
UNIT 17 FLEXIBLE EXCHANGE RATE SYSTEM

Sluggish Price Adjustment

Structure

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17.0 OBJECTIVES

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

- explain the basic concepts of international transactions, balance of payments and exchange rate;
- explain how exchange rates are determined;
- explain the concept of flexible exchange rate and its implications; and
- analyse the relationship between flexible exchange rate and trade in goods and capital flows.

17.1 INTRODUCTION

A country is linked to other countries through two broad channels: *trade flows* and *financial flows*. Trade flows pertain to movement of goods and services between countries and thus facilitate exchange of products between countries, commonly known as *exports* and *imports*. When countries produce more than what they can domestically consume, they *export*. Similarly, when countries consume more than what they can produce, they import.

Thus, there would be balancing of production surpluses and deficit when trade takes place between countries.

The implications of the above formulations, (i.e., trade flows) on the components of aggregate demand (AD) would be to include net exports [i.e., exports(X) – imports (M)] such that

$$AD = C + I + G + X - M$$

where,

C: Consumption

I: Investment

G: Government Expenditure

S: Savings

This would mean that

- if $AD > \text{output}$, then imports rise
- if $AD < \text{output}$, then exports rise

Let us look into financial flows. The international linkages through financial flows shift the assets *between countries*.

That is, if

- domestic $I < S \implies$ domestic savings are exported, i.e., foreign investment abroad is financed by domestic savings.
- domestic $I > S \implies$ foreign savings are imported, i.e., domestic investment is financed by foreign savings.

Often we come across the term foreign direct investment (FDI) in India. It implies that excess savings in foreign countries is getting invested in India. Recall from Unit 1 of this course that an increase in investment results in an increase in aggregate output. Thus, the transactions in the asset market affect income, interest rate and exchange rate.

17.2 BALANCE OF PAYMENTS

The record of all transactions (trade and financial) of the residents of one country with the rest of the world is *Balance of Payments* (BoP). The direction of money flows determines whether a particular transaction is a *Credit* or *Debit* item. For example, exports of goods is a *credit* item as money flows into the economy. Similarly, *import* of goods is a *debit* item as money flows out of the country. Investment abroad (i.e., export of saving) is a debit item as the transaction results in out flow of money while foreign investment in a country is a credit item.

The BoP has two accounts: Current and Capital accounts. All current/revenue expenditure transactions (such as exports and imports of goods, transfer payments, non-factor payments, etc.) are recorded in current account. The current account balance reflects whether there is a surplus (+) or deficit (–) in this account.

All transactions, (export and import) that influence country’s capital assets are recorded in capital account. For example, if a country borrows capital from foreign sector, it would be recorded as credit item and if the country lends capital to the foreign sector, it would be recorded as debit item in capital account. The net surplus (+) or deficit (–) in capital account is recorded in capital account balance. The components of current and capital accounts are presented in table 17.1.

Table 17.1:Composition of Current and Capital Accounts

A) CURRENT ACCOUNT 1. Exports and Imports of Merchandise/Goods 2. Exports and Imports of Services (Invisibles) • Non-Factor Services • Investment Income • Private Transfers • Official Grants 3. Current Account Balance (Net of 1+2)	Surplus (+) Exports of goods and services > Imports of goods and services Vice versa for Deficit (–)
B) CAPITAL ACCOUNT 1. Direct Investments (Net) 2. Portfolio Investment (Net) 3. External Assistance (Net) 4. Commercial Borrowings (Net) 5. NRI Deposits (Net) 6. Capital account balance (1+2+3+4+5)	Surplus (+) The demand for domestic <u>assets</u> > domestic demand for foreign <u>assets</u> Vice versa for Deficit (–)

BoP equilibrium is achieved when the sum of current account balance and capital account balance is a zero, i.e., surplus in current account is exactly matched by deficit in capital account. If the addition of these two accounts results in a surplus (deficit) then it is indicated as BoP surplus (deficit).

17.3 EXCHANGE RATE

By definition, exchange rate is the price of one currency in terms of another currency, i.e., number of units of domestic currency that can be exchanged for one unit of foreign currency. For example, Rs.45/\$.

The demand for foreign currency arises when a country imports goods and services from another country. For example, when an Indian tourist visits the US, there is a need to exchange Rupees for US\$. Similarly, when a domestic firm imports (raw material or machinery) from another country or when investments are made abroad foreign exchange is required.

The supply of foreign currencies takes place when a country exports its goods and services. For example, when a foreign tourist visits India (i.e., export of tourism services) foreign currency is exchanged for domestic currency. Similarly, when a domestic firm exports to a firm in another country, foreign currency flows into the country.

Putting together, a country pays for its imports of goods and services from the foreign exchange earnings of exports. Thus, if the total demand for foreign exchange exceeds the total foreign exchange earnings, the rate at which currencies exchange for one another will change. Thus, the demand for and supply of foreign currencies will determine the *exchange rate*. If the value of one currency (in terms of another) increases, then the currency appreciates. On the other hand, if value of the currency decreases, the currency depreciates. For example, assume the exchange rate between Rs. and \$ to be Rs. 40/\$. If the exchange rate changes to Rs. 45/\$, then rupee is becoming cheaper relative to \$, hence rupee is depreciating against \$. Similarly, if the exchange rate changes to Rs. 35/\$, then rupee is becoming dearer relative to \$, hence rupee is appreciating against \$.

Exchange rate can be determined either by market forces (i.e., supply of and demand for foreign currency or by the government. Accordingly we have flexible exchange rate or fixed exchange rate.

17.4 DETERMINATION OF FLEXIBLE EXCHANGE RATE

The demand and supply schedules of foreign currencies will determine the exchange rate. For simplicity, let us assume that India and US are trade partners and the exchange rate between Rs and \$ is to be determined.

17.4.1 Derivation of Demand Schedule for Rupees

As mentioned above, demand for Rupees arises in the US when India exports certain goods and services. In return, there is supply of US \$ to India. Thus, in a two-country model, derivation of demand schedule for Rs. is the same as derivation of supply schedule of US \$.

Assume a situation where India is exporting product X to the US, the price of which is Rs. 100. Given an exchange rate of 0.06 (\$/Re), the dollar price of Product X is \$6. At this price, assume the demand for product X to be 1500 units in the US. For the transaction to be completed, the demand for Indian Rupees would be Rs.1, 50,000 ($=1500 \times 100$) while supply of foreign currency would be \$9000 ($=1,50,000 \times 0.06$). With a falling exchange rate (or rupee depreciating), the dollar price of the product

decreases. Simultaneously the demand for product X (in the US) increases thereby increasing the demand for Indian rupees (or supply of foreign currency).

