The Payments System

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The payments system

• In reality, banks (and related intermediaries) play an important role in clearing private debt

• Thus far, we have assumed that people acquire goods with cash—in reality, people also use credit to acquire goods
  
  – in particular, credit in the form of a promise to deliver cash in the future (a nominal debt obligation)
  
  – e.g., payment by check or credit card

• There is evidence to suggest that the payments system does not always work smoothly
• Episodes labeled “currency shortages” seem to occur from time to time

• Can a lack of currency actually cause (or exacerbate) financial disruptions?

• Why does the price-level simply not adjust in a way that ensures an adequate supply of real money balances?

• Is there a role for a central bank to play in helping the payments system work smoothly?

• Or might the responsibility of clearing debt be left to the private sector?
Spatial structure

- The economy consists of “islands”—a large center island, surrounded by $I$ pairs of small outer islands

- An island pair consists of a $c$-island and a $d$-island

- On each island, $N$ two-period-lived individuals are born in each period (there is also an initial old $N$ on each island)
Preferences and endowments

- A d-island person is endowed with $y$ units of d-island output (nonstorable) when young, and nothing when old
  - he wants to consume the c-island output when young and consume nothing when old

- A c-island person is endowed with $y$ units of c-island output (nonstorable) when young, and nothing when old
  - he wants to consume d-island output when old, and consume nothing when young
Efficient trading pattern

- Young c-islander gives his $y$ to a young d-islander
- Young d-islander gives his $y$ to an old c-islander
- Can the efficient trading pattern be realized with private debt?
  - Young d-islander must issue a personal IOU to the young c-islander—but has no way to repay (young c-islander wants d-output later, not now)
  - The old c-islanders value the output of young d-islanders, but have nothing to pay with—unless...
• Endow initial old c-islanders with fiat money $M/N$

• Now young d-islander can sell $y$ to old c-islander for fiat money
  – young d-islander can then use money to purchase $y$ from young c-islander
  – young c-islander willing to accept money because he can use it to purchase d-output when old
Debt with direct repayment

- In the description above, we assumed a particular communication pattern
  - young d-islander first meets old c-islander, then meets young c-islander
  - young c-islander then becomes old and meets young d-islander

- While fiat money is needed here, debt is not

- Suppose, instead, that young d-islanders visit (are in communication with) young c-islanders first
  - for trade to happen, c-islander must accept an IOU of some form
– but the only possible object a young d-islander could promise to deliver is fiat money

– young d-islander could acquire money by selling his output to old c-islander

● After he young meet, assume that all old agents (from all islands) travel to the center island

– center island is where debt is settled (we have to assume a commitment technology here)

– essentially, we need to assume that d-islanders can commit to the promises they make (the promise here is to deliver future money, not future goods)
– direct repayment is possible if it is costless to seek out the issuer of an IOU on the center island (old debtor meets his old creditor)

• After meeting in the center island, assume that old c-islanders visit (are in communication with) young d-islanders
  
  – i.e., old c-islanders use the money they collect from loan repayment to purchase the output they desire

• Note: the debt issued here looks a lot like a personal check drawn on a bank account (residing on the center island)
  
  – i.e., young d-islander pays for output by writing a check, then working for money, then depositing the money in the center island bank account, with the c-islander then arriving to cash the check
Clearinghouses

- A clearinghouse is a financial institution that provides clearing and settlement services for financial transactions.

- In the previous example, a clearinghouse (a bank that clears checks) is not necessary if creditors and debtors can settle debts among themselves.

- In reality, there may be impediments to direct bilateral clearing of debt.

- When this is so, the role of a central clearinghouse may facilitate payments.
Communication barrier 1

- In the example above, we assumed that all old agents visited the center island simultaneously
  
  - communication between all creditors and debtors at the time the debt matures is feasible, which made direct settlement possible

- Suppose, however, that agents do not arrive and depart the center island at the same time; e.g.
  
