UNIT 19 SLUGGISH PRICE ADJUSTMENT

Structure

19.0 OBJECTIVES

After going though this unit, you should be able to:

- explain how the equilibrium level of income is determined in an open economy;
- identify the policy mix for achieving internal and external balance with flexible exchange rates;
- identify the mix for achieving internal and external balance with fixed exchange rates; and
- explain aggregate supply factors and price adjustment in short run and long run.

19.1 INTRODUCTION

International factors affect real demand in an economy and therefore influence the level of equilibrium output. Various disturbances in income and trade factors affect the macroeconomic output determination. A closer look at the implications of trade factors is necessary because we need to understand how:

- international influences affect the domestic macroeconomic policy decisions.
- how macro policy choices change with changes in exchange rate regime.
- how transmission mechanism works in a globalized economy.

19.2 INCOME DETERMINATION IN AN OPEN ECONOMY

In Unit 2 of this course we explained the derivation of IS-LM curves for a closed economy. In this section we extend the IS-LM framework to include foreign trade. The assumptions made for deriving the Aggregate Demand (AD) curve continues, i.e.,

price level is given and output demanded is supplied (perfectly elastic Aggregate Supply (AS) curve). Before discussing the determination of equilibrium level of income, a brief introduction to how inclusion of trade modifies the analysis of aggregate demand is given.

19.2.1 Domestic Spending Vs. Spending on Domestic Goods

In a closed economy, all domestic output is consumed internally. Against this, in an open economy, part of the domestic output is sold to foreigners (exports). Similarly, part of the domestic consumption/spending is on foreign goods (imports).

This definitional change implies that domestic spending no longer determines domestic output. Instead, *spending on domestic goods* determines domestic output. Spending on domestic goods includes foreign demand for domestic goods and leakages in the form of domestic demand for foreign goods. The effect of these external transactions on demand for domestic output is as follows:

$$AD \text{ (Spending on Domestic goods)} = C + I + G + X - M \quad ...(19.1)$$

Spending on domestic goods is equal to:

- total spending by domestic residents less spending on imports; plus
- foreign demand for domestic goods.

At the aggregate level, this formulation will imply trade surplus/deficit (i.e. positive net exports) plus spending on domestic goods by domestic residents. In terms of rotations:

$$AD = C + I + G + NX$$

where NX is net exports.

19.2.2 Determinants of Net Exports

Exports rise when the foreign demand for domestic goods increases. The determinants of foreign demand are: foreign income (Y_f) and exchange rate (R).

$$X = f(Y_f, R,) \quad ...(19.2)$$

Note that Y_f is an exogenous factor in the sense that the domestic country has no control over the level of foreign income.

Imports rise when the domestic demand for foreign goods increase. Changes in exchange rate also influence the demand for imports.

$$M = f(Y, R) \quad ...(19.3)$$

Thus, $NX = (X - M) = f(Y_f, Y, R)$. From this, we can derive the NX function (see Fig. 19.1). In Fig. 19.1 we assumed exports to be exogenously given while imports is a linear function in GDP. Thus X is depicted as a horizontal straight line while $M=\bar{M}+mY$. When GDP is at a level of Y_1, there is balance of trade and X=M. When $Y<Y_1$, we have a positive net exports (since X>M). On the other hand, when $Y>Y_1$ we have negative net exports (since X<M).

The negative relationship between net exports and GDP is due to the following reason:

As income increases imports rise whereas exports are exogenously determined. Shifts in NX function take place with exchange rate changes. A depreciation will increase exports and decrease imports and thus shift the NX curve to the right.

