

EFFECTS OF CHANGES IN MONETARY AND FISCAL POLICIES BY THE GOVERNMENT

The equilibrium levels of national income and interest rate are shown by the intersection of the IS and LM curves. When the government changes its monetary policy or fiscal policy, either the LM curve or the IS curve shifts and the equilibrium levels also change. In the IS-LM model, monetary policy is represented by the LM curve and fiscal policy by the IS curve.

Effects of Changes in Monetary Policy

In the IS-LM model, monetary policy is represented by the LM curve. Suppose the government adopts an expansionary monetary policy to control deflation in the economy. For this, it increases the money supply through its central bank. The increase in the money supply is shown by shifting the LM curve to the right as LM_1 curve in Fig. 1. When the money supply increases, the interest falls, given the price level. The fall in the interest rate increases investment demand which causes the income to rise. This in turn, increases consumption demand. The fall in the interest rate and the rise in income jointly increase the aggregate demand and national income. As a result, a new equilibrium is established in the IS-LM model with lower interest rate and higher income levels.

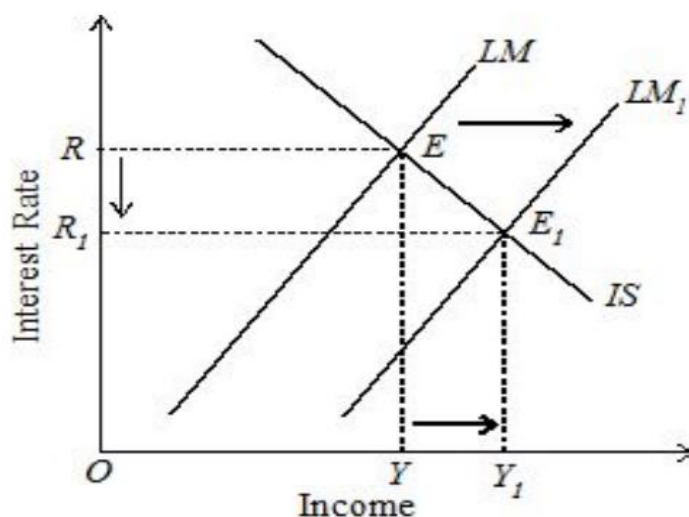


Fig. 1

This is illustrated in Fig. 1 where the initial equilibrium point E is at interest rate R and income level OY . An increase in the money supply shifts the LM curve to the right to LM_1 . It intersects the given IS curve at point E_1 which shows the new equilibrium with fall in the interest rate from R to R_1 and rise in the national income from OY to OY_1 . On the other hand if the government wants to control inflation, it reduces the money supply which shifts the LM curve to the left. As a result, a new equilibrium point will be established at higher interest rate and lower national income level. This will be due to the effects of reduction in the money supply when the interest rate rises, aggregate demand falls and national income declines.

Effects of Changes in Fiscal Policy:

The effects of changes in fiscal policy are related to government expenditure and taxes which are shown by shifts in the IS curve. They are explained in the case of an expansionary fiscal policy.

1. Increase in Government Expenditure :

Suppose there is depression in the economy and the government wants to raise the level of employment and income. For this, it increases its expenditure which raises aggregate demand both directly as government demand rises and indirectly when consumer expenditure increases with rise in employment and income of the people. As income rises, the transactions demand for money increases. The money supply being fixed, the increase in transactions demand leads to reduction in the speculative (bonds) demand for money. This causes the interest rate to rise. Thus with the increase in public expenditure the equilibrium levels of income and interest rate rise.

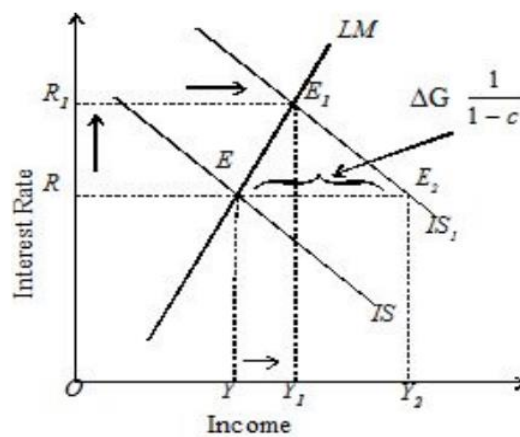


Fig. 2

This is illustrated in Fig. 2 where the initial equilibrium point is E at OR interest rate and OY income level. The increase in government expenditure shifts the IS curve to the right to IS_1 which intersects the given LM curve at point E_1 . This results in rise in the interest rate from OR to OR_1 and of the national income from OY to OY_1 . The figure shows that the horizontal distance by which the IS curve shifts when government expenditure increases is equal to ΔG , where ΔG is increase in government expenditure and $(1/1-c)$ is the multiplier in the Keynesian model. This leads to increase in equilibrium income from OY to OY_2 . But in the $IS-LM$ model, income rises to OY_1 which is less than OY_2 . This is because in the $IS-LM$ model when the interest rate rises with the increase in government expenditure, it causes crowding out (decline) in some private investment.

The opposite will be the effects of a decrease in government expenditure when there is inflation in the economy and the government adopts contractionary fiscal policy.