Table 17.1: Derivation of Demand for Rupees (Supply of \$)

Price of Indian Export good in Rs.	Exchange Rate (\$/Re)	Price of Indian Export good (X) in \$	Qty. of Indian Export (XI)	Demand for Indian Rupees (Rs.)	Supply of Foreign Exchange(\$)
100	0.06 (17.94)	6.0	1500	1,50,000	9000
100	0.04 (24.47)	4.0	1800	1,80,000	7200
100	0.03 (30.65)	3.0	2000	2,00,000	6000
100	0.029 (33.45)	2.9	2050	2,05,000	5945
100	0.023 (42.07)	2.3	2500	2,50,000	5750
100	0.022 (45.68)	2.2	2600	2,60,000	5720

Note: Figures in parenthesis are (RS/\$)

The relationship between exchange rate and the demand for Rupees is highlighted below in Fig. 17.1. Corresponding to the above, the supply of foreign currency can be drawn which will be upward sloping (see Fig. 17.2).

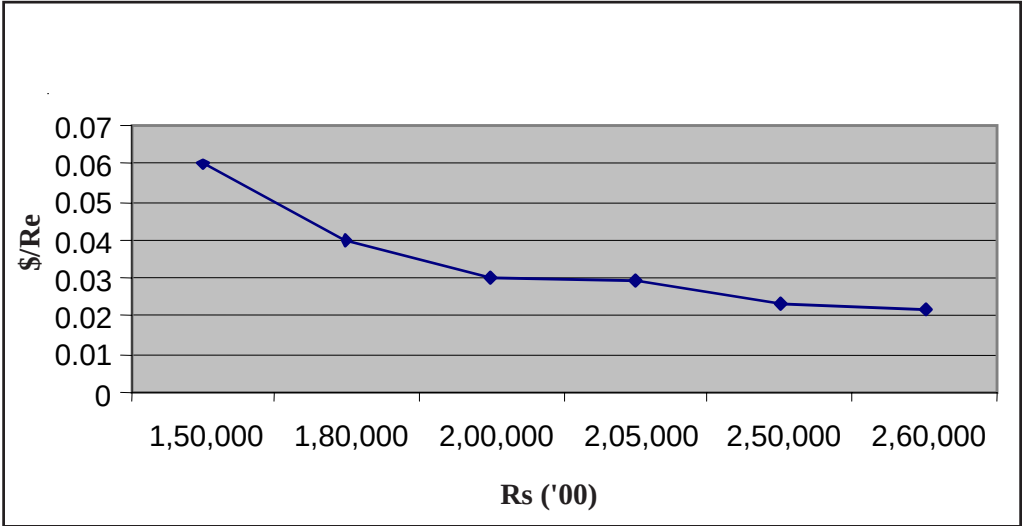


Fig. 17.1: Demand Schedule for Indian Rupees

Fig. 17.2: Supply Schedule for Foreign Currency

From Fig. 17.1, it is evident that the relationship between the exchange rate and the demand for rupee is negative. This implies that as rupee depreciates (or price in \$ terms

decreases), the demand for rupee currency increases. In terms of foreign currency, i.e., \$, the relationship between exchange rate and supply of foreign currency is positive. Thus, *exports* determine the relationship between exchange rate and *the demand for Indian rupees or supply of foreign currency*.

17.4.2 Derivation of the Supply Schedule of Rupees

Assume a situation where India is importing Product Y from the US, the price of which is \$10. Given an exchange rate of Rs. 17.94/\$ (or \$ 0.06/Re.), the rupee price of Product Y is Rs. 179.40. At this price, assume that demand for import of Product Y is 100 units. To complete the transaction, the corresponding supply of Indian rupees is Rs. 17,940 and the demand for foreign currency is \$ 1000. With a falling exchange rate (or rupee depreciating), imports become more expensive in the domestic market, thereby leading to a fall in import demand and hence a fall in supply of rupees. Conversely, if rupee were to appreciate, the rupee price of product Y falls thereby increasing the demand and increasing the supply of rupees.

Table17.2: Derivation of Supply Schedule of Rupees
(India importing from US)

Price of Indian Import good (Y) in \$	Exchange Rate (Rs/\$)	Price of US Import good (Y) in Rs.	Qty. of Indian Import (Y)	Demand for \$	Supply of (Rs.)
10	17.94 (0.06)	179.40	10	1000	17,940
10	24.47 (0.04)	244.70	60	600	14,682
10	30.65 (0.03)	306.50	45	450	13,792
10	33.45 (0.029)	334.50	40	400	13,380
10	42.07 (0.023)	420.70	30	300	12,621
10	45.68 (0.022)	456.80	25	250	11,420
10	37.16 (0.027)	371.60	35	350	13,006

Note: Figures in brackets are (\$/Re.)

The relationship between exchange rate and the supply of rupees (and the demand for foreign currency) is highlighted in Fig. 17.3.

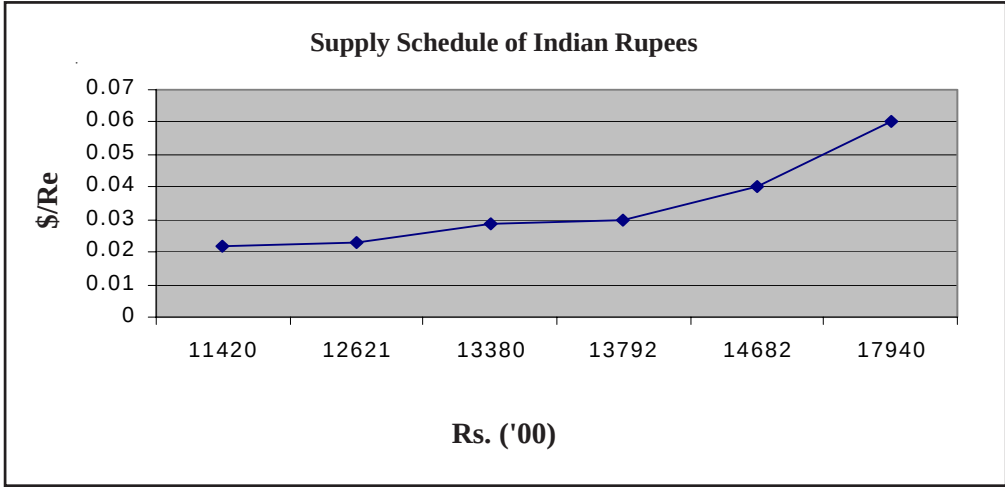


Fig. 17.3: Supply Schedule of Indian Rupees

From Fig.17.3, it is evident that the relationship between exchange rate and supply of rupees is positive. It implies that as rupee appreciates (depreciates), imports become cheaper (dearer) and the supply of rupees increases (decreases). In terms of the foreign currency, the relationship between exchange rate and demand for foreign currency is

negative. Thus, *imports* determine the relationship between exchange rate and the supply of Indian rupees or demand for foreign currency.