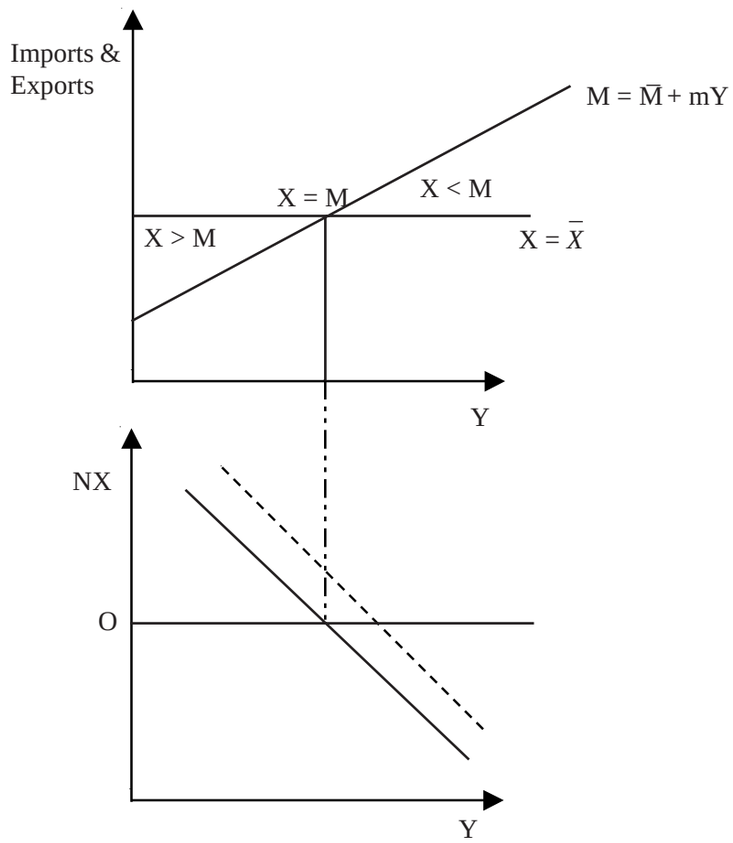


Fig. 19.1: Derivation of Net Export Curve

19.2.3 International Capital Movements

During 1950s most countries had fixed exchange rate and international flow of goods and services was quite important compared to capital flows. Gradually, however flexible exchange rate became the rule and capital flows gained prominence.

International capital movements (i.e., trade in assets and liabilities) also influence the BoP. As discussed earlier, for BoP equilibrium, net capital flows (i.e., inflows adjusted for outflows) must equal current account balance. If net capital flows are positive, there is BoP surplus, which may in turn influence the exchange rate, especially in flexible exchange rate regime.

Capital flows also matter for macroeconomy management as they influence the domestic interest rate. The size of capital flows is a function of differential interest rates between domestic and foreign countries. If free capital mobility is allowed, capital inflows will be higher where real interest rate is high. Moreover, capital outflows take place when interest rate falls. Thus, there would be a tendency for the domestic interest rate to move towards world interest rate. In effect, the domestic economy will be a price taker in the global financial markets.

19.2.4 Trade and Income Determination

The AD function for an open economy is AD = C + I + G + (X – M).

Exports (X) are exogenously determined, i.e. X = $\overline{X}$ while imports are a function of Y, i.e., M = $\overline{M}$ + mY. By substituting the same in the AD function, the equilibrium income[1] is

$$Y^* = (\overline{C} + \overline{I} + \overline{X} - \overline{M}).\frac{1}{1-[(1-t)c+m]} \quad \text{... (19.4)}$$

The trade multiplier, in this case is $\frac{1}{1-[(1-t)c+m]}$. As compared to the closed economy, the multiplier is reduced by the factor *'m'* (or marginal propensity to import). With a lower trade multiplier, induced changes in equilibrium income will also be smaller.

Changes in Investment (ΔI), government expenditure (ΔG) and exports (ΔX) will induce a positive change on equilibrium income. The size of this change in income will be equal to ΔI or ΔG or ΔX times the trade multiplier.

The equilibrium condition in an open economy can also be explained from the income approach.

C+I+G+(X-M) = C+S+TA

By re-arranging terms in the above, we obtain

(X-M) = (S-I) + (TA-G) ...(19.5)

From the above, it is clear that imbalances in the external sector can also be a result of imbalances in the internal sector. For example, an external deficit condition (X < M) can be on account of Savings-Investment deficit (i.e., S<I) and/or government deficit (i.e., TA < G). This would mean that to achieve external (BoP) equilibrium and internal (full employment) balance, monetary and fiscal policies would have to be used appropriately.

