Lecture 11: An Overview of Money and Monetary Policy

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Outline

- An introduction to money
  - What is money?
  - How to measure the quantity of money?
  - How money is created?
- An overview of monetary policy
  - Goals of monetary policy
  - Tools of monetary policy
  - Targets on monetary policy
  - The practice of Reserve Bank of Australia
  - Transmission mechanism of monetary policy

Reading for Monetary Policy: Champ, Freeman and Haslag (2011), Modeling Monetary Economies.

What is money?

- Money is any commodity (commodity money) or token (fiat money) that is generally acceptable as a means of payment.
- In ancient times, some commodities such as gold and silver were used as money.
- Modern societies use fiat money, which is intrinsically useless but enjoys legal tender status derived from an authoritative order of the government.
- Function of money:
  - means of payment
  - medium of exchange
  - unit of account
  - store of value

How to measure the quantity of money?

- Money in most countries consists of:
  - Currency: bills and coins
  - Deposits of the private sector at banks and other depository institutions:
    - Deposits are money because they can be converted into currency and because they are used to settle debt.
- Several monetary aggregates are used to measure the quantityof money in circulation: M1, M2, M3, Broad money and etc.

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Different countries have different measurement of money. The RBA defines the monetary aggregates as:

- M1: currency plus bank current deposit of the private non-bank sector.
- M3: M1 plus all other deposits of the private non-bank sector.
- Broad Money: M3 plus borrowing from the private sector by all financial intermediaries, less the latter's holdings of currency and bank deposits.
- Money Base: holding of notes and coins by the private sector plus deposits of banks with the RBA and other RBA liabilities to the private non-bank sector.

How money is created?

- Money is created through the banking system, to understand how money is created, we first introduce an important concept: monetary base.
- The monetary base includes: central-bank-issued currency (both as bank vault cash as currency circulating in the public), and the deposits of banks and other depository institutions at the central bank.
- In Australia, bank reserves are their deposits at their exchange settlement accounts in the RBA plus currency that is physically held in bank vaults.

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- The monetary base is **NOT** a monetary aggregate. It is a measure of the funding base that underlines the monetary aggregates, rather than a monetary aggregate itself.
- The monetary base is sometimes called high-powered money, because changes in the monetary base usually lead to increase in money and credit that are larger than the changes in the monetary base.

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- The central bank directly controls monetary base through printing new currency or open market operations, which is the purchase or sale of government bonds or securities by the central bank in the open market.
- How money is created? We use an open market purchase to illustrate the basic process. When the central bank conducts an open market purchase of government securities of $100, it can buy from banks or from nonbank public. In any case, the monetary base increase by $100.

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- Case 1: If the central bank buys from banks, then bank reserves increase by the amount of the open market purchase, $100.
- Now banks have excess reserves of $100 so they make loans. The Actual amount of loans depends on demand of loans from the nonbank public.
- Assume that banks make loans of $100 to Mr. A, and Mr. A spends the money at Mr. B's shop. Mr. B may deposit the money at his bank or hold them as cash.

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- Assume that Mr. B deposits all \$100 such that deposits in the banking system increase by \$100, i.e., stock of money increases by \$100.
- If the required reserve ratio in 10%, then banks need to keep \$10 as required reserve, and have excess reserves of $\$90 = \$100 \times (1 - 0.1)$. Banks can again make loans.
- Assume that **banks hold no excess reserves and no additional cash is held by the nonbank public** (all excess reserves transform into loans and all loans end up as deposits at banks).
- Then in the second round of lending, bank deposits increase by \$90, and in third round of lending, bank deposits increase by $\$90 \times (1 - 0.1) = \$81$, and so on.

- In total, bank deposits increase by:

$$\begin{aligned} 100 + 90 + 81 + \ldots &= 100 \cdot (1 + 0.9 + 0.9^2 + \ldots) \\ &= 100 \cdot \frac{1}{1 - 0.9} = 100 \cdot 10 = 1000, \end{aligned}$$

  i.e., the stock of money increases by 1000, which is 10 times of the initial increase in monetary base.

- Notice that the multiplier is equal to 1/the required reserve ratio. Without those two conditions, the multiplier would be smaller.

- Case 2: If the central bank buys from nonbank public, then the increase in bank reserves depends on whether the sellers of the government bonds keep the proceeds from the sale in currency or in deposits.
  - If the proceeds are kept in currency, the open market purchase has NO effect on bank reserves such that there is no multiplier effect, i.e., the stock of money increases by the same amount as the open market purchase.
  - If the proceeds are kept as deposits, then bank deposits increase by \$100, i.e., the stock of money increase by \$100 in first round.
  - Since banks now have excess reserves of \$90, they can make loans. Same money creation process continues as in Case 1.
  - Again under the two conditions, the stock of money increases by 10 times of the initial increase in the monetary base.