2. Reduction in Taxes :

We now explain the effects of reduction in taxes in the case of expansionary fiscal policy. A reduction in taxes raises the disposable income and increases consumption of the people. As income increases, the demand for money also rises and the demand for bonds declines. This leads to rise in interest rate. Thus the equilibrium levels of income and interest rate rise.

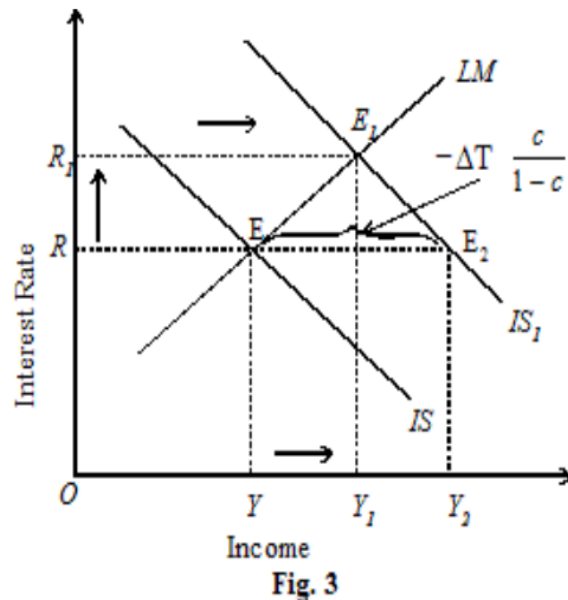


Figure 3 illustrates that a reduction in taxes ($-\Delta T$) shifts the IS curve to the right to IS_1 . Income increases from OY to OY_1 and the interest rate rises from OR to OR_1 . The figure also shows that the horizontal distance by which the IS curve shifts with increase in taxes which is equal to $-\Delta T \left[\frac{c}{1-c} \right]$, is the tax multiplier in the Keynesian model. This leads to the rise in income by $EE_2 (=YY_2)$ at the initial interest rate OR . But in the IS-LM model, the cut in taxes causes the interest rate to rise to OR_1 which reduces investment. As a result, the rise in income by YY_1 is less than YY_2 . This is because in the Keynesian model, investment is assumed to be fixed. In the opposite case of increase in taxes both income and interest rate will decline in contractionary fiscal policy.

Monetary Fiscal Policy Mix

Monetary and fiscal policies affect income. But their effects on the interest rate and investment are different. When expansionary monetary policy is adopted, the interest rate declines and investment increases. But in expansionary fiscal policy, when government expenditure is increased or taxes are cut, interest rate rises and investment declines. To keep the interest rate low and to encourage investment, the government adopts a monetary-fiscal mix of an accommodating monetary policy along with an expansionary fiscal policy in which the increase in money supply will prevent the interest rate from rising and thus offset the crowding out of private investment.

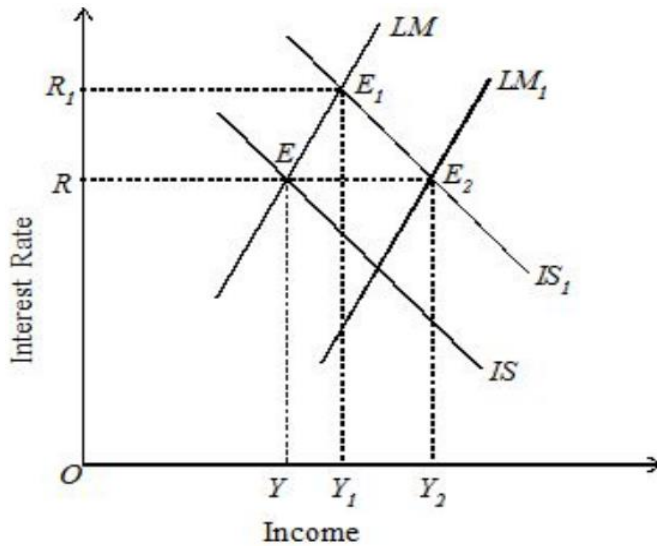


Fig. 4

In Fig. 4 where the initial equilibrium is at point E where the IS and LM curves intersect and determine OR interest rate and OY income level. With the increase in government expenditure or tax cut, the IS curve shifts to the right as IS1 curve. It cuts the LM curve at point E1 and the new equilibrium interest rate is OR1 and income level is OY1. But the increase in interest rate leads to the crowding out of some private investment. To prevent this crowding out, the government adopts an accommodating monetary policy in which the money supply is increased sufficiently so that the LM curve shifts far enough to the right to LM1 curve. It cuts the IS1 curve at point E2, the interest rate remains at the original level OR but income rises to OY2. Thus this monetary-fiscal mix has raised the income level with the interest rate remaining at OR level.