  - assume that people arrive and depart the center island in two stages, *early* and *late*
– 1/2 of old c-islanders and 1/2 of old d-islanders from different island pairs arrive early

– remaining set of old agents arrive late (after first group has departed)

• Notice that in both the early and late stages, the total net debt on the island sums to zero

  – the cash brought in by d-islanders is sufficient to pay off the IOUs brought in by c-islanders

• However, because creditors and debtors come from nonadjacent islands, no one holds the personal debt of the other
— e.g., early c-islander has cash, but his debtor is late, and early d-islander has cash, but his creditor is late

• In this case, the clearinghouse can accept early deposits of cash to purchase early arrivals of debt

  — early c-islanders sell the debt the own on a secondary market, take the cash to purchase future consumption

  — early d-islanders settle their debt obligation (through the clearinghouse), even though their creditors have yet to show up

• Process is repeated for the second wave of arrivals
Communication barrier 2

- The role of the clearinghouse becomes even more important if the arrival of debtors and creditors is not perfectly synchronized

- Case A: Suppose that the early arrivals consist entirely of creditors, late arrivals debtors

- Not so much of a problem—creditors deposit their cash, clearinghouse settles with debtors when they arrive later

- Case B: Suppose that the early arrivals consist entirely of debtors, late arrivals creditors (→ a currency shortage)
An elastic money supply

- What sort of institutional arrangements can solve the currency shortage that arises in Case 2B?

- In the past, clearinghouses would print their own clearinghouse notes, which they would use to purchase debt on the secondary market

  - in the model, early old c-islanders sell their debt for clearinghouse notes and use this as money when purchasing output from young d-islanders, and late old d-islanders deposit their cash (fiat money)

  - young d-islanders in the next period are willing to accept clearinghouse bills because they can take them to the center island in the next period
and redeem them for cash (which they then use to discharge their debt, either directly or via the clearinghouse)

- Actually, the textbook brings up an interesting issue here
  - if agents view fiat money and clearinghouse notes as perfect substitutes, then why would anyone bother redeeming notes for cash?
  - and if agents do not redeem their private money, what is to prevent the clearinghouse from simply printing more of them (to extract seigniorage revenue)?

- Recall that price-level is determined here by the market-clearing condition $M_t = p_t N_y$, where $M_t$ is the money the old c-islanders use to purchase the $N_y$ units of real output for sale by the young d-islanders
• The money supply in this case is given entirely by clearinghouse notes
  – but this assumes that the cash sitting at the clearinghouse remains out of circulation (i.e., it is sitting as reserves to meet future redemptions)
  – but if the redemption rate is less than 100%, then the clearinghouse is free to spend some of its reserves
  – it can just create new clearinghouse notes to provide the necessary “elastic” currency supply for next period’s early creditors
  – in this way, the money supply grows, leading to inflation

• Note: legislation requiring 100% backing of clearinghouse notes would prevent inflation (competition among private clearinghouses may also do the trick, but not so clear if all notes are viewed as perfect substitutes)
Discount window and open market operations

• Alternatively, imagine that a central bank resides in the center island, and stands ready to print new money and lend it to the clearinghouse (banking system), on the condition that the clearinghouse will use the money loan to purchase “real bills” (specific types of securities)

• In effect, the temporary cash loan replaces the act of creating new clearinghouse notes, as described above

• So, clearinghouse borrows cash, purchases debt with cash, which leaves with old creditors, then cash arrives later from old debtors, this cash is used to repay the central bank loan
Short-term nominal interest rate

- In Case 2B, we assumed an extreme case in which there is zero early cash in the center island.

- Suppose, instead, that some fraction of the cash arrives (and assume that clearinghouse notes are not permitted).

- Then there is less cash than the amount of outstanding nominal debt in the early period:
  - one would expect private debt to be traded at a discount; i.e., a positive short-term nominal interest rate (reflecting a liquidity shortage).
• Authors suggest that it is inefficient to have risk-free debt trading at a discount

• For a more advanced exposition, see: The Payments System, Liquidity, and Rediscounting, Scott Freeman, AER 1996