The IS-LM (**I**nvestment **S**aving – **L**iquidity Preference **M**oney Supply) model is a macroeconomic model that graphically represents two intersecting curves. The investment/saving (IS) curve is a variation of the income-expenditure model incorporating market interest rates (demand), while the liquidity preference/money supply equilibrium (LM) curve represents the amount of money available for investing (supply).

The model explains the decisions made by investors when it comes to investments with the amount of money available and the interest they will receive. Equilibrium is achieved when the amount invested equals the amount available to invest. [1]

Despite many shortcomings, the IS-LM model has been one of the main tools for macroeconomic teaching and policy analysis. The IS-LM model describes the aggregate demand of the economy using the relationship between output and interest rates. In a closed economy, in the goods market, a rise in interest rate reduces aggregate demand, usually investment demand and/or demand for consumer durables. This lowers the level of output and results in equating the quantity demanded with the quantity produced. This condition is equal to the condition that planned investment equals saving. The negative relationship between interest rate and output is known as the IS curve.

The second relationship deals with the money market, where the quantity of money demanded increases with aggregate income and decreases with the interest rate. [2]

The IS Curve

The IS curve tells you all combinations of *Y* and *r* that equilibrate the output market, given that firms are willing to supply any amount that's demanded. That is, the IS is the set of all *Y* and *r* combinations that satisfy the output market equilibrium condition that total demand given income *Y* and the cost of borrowing *r* must equal total supply:

$$Y^d(Y, r) = Y.$$

Notice the *Y* on the left hand side stands for income (because consumption demand depends on income) while the *Y* on the right hand side stands for total supply. We are justified in using the same symbol for both things because according to the basic national income accounting identity, whatever quantity is supplied creates income of the same amount. In turn, total demand

(Y^d) can be broken up into the sum of consumption demand, investment demand, government demand, and net foreign demand:

$$Y^d (Y, r) = C^d + I^d + G^d + NX^d$$

where *NX* stands for net exports (that is, exports minus imports), so how much more foreign countries demand from us than we demand from them. *C* is aggregate consumer spending (a difference between disposable income and taxes), *I* is planned investments, and *G* is government spending.
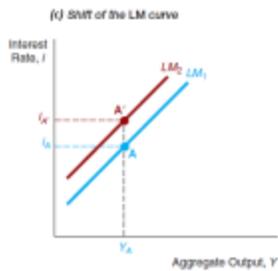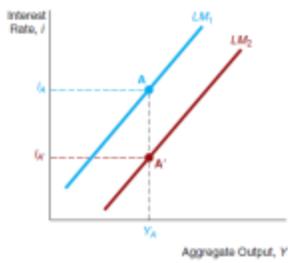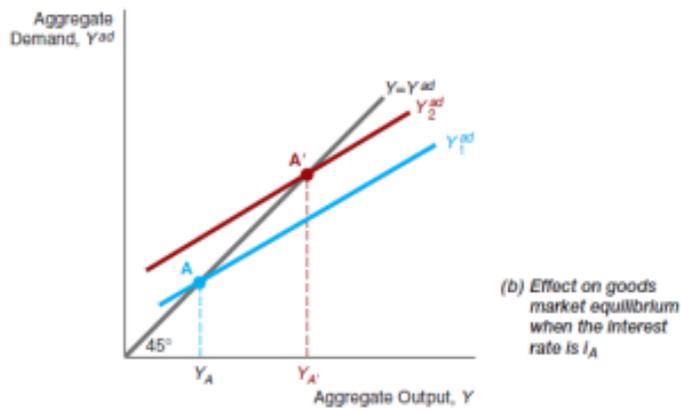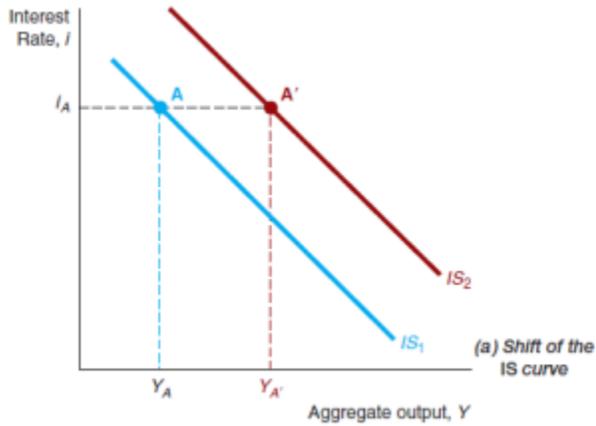
The LM Curve