The IS-LM model with Labour Market and Flexible Prices

The IS-LM model with labour market and flexible prices explains the determination of interest rate, price level and employment, output and income. It is a three-sector model in which goods, money and labour markets are in equilibrium. The entire analysis presents a synthesis of the Keynesian and classical systems based on the interaction of the aggregate demand and aggregate supply curves which are derived from the IS and LM curves. The

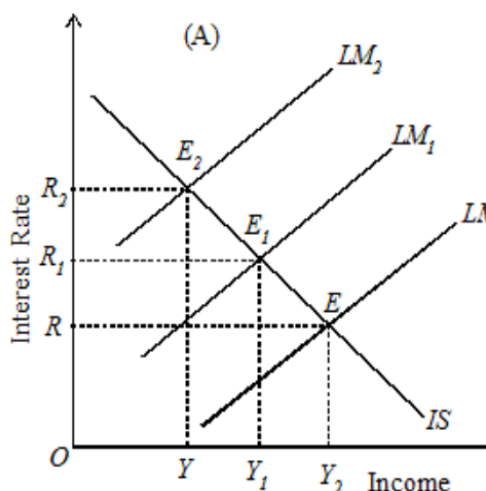
Keynesian system is based on demand-determined output in which prices and wages are fixed, given the usual upward sloping supply curve to the right. On the other side, the neoclassical system is based on supply-determined output in which prices and wages are flexible, given a vertical supply curve.

In the analysis that follows, the aggregate demand (AD) curve is derived from the IS and LM curves. The AD curve is common to both the neo-classical and Keynesian systems of the model. The main difference lies in the shapes of the neo-classical and Keynesian aggregate supply (AS) curves. The derivation of the neo-classical and Keynesian AS curves from the IS and LM curves is not possible. So the respective shapes of the AS curves are taken along with the AD curve to explain the two systems. Finally, the upward sloping AS curve to the right is taken to analyse the synthesis of the two systems in terms of the IS and LM model.

The Aggregate Demand Curve [AD]

The AD curve is drawn by plotting each equilibrium level of income (output) that is associated with each price level. All points on the AD curve represent the equilibrium of the product (goods) market and the money market.

In this analysis, all variables like investment, government spending, saving and taxes of the product market are assumed fixed and are, therefore, not affected by a change in the price level. So a change in the price level does not shift the IS curve. In the case of the LM curve, the variables are the real money supply and a constant money demand curve. So with the change in the price level, the real money supply (M/P) changes which shifts the LM curve and produces a new equilibrium level of income with the IS curve. Plotting income against the given price level, gives one point of the AD curve.



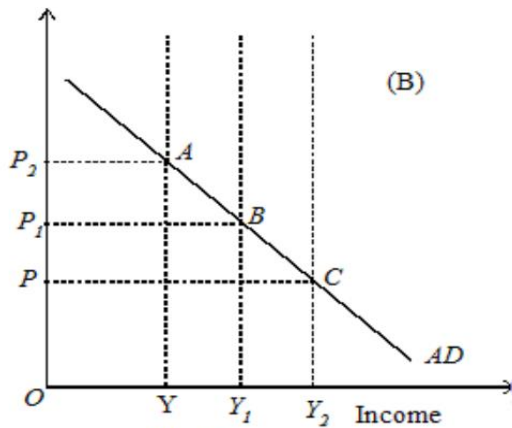


Fig. 5

The derivation of the AD curve is shown in Fig. 5 where in Panel (A) the initial equilibrium is at point E2 with income OY and interest rate OR2 when the IS curve intersects the LM2 curve. Plotting Y against the price level OP2 in Panel (A) of the figure gives the point A. Thus the income level at which the IS and LM curves intersect for a given price level is a point on the AD curve. A fall in the price level to OP1, shifts the LM2 curve to the right to LM1 in Panel (A). The new equilibrium is at E1 with income OY1 and and interest rate OR1 . Plotting Y1 against P1 in Panel (B), gives the point B. A further fall in the price to OP shifts the LM1 curve to the right to LM which increases equilibrium income to OY2 . Plotting Y2 against P in Panel (B) yields the point C. By joining the points A, B and C, we trace the aggregate demand curve AD.

The AD curve is negatively sloped because a fall in the price level increases the real money supply which leads to an excess supply of real money balances. With excess money supply, people buy bonds which raise bond prices and reduce interest rate. As a result of reduction in interest rate, investment increases which, in turn, increases output and income.

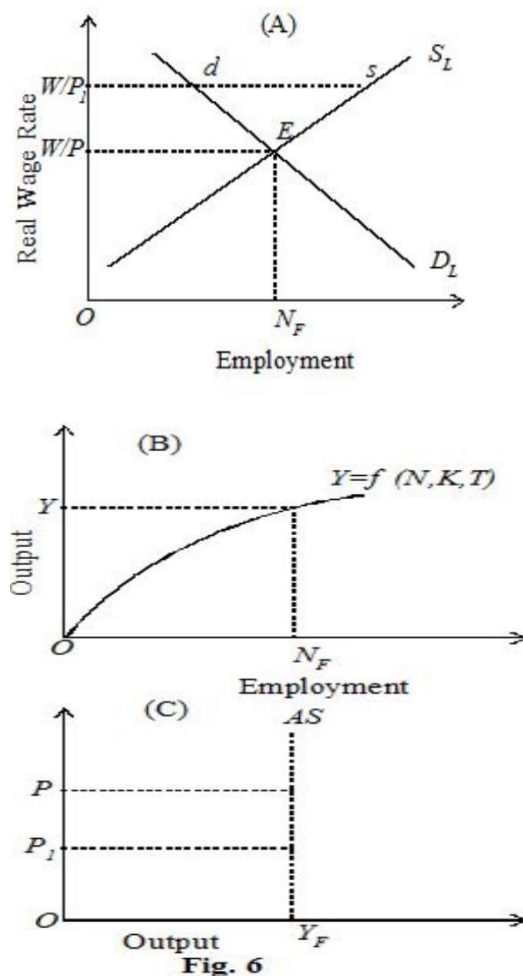
IS-LM Model with Flexible Wages and Prices : The Neo-Classical Analysis

