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Central Banking and the Money Supply Process – I

Hello, everyone. Welcome to this session. In today's lecture, we will discuss how central banks influence the money supply through the banking system. In the previous session, we discussed monetary policy and its tools. At that time, we had identified several quantitative instruments, such as open market operations, the discount window, and reserve requirements. At that time, we also defined what is meant by money supply.

We have seen that, altogether, the currency in circulation plus the deposits with the banking system is the main component of the money supply. Keep that in mind, so let's proceed. How is the money supply determined by the central bank through monetary policy? Changes in the money supply affect interest rates and the overall health of the economy. The key questions we will answer in this session are: First, how is the money supply determined? And the second question is, who controls the money supply? And then, finally, what causes it to change? And to answer this, there are four players involved in the money supply process.

The one is the central bank. A central bank is a monetary authority that supervises the banking system and manages monetary policy. We have seen that a central bank is the apex bank, a monetary authority, and acts as the lender of last resort for the banking system. The central bank is both a promoter and a regulator of the banking system. Then comes the second key player, which is the banking sector.

Banks include commercial banks, savings and loan associations, mutual savings banks, and credit unions. All these depository institutions form another key player in the money supply process. And then come the depositors, who are the public, including individuals and institutions that hold deposits in banks. Therefore, we have borrowers—individuals and institutions that borrow from depository institutions and other institutions that issue bonds, which are then purchased by depository institutions. These are the four major players: the central bank is the key player, followed by the banking system.

Let's now focus more on the central bank and how it determines the money supply through interactions with the banking system, depositors, and borrowers. As I mentioned, the central bank conducts monetary policy that involves actions affecting its balance sheet. Just like any other financial institution, the central bank also maintains a balance

sheet, on which we can list its assets and liabilities. Let's begin with the liabilities of a central bank. For the sake of discussion, I may occasionally refer to the Fed as an illustrative example of the central bank.

When I refer to the Fed, I mean the Federal Reserve System, which is the central banking system in the US, or the Reserve Bank of India, which is related to India. Let's begin with the liability side of a central bank's balance sheet. The FED's or RBI's monetary liabilities include currency in circulation. You know that currency in circulation is a promissory note issued by the RBI Governor. If you examine a currency note, you can see the promise written by the Reserve Bank Governor and his or her signature on it.

That means the currency in circulation is a liability for the central bank. In simple terms, if more currency is in circulation, the central bank's liability increases. Then, it comes to reserves. Reserves refer to commercial banks and other depository institutions. They deposit funds with the central bank.

It can include both required reserves that you have already seen. Required reserve, for example, 4.5%, plus excess reserves. Excess reserves mean the amount kept above the required reserve of 4.5%. Commercial banks may also hold excess reserves with the central bank through their accounts. They typically reserve this for contingency needs, such as deposit outflows or any other unforeseen circumstances. An unforeseen demand for funds may arise, so to prepare for that, the central bank sometimes keeps excess reserves as a cushion against unexpected deposit outflows and other monetary needs. As we previously discussed in class, these are referred to as the monetary base or high-powered money. The monetary base, or MB, consists of currency in circulation plus reserves held by depository institutions at the central bank, which includes reserves held in the Fed account as well.

On the liability side, what you see is the currency in circulation and the reserves. You may have noticed earlier in this slide that I mentioned reserves refer to the reserves held by the central bank, which include the required reserve and excess reserves kept with the central bank. However, the currency held by depository institutions is also considered part of reserves because it is not included in the currency in circulation. Currency in circulation refers to money in the general public's possession; currency held by depository institutions is not part of circulation but rather part of their reserves. So, you can see it on the right-hand side of this T-account.

A T-account indicates that it's part of our balance sheet. However, we only show the key elements or components of a transaction—just the ones we report in a T-account. We are not dealing with the entire balance sheet here; instead, we focus on where the transaction occurs, so we present it in a T-account. Note that I will show you in the upcoming slides. Here, the currency in circulation and reserves is a liability of the central bank.

Then again, to make the idea and concept very clear and simple, I categorized the reserve here as a required reserve. That is, as I have already defined, a portion of the total demand and time deposits that must be held with the central bank. That is the required reserve. An excess reserve refers to any additional reserves that banks choose to hold, whether with the Fed or in the form of cash elsewhere. To clarify the concept, let's distinguish between high-powered money and the money supply.

