Lecture 2
17-11-2015
Chapter 4,5
Last week we introduced a model for the goods market with we assumed that the demand for Investment goods (I) was determined exogenously. This week we extend the model and drop this assumption. It now depends on the interest rate. If the interest rate is low, it is cheap to invest so the logical behavior is to invest more. If the interest rate is high, it is expensive to invest so investors will invest less. We can see that 'I' is a function that negatively depends on the interest rate (i).
The model discussed this week provides us a theory for the interest rate, which is called Keynes liquidity theory. This theory analyses recessions and can only be applied in the short run.

What is money?
Money is a good that can be readily used to make transactions, so it facilitates transactions. In economic terms money is not the same as wealth. **Financial wealth =** financial assets that you own minus your financial liabilities. Income is part of your wealth. Money can have a high intrinsic value, like gold, which is the real value of currency. But nowadays currency values zero so in intrinsic terms it does not contribute to your wealth anymore. Money is a unit of account, it provides the terms in which prices are quoted so that you can compare products and measure their value. The practical function of money is that it is an unit of exchange. The third feature of money is that it can be used intemperate. It facilitates intertemporal substitution of purchasing power: 'save money today, spend it tomorrow.'

Money demand
The money demand consists of the demand for currency (coins and bills) and the demand for deposit accounts (checking and saving accounts and money market deposit accounts). The quantity of money demanded depends on:

- The opportunity of holding money
  When you hold money, you cannot invest in bonds. When you do invest in bonds you will receive interest 'i'. When you hold money, you forego a return 'i' on bonds.
- The number of transactions to be made
  A higher income results in more money demand because the price and quantity of the goods you want to purchase are higher.

M^d = €Y * L(i)
M^d = money demand
€Y = nominal income
L = liquidity
i = interest rate

The money demand negatively depends on the interest rate and positively on income. If the interest rate is high, people are putting money on their savings account. So if you want to purchase something, you have to get your money from that account. The demand for deposit accounts increases.
The money demand is a downward sloping curve with the interest rate on the y-axis and money on the x-axis (see slide 13 of lecture 2). A change in €Y causes a shift of the money demand curve because €Y is not a variable on one of the axis. A change of interest rate or money results in a change along the money demand curve.

Money supply

The ECB (European Central Bank) provides an increase or decrease in the money supply on the open market of government bonds. Interventions are called market operations. The money supply increases when the central bank buys government bonds from banks and households. The money supply decreases when the central bank sells government bonds.

Equilibrium on the money market
When the money supply and the money demand are equal, the money market is in equilibrium. The money supply is determined by the ECB and does not depend on the interest rate, so in the graph discussed previously the money supply is a vertical line. The money demand is downward sloping (see slide 16 of lecture 2).

In the lecture dr. R.M. Jong-A-Pin asked this question:
Consider a CB that aims to lower the interest rate. What should it do?
The answer is buying government bonds so that the money supply increases. In the graph discussed earlier you can see a lower interest rate by a higher money supply because the money supply shifts to the right.

The IS-LM model
The IS-LM model is a short run model for a closed economy where we focus on the goods market and the money market. In both markets, there are various combinations of the interest rate and income that ensure market equilibrium. All the equilibriums in the goods market result in the IS curve and all the equilibriums in the money market result in the LM curve. This is one overall equilibrium for the demand side of the market for goods and services. The IS-LM model can be used to examine the effects of fiscal policy and monetary policy

In the goods market $Y = Z$ and $Y = C + I + G$, so that $Y = C + I + G$. Expanding this equation gives us
$Y - C - G = Y$
$Y - C - G + T - T = I$
$(Y - C - T) + (T - G) = I$
$S_{pr} + S_{pu} = I$

S_{pr} = private savings
S_{pu} = public savings

As we said before, we will drop the assumption that investment is determined exogenously and now depends on the interest rate (which influences savings).

Important equations on the goods market:

$Y = Z$	production = demand
$Z = C + I + G$	demand for goods
$C = C(Y_d)$	consumption
$Y_d = Y - T$	disposable income
G = fixt, T = fixt	fiscal policy variables (exogenous)
$I = I(i,Y)$	investment

But for now, we assume that $I = I(i)$, so investment only depends on the interest rate. Any change in I leads to a change in Y. If the interest rate decreases it is cheaper to invest, there will be more investment and the economy as a whole has more demand so that output will increase. The interest rate has, via demand, a negative relationship on the output.

The IS curve
The IS curve represents all combinations of the interest rate (i) and the income level (Y) for which the goods market is in equilibrium.
We can adapt fiscal policy to the IS curve, for example increasing government spending. When government spending goes up, the aggregate demand will go up so investment and income will go up. The IS curve shifts to the right. The horizontal distance of the IS shift equals .
To combine the money market with the goods market, we write the same model in real terms . Real money supply is best understood as the purchasing power of money, i.e. how many goods you can buy with your money. On the money market, demand is increasing. When income rises there will be more demand what results in more output.

The LM curve
The LM curve represents all the combinations of the interest rate (i) and the income level (Y) for which the money market is in equilibrium.
An contractionary policy of the EBS will lead to an increase of the interest rate so the LM curve shifts inward. There will be no change in Y (output level) because Y is an exogenous variable on the money market. It is determined on the goods market. When the EBS will practice an expansionary policy, it is the other way around.

LM = IS
LM will be equal to IS when the goods market is in equilibrium with the money market at a combination of i and Y. An increase in government spending in the goods market will affect the national income in the IS-LM model. The effect in the IS-LM model is smaller than in the goods market. You can first draw this in a graph of the goods market and then in a graph of the IS-LM model.

The IS-LM model in short
The IS-LM model is a model for a closed economy in the short run. IS curve: al combinations of i and Y for which the goods market is in equilibrium. LM curve: all combinations of i and Y for which the money market is in equilibrium. The two markets together lead to one equilibrium i and Y (the demand equilibrium).
Expansionary fiscal policy shifts the IS curve to the right. This increases income (but not as much as in the model of the goods market because the interest rate rises).
Expansionary monetary policy shifts the LM curve to the right. This lowers the interest rate, which increases investment, and hence, income.