In a Simple Keynesian Model (SKM), we study how equilibrium income is determined in a demand determined economy focusing only on the goods market. Investment is considered in that model as an autonomous variable. We also have an idea about the Keynesian concept of liquidity preference, the inverse relationship between interest rate and bond prices and the Keynesian investment function (as dependent on rate of interest). Hicks (1937) developed IS-LM model which captures Keynes' idea of the inter-linkage between good market and financial/ money market via the investment function. **In this model we will see how equilibrium income and interest rate are simultaneously determined from interaction of good and money market.**

Good Market and IS Curve:

We know that the good market equilibrium condition is given by

$Y = C(Y-t(Y)) + G + I$ …….. (1)

Here instead of linear consumption function we consider consumption function in general the form where the marginal propensity to consume (**mpc**) is given by C', while $[Y-t(Y)]$ is disposable income. Here $t(Y)$ is total tax paid by the consumers and $t' > 0$ (tax revenue increases with the rise in income).

Now, instead of autonomous I, we assume $I = I(r)$ where $I' < 0$. This implies that investment I and rate of interest (r) are negatively related.

[Note that for any function $z = f(x)$, f' denotes the derivative of z w.r.t. x. Therefore C', I' also denote derivatives]

Now, let us rewrite equation (1) putting $I = I(r)$

$Y = C(Y-t(Y)) + G + I(r)$ ……..(2)

Let us consider that at $r = r_0$, the good market will be at equilibrium if $Y = Y_0$

In other words, equation (2) is satisfied at $r = r_0$ and $Y = Y_0$. Now suppose r falls from r_0 to r_1 ($r_0 > r_1$). As a result there will be an increase in investment expenditure. So at the original equilibrium, there will be an excess demand (excess of investment over expenditure) in the goods market. Equilibrium can be re-established only at a higher value of Y ($Y_1 > Y_0$) because a higher income will generate the additional savings (leakage) to match the additional investment (injection). So, for each value of r, there is a corresponding value of Y which will maintain equilibrium in the goods market. The IS curve is the locus of all such r and Y combinations. In other words, IS curve is the locus of all rates of interest and income which will maintain equilibrium in the goods market. It is clear that it will be a negatively sloped curve in (r, y) plane.

From equation (2), taking total differential on both sides, we have

$dY = C'(dY - t' dY) + I' dr + dG$

Or, $dY[1-C'(1-t')] = I' dr$ (assuming $dG = 0$))

Or, $dr/dY = [1-C'(1-t')]/I' < 0$
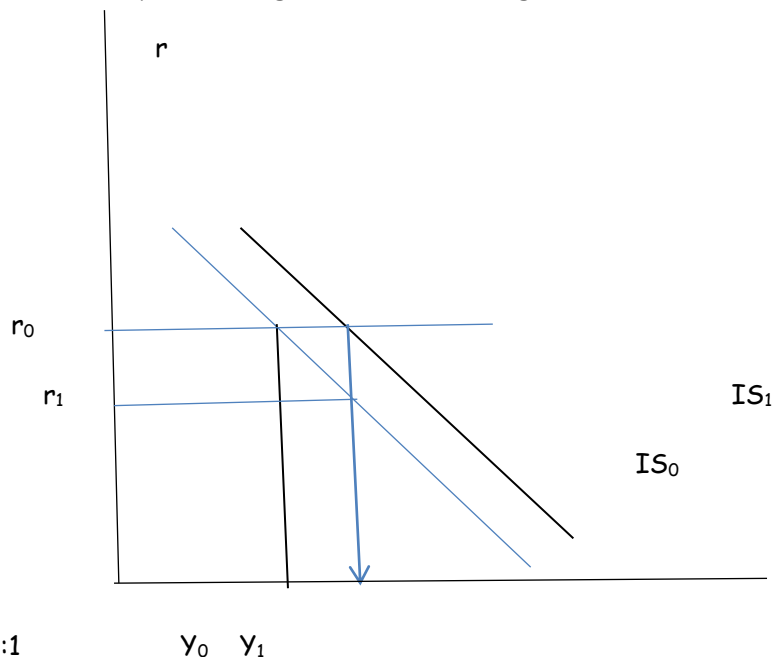
IS curve is depicted in fig 1 (derived from fig 2)

Fig:1 Y_0 Y_1 Y

In fig 1, we have drawn two IS curves - IS_0 and IS_1. The combinations (r_0, y_0) and (r_1, y_1) lie on the same IS curve - IS_0 (as discussed earlier).

What about IS_1? As IS_1 is a new curve, this **represents a change in some values other than r or Y**. For example, if the Government expenditure G changes, the IS curve will **shift. Similarly, changes in the investment function, or the tax function or the consumption function will also cause a change in position in the IS curve.** This is because any rise (fall) in G (in fact, any rise (fall) in injection) will cause a rightward (leftward) shift in IS because a higher Y will result without any change in r.

[**Compare** *this with the 'along the curve movement' and 'shift in curve' we studied in case of demand curves – one occurs when prices change while the latter occurs when the 'other things' like income, taste, prices of related goods etc change*].

If there is, say, a rise (fall) in G, the IS curve will shift to the right (left). Similarly, if, say, there is a reduction (increase) in taxes, the IS curve will shift to the right (left). Thus, any rise in injection (fall in leakage) will shift the IS curve to the right, while any rise in leakage (fall in injection) will shift the IS curve to the left. In the table below, we provide a snapshot of the various factors that may cause a shift in the IS curve as well as the direction of change that each factor causes.

Factor (Cause)	IS shifts right	IS shifts left	No shift
Rise in G	✓	-	-
Fall in G	-	✓	-
Rise in taxes	-	✓	-
Fall in taxes	✓	-	-
Rise in savings rate	-	✓	-
Fall in savings rate	✓	-	-
Change in investment function causing a rise in I at the same r	✓	-	-
Change in investment function causing a fall in I at the same r	-	✓	-
The Central Bank adopts some policy that causes a change in r	-	-	✓