We have already defined the money supply. We define the money supply as the total amount of currency in circulation. Additionally, demand refers to deposits held by the banking system, encompassing both demand deposits and time deposits. In short, the money supply comprises currency in circulation, as well as all deposits held by the public with the banking system. Then, for the monetary base, here 'c' is common, but 'r' comes into play.

The monetary base, which is high-powered money, refers to currency in circulation plus the reserves that we have already defined. As shown in the figure, the first part represents the money supply, also known as the money stock, which includes currency and deposits. To achieve this level of money supply, we examine the monetary base, as shown here. It includes currency in circulation, and the two are the same size. However, the reserves are small compared to the deposits.

What you see here is the bottom part, which is the monetary base. Based on this, a central bank can influence the money supply, which includes currency in circulation and deposits. When we estimate the money supply in an economy, we calculate or estimate the total currency in circulation and the total deposits in the banking system. In short, the Fed's control over the monetary base is the primary means by which it influences the money supply. Let's look at the balance sheet.

On the asset side, it was a government security. Government security refers to the Fed or the RBI providing a reserve to the banking system by purchasing securities. From the commercial banks in the banking system, these securities mainly refer to government securities issued by the central government and purchased by commercial banks as part of their investment portfolios. This means that a portion of what is held by commercial banks will be purchased by the central bank as part of the monetary policy process, which we will discuss shortly. Here, an increase in government securities held by the central bank leads to a rise in the money supply.

This is primarily achieved through open market operations, which involve the banking system purchasing and selling government securities. The second asset is that it can provide reserves to the banking system by making discount loans to banks. An increase in discount loans can also be a source of an increase in our money supply. In India, the

discount rate is referred to as the bank rate. It generally varies following a monetary policy announcement, and it is typically around 4 percent, currently 4.25 percent. And it's when a commercial bank borrows money from the central bank under the discount window that it's a kind of borrowed reserve, because, as I will be showing you shortly, when a commercial bank borrows from a central bank, the reserve component immediately increases. Here, giving a loan with a discount to a commercial bank is considered an asset for the central bank. You can see that the central bank's assets include government securities bought from the government and from commercial banks. Additionally, if the central bank directly lends to commercial banks by purchasing government securities, that also becomes part of its assets. When it comes to government securities, it doesn't necessarily mean that they are bought from commercial banks.

Sometimes, they can be purchased directly. Occasionally, the central government may lend directly, and in return, it will buy bonds issued by the government. The central bank will buy government securities, which will then become part of its assets. I have already mentioned that the second component is discount loans. Let's now discuss, with some illustrative examples, how open market operations affect the balance sheets of the Fed, the central bank, and commercial banks, and how they influence the money supply.

Let's start with an open market purchase from a bank. Assume that the Fed or the RBI purchases $100 of government securities from a bank and pays with a $100 check. You can see the resulting changes in the T-account. A T-account displays only this specific transaction from the balance sheet, and as a result, other components of the balance sheet remain unchanged. We typically use a T-account only to reflect the particular transaction we are discussing.

In this case, the transaction involves the Fed, or the central bank, buying securities. $100 worth of bonds is a type of government security held by a bank. When the bank holds these securities, it gives a check in return. Let's see what happens within the banking system: initially, the bank's assets include government bonds totaling $100. When these bonds are subtracted from its assets, a deficit appears, indicating a decline in assets.

There is a $100 decline in government bond securities assets within the banking system. As you know, when the central bank buys an equivalent amount, such as 100, it injects that amount into the banking system. This action immediately results in the bank's account with the central bank being credited. For example, the bank might receive this in the form of a check, and instantly, the amount—say 100—is credited to the bank's account with the central bank. Then, what about the central bank's balance sheet? There is an increase in securities because this $100 now comes from the commercial bank. When it credits $100 to the commercial bank's account as reserves, it becomes a liability.

You can see that with the central bank, there is an increase in assets at the same time as an equivalent increase in liabilities. The net result is that reserves have increased by 100, so there is no change in currency here. So, what is the monetary base? You can see that the monetary base has increased by $ 100 because it includes currency in circulation plus reserves. Although the currency hasn't changed, you can see that the monetary base has increased. Reserve has increased, which means more reserves are included in the monetary base, and the overall monetary base has risen by 100.