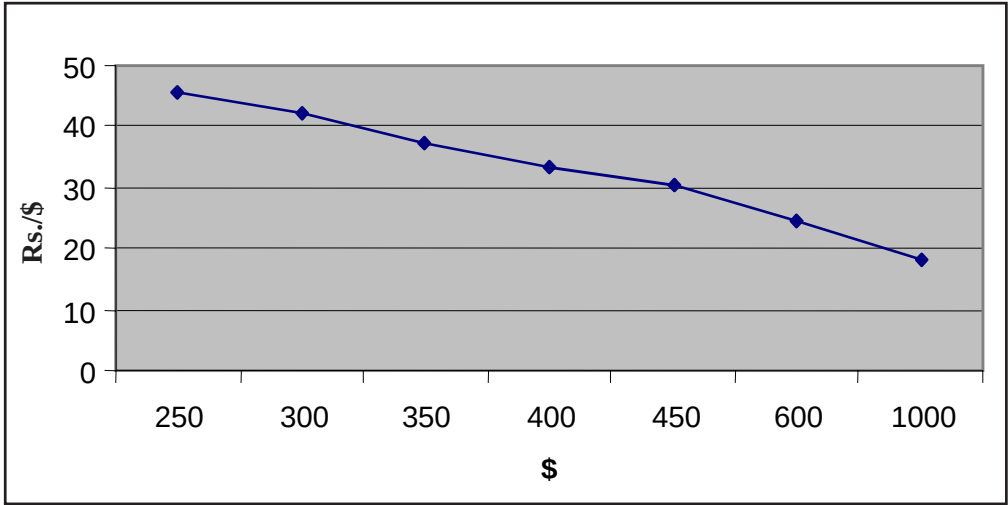


Fig. 17.4: Demand Schedule of Foreign Currencies

17.4.3 Equilibrium Exchange Rate

The theory of exchange rate determination explains how demand and supply of foreign exchange interact and jointly determine the equilibrium exchange rate.

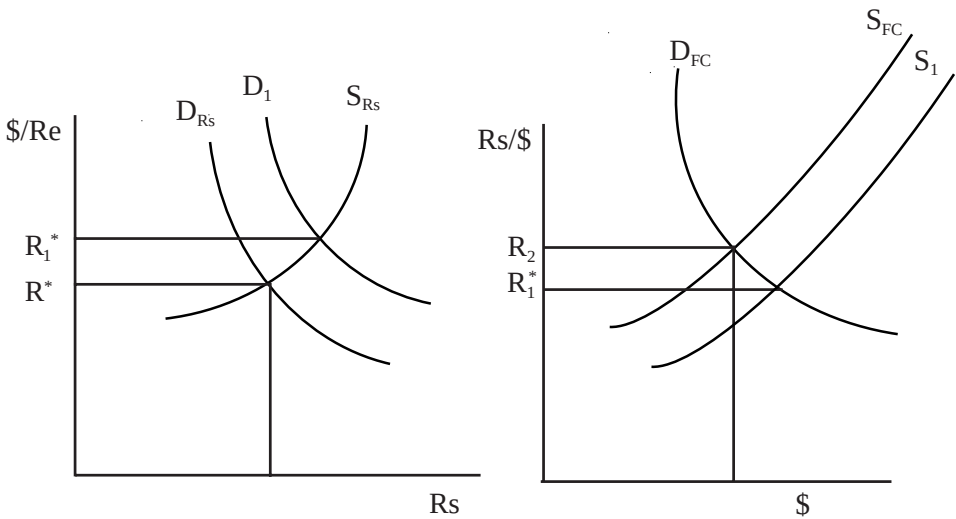


Fig. 17.5: Equilibrium Exchange Rate

As seen earlier, the demand schedule for Indian rupees (or supply schedule of foreign currency) arises from the foreign demand for Indian exports. Similarly, the supply schedule of Indian rupees (or demand schedule for foreign currency) arises from the Indian demand for foreign goods or imports. Together, they determine the equilibrium exchange rate (R^*)

Suppose there is an exogenous increase in income in the US and therefore an increase in demand for Indian goods. Correspondingly, the demand schedule for Indian rupees shifts to D_1 (see fig. 17.5 (a)). The resultant equilibrium exchange rate (R_1^*) indicates that the Rupee has appreciated against the dollar. Similarly, if Indian imports increase (relative to the exports) then the supply curve (SRs) shifts to the right (see Fig. 17.5(b)) resulting in the depreciation of Indian rupee from R_2 to (R_1^*).

Thus, in a *flexible exchange rate* regime, market demand for and supply of a country’s currency determines the changes in exchange rate. As the demand and supply schedules

for currency are determined by many forces, there would be a tendency for high volatility of exchange rates in this regime. As there would be no intervention by the Central Bank in determining the exchange rate, the BoP will always be in equilibrium. It means that the exchange rate adjusts to make the balances in current and capital accounts sum to zero.

Sluggish Price Adjustment

17.5 FACTORS AFFECTING FLEXIBLE EXCHANGE RATE

Shifts in the demand and supply schedules for foreign currency take place on account of a number of factors. Some of them are enumerated below.

If economic growth in India increases relative to the US, then Indian demand for US goods increases (imports rise). It shifts the supply schedule of Indian rupees to the right thereby depreciating rupee as against the dollar.

Second, if the inflation rate in India rises faster than that in the US, imports become cheaper. It leads to more imports resulting in supply schedule of rupees shifting to the right thereby depreciating the rupee against the dollar.

Third, if interest rate in India increases relative to that in the US, capital inflows rise. With an increase in demand for investment in demand, the demand schedule (for rupees) shifts to the right resulting in rupee appreciating against the dollar.

Fourth, expectations also affect the exchange rate. Speculations about interest rates, growth rates, etc. influence the supply and demand forces, which in turn, influence the exchange rate.

Check Your Progress 1

- 1) Fill in the Blanks:
 - a) If the Indian economy is growing more rapidly than other economies, India's are likely to grow more rapidly than its Thus India's demand for foreign currency will Consequently, the rupee is likely to
 - b) When country A's currency becomes more valuable relative to country B's currency, country A's currency is said to relative to that of country B, and country B's currency is said to relative to that of country A.
- 2) State whether True or False and explain briefly:
 - a) The balance of payments accounts always balances under flexible exchange rate regime.
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b) When currency depreciates, imports tend to increase.

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c) When exports rise currency appreciates.