19.3 INTERNAL AND EXTERNAL BALANCE WITH FIXED EXCHANGE RATES

We mentioned earlier in Sub-section 19.2.3 that interest rate in home country will be equal to global interest rate in an open economy. In case there is a difference between domestic interest rate (r) and global interest rate (r^*) capital movement will take place.

The analysis of open economy macro economic adjustments under perfect capital mobility is provided by the Mundell-Flemming model. In this model the standard IS-LM framework (see Unit 2) is extended to include the BP curve which is horizontal. In Fig. 19.1 we present the IS-LM curves as we had derived in Unit 2. In addition we

[1]The calculation of equilibrium income in a closed economy is on the following basis:

AD = C + I + G = Y*

By substituting we get

$C = \overline{C} + cY_d$

$I = \overline{I}$

$G = \overline{G}$

TA = ty (taxes)

TR = 0

$Y_d = Y - TA + TR$

$AD = \underbrace{(\overline{C} + \overline{I} + \overline{G})}_{\overline{A}} + c(1-t)\,Y$

$AD = \overline{A} + c(1-t)\,Y$

$Y^* = AD = Y = \overline{A} \cdot \frac{1}{1-[(1-t)c]}$

draw a horizontal line BP which shows the global interest rate, r^*. When $r = r^*$ there is no capital mobility and there is external balance or equilibrium for the economy.

To trace the effects of monetary and fiscal policy changes under Mundell-Flemming model, we start from a position of full employment equilibrium, where $Y=Y^*$. To correct a disequilibrium that has been caused by some exogenous shock, how the adjustment mechanism works will be analyzed below:

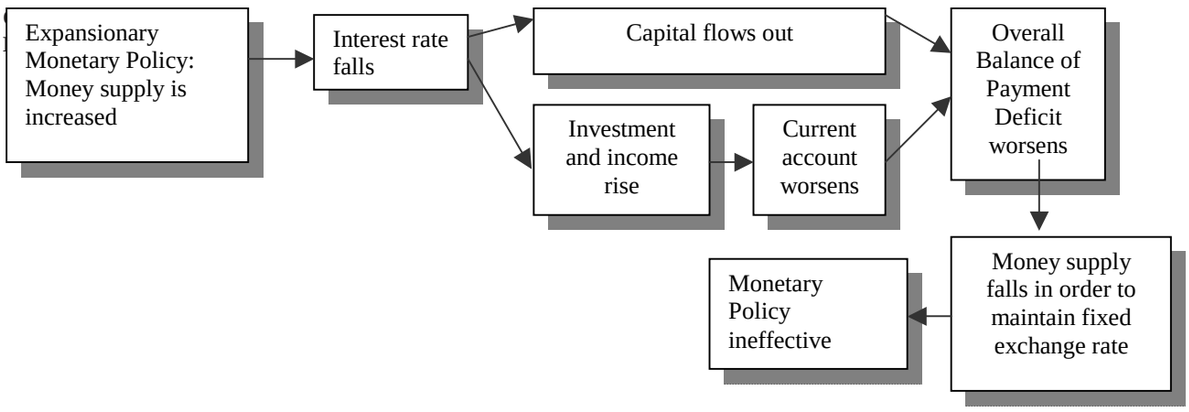
19.3.1 Monetary Policy

Fig. 19.2: IS-LM Framework

We start with a condition of full employment, i.e., equilibrium in goods market (IS curve), money market (LM curve), and external sector (BP curve). The interest rate and income corresponding to the equilibrium condition is r* and Y*. Suppose there is an expansionary monetary policy such that money supply (M_s) increases. Consequently the LM Curve shifts downward to the right (LM_1). The process of adjustment will be as follows:

Fig. 19.3: Effect of Increase in Money Supply

With increase in money supply (M_s), interest rate falls in the home economy which leads to capital outflow (as global interest rate is higher at r^*), which results in deteriorating of capital account balance. At the same time, fall in interest rate stimulates domestic investments and income through the multiplier process. This induces imports to rise and thus a deterioration of the current account balance. With both current and capital account worsening, there will be BoP deficit, leading to depletion of foreign exchange reserves. This implies a reduction in money supply or shifting of LM curve from LM_1 to LM. Thus, expansionary monetary policy is ineffective under fixed exchange rate regime.



