Department of Distance Education

Punjabi University, Patiala

Class : M.A. I (Economics) **Semester : 2**
Paper : II (Macro Economic Analysis) **Unit : II**
Medium : English

Lesson No.

2.1 : Balance of Payments and Exchange Rate

2.2 : Mundell-Fleming Model with Perfect Capital Mobility

2.3 : Asset Market, Exchange Rate and Interest Rate

2.4 : Inflation, Money Growth and Interest Rates, Seigniorage and Inflation

2.5 : Budget Deficit and Fiscal Policy

2.6 : The Ricardian Equivalance Debate, Cost of Deficit and Debt Crisis

Department website : www.pbidde.org

BALANCE OF PAYMENTS AND EXCHANGE RATE

2.1.1 Introduction

The balance of payments of a country is a systematic record of all its economic transactions with the outside world in a given year. It is a statistical record of the character and dimensions of the country's economic relationships with the rest of the world. According to Bo Sodersten, "The balance of payments is merely a way of listing receipts and payments in international transactions for a country."B. J. Cohen says, "It shows the country's trading position, changes in its net position as foreign lender or borrower, and changes in its official reserve holding."

2.1.2 Objectives of the lesson

In this lesson, we will study the structure of balance of payments account and different policies, exchange rate and determination of equilibrium exchange rate.

2.1.3 Structure of Balance of Payments Accounts

The balance of payments account of a country is constructed on the principle of double-entry book-keeping. Each transaction is entered on the credit and debit side of the balance sheet. But balance of payments accounting differs from business accounting in one respect. In business accounting, debits (-) are shown on the left side and credits ('+) on the right side of the balance sheet. But in balance of payments accounting, the practice is to show credits on the left side and debits on the right side of the balance sheet.

When a payment is received from a foreign country, it is a credit transaction

while payment to a foreign country is a debit transaction. The principal items shown on the credit side (+) are exports of goods and services, unrequited (or transfer) receipts in the form of gifts, grants, etc. from foreigners, borrowings from abroad, investments by foreigners in the country and official *sale* of reserve assets including gold to foreign countries and international agencies. The principal items on the d*ebit* side (-) include imports of goods and services, transfer (or unrequited) payments to foreigners as gifts, grants, etc., lending to foreign countries, investments by residents to foreign countries and official *purchase* of reserve assets or gold from foreign countries and international agencies.

These credit and debit items are shown vertically in the balance of payments account of a country according to the principle of double-entry book-keeping. Horizontally they are divided into three categories: the current account, the capital account and the official settlements account or the official reserve assets

The balance of payments account of a country is constructed in Table **1**:

Table 1: Balance of Payments Account

Credits (+) (Receipts)		Debits (-) (Payments)	
1. Current Account			
Exports		Imports	
(a)	Goods	(a)	Goods
(b)	Services	(b)	Services
(c)	Transfer Payments	(c)	Transfer Payments
2. Capital Account			
(a)	Borrowings from Foreign Countries	(a)	Lending to Foreign Countries
(b)	Direct Investments by Foreign Countries	(b)	Direct Investments in Foreign Countries
3. Official Settlements Account			
(a)	Increase in Foreign Official Holdings	(b)	Increase in Official Reserve of Gold and Foreign Currencies
Errors and Omissions			

1. Current Account: The current account of a country consists of all transactions relating to trade in goods and services and unilateral (or unrequited) transfers. Service transactions include costs of travel and transportation, insurance, income and payments of foreign investments etc. Transfer payments relate to gifts,

foreign aid, pensions, private remittances, charitable donations etc. received from foreign individuals and governments to foreigners.

In the current account, merchandise exports and imports are the most important items. Exports are shown as a positive item and are calculated f.o.b. (free on board) which means that costs of transportation, insurance, etc. are excluded. On the other side, imports are shown as a negative item and are calculated c.i.f. which means that costs, insurance and freight are included. The difference between exports and imports of a country is its *balance of visible trade* or merchandise trade or simply *balance of trade.* If visible exports exceed visible imports, the balance of trade is favourable. In the opposite case when imports exceed exports, it is unfavourable.

In the current account, the exports of goods and services and the receipts of transfer payments (unrequited receipts) are entered as credits (+) because they represent receipts from foreigners. On the other hand, the imports of goods and services and grant of transfer payments to foreigners are entered as debits (-) because they represent payments to foreigners. The net value of these visible and invisible trade balances is the balance on current account.

