1. OBJECTIVES

We now look at goods and financial markets together. We develop the IS/LM model that permits us to think about how output and the interest rate are determined simultaneously. This same model permits to look at the effects of monetary and fiscal policies on the economy.

**TWO FUNDAMENTAL CURVES**

- IS CURVE (equilibrium in goods market)
- LM CURVE (equilib. in financial markets)

**BOTH THE ‘IS’ AND ‘LM’ CURVES ARE A RELATIONSHIP BETWEEN i AND Y**

2. THE GOODS MARKET AND THE IS RELATION

**EQUILIBRIUM IN GOODS MARKETS GIVEN BY:**

\[ Y = Z \]

**THE ‘IS’ CURVE WILL BE DERIVED FROM THIS EQ. CONDITION**

**A NEW LOOK AT INVESTMENT (I):**

**INVESTMENT DEPENDS ON 2 FACTORS**

- LEVEL OF SALES (Y)
- INTEREST RATE (i)

WE WRITE:

\[ I = I(Y, i) \]

\[ (+, -) \]

**Assumption:** Production=Sales, Inventory Investment=0;
DERIVATION OF IS CURVE:

EQUATION NOW BECOMES: \[ Y = C(Y-T) + I(Y,i) + G \]

IS relation is the relation between \( Y \) and \( i \) that comes from the above equation.

IS CURVE: All combinations of \((Y,i)\) such that we’ve an equilibrium in the goods market.

WHAT SHIFTS THE IS CURVE: \( G \), \( T \), Consumer confidence \((c_0)\)
3. FINANCIAL MARKETS AND THE LM RELATION

Recall that equilibrium in financial markets is defined by:
\[ M^s = M^d \]
Let \( M = M^s \)

REAL MONEY, REAL INCOME, AND THE INTEREST RATE:

It is more convenient to rewrite above condition as a relation between Real Money, Real Income, and the interest rate.

\[ \frac{M}{P} = Y \cdot L(i) \]

Notice the introduction, for the first time of \( P \), the Price Level.

Assumption: \( P \) is given !!

DERIVATION OF LM CURVE:

LM CURVE: All combinations of \((Y, i)\) such that we’ve an equilibrium in financial markets.

WHAT SHIFTS THE LM CURVE: \( M, P \).
THE IS/LM MODEL

CANT PUT IS AND LM RELATIONS TOGETHER: SIMULTANEOUS EQUILIBRIUM IN GOODS MARKET AND FINANCIAL MARKETS (EQ. OF THE ECONOMY).

\[ Y = C(Y-T) + I(Y, i) + G \]
\[ \frac{M}{P} = Y. L(i) \]

WHAT CAN WE DO WITH SUCH A FRAMEWORK?

To see what happens to output and the interest rate when the Central Bank and/or the Government use their economical instruments (M, G, T) or when Consumers’ confidence is altered.

Step 1: How the curves shift.
Step 2: Characterize the effects of these shifts on the equilibrium.
Step 3: Describe the effects in words.

GOVERNMENT INTERVENTION: FISCAL POLICY (G, T)

FISCAL CONTRACTION: Increase in Taxes or decrease in Spending.
FISCAL EXPANSION: Decrease in Taxes or Increase in Spending.

Example: The effects of an increase in Taxes.
CENTRAL BANK INTERVENTION: MONETARY POLICY (M)

MONETARY CONTRACTION: Decrease in Money Supply.
MONETARY EXPANSION: Increase in Money Supply.

Example: The effects of a Monetary Expansion.

POLICY MIX

Both the government and the Central Bank intervene in the Economy at the same time: fiscal policy and monetary policy used together.
**ADDING DYNAMICS**

IS CURVE/ GOODS MARKET - The adjustment of output is done slowly.  
LM CURVE/ FINANCIAL MARKETS - Instantaneous adjustment of interest rate.

**ASSUMPTION:** The adjustment of the interest rate to any change in the demand or the supply of money is so fast that the economy is always on the LM curve.

**CONCLUSION**

IS/LM MODEL APPEARS TO BE A REASONABLE DESCRIPTION OF EVENTS IN THE SHORT-RUN. THE PRICE LEVEL IS FIXED.

IT DOES NOT CAPTURE: OPEN-ECONOMY PHENOMENA, CHANGES IN PRICE LEVEL.

**THE ALGEBRAIC VERSION OF THE IS/LM MODEL**
MODEL:

\[ C = c_0 + c_1 Y_D \]  \[1\]
\[ Y_D = Y - T \]  \[2\]
\[ I = I(Y, i) = I_0 - I_1 i + I_2 Y \]  \[3\]
G, T given
\[ (M/P)^d (Y, i) = m_0 Y - m_1 i \]  \[4\]
\[ (M/P)^s = m_S \] given

ENDOGENOUS VARIABLES: Y, i, Y_D, I, C, (M/P)^d;
EXOGENOUS VARIABLES: T, G, m_S;
Constants: c_0, c_1, m_0, m_1, I_0, I_1, I_2;

DETERMINATION OF THE EQUATION FOR THE IS CURVE:

**IS CURVE** IS THE RELATIONSHIP BETWEEN Y AND i GIVEN BY THE EQUILIBRIUM CONDITION IN THE GOODS MARKET:

\[ Y = C + I + G \]

Solving (you should do it), we get the following relationship between Y and i:

\[ Y = \frac{1}{1 - c_1 - I_2} \cdot [c_0 - c_1 T + I_0 + G] - \frac{I_1}{1 - c_1 - I_2} \cdot i \]  \[5\]

DETERMINATION OF THE EQUATION FOR THE LM CURVE:

**LM CURVE** IS THE RELATIONSHIP BETWEEN Y AND i GIVEN BY THE EQUILIBRIUM CONDITION IN THE FINANCIAL MARKETS:

\[ (M/P)^d = m_S \]

Solving (you should do it), we get the following relationship between Y and I:

\[ i = \frac{m_0}{m_1} \cdot Y - \frac{m_S}{m_1} \]  \[6\]

THE EQUILIBRIUM OUTPUT OF THE ECONOMY:


\[ Y = \frac{1}{1 - c_1 - I_2 + I_1 \frac{m_0}{m_1}} \cdot [c_0 - c_1 T + I_0 + G + I_1 \frac{m_S}{m_1}] \]
You can then go back to [6] and get the expression (or the value) for i.

**THE CROWDING OUT EFFECT**

The effect of a change in G (or T) on output, compared to our previous *Keynesian cross model* (where I did not depend on the interest rate) is reduced through the negative relationship between I and i. Basically, the multiplier is smaller than before. In the IS/LM model, a fiscal expansion raises the interest rate and crowds out investment.