Discussion of
"A Theory of Payments-Chain Crises"
by Saki Bigio

Presented in NBER Summer Institute 2023

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13th July, 2023

Introduction

- ▶ Goal of paper: to understand how payment frictions amplify financial crises.

- ▶ Approach: builds a model where:
    - ▶ In a financial crisis, fewer customers can pay for goods upfront when they make orders,
    - ▶ ⇒ Producers delay production until customers receive income to make payments,
    - ▶ ⇒ Output decreases, which makes it harder for agents to save to purchase goods upfront

- ▶ Comment 1: What part of the supply chain/credit market is this paper modeling?

- ▶ Comment 2: What are the likely market structures and policies in this market?

- ▶ Comment 3: What other types of dynamics can the model generate?

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Model

- ▶ Discrete time, infinite horizon production economy with no aggregate risk.

- ▶ Populated by two types of log-utility households:
  - ▶ Savers who have positive wealth but do not produce, and
  - ▶ Workers who borrow from savers and inelastically supply labor.

- ▶ Production takes place in exclusive bilateral agreements:
  - ▶ Customer orders a product from an agent that owns a production unit,
  - ▶ Production of order occurs within a unit time interval and is linear in time,
  - ▶ Exclusivity means that only customer values the product

Payment and Contracting Frictions

► Two types of payments:

   1. Spot orders: are paid immediately

   2. Chained orders: are paid after customer receives payment from another transaction

► Payment and Contracting Frictions:

   ► Production only starts once customer can show "proof of funds"

   ► Customers only pay producers once they have received $1 - \delta$ of order

   ► Contract restrictions: short-term, non-contingent on production or on network structure

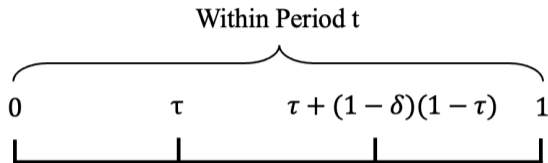# Spot Orders Lead to Full Production Within a Period

Within Period t

$0 \qquad\qquad 1 - \delta \qquad\qquad 1$
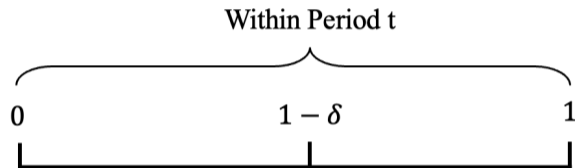
- Spot order
- Funds escrowed
- Production starts

- Payment

- Production ends

► For spot orders, customers can show proof of funds

► So, production starts immediately

► And production goes for entire interval

Chained Orders Restrict Production Within a Period

Within Period t

$$0 \qquad \tau \qquad \tau + (1-\delta)(1-\tau) \qquad 1$$

- Chain order
- Customer gets income
  - Funds escrowed
  - Production starts
- Payment
- Production ends

► Customers cannot show proof of funds until they receive payments from other traders

► So, production and payment are delayed

► Production only occurs for part of interval

Aggregate output is: $\mathcal{Y} = 1 - \mu + \mu \mathcal{A}(\mu)$, where μ is fraction of trade in chain orders and $\mathcal{A}(\mu) \leq 1$ is average productivity in chain orders.

Borrowing Constraints + Payment Frictions Generate Feedback

▶ Savers have positive wealth and so always make spot orders

▶ Workers have negative wealth and so choose between:
  1. Making spot orders by borrowing S_t^w, subject to spot-borrowing limit $\bar{S}_t$
  2. Making chain orders at higher price

▶ This generate feedback: If workers have high debt,
  ⇒ They cannot access short term credit to make spot orders due to borrowing constraint
  ⇒ Production is delayed and output is low ⇒ workers don't save and debt stays high

▶ This leads to two steady states:
  1. *Undisrupted steady state:* with low debt, only spot orders, and high output
  2. *"Payment-chain-crisis" steady state:* with high debt, worker chained orders, low output

Planner Balances Social Insurance With Increasing Spot Trades

▶ Key externality: customers do not internalize the impact of delays from chain orders.

▶ Paper solves the problem of a Ramsey planner that internalizes this externality:
  ▶ Planner chooses sequence of debt taxes, labor taxes, and customer expenditure taxes.
  ▶ To choose the welfare maximizing competitive equilibrium.