IS-LM model with flexible wages and prices based on the neo-classical theory of employment, income and output. In this analysis, the Keynesian aggregate demand curve is combined with the neo-classical aggregate supply curve.

The Aggregate Supply Curve (AS)

The neo-classical AS curve is vertical as shown in Panel (C) of Fig.6 because of the following assumptions:

1. Wages and prices are fully flexible.
2. There is perfect information about market prices on the part of market participants. Both the employers of labour and workers know the money wage rate in the labour market and how much commodities the real wage rate (W/P) can buy.
3. The economy is always at its full employment income and output level.
4. The labour market is characterised by market-clearing which means that the equilibrium real wage is established at the full employment level.
5. Monetary and fiscal policy affect prices but not the aggregate level of output and employment.



Given these assumptions, the AS curve is derived from the demand for labour and supply of labour curves along with the aggregate demand function, as shown in Fig. 6.

Panel (A) of the figure shows labour market equilibrium at point E where the supply of labour curve, SL equals the demand curve for labour curve, DL which establish the equilibrium real wage rate W/P . This leads to the full employment equilibrium level, ONF . As prices and wages are fully flexible, the real wage rate is also fully flexible. This means that the labour market is always in equilibrium. Any excess supply of labour or demand for labour will instantaneously bid the real wage rate back to the equilibrium level.

The aggregate production function, $Y=f(N,K,T)$ in Panel (B) shows the level of output OY at the full employment level ONF . Since the level of full employment is unaffected by changes in prices, therefore the level of output is also independent of price changes.

Consequently, the AS is vertical at the level of full-employment output OYF in Panel (C) of the figure. To show the adjustment mechanism beginning from labour market equilibrium in Panel (A), a fall in the price level from OP to OP1 with a given money wage rate would increase the real wage rate from W/P to $W/P1$. This would reduce the demand for labour thereby causing excess supply of labour by ds. The unemployed workers would bid down the money wage rate until the real wage rate is restored to its equilibrium level, W/P and the excess supply of labour is eliminated. Thus any change in the price level is immediately reflected in a change in money wage rate to maintain equilibrium real wage rate, full employment and output.

The Complete Neo-Classical Model:

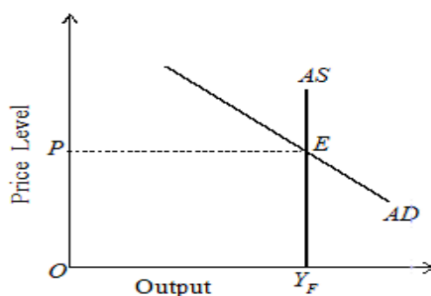
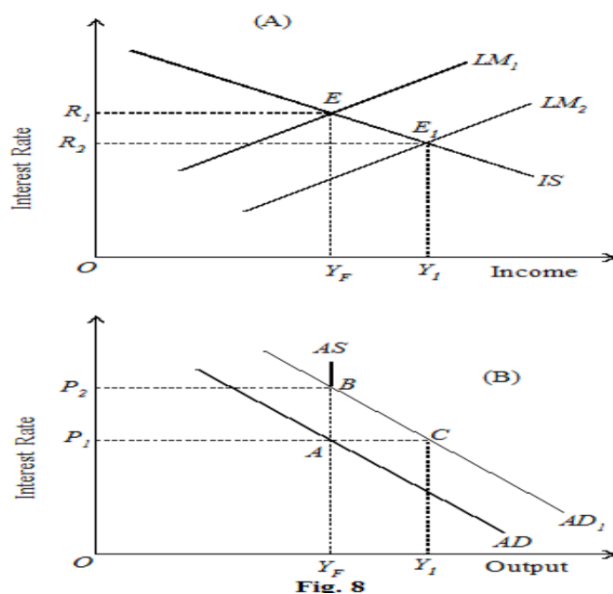


Fig. 7

Figure 7 depicts full equilibrium in the neo-classical model at point E where the AD curve intersects the AS curve. At this point, output is at its full employment level OYF and the equilibrium price level is OP. With flexible money wages and prices, the real wage rate always adjusts to maintain full employment in the labour market. Given this labour, firms produce full employment output OYF . The aggregate demand curve AD shows points at which money demand equals money supply and planned spending on goods equals output produced. The equilibrium price level OP clears the markets for labour, goods and money. The labour market is in equilibrium on the AS curve. The money market clears on the AD curve along with the equality of aggregate demand for goods with the actual output of goods. Thus in the neo-classical model, the markets for labour, money and goods are simultaneously in equilibrium at point E.

