Monetary Theory

An introduction to some basic ideas

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Barter vs monetary exchange

- A barter exchange consists of a *quid pro quo* swap of goods/services (goods not designed to circulate)

- Monetary exchange refers to the phenomenon of exchanging goods for money, and then money for goods
There is clearly a sequential (inter-temporal) aspect to monetary exchange

- the fundamental exchange is between *current* goods for *future* goods (money is not the ultimate goal)

- money circulates as a medium of exchange (so it necessarily serves as a store of value)
Direct vs indirect exchange

- Barter exchange entails *direct exchange*: apples are purchased with oranges (and vice-versa)

- Monetary exchange entails *indirect exchange*:
  - apples are sold for money (money is purchased with apples)
  - oranges are then purchased with money (money is then sold for oranges)

- But why not a direct exchange of current apples for future oranges?
• In particular, why not a credit transaction that bypasses the use of money?

• Why not buy things on credit by issuing personal IOUs?
Direct credit exchange

• In fact, much economic activity does take the form of direct credit exchange

• Gift-giving economies
  – a sacrifice is made (credit is extended) to a trading partner (or to society in general)
  – not charity—rather, exchange for a future (reciprocal) gift

• A common form of exchange among small groups of individuals (families, friends, clubs, primitive societies, etc.)
Modeling direct exchange (barter and credit)

- This is textbook microeconomic theory

- Consider two individuals R and F, who value goods \( x \) and \( y \)

- An individual has preferences \( u(x, y) \) and an endowment \((e_x, e_y)\)

- Draw an Edgeworth box diagram

- Tangency of indifference curves called the \textit{contract curve} (set of Pareto optimal allocations)
• Slope of indifference curve can be used to infer a relative price—e.g., the real interest rate, if \((x, y)\) are time-dated goods
Arrow-Debreu securities

- The simple model above can be extended to many people and many goods

- Note that goods may be defined by their spatial and temporal dimensions
  - e.g., a lecture delivered on 09/01/2012 in Seigle Hall 103
  - this is a different good than the same lecture delivered at a different time and/or different place

- Uncertainty can be accommodated by introducing “state-contingent” goods
  - e.g., a lecture delivered on 09/01/2012 in Seigle Hall 103 if it does not snow
Frictions

• What are the “frictions” that prevent A-D securities from implementing efficient allocations?

• Two key frictions: [1] limited commitment; and [2] private (or asymmetric) information
  – in what follows, I will focus on [1]

• Commitment: the willingness and/or ability to honor a promise
  – since the financial market is a market in promises, the credibility of promise-makers (debtors) is an important consideration
A 2-period model of intertemporal exchange

- There are two periods and two goods, current consumption \(c_1\) and future consumption \(c_2\)

- There are two individuals A and B
  - A has preferences \(U_A = c_1 + \beta c_2\)
  - B has preferences \(U_B = \beta c_1 + c_2\)
    - assume \(0 < \beta < 1\)

- Both individuals have an endowment \((y_1, y_2) = (y, y)\)
• Assume that $y_1$ is nonstorable (otherwise, B could just save his current income and consume it later when he values it more)

• Autarkic (no-trade) allocation yields utility payoff $(1 + \beta)y$

• The two individuals could be made better off by trading with each other (there exist bilateral gains to trade)

• For equal Pareto weights, efficient allocation yields utility payoff $2y$

• Any Pareto-improving trade will involve A purchasing $c_1$ from B in exchange for $c_2$
• So how should we imagine trade taking place here?

• We need to be more specific about the nature of the endowment

• We could think of each person owning an asset that generates a production flow \((y_1, y_2)\)
  
  – one interpretation is that the asset is human capital, with \((y_1, y_2)\) comprising a flow of labor services generated by the human capital asset

  – alternatively, we can think of the asset as physical capital (e.g., a house that generates a flow of shelter services)
Immediate vs delayed settlement

- A wants to acquire $y_1$ from B—how can he pay for it?

Option 1: If A could commit to his promises, he could simply issue an IOU to deliver $y_2$ in the future

- debt incurred at date 1 is settled at date 2 (delayed settlement)

Option 2: If A cannot commit to his promises, he could simply sell his asset (ex dividend)

- transaction settled at date 1 (immediate settlement)
Weighing options 1 and 2

- Problem with option 1 is that debtor may not keep his promise (if he could, he would rather not deliver $y_2$ and consume it for himself)

  - what is the punishment for default? (will return to this issue later)

- Problem with option 2 is that the asset may inalienable to the original owner

  - e.g., if asset is human capital, there may be laws against slavery and/or indentured servitude

  - e.g., the owner’s input may be essential to operating the asset—if this input cannot be promised, asset will be “undervalued”
A 3-period model of intertemporal exchange

- Something seems to be missing in the 2-period model above; at least, as far as explaining monetary exchange.

- Yes, A may use his asset to purchase $y_1$, but B subsequently consumes the asset – it no longer circulates as a medium of exchange (the exchange looks very much like barter, except with an intertemporal dimension).

- Is this important?