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3) A can of soda costs \$0.75 in the United States and 12 pesos in Mexico. What would the peso-dollar exchange rate be if purchasing-power parity holds? If a monetary expansion caused all prices in Mexico to double, so that soda rose to 24 pesos, what would happen to the peso-dollar exchange rate?

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17.6 LET US SUM UP

All transactions with the foreign sector are recorded under BoP accounts. The direction of money flows determines whether a particular transaction is a *credit* or *debit* item. For example, export of goods is a credit item as the money flows into the economy. But, investment abroad (i.e., export of savings) is a *debit* item as the transaction results in money flowing out of the country.

The BoP has two accounts: *current* and *capital* accounts. All current revenue/ expenditure transactions (like exports and imports of goods and services) are recorded in current account. The current account balance reflects whether there is a surplus (+) or deficit (–) in this account. BoP equilibrium is achieved when addition of current account balance and capital account balance results in a zero, i.e., surplus in current account is exactly matched by deficit in capital account.

By definition, exchange rate is the price of one currency in terms of another currency, i.e., number of units of domestic currency that can be exchanged for foreign currency. For e.g., Rs./\$ or \$/Re. The demand and supply schedules of currency determines the exchange rate. The demand curve of currency is derived from the demand for exports. The supply curve of currency is derived from the demand for imports. In a *flexible exchange rate* regime, changes in market demand for and supply of a country’s currency determines the changes in exchange rate.

17.7 KEY WORDS

Capital	: Here, in this Block, the word connotes financial capital.
Currency	: The sum of outstanding paper money and coins.
Depreciation	: A fall in the value of a currency relative to other currencies in the foreign exchange market.

Devaluation	: An action by the Central Bank to reduce the value of domestic currency vis à vis foreign currencies.	Sluggish Price Adjustment
Exchange Rate	: The rate at which domestic currency is exchanged with foreign currencies.	
Exports	: Goods and services sold to foreign countries.	
Flow	: A variable measured as a quantity per unit of time. This is different from stock, which is quantity of a variable measured at a particular point of time.	
Fixed Exchange Rate	: An exchange rate that is set by the Central Bank under the condition that it is willing to buy and sell foreign exchange at that rate.	

17.8 SOME USEFUL BOOKS

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

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

Sachs, Jeffrey. D. and Felipe Larrain B., *Macroeconomics in the Global Economy*, Prentice Hall Inc., New York.

Salvatore, D., 2001, *International Economics*, John, Wiley and Sons, Chapters 13-14.

17.9 ANSWERS/HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

- 1) a) If the Indian economy is growing more rapidly than other economies, India’s **Imports** are likely to grow more rapidly than its **Exports**. Thus India’s demand for foreign currency will **Increase**. Consequently, the rupee is likely to **depreciate**.
- b) When country **A**’s currency becomes more valuable relative to country **B**’s currency, country **A**’s currency is said to **appreciate** relative to that of country **B**, and country **B**’s currency is said to **depreciate** relative to that of country A.
- 2) a) **True:**
Equilibrium in BoP = Current Account balance + Capital Account balance. Surplus in current and/or capital account implies demand for domestic currency (eg., Indian rupees) increases. As such, the demand schedule shifts to the right resulting in currency appreciation. The converse is true for deficit situation. Under flexible exchange rate regime, these exchanges rate adjustments take place until the BoP is in equilibrium.
- b) **False:**
When currency depreciates, the domestic price of imports increases. Hence, the demand for imports falls.
- c) **True:**
When exports rise (relative to imports) the demand schedule for domestic currency shifts to the right. Assuming, unchanging supply schedule, this results in the appreciation of the equilibrium exchange rate.
- 3) The Peso-dollar exchange rate is 16 (12 ÷ \$0.75). If prices in Mexico double, the new peso-dollar exchange rate is 32 (2÷\$0.75). This implies that if inflation in one trading partner is higher, then the currency depreciates.

UNIT 18 FIXED EXCHANGE RATE SYSTEM

Structure

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- 18.3 Price Adjustments under Fixed Exchange Rate
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- 18.5 Let Us Sum Up
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18.0 OBJECTIVES

After going through this unit, you should be able to

- explain the meaning and determination of fixed exchange rate;
- analyse the relationship between fixed exchange rate and BoP;
- analyse how changes in fixed exchange rate are brought about; and
- construct and interpret exchange rate indices.

18.1 INTRODUCTION

National currencies are generally acceptable within the geographical boundaries of a country. As such, trade between countries typically involves exchange of one country’s currency for that of another. For example, if India were to import from the US, payments are to be made in US\$. For making this international payment, India needs to earn the US\$ (through exports) or buy the same from the foreign exchange market. How many Indian rupees need to be paid to purchase US\$ depends on the value of dollar or *exchange rate*.

As you know, a rise (fall) in the external value of Rupee is called an appreciation (depreciation). For example, if the exchange rate between Rupee-US dollar is Rs.35/\$ which changes to Rs 32/\$, then the value of Rupee in terms of dollar has increased. Hence, Rupee has appreciated against the dollar. Conversely, had the exchange rate changed to Rs 38/\$ then the value of Rupee in terms of dollar would have decreased. In this case, Rupee has depreciated against the dollar.

Assuming a simple situation where only two countries trade with one another, international transactions take place between two currencies. Exchange rate, in this situation, is determined by the demand for and supply of the two currencies. Because the exchange rate is expressed as the value of one currency in terms of another, when one currency appreciates, the other depreciates.

However, when a country has multiple trading partners, exchange rate between two currencies will also be influenced by the changes in the value of other currencies. For example, consider India’s major trading partners to be the US, EU, Japan and China. The exchange rate between US\$ and Indian rupee will not only be influenced by the

export and import flows between these two countries but also by the value of Euro, Yen and Yuan. If the exchange rate between US\$ and Yen changes, this also will influence the exchange rate between US\$ and Rupee. These dynamics of exchange rate changes are analyzed with appropriate exchange rate indices, namely, nominal effective exchange rate (NEER) index and real effective exchange rate (REER) index.

Exchange rate changes are also a function of the exchange rate regime followed by a country, which is of two types, viz., flexible and fixed exchange rates. When the exchange rate is determined by the equality between demand and supply for foreign currency, then we have flexible or floating exchange rate regime. When official intervention (by monetary authorities or government) is used to maintain the exchange rate at a particular value, then we have *fixed* or *pegged* exchange rate regime. Between these two regimes, there are many possible intermediate cases, such as, *adjustable peg* and *managed float*. Under the *adjustable peg*, governments maintain the par values for the exchange rates but explicitly identify the conditions under which the par value can change. In a *managed float*, the government seeks to have some stabilizing influence on the exchange rate but does not fix the exchange rate at a pre determined par value.