Effect of Monetary Policy in Neo-Classical Model



The effect of monetary policy on employment and output in the neo-classical system is explained in terms of the IS-LM model in Fig. 8. Suppose the economy is in equilibrium at point E where the LM curve intersects the IS curve with OR_1 interest rate and OY_F full employment income level in Panel (A).

Panel (B) of the figure shows the equality of the AD and AS curves at point A which determines OP_1 price with OY_F aggregate output in the economy. An increase in the money supply shifts the LM_1 curve to the right to LM_2 . The new equilibrium point is E_1 with lower interest rate OR_2 and higher income OY_1 . The increase in the money supply and reduction in interest rate increase the aggregate demand which shifts the AD curve to the right to AD_1 in Panel (B). At the initial price level OP_1 , the output increases to OY_1 . But point C on the AD_1 curve does not show the equilibrium price level which is at point B where the AD_1 curve intersects the vertical AS curve at the higher price level OP_2 . The rise in the price level reduces the real money supply (M/P) which shifts the LM_2 curve to the left to LM_1 and the interest rate rises to OR_1 and the full employment equilibrium level of income and output is established at OY_F .

Let us understand the process through which the economy adjusts instantaneously in the neo-classical model from point E to E_1 in Panel (A) when the money supply is increased, and the price level is OP_1 in Panel (B). An increase in the money supply shifts the LM_1 curve to LM_2 and lowers the interest rate from OR_1 to OR_2 . This increases the aggregate demand which shifts the AD curve to AD_1 . But aggregate demand exceeds full employment output by $(Y_F - Y_1)$ which the firms can supply at the initial price level OP_1 . The excess demand for goods bids the price level to OP_2 . High price level reduces the real money supply.

As a result the LM curve and the interest rate return to their original levels LM_1 and OR_1 respectively and the economy is again at the full-employment income and output level OY_F . In the labour market, high money wage rate matches the increase in the price level, thereby maintaining the real wage rate at its original level.

Thus in the neo-classical model with full wage-price flexibility, a change in the money supply leads to an equal proportionate change in the money wage rate and the price level but without any change in income and output which remain at the full employment level.

Effect of Fiscal Policy in Neo-Classical Model

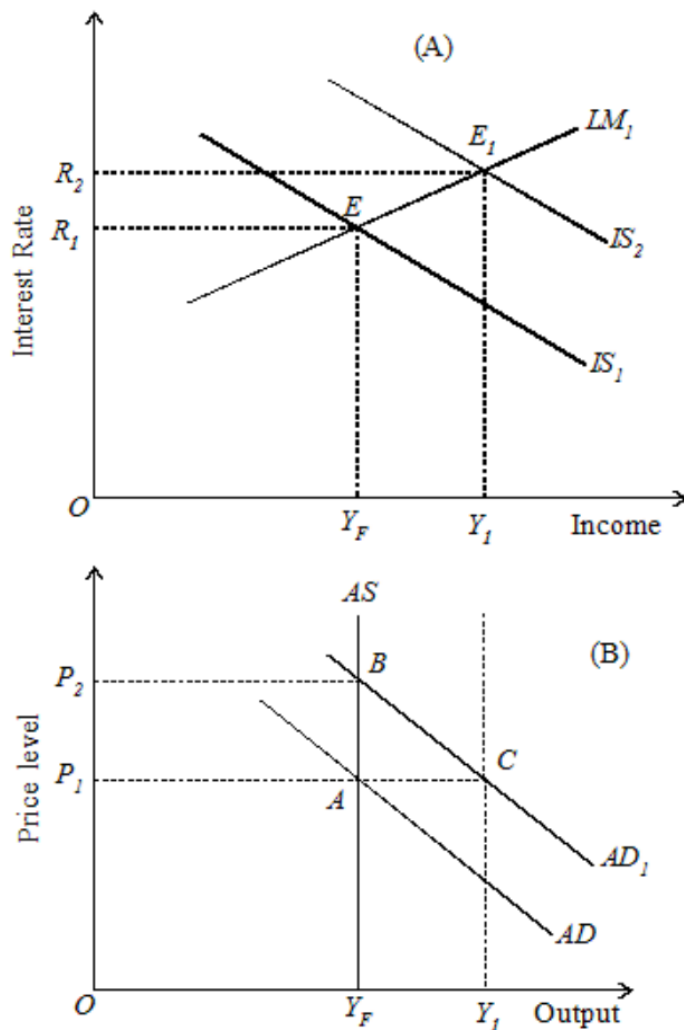


Fig. 9

Fig. 9 explains the effect of fiscal policy in the neo-classical model. An expansionary fiscal policy in the form of increase in government spending (or reduction in taxes) shifts the IS curve upward to the right from IS_1 to IS_2 , given the LM curve, as shown in Panel (A). The effect of fiscal expansion is to increase aggregate demand which is shown by the shift in the AD curve upward to the right to AD_1 in Panel (B). At the initial price level OP_1 , output increases to OY_1 , more than the full employment output OY_F . But firms want to supply the full employment output OY_F .