Source: Salvatore Dominic (2005), *"Introduction to International Economics"*

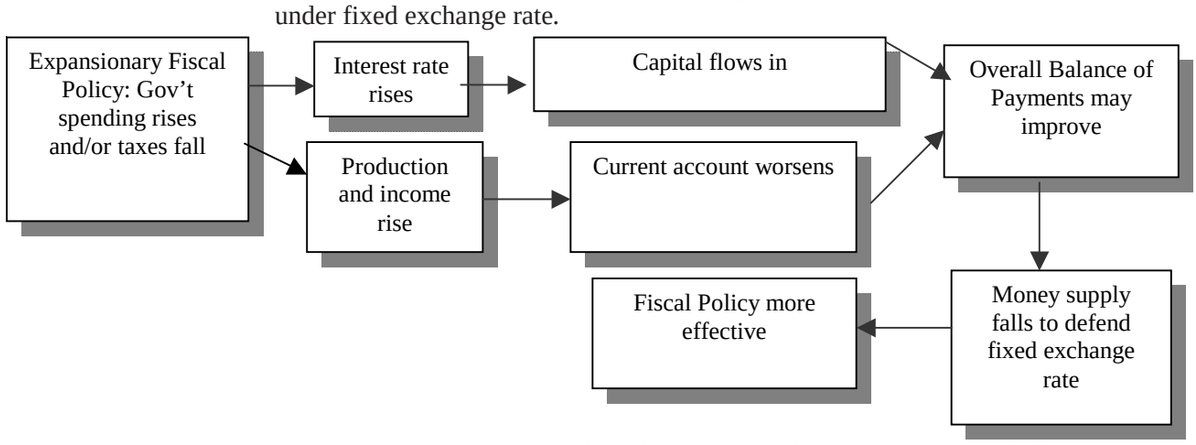
Fig. 19.4 : Monetary Policy is Ineffective Under Fixed Exchange Rates

19.3.2 Fiscal Policy

Suppose instead of expansionary monetary policy, a country uses fiscal policy to address recessionary trends. The process of adjustment will be as follows:

Fig. 19.5: Shift in IS Curve

Expansionary fiscal policy implies either increased government spending(G) or reduction in taxes(T). As a result of increased government spending, the IS curve shifts upward to the right from IS to IS_1. Consequently there is a rise in domestic interest rate, which induces more capital inflows. At the same time, income also rises whereby imports increase leading to worsening of current account balance. Assuming that the surplus in capital account is greater than the deficit in current account, there would be BoP surplus. It implies an increase in M_s thereby shifting the LM curve to LM_1. As such, the equilibrium income increases to. Thus, expansionary fiscal policy is quite effective under fixed exchange rate.



Source: Salvatore Dominic (2005), *"Introduction to International Economics"*

Fig. 19.6: Fiscal Policy is Effective Under Fixed Exchange Rates

Note that in a fixed exchange rate there little scope of maneuvering exchange rate. Rather the adjustment takes place through changes in fiscal policy.

19.4 INTERNAL AND EXTERNAL BALANCE UNDER FLEXIBLE EXCHANGE RATE

In flexible exchange rate regime, disequilibrium in BoP will be adjusted through the changes in exchange rate. A BoP deficit will lead to currency depreciation and BoP surplus will lead to currency appreciation.

19.4.1 Monetary Policy

Suppose a country (with flexible exchange rate) uses expansionary monetary policy to correct recessionary trends. The process of adjustment will be as follows:

Fig. 19.7: Effect of Monetary Policy

Increase in money supply will lead to downward shift in LM curve from LM to LM_1, which will result in a fall in interest rate. A lower **r** leads to capital outflows and thus deficit in capital account. At the same time, a higher Y leads to increase in imports and thus worsening of current account deficit. With a deficit in capital and current accounts, there will be a BoP deficit.