- Summary: When the central bank conducts an open market purchase, it increases bank's reserves. Banks lend the excess reserves. By making loans, banks create money.
  - If banks hold no excess reserves and no additional cash is held by the public, the money created is 1/the required reserve ratio times of the initial increase in monetary base.
  - Without these two conditions, the multiplier effect is smaller.

An Introduction to Money (12 of 12)

- From the money creation process, we see that the central bank can influence but cannot directly control the stock of money in circulation, since the money created following an initial increase in monetary base is influenced by the public's behavior (demand for cash and credit) and banks' behavior (supply of loans), which are out of the central bank's direct control.
- The reverse occurs when the central bank sells a government security.

Goals of Monetary Policy (1 of 2)

- Monetary policy refers to action by a central bank or monetary authority that manages money supply, interest rates and credit availability to achieve certain goals.

Goals of monetary policy:

- Recall that general objectives of government policies are to maintain full employment, moderate business cycle, achieve sustained long-term growth, and keep price stability.
- In addition to the four goals above, another two goals of monetary policy are to keep stability of financial market and stability in foreign exchange market.
- Among these goals, price stability is increasingly viewed as the most important goal for monetary policy.

Goals of Monetary Policy (2 of 2)

- A **small amount** of inflation is often viewed as having a positive effect on the economy. However, inflation rates above certain level are regarded as being harmful. (A discussion of the consequences of inflation will be given in later lectures).
- In the data, inflation and monetary and money growth are closely related. So inflation is regarded by many economists as solely being down to the variations in the money supply, which is somehow under the control of central banks.
- Although many of the macroeconomic goals are consistent with each other, this is not always the case. The goal of price stability often conflicts with the goals of interest-rate stability and high employment in the short run.

Tools of Monetary Policy (1 of 5)

- Historically, conduct of money policy emphasizes the role of monetary aggregate. However, as we have seen from the money creation process, the actual amount of money in circulation is out of the control of central banks. This is especially true since the financial liberalization in 1980s.
- In recent years, central banks have increased their focus on the interest rate on overnight loans of reserves from one bank to another (known as federal funds rate in the U.S. and cash rate in Australia) as the primary indicator of the stance of monetary policy.

Tools of Monetary Policy (2 of 5)

- There are three policy tools that a central bank can use to manage the short term interest rate: open market operations, discount rate, and reserve requirement.
- Other interest rates in the economy are influenced by this short term interest rate to varying degrees, so that monetary policy affects the economy in pursuit of the goals.

Tools of Monetary Policy (3 of 5)

- Open market operations:
  - Open market purchases expand reserves and the monetary base, thereby raising money supply and lowering federal funds rate and other short-term interest rates.
  - Open market sales shrink reserves and the monetary base, lowering the money supply and raising short-term interest rates.
- Changing the discount rate, which is the interest rate at which the central bank stands ready to lend reserves to depository institutions.
  - Raising the discount rate causes the federal funds rate to rise while lowering it causes the federal funds rate to fall.

Tools of Monetary Policy (4 of 5)

- Changing the required reserve ratios: The central bank sets required reserve ratio for each type of deposits.
  - Increasing reserve requirements leads to a rise in the federal funds rate, while decreasing them leads to the opposite.
- **Open market operations** are the most important monetary policy tools. Study how federal reserve bank conducts open market operations.

Tools of Monetary Policy (5 of 5)

- Advantages of open market operations:
  - The central bank has complete control over the volume of open market operations (no complete control over amount of discount loans).
  - Open market operations are flexible and precise; they can be used to any extent.
  - Open market operations are easily reversed.
  - Open market operation can be implemented quickly; they involve no administrative delays.

Targets of Monetary Policy (1 of 7)

- A central bank's problem is that it wishes to achieve certain goals, but it does not directly influence the goals. It has a set of tools to employ that can affect the goals indirectly after a period of time (typically more than a year).
- If the central bank waits to see what the price level and employment will be one year later, it will be too late to make any corrections to its policy-mistakes will be irreversible.
- All central banks consequently pursue a different strategy for conducting monetary policy by aiming at variables that lie between its tools and the achievement of its goals.

Targets of Monetary Policy (2 of 7)

- The strategy is as follows:
  - First, set final goal target, which is numerical target for inflation, unemployment rate, etc. For example, many central banks choose an inflation target of 2-3% per annum.
  - Then choose a set of variables to aim for, such as monetary aggregates (M1, M2) or interest rates (short or long-term), which have a direct effect on employment and the price level. These are called intermediate targets.