2. Capital Account: The capital account of a country consists of its transactions in financial assets in the form of short-term and long-term lendings and borrowings, and private and official investments. In other words, the capital account shows international flow of loans and investments, and represents a change in the country's foreign assets and liabilities. Long-term capital transactions relate to international capital movements with maturity of one year or more and include direct investments like building of a foreign plant, portfolio investment like the purchase of foreign bonds and stocks, and international loans. On the other hand, short-term international capital transactions are for a period ranging between three months and less than one year.

There are two types of transactions in the capital account—private and government. Private transactions include all types of investment: direct, portfolio and short-term. Government transactions consist of loans to and from foreign official agencies.

In the capital account, borrowings from foreign countries and direct investment by foreign countries represent capital inflows. They are positive items or credits because these are receipts from foreigners. On the other hand, lending to foreign countries and direct investments in foreign countries represent capital outflows. They are negative items or debits because they are payments to foreigners. The net value of the balances of short-term and long-term direct and portfolio investments is the *balance on capital account.*

3. The Official Settlements Account: The official settlements account or official reserve assets account is, in fact, a part of the capital account. But the U.K. and U.S. balance of payment accounts show it as a separate account. "The official settlements account measures the change in nation's liquidity and non-liquid liabilities to foreign official holders and the change in a nation's official reserve assets during the year. The official reserve assets of a country include its gold stock, holdings of its convertible foreign currencies and SDRs and its net position in the IMF." It shows transactions in a country's net official reserve assets.

Errors and Omissions: Errors and omissions is a balancing item so that total credits and debits of the three accounts must be equal in accordance with the principles of double entry book-keeping so that the balance of payments of a country always balances in the accounting sense.

2.1.4 Equilibrium in Balance of Payments

Balance of payments always balances means that the algebraic sum of the net credit and debit balances of current account, capital account and official settlements account must equal zero. Balance of payments is written as

$$B = R_f - P_f$$

Where

B represents balance of payments, R is receipts from foreigners, *P is* payments made to foreigners.

When $B = Rf - P_f = 0$, the balance of payments is in equilibrium.

When $R - P > 0$, it implies receipts from foreigners exceed payments made to foreigners and there is *surplus* in the balance of payments. On the other hand, when $R_f - P_f < 0$ or $R_f < P$, there is *deficit* in the balance of payments as the payments made to foreigners exceed receipts from foreigners.

If net foreign lending and investment abroad are taken, a flexible exchange rate creates an excess of exports over imports. The domestic currency depreciates in terms of other currencies. The exports become cheaper relatively to imports. It can be shown in equation form:

$X+B=M+I$

Where X represents exports, *M* imports, *I.* foreign investment, *B* foreign borrowing

or $X-M = I_f-B$

or $(X-M)-I,-B) = Q$

The equation shows the balance of payments in equilibrium. Any positive balance in its current account is exactly offset by negative balance on its capital account and vice versa. In the accounting sense, the balance of payments always balances. This can be shown with the help of the following equation : C + S + T = C + I + G + (X-M)

or $Y- \quad C + I + G + (X-M)$ [$Y = C + S$ +T]
where C represents consumption exepnditure, S domestic saving, T tax receipts, / investment expenditures, G government expenditures, X exports of goods and services, and M imports of goods and services. In the above equation
$C + S + T + GNI$ or national income (K) and
$C + I+G=A$, where A is called 'absorption'.

In the accounting sense, total domestic expenditures $(C + I + G)$ must equal current income (C + S + T) that is A = Y. Moreover, domestic saving (S_d) must equal domestic investment (I_d). Similarly, an export surplus on current account $(X > M)$ must be offset by an excess of domestic savings over investment $(S_d > I_d)$. Thus, the balance of payments always balances in the accounting sense, according to the basic principle of accounting. In the accounting system, the inflow and outflow of a transaction are recorded on the credit and debit sides respectively. Therefore, credit and debit sides always balance. If there is a deficit in the current account, it is offset by a matching surplus in the capital account by borrowings from abroad or/and withdrawing out of its gold and foreign exchange reserves, and vice versa. Thus, the balance of payments always balances in this sense also.

Disequilibrium in Balance of Payments

A disequilibrium in the *BOP* of a country may be either a deficit or a surplus. A deficit or surplus in *BOP* of a country appears when its autonomous receipts (credits) do not match its autonomous payments (debits). If autonomous credit receipts exceed autonomous debit payments, there is a surplus in the *BOP* and the disequilibrium is said to be *favourable.* On the other hand, if autonomous debit payments exceed autonomous credit receipts, there is a *deficit* in the *BOP* and the disequilibrium is said to be unfavourable or adverse.