18.2 DETERMINATION OF FIXED EXCHANGE RATE

In the flexible exchange rate regime, exchange rates are highly volatile which leads to uncertainties in the international payments/transactions. For most developing countries, such uncertainties are unacceptable especially considering their development agenda. Therefore, stability in exchange rate is maintained through government intervention.

Let us consider a simplified analysis of how a fixed exchange rate system operates. As given in Fig. 18.1, S is the supply curve and D¹ and D² are the demand curves for foreign exchange (say, dollar). The equilibrium exchange rate with respect to S and D² is Rs.30/\$. Assume that the government intervenes to ensure that the exchange rate is maintained at Rs. 25/\$. When exchange rate is Rs.25/\$ demand for dollar is higher than supply of dollar. In order to ensure that the exchange rate does not rise to Rs. 30 per dollar (which is required by supply-demand equilibrium), the government needs to sell Q₁Q₂ dollars. On the other hand, suppose prevailing demand conditions are depicted by the demand curve D¹, where equilibrium exchange rate dictated by supply-demand condition is Rs.20/\$. In this case, the government needs to buy Q₁Q₃ dollars from the foreign exchange market to ensure that the exchange rate is maintained at Rs. 25/\$.

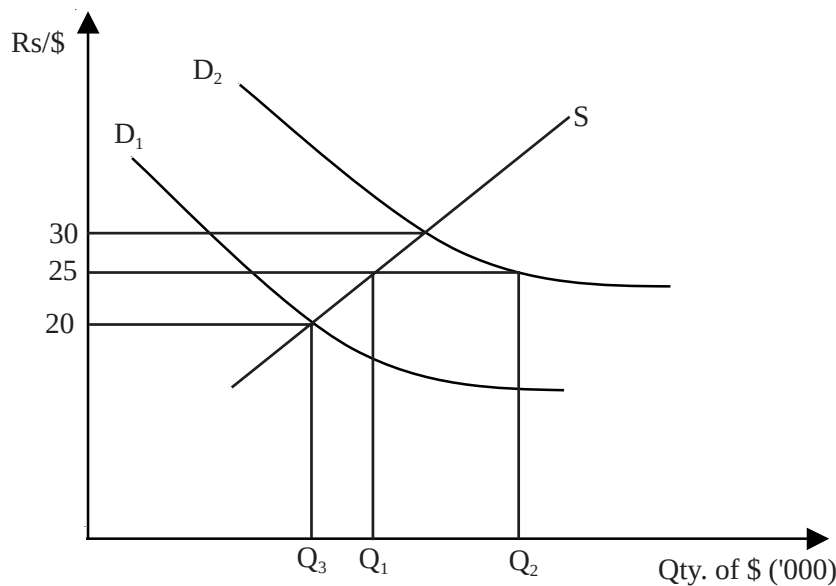


Fig. 18.1: Determination of Fixed Exchange Rate

The buying/selling of the foreign exchange to maintain a given exchange rate implies that the government maintains foreign exchange reserves. (By definition, foreign exchange reserves include foreign currencies, gold reserves and SDRs). For example, BoP deficit (i.e., the demand for foreign currency (imports) is higher than the supply of foreign currency (exports)), is adjusted against the foreign exchange reserves maintained by the country. As such, the monetary authorities will suffer a loss of reserves. Similarly, a BoP surplus implies that there is a rise in the country's foreign exchange reserves. Recall from previous unit that in a flexible exchange rate regime, BoP surplus/deficit results in exchange rate appreciation/depreciation.

At any given point in time the foreign exchange reserves of a country are limited. Therefore, continuous disequilibrium between demand for and supply of foreign exchange cannot be sustained. In such situations, currency is *devalued* (in the case of deficit) and *revalued* (in the case of surplus). When devaluation takes place, exports become cheaper (i.e., rise in supply of foreign currency) and imports become expensive thereby initiating a balance between demand and supply forces.

18.3 PRICE ADJUSTMENTS UNDER FIXED EXCHANGE RATE

In a flexible exchange rate regime trade deficits (surpluses) are automatically corrected by a depreciation (appreciation) of a country's currency. On the other hand, in a fixed exchange rate regime, disequilibrium conditions are corrected by changes in domestic prices. A deficit reduces the country's money supply which in turn reduces the prices. The reduction in the country's money supply will tend to increase the interest rate, which in turn dampens the investment and thereby reduces aggregate demand. Consequently, price level will fall which will encourage exports and discourage imports. At the same time, higher interest rate induces capital inflows that would help in financing the deficit.

The process of price adjustment under the fixed exchange rate regime is similar to that of the price adjustment under the gold standard, i.e., *price-specie-flow-mechanism*. Under gold standard, a country's currency is defined by the gold content. This is to say that a country will be ready to buy or sell any amount of gold at that price. Further, as the gold content in one unit of currency is fixed, exchange rates will also be fixed. For example, assume that a £1 gold coin in the UK contains 113.0016 grains of pure gold, while a \$1 gold coin in the US contains 23.22 grains of gold. This implies that the exchange rate (\$/£) is 4.87 (i.e., $113.0016 \div 23.22$). Assuming no shipping costs, exchange rate will be stable unless there is a change in the gold reserves of any country. This is because no one will be willing to pay more than \$4.87 for a £1 coin as gold worth of \$4.87 can be purchased in the US and exchange it for £1 in the UK. Similarly gold worth £1 can be purchased in the UK and exchanged for \$4.87 in the US.

These gold outflows/inflows measure the size of Balance of Payment deficit/surplus. In a deficit situation, the automatic adjustment mechanism is as follows: With gold outflows under trade deficit, country's money supply will fall, which in turn, triggers a fall in internal prices. As a result, exports will be encouraged and imports will be discouraged until the deficit in BoP is eliminated.

This adjustment mechanism operates in a similar manner even if a country is not following a gold standard. The foreign exchange reserves held by a country is akin to the gold reserves. As such, disequilibrium in trade flows will be reflected in the changes in the foreign exchange reserves which in turn influences the money supply and thereby the domestic prices.

18.4 UNDERSTANDING EXCHANGE RATE MOVEMENTS

18.4.1 Real vs Nominal Exchange Rate

As discussed in the earlier sections, exchange rate movements are influenced by the relative prices in the trading countries. As such, we differentiate between *nominal* and *real* exchange rate. The real exchange rate is defined as the nominal exchange rate adjusted for the ratio of foreign to domestic prices (R).

R = P_f / P

P_f = Price level in foreign country

P = price level in domestic counry

If R > 1, foreign prices are higher than domestic prices. That is, goods abroad are more expensive at home. Similarly, if R<1, it implies that domestic prices are higher than foreign prices, i.e., goods at home are more expensive than goods abroad. Thus, the real exchange rate measures a country’s competitiveness in international market.