▶ Lesson 1: in transitions from payments-chain crisis, debt might be too high or low:
  ▶ ↓ debt ⇒ ↑ worker wealth, which frees credit lines to ↑ spot orders.
  ▶ ↑ debt ⇒ ↑ saver wealth, which also ↑ spot orders.
  ▶ Makes the problem non-concave leading to bang-bang solutions.

▶ Lesson 2: Government spot and chained expenditures have different welfare impacts.

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1. What Part of the Economy is This Credit Market Modeling?

▶ Although the paper is focused on modeling the payment system,

▶ Many model dynamics and inefficiencies come from restrictions in the credit market:

  ▶ Short-term credit limit is exogenous (and unrelated to default, which never occurs)

  ▶ Lenders do not net out accounts receivables across the supply chain when making loans
  (Put another way, accounts receivable cannot be used as collateral for orders)

  ▶ No long term trade-credit contracts (unlike in Bocola & Bornstein (2023))
  (Or any other long term contracting arrangements between customers and suppliers)

▶ And these are strong restrictions!

▶ Interpret: country-wide supply chain with small lenders & no long-term relationships.

2. What Prevents Intermediation by Trading Platforms?

▶ Two views on how to understand non-relationship based supply chains with the payment and production frictions in this paper:

  1. Supply chains have many small agents that cannot coordinate to resolve externalities
     ⇒ Government should focus on taxes/subsidies to credit and production

  2. Large platforms have emerged that coordinate trading/payments but extract rents
     ⇒ Government should focus on regulating platforms as natural monopolies

▶ Many reasons to believe we are moving towards large platforms coordinating trade

  ▶ Empirical: BigTech (e.g. Alibaba) offers trading, payment, & credit services to producers
    (e.g. Liu et al. (2022), Lu et al. (2023))

  ▶ Theory: trading platform partially internalizes the externalities
    (e.g. Chiu & Wong (2021), Brunnermeier & Payne (2023))

Different views of the likely market structure lead to different policy concerns

3. What Other Types of Dynamics Can The Model Generate?

▶ The paper is interested in how the payment system can react to financial stress.

▶ However, model shuts down most possible ways of responding to a crisis. Changes to:

  ▶ Total consumption/saving (allowed)
  ▶ Fraction of chain orders (allowed)
  ▶ Average default rate and price of credit (shut down)
  ▶ Delay until production starts and payments are made (shut down)
  ▶ Distribution of surplus within a long-term relationship (shut down)
  ▶ Exclusivity of production arrangements (shut down)
  ▶ Whether trade occurs through an intermediary/platform (shut down)

▶ I think that relaxing these margins opens up interesting complementary dynamics.

▶ And allows model to speak to recent literature on evolution of the payment system.

Example Extension: Choice of Trading/Payment System

▶ Producers now make discrete choice between bilateral trades and platform:

  ▶ Platform offers short term credit against future income from other platform trades.
  ▶ However, trade frequency on platform depends upon ϕ, the fraction of orders on platform
  ▶ Producing bilaterally gives: $\pi^B + \zeta^i$, where π^B is profit and $\zeta^i \sim Gu(\gamma, \cdot)$
  ▶ Producing on platform gives: $\pi^P(\phi) + \zeta^i$, where profit $\pi^P(\phi)$ has network effect

▶ Aggregate output in the economy is now given by (new elements in red):

$$\mathcal{Y} = (1 - \phi)\left[1 - \mu + \mu\mathcal{A}^B(\mu, \phi)\right] + \phi\mathcal{A}^P(\phi), \qquad \phi = \left(1 + \left(\pi^B / \left(\pi^P(\phi)\right)^\gamma\right)\right)^{-1}$$

▶ New complementary dynamic: economic downturn tightens credit limits
  $\Rightarrow \downarrow$ profit in bilateral trades $\Rightarrow \uparrow$ producers choosing platform
  $\Rightarrow \uparrow$ platform network effect $\Rightarrow$ new equilibrium with high platform trade.

Downturn leads to new trading system rather than permanent payment crisis

Conclusion

▶ Interesting paper that introduces detailed payment frictions into a macro model.

▶ Has lots of potential for understanding changes to payment and trading systems.

▶ Unclear to me that it currently has the right policy concerns.

THANK YOU