Now, imagine a scenario where there's an open market purchase from the non-bank public. Assume that a person or corporation sells 100 dollars' worth of bonds to the Fed and deposits the check in a local bank. Instead of going through a bank, a person or corporation directly sells $100 worth of bonds to the Fed and deposits the check in a local bank. The transaction with non-bank public securities is in decline, while checkable deposits are increasing because they sell a bond worth $100. Immediately, the central bank will issue them a check, and if they deposit that check into a commercial bank's individual or corporate account, it will be recorded as an increase in their checkable deposits.

This shows that it is their asset. Within the banking system, the reserve has increased because when an individual or corporation presents a check to their bank, the reserve immediately increases along with the checkable deposits. Because of this reserve, you know that the central bank will give this money to the commercial banks. From there, the commercial bank will transfer the funds to the individual, person, or corporation that deposited the check. The Federal Reserve System shows a corresponding increase in securities and liabilities. In summary, what you can see is that the net result is that reserves have increased by 100.

However, there is no change in the currency. And again, you can see that the monetary base has risen by $100. Let's now examine another case where the person selling the bone cashes the Fed check either at a local bank or at the Fed for immediate currency. So, what happens if they don't keep the money in the banking system? Instead, they directly cash it. What's the change here? The non-bank public—all of these are the same. Here, the Federal Reserve System, which is the central bank, serves as the banking system.

What you can see here is that RBI's securities have risen by 100, and the currency in circulation among the public has increased by 100. Again, reserves remain unchanged, while the currency in circulation increases by 100. Now, the monetary base increases by an amount of 100 because we know that the monetary base equals c plus r. It now increases primarily in terms of currency in circulation, resulting in a rise in the monetary base.

This is the reason. This is a summary of the two illustrative cases we discussed here. What you can say is that in the first case, reserves have increased. That is part of the monetary base. In the second case, if they cash it out directly, they are also liable. The monetary base increases, but in the form of currency in circulation, because we have already defined the monetary base or high-powered money as equal to currency in circulation plus reserves.

This is the summary of open market purchases. We have already discussed this, and it would be helpful to consolidate everything onto one slide here. Similarly, this is an open market purchase. If they make an open market sale instead of purchasing, the sale refers to whatever the central bank holds as the government's equity that it sells to the banking system. And then, in return, they withdraw the money from the banking system. That is normally used when the central bank wants to reduce the money supply or lower the reserves within the banking system.

Now, let's discuss another tool called loan discounting. Key points are that this is referred to as rediscounting of bills, and there is also a direct loan to commercial banks without requiring collateral. Discounting of bills means a commercial bank can borrow from the central bank by selling government securities to the central bank. However, the agreement stipulates that after a specified period, typically 15 or 30 days, the government will repurchase the same security at an agreed-upon interest rate.

Right. In practice, the discounting of loans, primarily long-term loans, refers to the direct lending of funds by the RBI to commercial banks at a discount rate. In India, this is called a bank rate; in the US, it is referred to as a discount loan. However, in India, it is referred to as the bank rate. Non-banking financial companies are not permitted to use these windows; however, they can participate in open market operations involving government securities, which are conducted at the repo rate. They can borrow, so the repo rate is mainly used for short-term loans.

Typically, banks borrow from the central bank to meet their reserve requirements and address other very short-term financial and monitoring needs. Making a discount loan to a bank: here we will illustrate what happens when a central bank issues a loan or approves a loan to a commercial bank and how this affects the banking system, the Federal Reserve, the central bank's balance sheet, and the T-accounts. Here, it is assumed that the Fed or RBI offers a $100 discount loan to First National Bank, a commercial bank. As a result, the bank is credited with 100 dollars in reserves from the loan proceeds. The important thing to remember here is that when a central bank provides a loan to a commercial bank, it immediately lends out the full amount, in this case, 100 dollars.

Instead of directly giving cash, the central bank will credit this $100 to the account that the commercial bank holds with the central bank. Remember that each commercial bank has an account with the central bank. When a commercial bank receives a loan, the central bank immediately credits that bank's account. This causes the monetary liabilities of the Fed to increase by 100. You can see that when the central bank credits, the commercial bank's reserves increase, which means that the reserves are assets for the commercial bank.

However, for the central bank, they are also assets within the banking system. Examine the banking system here to understand what happens when it is credited. A loan increases its assets by $100, but at the same time, you know that when it issues a loan, it is a liability, so its liability also increases by an equivalent amount of $100. In the Federal Reserve System, as I previously mentioned, liabilities increase by $100, and assets increase because the Fed has extended a loan to the commercial bank.