So there is excess demand for goods by AC ($Y_F - Y_1$). This bids up the price level until excess demand is eliminated at point B on the vertical AS curve at the higher price level OP_2 . Given the money supply, the rise in the price level reduces the real money supply, raises the interest rate to OR_2 and reduces private expenditure on consumption and investment.

Thus when an increase in government spending crowds out an equal amount of private expenditure, the IS_2 curve shifts leftward to IS_1 and the initial equilibrium level E is re-established so that the aggregate demand remains at the full employment level OY_F at the higher price level OP_2 .

IS-LM MODEL IN THE KEYNESIAN ANALYSIS WITH FLEXIBLE PRICES AND FIXED MONEY WAGES

The Keynesian model assumes that the money wage rate is not flexible rather it is sticky downward in the short run. Therefore, workers are willing to accept a cut in their real wage rate by an increase in the general price level. Keynes argued that workers are prepared to work at the current money wage rate, even if their real wage rate is lowered by the increase in the price level. This is due to the existence of "money illusion" : they attach more importance to their money wage rate than to their real wage rate. In fact, they resist cut in their money wage rate but do not have the same resistance to a cut in real wage rate resulting from increase in the price level.

Before discussing the complete Keynesian approach in terms of the IS-LM framework, it is essential to derive the Keynesian aggregate supply curve.

The Aggregate Supply Curve:

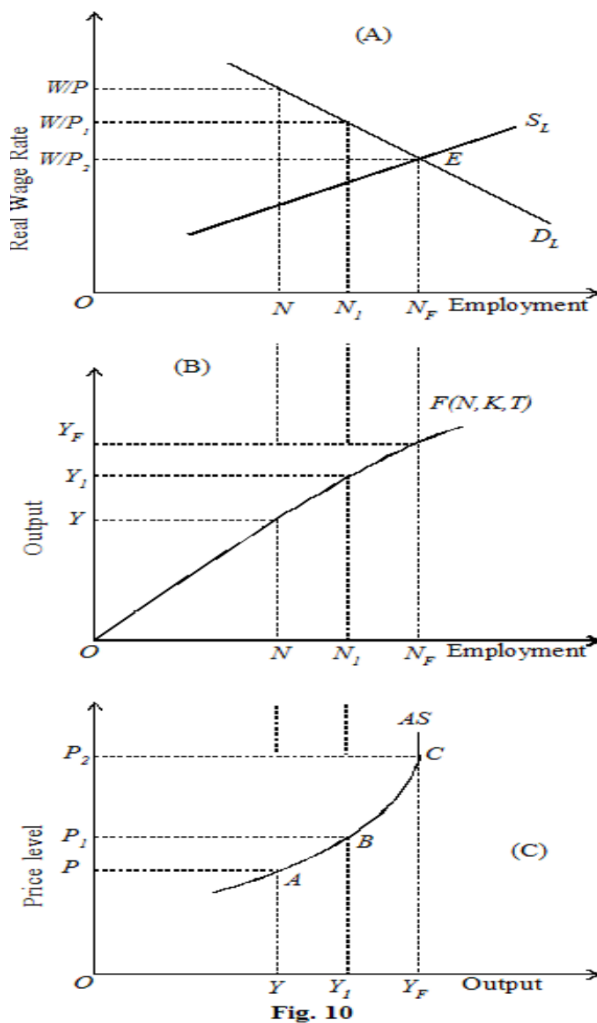


Fig. 10

Given a fixed money wage rate and flexible prices, the derivation of the aggregate supply curve, AS is shown in Fig. 10. Panel (A) of the figure depicts the determination of labour market equilibrium at point E when the demand for labour curve DL intersects the supply of labour curve SL at the market-clearing equilibrium real wage rate W/P_2 . Starting movements of the real wage rate above point E and along the upper side of the DL curve, when the price level is OP in Panel (C), the real wage corresponding to it is W/P . At this wage rate, ON workers are employed and the output supplied via the production function $f(N,K,T)$ shown in Panel (B) is OY. As the price level rises to OP_1 , the real wage rate falls to W/P_1 , thereby increasing employment to ON_1 due to money-illusion, and output to OY_1 . Further rise in the price level to OP_2 , increases employment to the market-clearing level ONF and output to full employment level OY_F . The curve shown in Panel (C) which plots the price levels against the corresponding output levels at A, B and C trace the aggregate supply curve AS.

The Keynesian AS curve which slopes upward from left the right is shown vertical beyond point C like the neo-classical AS curve. This is because with the rise in the price level, the output continues to rise up to the full employment level which is consistent with labour market clearing. But beyond this level, any further rise in the price level will have no effect on employment and output.

Thus the Keynesian AS curve represents a synthesis of the neo-classical supply curve and Keynes' aggregate supply curve. In the short run, the Keynesian AS curve is upward sloping like an ordinary supply curve because there is always underemployment in the economy. But in the longrun, the AS curve becomes vertical (from point C as in Fig. 11) when there is full employment in the economy.

