

Unit 10

The context for this unit

We saw in the previous three units how markets provide a place of interaction from which people mutually benefit. One aspect of these interactions which has, while present, remained in the background is that of money.

The treatment of money is one of the ways in which this textbook remains superior to other principles of economics textbooks. Are you ready for it— commercial banks do not lend deposits; rather, loans issued by commercial banks create deposits. The interest rate that banks charge is not determined by supply and demand; rather, it is a markup over the interest rate set as a policy decision by the central bank to influence economic outcomes.

This unit

Early on in this unit, you are introduced to an intertemporal decision model. It is just another constrained optimization model, the difference is that rather than decide between good A or good B, the decision-maker is choosing between time A and time B. Do not let the time element confuse you; it is exactly the same as before: two functions, one that is optimized and one that acts as a constraint, and then find the equilibrium where $MRS=MRT$. The reason we want to understand the decisions making across time is that it allows us to understand how the policy rate set by the central bank can influence economic outcomes. The interest rate affects the decision-makers willingness to move money, and the purchasing power it represents, through time

We then conclude this unit with a discussion on banks and money.

Money

Keynes (1930) in his *Treatise* states that “the money-of-account is the description or title, and the money is the thing which answers to that description.”

In the US, the money of account is the dollar.

The two things which answer to that description, at least the two things that we will consider in this course, are High Powered Money (HPM) or referred to as base money is issued by the federal government. HPM consists of the little green pieces of paper that you may or may not be carrying in your pocket. It also exists in the form of reserves which are the money that commercial banks have in its account with the federal reserve.

The second type of money that we consider is bank money and it shows up in its most common form as demand deposits or equivalently your checking account. Bank money is created when a commercial bank issues a loan.

HPM and bank money are money-things that are used as a medium of exchange and as a store of value either against uncertainty or for speculative purposes.

Money represents a debt-relation or a promise to pay that exists between human beings. It cannot be identified independently of its institutional usages, for money expresses a social relation.

There exists a hierarchy of money things- all of which are denominated in the unit of account. Non-banks use bank money for net clearing. Banks use HPM for net clearing with other banks and with the government.

Money-things are IOU's— money is a debt relationship. This conception of money as a debt relation will become clear when we consider balance sheet implications of credit.

Maybe you are wondering why do people accept money as payment? There are a few different reasons, but here is one of the most powerful reasons. The state imposes an obligation on the citizens and names what can be used to fulfill this obligation; in doing so, the state is describing the money-of-account. In our current system of fiat money, the state has monopoly power to issue the money-thing which exists at the top of the hierarchy, the money-thing that everyone will accept.

Income and wealth

It is important to distinguish between a stock and a flow. The greatest distinguishing feature between the two is the time element. If time were to stop, a flow would cease to exist while a stock would remain. The bathtub analogy may clarify. The water flowing into the tub through the shower head or flowing out of the tub through the drain would cease to exist if we could somehow freeze time. The stock of water in the tub would still be there if we stopped time. Flows affect the levels of stocks, particularly the difference between the inflows and outflows.

Income represents a flow of money that, *ceteris paribus*, increases the stock of wealth.

Other key concepts

This all seems self-explanatory. Are these concepts stocks or flows?

Consumption over time

Now we start to build our intertemporal model. We assume that our decision maker starts with an endowment which consists of a stock of money or goods and exists in a two-period world, now and later. The opportunity cost here emerges from the assumption of a fixed endowment.

The ability to borrow and lend is the ability to move money through time, rearranging the time profile of our consumption bundle.

Quick aside: pay attention to the names of the characters in the text and who is in the advantaged and disadvantaged position.

Borrowing

There are a few things that affect the constraint in this intertemporal model: the endowment, both its size and time profile, and the interest rate. The time profile of the endowment refers when the decision maker receives the endowment, now or later. The slope of our constraint, our feasible frontier is the MRT which is interpreted as the tradeoff between consumption now and later. The feasible set represents all the possible combinations of consumption now and later.

In this example Julia receives her endowment of 100 units next period. We are presented with two scenarios, an interest rate of 10% and 78%.

At 10%, the most Julia can borrow is 91. Next period she will have to pay back the entire 100 which is the principal plus interest. If she were to borrow 91, she has effectively transferred all her purchasing power to the present.

If we increase the interest rate, the slope of the feasible frontier changes as does the size of the feasible set, they are steeper and smaller, respectively. The amount that she can transfer to the present is smaller as the price of transferring purchasing power to the present has increased. The increase in the interest rate has reduced Julia's capacity to consume in the present.

Why didn't the vertical intercept change with a change in the interest rate?

How much will Julia decide to consume now?

Before we can answer this question, we need to discuss her preferences.

