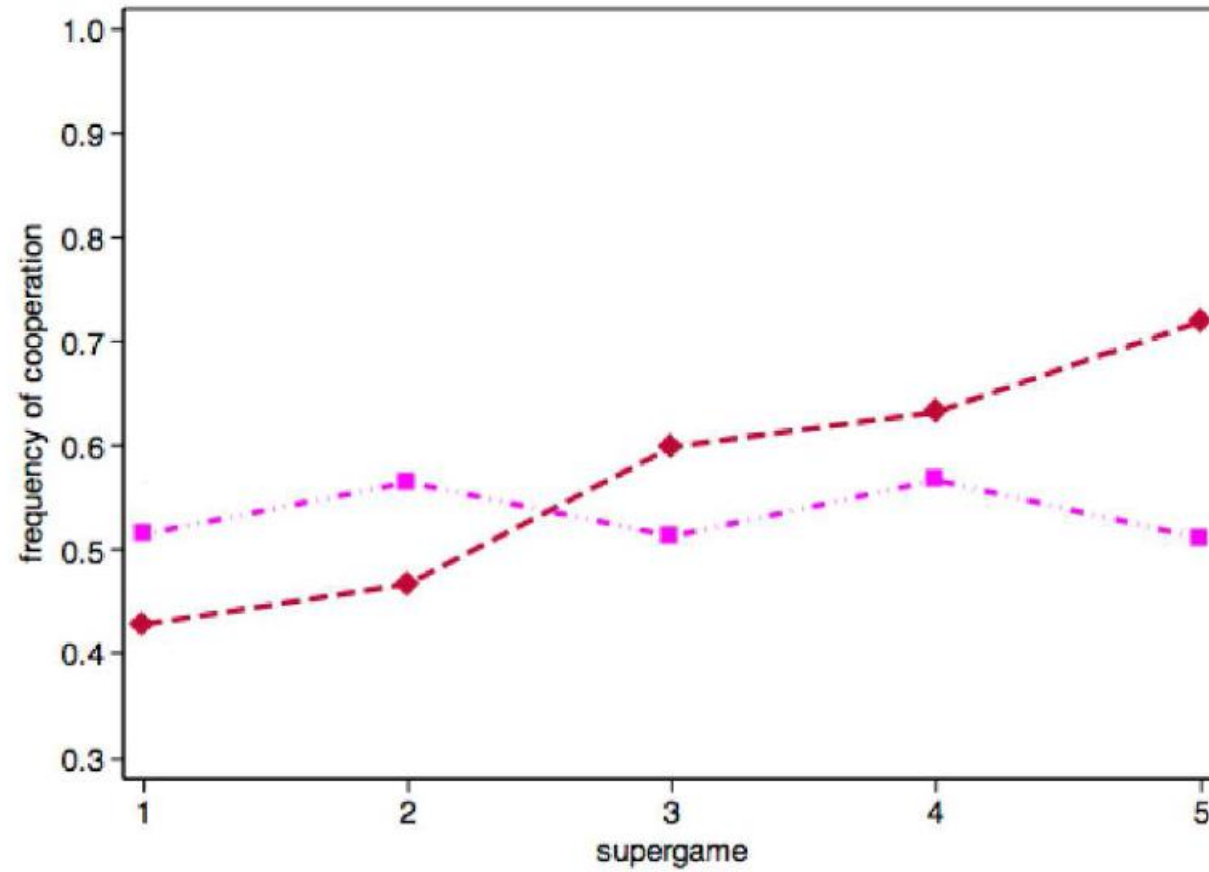
Socially suboptimal to issue tokens, should not theoretically happen

Track (if and) how a currency system develops over 5 consecutive “games”

FIXED SUPPLY: CIRCULATION & EFFICIENCY GROW



PRIVATE SUPPLY: CIRCULATION & EFFICIENCY LANGUISH



WHAT HAVE WE LEARNED?

LESSON 1

Money builds trust, helps strangers collaborate to attain shared prosperity

- Innovate by leveraging pre-existing trust in sovereign instruments?

LESSON 2

Money is a social convention, subject to coordination & confidence issues

- Suggests care with *ad-hoc* intervention in a currency system

LESSON 3

A currency system is a public good, inefficient private contribution likely

- A motivating factor behind public involvement with currency innovation