The deterioration in BoP results in currency depreciation. As such, net exports rise (exports rise and imports fall) and IS curve shifts to the right from IS to IS_1. Correspondingly, the new equilibrium output is . Thus, monetary policy, in this case, is effective and results in an increase in aggregate output of the economy.

19.4.2 Fiscal Policy

Suppose instead of monetary policy, the country uses expansionary fiscal policy to correct recessionary trends. The process of adjustment will be as follows:

Fig. 19.8: Effect of Fiscal Policy

Increase in government spending will shift the IS curve to IS_1. As such interest rate rises, capital inflows increase and the overall BoP will improve. With a BoP surplus, currency appreciates and net exports fall (exports fall and imports rise) resulting in shifting of IS_1 to IS. Thus, fiscal policy is ineffective under flexible exchange rates.

19.5 PRICE ADJUSTMENT

In the Keynesian framework, supply curve in the short-run is assumed to be horizontal. This indicates that any output up to potential can be supplied at the existing price level. Thus, the output produced is primarily determined by the position of the aggregate demand curve.

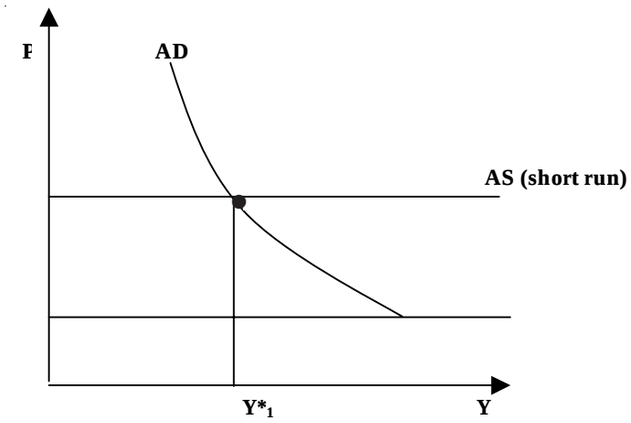


Fig. 19.9: Equilibrium Output Determination

The assumption underlying the horizontal AS curve, however, is that average cost does not change. If we relax the assumption that unit costs will remain constant over the output range, we have a supply curve that is upward sloping. It implies that as output increase, unit cost tends to rise. With productivity/efficiency of inputs falling beyond an output range, profit maximizing firms will not want to increase production unless these higher unit costs are recovered through higher prices.

As you know, macroeconomic equilibrium occurs at the intersection of the AD and AS curves and determines the value of GDP and price level. At the equilibrium level, the spending (demand) behaviour is consistent with the production (supply) activity. At all other points, AD and AS are inconsistent. For instance, at P_1, AD (spending) is higher than the production (supply) to the extent of (Y_1-Y_2) in Fig. 19.9. As such, prices tend to increase till P^* when AD=AS. Similarly, shifts in AD will induce higher equilibrium prices (P^{**}).

Fig. 19.10: Impact of Change in Aggregate Demand

19.5.1 Fixed Exchange Rate and Fiscal Policy

Starting with full employment equilibrium, an increase in government spending stimulates production activity in the economy and results in a shift in the IS curve from IS to IS_1 (see panel-a of Fig. 19.10). Given the LM curve, the equilibrium rate of interest is higher than before.

(a) **(b)**

Fig. 19.11: Impact of increase in Government Spending

The increase in government spending shifts the IS curve to IS_1. As a result, *r* rises, capital inflows increase leading to BoP surplus. Surplus BoP, under fixed exchange rate, increases domestic money supply thereby shifting the LM curve to LM_1.

The combined effect of IS and LM curves is that the AD shifts to the right to AD_1. The increase in aggregate demand causes the GDP to increase to Y_1 when price level is held unchanged at P^*. In the short run, aggregate demand and aggregate supply are in equilibrium at Y_2 corresponding to higher prices. However, in the long run, with full adjustment in supply factors, aggregate supply shifts to AS, which corresponds to initial equilibrium (Y*) but with higher prices (P_1).