That means the loan is an asset for the central bank here. The $100 discount loan is an asset. So, what if the commercial bank that received the loan now repays a discount loan from the Fed? Since paying off the loan is the same as repaying the loan, what if the bank pays off the loan from the Fed, thereby reducing its borrowing from the Fed by 100? You can see that the monetary base declined by the same amount, so the changes in the banking system's assets and liabilities also decreased by $100. The federal banks' discount loans that they receive back also decline, which causes liabilities to decrease as well. Therefore, in this process, the monetary base declines.

Let's now examine the other factors that affect the monetary base. Apart from these two open market operations and the discount window, there are some other factors that also affect the monetary base. There are primarily two key factors affecting the monetary base, but they are not controlled by the Fed. One is a float. Float refers to the process by which the Fed clears checks for banks. It usually credits the check amount to the depositing bank and increases its reserves, but only later debits the bank on which the check is drawn.

This temporary increase in reserves within the banking system, caused by the Fed's check-clearing process, is referred to as a flaw. In simple terms, 'flawed' here means that, for example, if you receive a check issued by a company or your employer and cash it for $100. Or let me just take a large amount in the Indian situation. For example, a cheque for one lakh rupees that you use to buy a company or from someone who owes you one lakh rupees, and you deposit this cheque in a bank where you hold an account. What you need to do immediately is deposit this check into your bank account; then the bank will credit one lakh rupees to your demand deposit account.

But at the same time, assume that this check was issued by a different bank, not the bank where you are depositing the money. Immediately, you can see that the deposit in your account has increased. So, does that mean the reserve has gone up? At the same time, the amount was not deducted from the bank that issued this check. Additionally, the entire transaction between your bank and the bank that issued the check is not done directly; it is processed through a central banking system. When this amount is credited to your account, it occurs immediately.

That means the reserve will immediately increase as the banking system's reserves increase simultaneously. It won't be deducted from the other bank; it will take some time—possibly one, two, or three hours—due to technological advancements. All these transactions will be settled immediately due to electronic processing. However, there will be a temporary net increase in the total amount of reserves here, possibly lasting one or two hours, which will lead to a rise in reserves within the banking system and an expansion of the monetary base. The second component is that when the central government, that is, the treasury, transfers its deposit from a commercial bank to its account at the central bank.

When the Treasury or the central government transfers deposits from commercial banks to its account at the Fed, resulting in a rise in Treasury deposits at the Fed, it causes a deposit outflow from these banks. It causes a drop in reserves here. You can see it causes a decrease in reserves within the banking system, which also leads to a fall in the monetary base. In summary, here is an overview of open market operations. Normally, the central bank can control the monetary base through open market operations because these operations are conducted daily via the trading desk that the central bank operates, and the Fed completely manages sales by placing orders without delays.

This one is called the non-borrowed reserve, and the second one is the discount loan. As you can see, with open market operations, when the central bank purchases government securities from the banking system, the reserves of the commercial banks increase. However, this is not achieved through the commercial banks borrowing from the central bank, but by selling their securities to the central bank. That is why it is called non-borrowed, and the reserves increase. Through non-borrowed sources, the second type is the discount loan, also known as borrowed reserve.

Here, two lending options are available: one is at the bank rate, as I have already mentioned, without collateral, which involves long-term loans; the other is at a repo rate, again as I mentioned, with collateral, which involves overnight loans. All of these are very short-term loans. And here, when a commercial bank borrows from the central bank, its reserves increase immediately. However, these reserves are borrowed reserves because the central bank cannot arbitrarily decide to increase the reserves through borrowing. You

cannot decide arbitrarily because it depends on whether commercial banks are willing to borrow from the Fed or the RBI.

This means that if a commercial bank doesn't find a more productive way to use these funds, it won't borrow from the central bank, or perhaps the commercial bank doesn't have any reason to do so. A reserve shortfall occurs when the required reserve isn't met; in that case, banks won't borrow from the central bank. The second component, the borrowed reserve, entirely depends on the willingness of commercial banks to borrow from the central bank. In short, you can think of the monetary base as consisting of non-borrowed reserves and borrowed reserves. In this session, we discussed how the central bank uses open market operations and the discount window to influence the money supply, primarily by affecting the reserves of the banking system.

And then we distinguished between borrowed reserves and non-borrowed reserves. Non-borrowed reserves refer to reserves accumulated through open market operations, while borrowed reserves primarily come from the discount loan window. Thank you for watching this session. See you in the next one and thank you again.