Preferences for consumption

Consumption smoothing results from diminishing marginal returns to consumption. The value to the individual of an additional unit of consumption declines, the more consumption the individual has. Also known as: diminishing marginal utility. Diminishing marginal returns to consumption in each period mean that Julia would like to smooth her consumption, that is, to avoid consuming a lot in one period and little in the other.

Impatience describes how we value goods now vs later. Impatience would cause the decision maker to place greater utility on consumption in the present or equivalently, to place a greater discount on consumption in the future.

Consumption smoothing

Recall that we have the feasible set which gives all the possible combinations of consumption now and consumption later.

The indifference curve bows to the origin because of Diminishing marginal utility and represents all possible combinations of consumption now and consumption later that keep her utility constant. The more goods she has in the present, the less she values an additional one now relative to more in the future. The slope of her indifference curve is the MRS- marginal rate of substitution between consumption now and consumption later.

At point C, the MRS is relatively high as the indifference curve is quite steep. Because of diminishing marginal returns, Julia would be willing to exchange a large amount of consumption in the future for a smaller increase in the present. In fact, at this point, the rate at which she is willing to exchange is greater than the rate she is given by her constraint: $MRS > MRT$. She should move consumption to the present.

At point E, MRS is relatively low as the indifference curve is quite flat. Because of her desire to smooth consumption, at point E she would only be willing to give up a small amount of future consumption even for a very large increase in present consumption. In fact, the rate she is willing to make the trade-off for

more consumption in the present is less than the rate given by her constraint: $MRS < MRT$. She should move consumption to the future.

At point F, the rate she is willing to exchange is equal to the rate to constrained to and we have our equilibrium condition: $MRS = MRT$.

Pure impatience

Consumption smoothing is not the result of impatience. Consumption smoothing is the desire to avoid having a lot in one period and a little in the other.

Impatience is placing a greater value on the same endowment in the present period than it is given in the later period.

Optimal decision making

At point F, $\rho > r$. The rate at which Julia values consumption now vs. later is greater than price of bringing buying power to the present. Thus, she should transfer more consumption to the present.

If the interest rate increases:

- What happens to feasible set?
- What happens to temporal composition of consumption?

Borrowers and savers

The endowments of Julia and Marco differ because of their time composition. Marco gets his endowment in the present and Julia must wait.

Julia's reservation indifference curve is very steep at her endowment, suggesting that she would be willing to give up a large amount of future consumption for a small increase in present consumption. How much she transfers to present depends on cost of doing so.

Marco's reservation indifference curve very flat at endowment suggesting that he would be willing to give up a large increase in present consumption for a small increase in future consumption. How much he transfers to future depends on cost of doing so.

Saving and lending

In this example we are considering Marco who receives his endowment in the present. In the first example, Marco's only option for moving consumption through time is to save, but this has a cost much like a negative interest rate would.

Inner line represents the feasible frontier with storage. Given Marco's preferences (represented by his indifference curves) he would store grain if there were no other options. At point H, Marco's MRS between consumption now and in the future equals his MRT which gives the cost of moving present goods into the future.

What if Marco can lend and be assured of repayment. This is a very big assumption, and I would strongly encourage you not to make this same assumption and do not offer to lend money to anyone you met on

craigslist. By lending, Marco's feasible set expands, and he ends up transferring more consumption into the future, consuming more in total, but reduces consumption in the present.

Investment

Another way to move consumption through time is to invest. We assume away uncertainty and the possibility that the investment does not yield a positive return. Marco begins with an endowment of 100 and can further enhance his consumption by accessing credit and borrowing.

The inner frontier represents the situation without credit and a guaranteed return of 50%. In this scenario, Marco balances the tradeoff he is willing to make with the tradeoff he is constrained to make and arrives at the optimal intertemporal consumption bundle at point K.

If Marco, who begins with his endowment, has access to credit at a lower cost than the return to investing, he can further improve his situation by investing and borrowing. Accessing credit shifts the frontier out and Marco ends up balancing tradeoffs at point L.

Before advancing I want you to reflect on the narratives of Marco and Julia.

- Who started with assets?
- Who had the productive investment opportunity?

Does gender or any other part of our identity affect the outcomes we experience in the economy?

Balance sheet

Now we turn to balance sheets. Analyzing the economy through balance sheets can be very insightful. Assets are owned and liabilities owed.

Considering financial assets and liabilities demonstrates the nature of money as a social relation, linking sectors and individuals through space and time.

Balance sheet and wealth

Every financial asset has an offsetting liability. The existence of an offsetting liability means an extension of credit does not affect net worth.

We return to Julia who receives her endowment next period. Julia can borrow against her future endowment and takes out a loan of \$58. The extension of credit simultaneously created an asset and offsetting liability for Julia.

The first row of the table demonstrates the previously stated assertion that the extension of credit does not affect net worth.

Every financial asset must have an offsetting liability!

Banks

A bank is a very special type of firm. They are still motivated by the singular pursuit of profit, but they have the unique privilege of creating money which sits high on the hierarchy.