Table 18.1: Construction of Nominal, Real Exchange Rate Index

Period	Nominal Exchange Rate (Rs/\$)	Nominal Exchange Rate Index	Indian Price Index	US Price Index	Real Exchange Rate Index
1	18	100	100	100	100.0
2	25	139	120	100	166.8
3	30	167	120	120	167.0
4	30	167	130	115	189.0
5	35	194	140	110	247.0
6	28	156	150	105	222.9

From Table 18.1 it is evident that the real exchange rate is higher than the nominal exchange rate when domestic prices are higher than foreign prices. Further, the changes in nominal exchange rate are largely on account of the disequilibrium in the trade flows between countries. In Table 19.1 we observe that Indian price index has increased faster than US Price index. As a result real exchange rate index, which is obtained as the ratio of Indian price index to US price index, has increased from 100 in period 1 to 222.9 in period 6. The nominal exchange rate index (which is simply the nominal exchange rate converted to index number) has increased from 100 in period 1 to 156 in period 6.

18.4.2 Purchasing Power Parity (PPP)

The exchange rate is determined by the relative purchasing power of currency within each country. For example, if a product X costs Rs. 100 in India and costs \$2 in USA, then the rupee – dollar exchange rate is Rs. 50 per \$. This illustrates the theory of Purchasing Power Parity (PPP) wherein two currencies are at purchasing power parity when a unit of domestic currency can buy the same basket of goods at home or abroad.

There are two versions of PPP, the *Absolute PPP* and the *Relative PPP*. The Absolute PPP postulates that the equilibrium exchange rate between two currencies is equal to the ratio of price levels in the two countries. Specifically,

R = P_1 / P_2

Where P_1 is the price level in the home country and P_2 is the price level in the foreign country.

The Relative PPP postulates that the change in exchange rate is equal to the difference in changes in the price levels in the two countries. Specifically,

$$R' = P'_1 - P'_2$$

Thus, the percentage change in exchange rate (R') will be equal to the percentage change in domestic prices (P'_1) minus the percentage change in foreign prices (P'_2). This would be true as long as there are no changes in transportation costs, obstruction to trade (tariff and non-tariff barriers) and the ratio of traded to non-traded goods. Since trade and commodity arbitrage respond sluggishly (due to the above factors), relative PPP can be approximated in the long run.

Thus, in the long run, the real exchange rate will return to its average level. In other words, if real exchange rate is above long run average level, PPP implies that the exchange rate will fall.

18.4.3 NEER Vs REER

In a situation where there are multiple trade partners, the effect of cross-currency movements are judged by nominal effective exchange rate (NEER) and real effective exchange rate (REER). The construction of export weighted NEER index is shown in the Table 18.2.

Table 18.2: Construction of NEER Index

Period	Nominal Exchange Rate Index(Rs/£)	Nominal Exchange Rate Index (Rs/\$)	Nominal Effective Exchange Rate Index
1	100 (x0.3)	100 (x0.7)	100
2	100 (x0.3)	90 (x0.7)	93
3	120 (x0.3)	90 (x0.7)	99
4	90 (x0.3)	80 (x0.7)	83

We make the following assumptions:

- i) India’s trading partners are the UK and the US
- ii) Share of the US in India’s trade = 70%
- iii) Share of the UK in India’s trade = 30%

The NEER index is the trade weighted average of the trade flows between India and the UK, and between India and the US. For example, for period 2 the NEER index is $100 \times 0.3 + 90 \times 0.7 = 93$. With unchanging trade shares, when rupee-dollar nominal exchange rate falls by 10%, NEER falls by 7%(that is, 70% of 10%). When the Rupee-pound nominal exchange rate increases by 20%, then NEER increases by 6% (that is, 30% of 20%). Thus, the exchange rates of the major trading partners influence the movements of NEER.

When NEER is adjusted for the differences in relative prices between trading partners, the trade weighted REER is obtained. Table 18.3 presents the comparative NEER and REER indices of India for the period 1991-2003. We find that rupee has been strengthening against the currencies of major trading partners. A comparison with the REER shows that the except for 1996-97 and 2003-04, the percentage increase in domestic prices has been more than that in the major trading partners. However, this has been neutralized, to some extent, by the rupee depreciation against the dollar.

Table 18.3: NEER and REER Indices of India (Base: 2000–01=100)

Sluggish Price Adjustment

Year	Exchange Rate (Rs/\$)	NEER (5-Country index)	REER (5-Country index)
1991-1992	24.47	180.40	103.72
1992-1993	30.65	148.29	95.58
1993-1994	31.37	136.74	92.11
1994-1995	31.40	132.59	95.78
1995-1996	33.45	121.25	95.17
1996-1997	35.50	118.43	97.60
1997-1998	37.16	118.49	102.26
1998-1999	42.07	104.87	98.25
1999-2000	43.33	100.99	96.94
2000-2001	45.68	99.54	96.17
2001-2002	47.69	98.47	99.36
2002-2003	48.40	93.13	96.89
2003-2004	45.95	92.07	101.21

Source: Economic Survey, 2004-05

The REER and NEER indices in Table 18.3 are export-weighted indices with weights based on direction of India’s exports during 1992-97. The 5-Country index includes: USA, Japan, UK, Germany and France.

Check Your Progress 1

- 1) If PPP holds and if a basket of goods is priced at \$100 in the US costs in £80 UK, what will be exchange rate between £ and \$?
-
-
-
-
- 2) Suppose if UK prices rise by 10% while the US prices rise by 5%, what will be the new exchange rate?
-
-
-
-
- 3) Following a BoP crises in 1990-91, the Indian government devalued the rupee by over 30%. Explain why.
-
-
-

- 4) Explain the following:
- a) To maintain a fixed exchange rate regime, foreign exchange reserves have to deplete.
.....
.....
.....
 - b) Fixed exchange rate regime always leads to a rise in domestic prices.
.....
.....
.....
- 5) Select the appropriate alternative and explain:
- i) If the United States fixes its exchange rate, such as four Belgian francs per dollar, then to keep it fixed at the four-francs-per-dollar rate,
 - a) Belgian and American exporters and importers must agree to keep their mutual trade in balance.
 - b) Belgain and American exporters and importers must agree not to trade at any other exchange rate.
 - c) The U.S. government does the exporting and importing for the United States.
 - d) Both the U.S. and Belgian governments do the exporting and importing for their respective countries.
 - e) The U.S. government must buy and sell U.S. dollars on the foreign exchange market.
 - ii) The nominal effective exchange rate is
 - a) an unweighted index of several bilateral exchange rates.
 - b) a weighted index of several bilateral exchange rates.
 - c) a lateral exchange rate that is adjusted for inflation.
 - d) a bilateral exchange rate that is unadjusted for inflation.
 - iii) The real effective exchange rate is
 - a) a weighted index of several bilateral exchange rates, adjusted for inflation.
 - b) a weighted index of several bilateral exchange rates, unadjusted for inflation.
 - c) a bilateral exchange rate that is adjusted for inflation.
 - d) bilateral exchange rate that is unadjusted for inflation.
.....
.....
.....
.....
.....
.....