The Complete Keynesian Model :

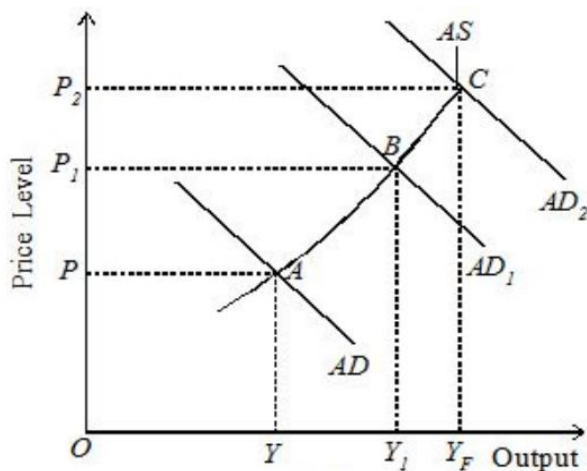


Fig. 11

The Keynesian system is presented in Fig. 11 where the AD curve (derived in Fig. 5) and the AS curve (derived in Fig. 10) determine the general price level and aggregate employment, output and income when the economy is in general equilibrium. In the Keynesian system, as money wages are constant, involuntary unemployment exists. Therefore, unlike the neo-classical AS curve which is vertical, the Keynesian AS curve is not vertical until the full employment level is reached. To increase employment, the Keynesians suggest increase in aggregate demand which affects the price level and aggregate output and income. In Fig. 11 equilibrium occurs at point A when the AS and AD curves intersect at the price level OP and output level OY. When the AD curve shifts upward to AD_1 , the price level rises to OP_1 and output level to OY_1 . At this level, the actual output falls short of full employment output by $Y_1 - Y_F$. If aggregate demand is increased sufficiently so that the AD_1 curve shifts to AD_2 curve which intersects the AS curve at point C, the price level would increase from OP_1

to OP_2 and the aggregate output would increase from OY_1 to the full employment level OY_F . Any further increase in aggregate demand would have no effect on aggregate output, employment and income, except raising the price level. This is because the demand for productive resources would exceed their available supplies at full employment. In contrast, in the neo-classical system, the AS curve is a vertical straight line (see Fig. 3) which along with the Keynesian aggregate demand curve, AD determines only the equilibrium price level, OP and the level of full employment output OY_F . Any increase in aggregate demand would shift the AD curve upward to the right, thereby causing only increase in the price level at the same level of output OY_F .

Effect of Monetary Policy in the Keynesian system:

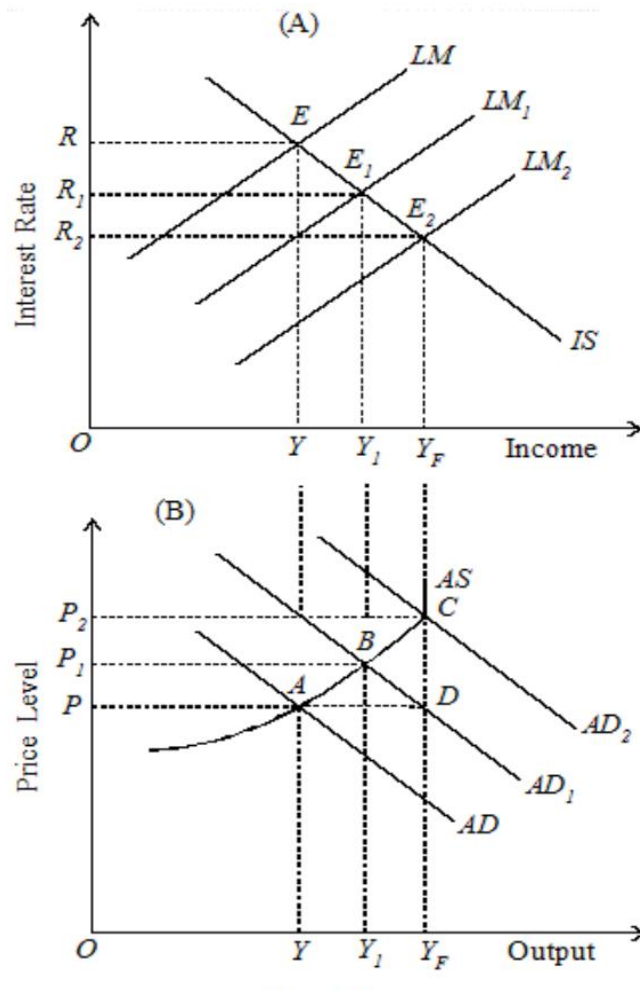


Fig. 12

The effect of monetary policy on employment, output and income in the Keynesian system is explained in Fig. 12 in terms of the IS-LM model when the price level is flexible and money wage rate is fixed. Suppose the economy is in equilibrium at point E where the LM curve intersects the IS curve with OR interest rate and OY employment and income level in Panel (A) of the figure. The equality of the AD curve and AS curve is depicted at point A in Panel (B) which determines OP price with OY aggregate output. An increase in the money supply to achieve full employment shifts the LM curve to the right to LM_2 which cuts the IS curve at point E_2 which leads to the full employment level of income, OY_F . This shifts the AD curve to the right to AD_2 and raises the price level from OP to OP_2 . The increase in the price level reduces the real money supply (M/P) which partially offsets the effects of the rise in the money supply so that the LM_2 curve shifts to the left to LM_1 and cuts the IS curve at E_1 . Now the interest rate rises from OR_2 to OR_1 and the level of employment and income is

OY₁ which is less than the full employment level OY_F. With the rise in interest rate, investment declines and the aggregate demand curve AD₂ shifts leftward to AD₁ with fall in the price level from OP₂ to OP₁ and output from OY_F to OY₁.