Banks borrow high powered money from households, other banks, and the central bank. They do not, however, inherently require high powered money to make a loan. When a bank extends credit, it does so by creating bank money.

More on this in a moment.

Central bank

The central bank issues the money thing that sits on top of the hierarchy. The central bank has the unique and powerful ability to create high powered money *ex-nihilo*.

The central bank functions as the bank for commercial banks. Commercial banks have an account at the central bank in the same way you or I have an account with them.

The central bank also creates money in the very same way commercial banks create money, by crediting accounts. Legal tender is created by the stroke of a computer key.

If you do not believe me, watch the clip from 60 minutes where Ben Bernanke, former chair of the Federal Reserve, says the exact same thing.

Bank money

Commercial banks create money when they issue a loan. Bank money is second from the top in the hierarchy. The reason bank money sits so high is that it is easily converted into base money, in fact more easily than any other money.

Consider the balance sheet of the fictional bank. Gino had earlier received \$20 from a sale to Marco. Marco swiped his debit card, instructing his bank to transfer \$20 to Gino's account. Banks settle with each other in a very similar fashion; they settle by transferring reserves, instructing the federal reserve to move money from one account to the other.

The \$20 in Gino's account is an asset to Gino and a liability to the bank who must convert the bank money into base money upon demand.

Returning to the example, Gino takes out a loan for \$100. The bank credits Gino's account, raising its balance to \$120. The loan created a deposit. From the bank's perspective, looking at the bank's balance sheet, there was a simultaneous creation of an asset- the loan that Gino owes the bank and an offsetting liability- bank money deposited into Gino's account which is payable to Gino on demand.

Loans create deposits. When a bank issues a loan to its customer it is not lending them other customers deposits. The bank creates bank money by crediting the account of the borrower.

Default risk and liquidity risk

Extending credit is an exchange of money now for money later. Money links the present to the future.

When a bank issues a loan, it credits the account of the borrower who has access to money now. However, the loan, a liability to the borrower and asset to the lender, must be repaid in the future; the repayment of the loan is the money later part of the money now for money later description of credit.

The bank is taking a risk by extending credit; the bank offers an asset which is highly liquid- the deposit in exchange for a highly illiquid asset- the loan. Liquidity refers to how quickly and costly an asset can be converted into base money.

Banking crisis

Banks create deposits when issuing loans. The deposits are convertible into base money. However, banks do not hold onto sufficient base money to meet the full extent of their liabilities. The discrepancy between balances makes them susceptible to bank runs.

Banks can and did, at an astounding rate in the leadup to the Great Recession, issue loans that will not be paid back.

Either of these scenarios can cause bank failure. Because banks are integral to the functioning of the economy, the government will step in to prevent their failure.

The money market

Processing payments involves a transfer of base money between banks. Combined with the regular withdrawals, banks require base money to meet transactions. Covering these transactions is done by borrowing.

If you walk into the bank with a crisp \$20 bill and deposit it into your account, the bank is effectively borrowing that base money from you. Banks also borrow money in the money market at an interest rate set by the federal reserve.

The demand for base money depends on transactional needs.

The supply of money is a decision by the central bank. The central bank, at least in the US and most other countries, does not seek to control the supply of base money. Rather, the central bank sets an interest rate and allows the demand for money at that interest rate to determine the supply of base money.

The financial system

The policy interest rate is the cost of base money. The interest rate set by the central bank determines all other interest rates in the financial system. The bank lending rate is determined as a markup over the policy rate.

Banks net worth

Insolvency and illiquidity are two distinct problems. When a bank faces a liquidity problem, it is not able to secure sufficient base money. When a bank faces insolvency it has negative net worth.

The central bank can address a liquidity problem by lending base money directly to the bank. Remember that the extension of credit does not affect net worth; lending money to banks will not address an insolvency problem.

Policy rate and the economy

The policy rate influences all interest rates in the domestic economy. Recall how a change in the interest rate affected Julia and Marco from earlier. Lowering the interest rate encourages greater spending today while raising the interest rate encourages greater spending in the future.

Principal agent problem

Like the interaction between labor and capital in setting the wage, the interaction between borrower and lender can be studied as a principal-agent problem.

How then can one hope to resolve the conflict of interest that troubles this interaction?

Equity and collateral

Two ways the conflict can be resolved is to require equity or collateral. Both resolutions require the agent to have some skin in the game, thus increasing the borrower's interest in seeing the project through to success as well as a signal that the borrower believes the project will be successful.

Credit rationing

One very perverse feature of credit is that those who do not need it can access it on the most favorable terms. Constraining and excluding access to credit are two forms of credit rationing. Credit rationing increases instability and inequality.

Power dynamics come into play here. Most often, the lender has the power advantage and can abuse this power in pursuit of profit.

That is all I have to say for this week, peace out.