The LM curve tells you all combinations of Y and r that equilibrate the money market, given the economy's nominal money supply M and price level P. That is, the LM curve is the set of all Y and r combinations that satisfy the money market equilibrium condition, real money demand must equal the given real money supply:

$$M^d(Y,r) = M/P$$

Notice the real money supply on the right hand side is fixed when drawing the LM; any change in the real money supply shifts the entire curve. Assuming real money demand depends positively on the amount of real transacting Y and negatively on the opportunity cost of holding money r, the LM is an upward sloping curve, with steepness depending on how sensitive real money demand is to changes in r. [4]

Factors That Cause Shifts

The IS curve shifts whenever a change in autonomous factors (factors independent of aggregate output) occurs that is unrelated to the interest rate.

Interest
Rate, i

i_A ----- A   A'

IS$_2$

IS$_1$ (a) Shift of the
                IS curve

Y_A $Y_{A'}$

Aggregate output, Y

Aggregate
Demand, Y^{ad}

$Y=Y^{ad}$
Y_2^{ad}

A'

Y_1^{ad}

A

(b) Effect on goods
    market equilibrium
    when the interest
    rate is i_A

45°

Y_A $Y_{A'}$

Aggregate Output, Y

Interest
Rate, i LM$_1$

LM$_2$

i_A A

$i_{A'}$ A'

Y_A

Aggregate Output, Y

(c) Shift of the LM curve

Interest
Rate, i

LM$_2$ LM$_1$

$i_{A'}$ A'

i_A A

Y_A

Aggregate Output, Y

(d) Shift in the LM curve

A rise in autonomous consumer expenditure shifts aggregate demand upward and shifts the IS curve to the right (Fig. a). A decline reverses the direction of the analysis. For any given interest rate, the aggregate demand function shifts downward, the equilibrium level of aggregate output falls, and the IS curve shifts to the left.

A rise in planned investment spending unrelated to the interest rate shifts the aggregate demand function upward (Fig. b). This phenomenon is also observed with an autonomous rise in net exports unrelated to the interest rate. Additionally, changes in government spending and taxes are the other two factors that can lead to shifts in the IS curve.

While five factors can cause the IS curve to shift, there are only two factors that can have the same effect on the LM curve: changes in the money supply and autonomous changes in money demand.

An increase in the money supply results in an excess of money at points on the initial LM curve and shifts the LM curve to the right (Fig. c). This condition of excess demand for money can be eliminated by a rise in the interest rate, which reduces the quantity of money demanded until it again equals the quantity of money supplied.

An autonomous rise in money demand would lead to a leftward shift in the LM curve (Fig. d). The increase in money demand would create a shortage of money, which is eliminated by a decline in the quantity of money demanded that results from a surge in the interest rate. [5]

IS-LM in Liquidity Trap

The IS-LM graphs are typically drawn in such a way that the equilibrium interest is positive. However, in recent years the target (short term) interest rates have declined to zero and cannot go further downward (since nominal interest rates for the most part cannot be negative).
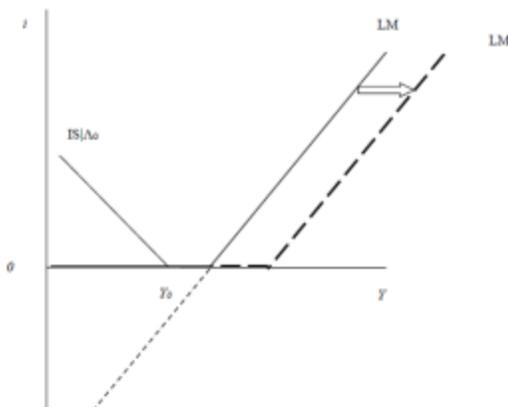
In this situation, equilibrium income is Y_0, and the interest rate is at 0. An increase in the money supply shifts out the LM curve, but cannot further drive down the interest rate. Since interest rates can't decline, then investments cannot be encouraged by this channel. However, fiscal policy can increase output which would cause a shift outward of the IS curve. Hence, here, monetary policy becomes ineffective, while fiscal policy has quite an effect. [6]