18.3 LET US SUM UP

Under the *fixed exchange rate* regime fluctuations in exchange rate are managed through intervention by the government or kept fixed. The implications are that in spite of changes in export and import trends, the exchange rate remains fixed. In this regime, adjustments in exchange rate are made through policy on *devaluation* and *revaluation* of domestic currency.

If a country's imports rise relative to exports, the supply of domestic currency will be higher relative to the demand for domestic currency. This leads to BoP deficit. Adjustments in BoP deficit are made against the foreign exchange reserves maintained by a country. In deficit situation, reserves deplete and in surplus situation they rise. If the imbalances persist, currency devaluation or revaluation takes place to facilitate adjustments. Trade imbalances also gets adjusted through changes in domestic prices. In a deficit situation, money supply reduces thereby initiating a fall in domestic prices. Similarly, a surplus situations leads to rise in domestic prices.

Various measures are used to analyze the exchange rate movements. The price difference between the domestic and foreign countries is reflected in the difference between nominal and real exchange rates. Thus, the real exchange rate highlights the competitiveness of domestic goods in the foreign markets. With multiple trade partners, the effect of cross currency volatility can be examined through the NEER and REER indices. These indices are trade weighted indices with respect to major trading partners.

18.4 KEY WORDS

- Depreciation** : A fall in the value of a currency relative to other currencies in the foreign exchange market.
- Devaluation** : An action by the Central Bank to reduce the value of domestic currency vis à vis foreign currencies.
- Exchange Rate** : The rate at which domestic currency is exchanged with foreign currencies.

18.5 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, *Macroeconomics*, Fourth Edition, Macmillan, New Delhi.

Salvatore, D., 2005, *Introduction to International Economics*, John, Wiley & Sons, New York, Chapter 13 & 4.

18.8 ANSWERS/HINTS TO CHECK YOUR PROGRESS EXERCISESSS

Check Your Progress 1

- 1) Exchange rate between £ and \$
 $R = £\ 0.8 / \$$
- 2) New Exchange rate = $0.8 \times \frac{110}{105} = 0.838$
Thus $R' = £0.838/\$$

Open-Economy Macro-Modelling

- 3) BoP crisis implies BoP deficit. Under a fixed/pegged exchange rate regime, BoP deficit is adjusted against the available foreign exchange reserves. With depletion in foreign exchange reserves, disequilibrium in the BoP can be corrected through currency devaluation whereby exports become cheaper and imports become costlier.
- 4)
 - i) In a fixed exchange rate regime, BoP deficit leads to depletion of foreign exchange reserves while a BoP surplus leads to a rise in reserves. Therefore, this statement will be true only under conditions of deficit.
 - ii) Under a fixed exchange rate regime, BoP surplus leads to an increase in money supply and therefore leads to a rise in domestic prices. BoP deficit, on the other hand, leads to a fall in domestic prices.
- 5)
 - i) The U.S. government must buy and sell U.S. dollars on the foreign exchange market.
 - ii) The nominal effective exchange rate is a weighted index of several bilateral exchange rates.
 - iii) The real effective exchange rate is a weighted index of several bilateral exchange rates, adjusted for inflation.

UNIT 19 SLUGGISH PRICE ADJUSTMENT

Sluggish Price Adjustment

Structure

- 19.0 Objectives
- 19.1 Introduction
- 19.2 Income Determination in an Open Economy
 - 19.2.1 Domestic Spending Vs Spending on Domestic Goods.
 - 19.2.2 Determinants of Net Exports
 - 19.2.3 International Capital Movements
 - 19.2.4 Trade and Income Determination
- 19.3 Internal and External Balance with Fixed Exchange Rates
 - 19.3.1 Monetary Policy
 - 19.3.2 Fiscal Policy
- 19.4 Internal and External Balance under Flexible Exchange Rate
 - 19.4.1 Monetary Policy
 - 19.4.2 Fiscal Policy
- 19.5 Price Adjustment
 - 19.5.1 Fixed Exchange Rate and Fiscal Policy
 - 19.5.2 Flexible Exchange Rate and Monetary Policy
- 19.6 Let Us Sum Up
- 19.7 Key Words
- 19.8 Some Useful Books
- 19.9 Answers/Hints to Check Your Progress Exercises

19.0 OBJECTIVES

After going through 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:

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

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).

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

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.

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

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.

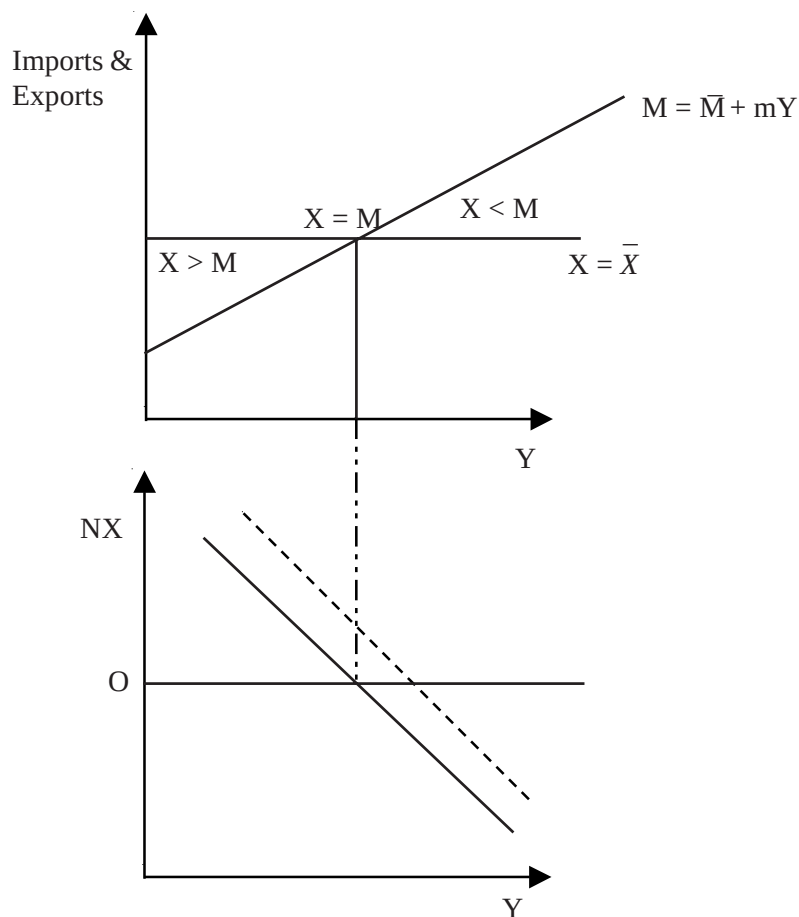


Fig. 19.1: Derivation of Net Export Curve

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. $X = \bar{X}$ while imports are a function of Y, i.e., $M = \bar{M} + mY$. By substituting the same in the AD function, the equilibrium income¹ is