- We can easily extend the model above to accommodate the possibility of circulation and see if doing so matters.
• A has preferences $U_A = c_1 + \beta c_2 + c_3$

• B has preferences $U_B = \beta c_1 + c_2 + c_3$

• Each person has two assets, one of which is as described above—delivers the output stream $(y_1, y_2)$

• The second asset produces an output at date 3 $(y_3)$ that only the original owner values
  
  – this implies $c_3(i) \leq y_3(i)$ for $i = A, B$

• Note that the Pareto optimal allocation is as above, together with $c_3 = y_3$ (where each person consumes the fruit of his second asset)
• Now, imagine that commitment is lacking and that the first asset is inalienable (non-transferable)

• Then the *only way* to achieve an efficient allocation is to use A’s second asset as a medium of exchange

  – at date 1, A pays B for $y_1$ using his second asset (to which B attaches zero “fundamental” value)

  – at date 2, B pays A for $y_2$ (A is made better off because he values $c_3$ more than $c_2$, and B is made better off because he does not value the $y_3$ produced by A’s second asset)

• Notice: A’s second asset is like collateral—it is held “hostage” by B, and released once A’s debt is discharged
Sale and repurchase agreements (repo)

- The “repo market” is sometimes called the “shadow banking” sector, for reasons that I will explain later in the course

- What is it? An agreement to sell an asset for cash (used to purchase goods or services), and then repurchase the asset at a later date at a specified price

  - essentially, a collateralized credit arrangement

- In our model, think of A selling his second asset to B (in exchange for period 1 goods) and then repurchasing the asset in the next period (in exchange for period 2 goods)
A lack of double coincidence of wants

• A “double coincidence of wants” simply means that there exist bilateral gains to trade (as in the examples above)

• A “triple coincidence of wants” means that there exist trilateral gains to trade (generally, multilateral gains to trade)

• Note: it is possible to have multilateral gains to trade together with the absence of any bilateral gains to trade
  – this case is described as a lack of double coincidence (of wants)
  – frequently offered as a rationale for monetary exchange
• The economies described above have bilateral gains to trade and a medium of exchange is necessary when commitment is lacking

  – conclusion: a lack of double coincidence (LDC) is not necessary to explain the use of money

• So LDC is not necessary—but is it sufficient?

• To answer this question, let us consider a LDC model

  – Wicksell’s triangle
Wicksell’s triangle

- Consider an economy with three people: A, B, and C (Adam, Betty, and Charlie)

- There are three periods, 1, 2, and 3 (morning, afternoon, and evening)

- There are three (time-dated) goods: $c_1$, $c_2$, $c_3$
• Preferences and endowments

\[
U_A = \beta c_3 + c_1 \text{ and } (y_1, y_2, y_3) = (0, 0, y) \\
U_B = \beta c_1 + c_2 \text{ and } (y_1, y_2, y_3) = (y, 0, 0) \\
U_C = \beta c_2 + c_3 \text{ and } (y_1, y_2, y_3) = (0, y, 0)
\]

• Convince yourself that there are no gains to trade between any two pairings (so, a LDC)

• Autarkic utility payoff is \(\beta y\)

• Pareto efficient utility payoff (equal Pareto weights) is \(y\)

  – clearly, there exist multilateral gains to trade
Figure 1
Multilateral Gains to Trade and a Lack of Double-Coincidence in the ABC Economy

Charlie
Wants Night Bread
Produces Afternoon Bread

Adam
Wants Morning Bread
Produces Night Bread

Betty
Wants Afternoon Bread
Produces Morning Bread

Night Delivery
Afternoon Delivery
Morning Delivery
• Efficient trading pattern has B giving $y_1$ to A, C giving $y_2$ to B, and then A giving $y_3$ to C

  – so everyone gets what they really want

• Arrow-Debreu securities: [IOU $y_j$] for $j = 1, 2, 3$, issued by B,C and A, respectively

• If people can commit to these promises, then efficient allocation can be achieved in any number of ways; e.g.

  – cooperative exchange or Arrow-Debreu securities market

• Conclusion: LDC is not sufficient to explain monetary exchange
Monetary exchange in the Wicksellian model

• Once again, assume that individuals lack commitment and that B, C assets are inalienable
  – cooperative exchange, Arrow-Debreu market, etc. will no longer work

• Well, what might work?

• A wants to consume in the morning and B produces morning bread
  – let A purchase morning bread with his asset (night bread)
  – of course, B does not value night bread *per se*, so why should she agree to such a trade?
• Because she expects to be able to use the A asset to purchase afternoon bread from C
  – C should be willing to accept A asset because C values night bread

• In this way, the A asset circulates as a medium of exchange
  – but remember, money is solving the lack of commitment friction, not the LDC
Income-generating assets as money

- In the examples above, I assumed that property rights some income-generating assets (physical and human capital) are easily transferable

  - ease of transfering property rights is an essential characteristic of any monetary asset (the A asset in the example above)

- But in reality, how is one supposed to pay for (say) a cup of coffee with a slice of (say) commercial real estate?

- Income-generating assets generally lack divisibility and portability
• But the actual physical property of an asset is a *red herring*

![Red Herring Image]

### Definition of RED HERRING
1. A herring cured by salting and slow smoking to a dark brown color.
2. (from the practice of drawing a red herring across a trail to confuse hunting dogs) something that distracts attention from the real issue.

• In particular, even if capital is not easily divisible and portable, one can in principle make *claims to capital* highly divisible and portable.

• Historically, paper banknotes; today, electronic book-entry items (deposit accounts).
Commodity money

• Commodity money refers to a payment instrument that takes a physical form and has intrinsic value

  – classic examples are gold, silver, copper, salt (salary), cigarettes, and more

• Note that these objects are typically not income-generating assets (except possibly, negative income – they are costly to store)

  – is there a problem with income-generating assets as monetary instruments?

  – if so, why not a monetary system based on commodity money?