Targets of Monetary Policy (3 of 7)

- However even these intermediate targets are not directly affected by central bank's policy tools. Therefore, it chooses another set of variables to aim for, called **operating targets**, or **instruments**, such as monetary base or other reserve aggregates, and some short term interest rate, which are easily controllable by its policy tools.
- Remarks:
  - The relationship among them can be described as: monetary policy tools$\rightarrow$ the operating target$\rightarrow$ the intermediate target$\rightarrow$ final goal target.
  - Note all central banks set all these targets. For some countries, there is no intermediate target nor an operational target, but a numerical target for the final goal, combined with policy tools in pursuit of that goal.

Targets of Monetary Policy (4 of 7)

- Choosing the targets
  - Final goal target: Many industrialized countries, including Australia, have chosen an inflation target range (2-3% for Australia).
  - Intermediate target: Interest rate target or monetary aggregate target? Three criteria for choosing an intermediate target:
    - It must be measurable.
    - It must be controllable by the central bank.
    - It must have a predictable effect on the final goal.
  - Operating target: Both federal funds rate and reserve aggregates are measured accurately and are easily controlled by the policy tools. Which one to choose depends on the choice of the intermediate target.
    - If the desired intermediate target is an interest rate, the preferred operating target will be an interest rate like the federal funds rate.

Targets of Monetary Policy (5 of 7)

- There are a lot of debates on whether interest rates or monetary aggregates provide a better intermediate target. Historically both were widely adopted in central bank practice. However, there has been a de-emphasis on monetary aggregates among central banks since 1980s, and interest rate targeting becomes increasingly popular.
  - The financial liberalization makes it even harder to control the monetary aggregate.
  - Relative stable inflation rate makes the real interest rate easier to predict and control (nominal interest rates are easily measured and controlled).
- In nowadays, most central banks in developed countries conduct monetary policy by setting a target for **nominal** short term interest rate, typically the interest rate on reserve loans.

Targets of Monetary Policy (6 of 7)

- How the nominal interest rate should be targeted?
  - John Taylor (Stanford University) has come up with an answer, his so-called Taylor rule, in 1993.
  - The Taylor rule indicates that the federal funds rate should be set equal to the inflation rate plus a weighted average of two gaps: an inflation gap (current inflation minus a target rate) and an output gap (percentage deviation of real GDP from potential GDP). This rule can be written as follows:

$$i_t = \pi_t + r_t^* + \omega_\pi(\pi_t - \pi_t^*) + \omega_y(y_t - y_t^*).$$

- Taylor estimates ω_π and ω_y using historical data. As Taylor shows, the Taylor rule does a pretty good job of describing the Fed's setting of the federal funds rate under Chairman Greenspan.

Targets of Monetary Policy (7 of 7)

- An equation like the Taylor rule is called monetary policy reaction function, which describes how the action the central bank responds to the state of the economy. A central bank's behavior is ultimately instructed by some sort of policy reaction function.
- In the literature, there is substantial work that estimates a modified Taylor rule (such as incorporating interest rate smoothing, exchange rate, forward-looking variables, and so on) using country specific data to understand the central bank's behavior.

The Practice of Reserve Bank of Australia (1 of 3)

- The Reserve Bank of Australia (RBA) is responsible for formulating and implementing monetary policy. The RBA's duty is "to ensure that the monetary and banking policy of the Bank is directed to the greatest advantage of the people of Australia" and "best contribute to"
  (a) the stability of the currency of Australia;
  (b) the maintenance of full employment in Australia; and
  (c) the economic prosperity and welfare of the people of Australia"
- The Government recognizes the independence of the Reserve Bank and its responsibility for monetary policy matters.
- The RBA adopts inflation targeting since 1993, which sets "a target for consumer price inflation, of 2-3 percent per annum. Monetary policy aims to achieve this over the medium term and, subject to that, to encourage the strong and sustainable growth in the economy".

The Practice of Reserve Bank of Australia (2 of 3)

- "The inflation target is defined as a medium-term average rather than as a hard-edged target band within which inflation is to be held at all times. This formulation allows for the inevitable uncertainties that are involved in forecasting, and lags in the effects of monetary policy on the economy".
- The operating target is the **cash rate**, which is the interest rate charged on overnight loans between financial intermediaries in order to maintain their exchange settlement balances.
- The RBA uses its open market operation to target the cash rate. Other interest rates adjust accordingly so as to affect real decisions of the private sector.

The Practice of Reserve Bank of Australia (3 of 3)

- Decision process:
  - The formulation of monetary policy is the primary responsibility of the Reserve Bank Board.
  - The Board normally meets eleven times each year, on the first Tuesday of the month except in January.
  - For each meeting the Bank's staff prepare a detailed report of developments in Australian and International economies, and in domestic and international financial markets. The reports contain a recommendation for the policy decision.
  - Decisions by the Reserve Bank Board to change the cash rate are made, and communicated publicly afterwards.
- For more, visit the RBA's website and the RBA speech "The Australian Experience with inflation Targeting"[1].

[1] https://www.rba.gov.au/speeches/2009/sp-ag-150509.html