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

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

$$(X - M) = (S - I) + (TA - G) \quad \dots (19.5)$$

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

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

$$AD = C + I + G = Y^*$$

By substituting we get

$$AD = \frac{\bar{C} + \bar{I} + \bar{G}}{\bar{A}} + c(1-t)Y$$

$$AD = \frac{\bar{A}}{\bar{A}} + c(1-t)Y$$

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

$$C = \bar{C} + cY_d$$

$$I = \bar{I}$$

$$G = \bar{G}$$

$$TA = ty \text{ (taxes)}$$

$$TR = 0$$

$$Y_d = Y - TA + TR$$

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:

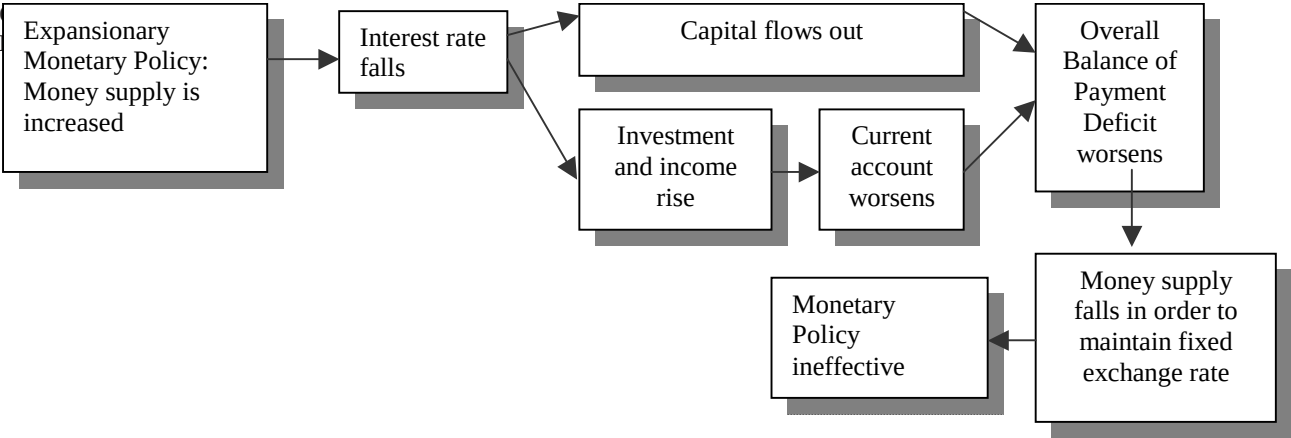
19.3.1 Monetary Policy

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.



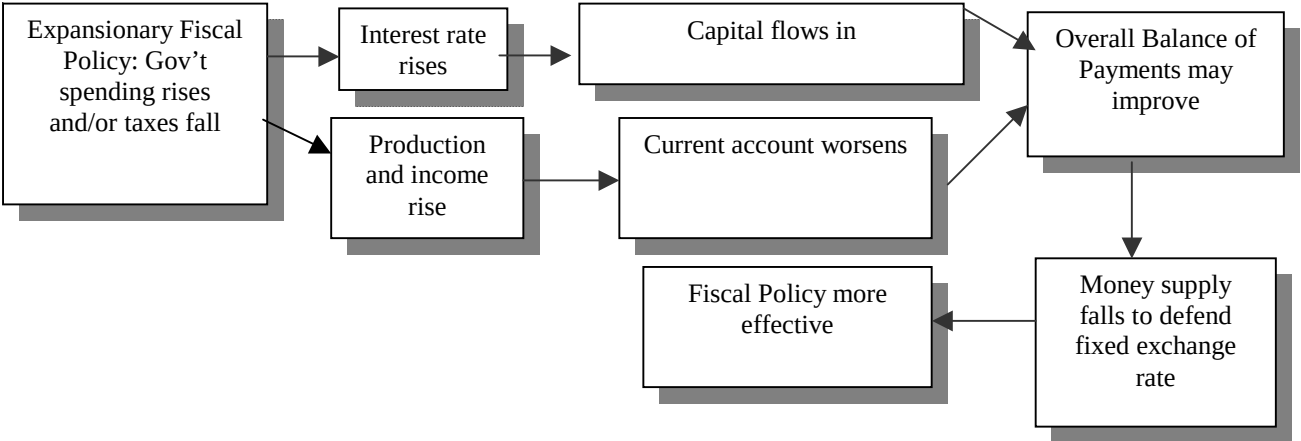
Source: Salvatore Dominic (2005), “Introduction to International Economics”
 Fig. 19.4 : Monetary Policy is Ineffective Under Fixed Exchange Rates

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 IS₁. 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 LM₁. 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.

Sluggish Price Adjustment

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.

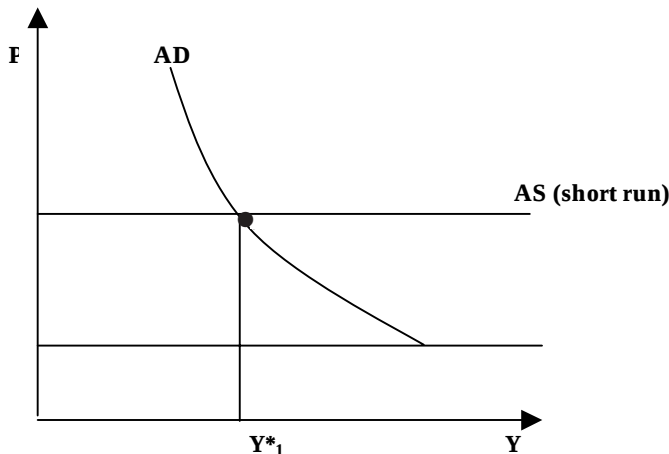


Fig. 19.9: Equilibrium Output Determination

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

Sluggish Price Adjustment

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)
-
-
-
-
-
- 2) Enumerate the conditions wherein a country opts for currency devaluation.
-
-
-
-
-
- 3) Starting with an equilibrium condition, explain what 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
-
-
-
-
-

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 point 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.