19.5.2 Flexible Exchange Rate and Monetary Policy

Starting with a full equilibrium, a monetary expansion stimulates production activity in the short run but causes higher prices in the long run.

(a) **(b)**

Fig. 19.12: Impact of increase in Money Supply

With an increase in money supply, LM curve shifts to LM_1 following which, the interest rate falls leading to capital outflows. This causes BoP deficit and currency depreciation. The net exports rise and the IS shifts to IS_1 leading to a higher equilibrium output at.

The combined effect of these shifts in goods and money markets results in AD function moving upwards to AD_1. GDP increases to initially with marginal increase in prices. However, with complete adjustment in the supply factors, in the long run, the real output shifts back to Y^* but with a higher corresponding price level.

Check Your Progress 1

1) How does a country use fiscal and monetary policies to correct a recession or unemployment with flexible exchange rates? (Assume perfect capital mobility)

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2) Enumerate the conditions wherein a country opts for currency devaluation.

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3) Starting with an equilibrium condition, explain wheat happens to the price level and real GDP in the short run and long run for the following situation:

   a) increase in export demand

   b) increase in crude oil prices

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19.6 LET US SUM UP

The macroeconomic income determination model that includes foreign sector has an additional component in the aggregate demand function, i.e., net exports. While exports have a positive influence, imports have a negative effect on aggregate demand. At the equilibrium level GDP, desired aggregate spending equals national output. The effect of an exogenous change in the components of aggregate demand on equilibrium output will be determined by the multiplier, which is lower (by factor of '*m*') when compared to the closed economy multiplier.

The imbalances in the external sector, if any, can also be a result of the imbalances in the internal sector (i.e., $S \neq I$ and $TA \neq G$). To bring about external (BoP) equilibrium and internal balance (full employment) fiscal and monetary policies can be used depending on the exchange rate regime, i.e., fixed and flexible exchange rates. With the perfect capital mobility and a fixed exchange rate regime, monetary policy has no real impact. However, fiscal policy results in equilibrium output expansion.

With perfect capital mobility and a flexible exchange rate, fiscal policy has no real impact but monetary policy results in output expansion. Given a short-run supply curve (AS) which is positively sloped and assuming perfect capital mobility condition, shifts in aggregate demand on account of increased government spending under fixed exchange rate and expansionary monetary policy under flexible exchange rate creates inflationary gap in the long run.

19.7 KEY WORDS

Capital : Here, in this Block, the word connotes financial capital.

IS Curve : The negative relationship between interest rate and aggregate output. Each paint on the IS Curve depicts equilibrium in the real sector of the economy.

LM Curve : The positive relation between interest rate and aggregate income that arises in the money market of the economy.

19.8 SOME USEFUL BOOKS

Baumol, W.J. and ALan S. Blinder, 1999, *Economics: Principles and Policy*, harcourt College Publishers, Chapter 36.

Dornbusch, R., S. Fischer and R. Startz, 2004, *Macroeconomics*, Ninth Edition, Tata McGraw-Hill, New Delhi.

Mankiw, N. G., 2000, *Macroeconomic*, Fourth Edition, Macmillan, New Delhi.

Salvatore, D., 2005, *Introduction to International Economics*, John Wiley & Sons, New York, Chapter 13 & 14.

19.9 ANSWERS/HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

1) See Section 19.4 and answer.

2) Currency devaluation is an option under fixed exchange rate regime. The conditions wherein currency devaluation takes place are:

   a) Imports are in excess of exports. This disequilibrium continues for a considerably long period of time.

   b) Foreign exchange reserves deplete.

3) a) An increase in export demand leads to a rightward shift of IS curve and AD curve. With AS curve unchanging, in the short run, prices and output increase. However in the long run, assuming potential supply to remain constant, adjustment in supply factors take place and GDP will revert to the initial equilibrium but at higher price level.

   b) Oil being a critical production input, an increase in oil prices will lead to a leftward shift in AS curve. Assuming the AD curve to be unchanging, this results in increase in price level in the short run. However, in the long run, demand and supply adjustments take place and equilibrium GDP is at a lower level.