However, the full employment level of output OY_F can also be achieved, if the price level remains constant at OP when the AD₁ curve intersects the AS curve at point D. But this is not possible under flexible prices and fixed money wage rate in the Keynesian system, because there is always underemployment equilibrium and monetary policy is less effective.

The Effect of Fiscal Policy in the Keynesian System:

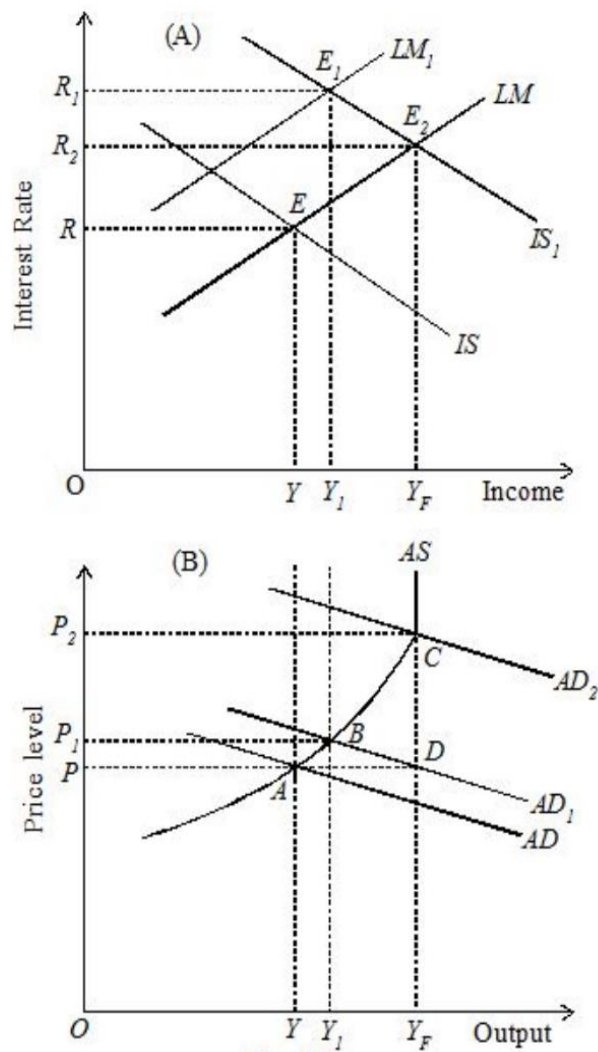


Fig. 13

The effect of fiscal policy on employment, income and output in the Keynesian system is explained in Fig. 13 in terms of the ISLM model when the price level is flexible and money wage rate is fixed.

Suppose the government follows an expansionary fiscal policy by increasing investment or reduction in taxes to attain full employment in the economy. Initially, the economy is in equilibrium at point E where the IS curve cuts the LM curve with OR interest rate, OY income level and OP price level. As a result of increase in investment, the IS curve shifts upward to the right to IS₁ which intersects the

LM curve at point E2 in Panel (A) of the figure. This raises the interest rate from OR to OR2 and income from OY to the full employment level OYF . The increase in investment is reflected in the shift of the aggregate demand curve from AD to AD2 where it cuts the AS curve at point C and the price level rises from OP in Panel (B) to OP2 and output from OY to OYF . The rise in the price level decreases the real money supply which shifts the LM curve upward to the left to LM1 and cuts the IS1 curve at point E1 thereby raising the interest rate from OR2 to OR1 and reducing the income level from OYF to OY1 . The rise in the interest rate leads to the decline in aggregate demand which shifts the AD2 curve downward to AD1 which cuts the AS curve at point B. The price level falls from OP2 to OP1 and and output from OYF to OY1 .

However, the full employment output level, OYF can also be achieved if the price level is constant at OP and the AD1 curve intersects the AS curve at point D, as shown in Panel (B) of the figure. But this is not possible with flexible prices and fixed money wage rate in the Keynesian system because there is always underemployment equilibrium, and fiscal policy, like monetary policy, is less effective.

References:

- R.J. Gordon, *Macroeconomics*, 6/e, 1993.
- R.E. Hall and J.B. Taylor, *Macroeconomics*, 5/e, 1997
- N.G. Mankiw, *Macroeconomics*, 4/e, 2004.
- R.T. Froyen, *Macroeconomics*, 7/e, 2003
- J.M. Keynes, *General Theory of Employment, Interest and Money*, Ch. 18. 1936.
- Macro Economic Theory ML Jhingan
- A.H. Hansen, *A Guide to Keynes*, Ch. 9. 1953.
- G. Ackley, *Macroeconomic Theory*, Ch. XIII, 1961