Causes of Disequilibrium

There are many factors that may lead to a BOP deficit or surplus:

1. Temporary Changes: There may be a temporary disequilibrium caused by random variations in trade, seasonal fluctuations, the effects of weather on agricultural production etc. Deficits or surpluses arising from such temporary causes are expected to correct themselves within a short time.

2. Fundamental Disequilibrium: Fundamental disequilibrium refers to a persistent and long-run *BOP* disequilibrium of a country. It is a chronic *BOP* deficit, caused by such dynamic factors as changes in consumer tastes within the country or abroad which reduce the country's exports and increase its imports, continuous fall in the country's foreign exchange reserves due to supply inelasticities of exports and excessive demand for foreign goods and services, excessive capital outflows due to massive imports of capital goods, raw materials, essential consumer goods,

technology and external indebtedness, low competitive strength in world markets which adversely affects exports and inflationary pressures within the economy which make exports dearer.

3. Structural Changes: Structural changes bring about disequilibrium in BOP over the long-run. They may result from the following factors: (a) Technological changes in methods of production of products in domestic industries or in the industries of other countries. They lead to changes in costs, prices and quality of products, (b) Import restrictions of all kinds bring about disequilibrium in *BOP. (c)* Deficit in *BOP* also arises when a country suffers from deficiency of resources which it is required to import from other countries. (d) Disequilibrium in *BOP* may also be caused by changes in the supply direction of long-term capital flows. More and regular flow of long-term capital may lead to *BOP* surplus, while an irregular and short supply of capital brings *BOP* deficit.

4. Changes in Exchange Rates: Changes in foreign exchange rate in the form of over-valuation or under-valuation of foreign currency lead to *BOP* disequilibrium. When the value of currency is higher in relation to other currencies, it is said to be overvalued. Opposite is the case of an undervalued currency. Over-valuation of the domestic currency makes foreign goods cheaper and exports dearer in foreign countries. As a result, the country imports more and exports less of goods. There is also outflow of capital. This leads to unfavourable *BOP.* On the contrary, under-valuation of the currency makes *BOP* favourable for the country by encouraging exports and inflow of capital and reducing imports.

5. Cyclical Fluctuations: Cyclical fluctuations in business activity also lead to *BOP* disequilibrium. When there is depression in a country, volumes of both exports and imports fall drastically in relation to other countries. But the fall in exports may be more than that of imports due to decline in domestic production. Therefore, there is an adverse *BOP* situation. On the other hand, when there is boom in a country in relation to other countries, both exports and imports may increase. But there can be either a surplus or deficit in *BOP* situation depending upon whether the country exports more than imports or imports more than exports. In both the cases, there will be disequilibrium in *BOP.*

6. Changes in National Income: Another cause is the change in the country's national income. If the national income of a country increases, it will lead to an increase in imports thereby creating a deficit in its balance of payments, other things remaining the same. If the country is already at full employment level, an increase in income will lead to inflationary rise in prices which may increase its imports and, thus, bring disequilibrium in the balance of payments.

7. Price Changes: Inflation or deflation is another cause of disequilibrium in the balance of payments. If there is inflation in the country, prices of exports increase. As a result, exports fall. At the same time, the demand for imports increase. Thus, increase in export prices leading to decline in exports and rise in imports results in adverse balance of payments.

2.1.5 Measures to Correct Deficit in Balance of Payments

When there is a deficit in the balance of payments of a country, adjustment is brought about automatically through price and income changes or by adopting certain policy measures like export promotion, monetary and fiscal policies devaluation and direct controls.

1. Devaluation or Expenditure-Switching Policy

Devaluation raises the domestic price of imports and reduces the foreign price of exports of a country devaluing its currency in relation to the currency of another country. Devaluation is referred to as expenditure switching policy because it switches expenditure from imported to domestic goods and services. When a country devalues its currency, the price of foreign currency increases which makes imports dearer and exports cheaper. This causes expenditures to be switched from foreign to domestic goods.

2. Direct Controls

To correct disequilibrium in the balance of payments, government also adopts direct controls which aim at limiting the volume of imports. The government restricts the import of undesirable or unimportant items by levying heavy import duties, fixation of quotas etc. At the same time, it may allow imports of essential goods duty free or at lower import duties, or fix liberal import quotas for them. For instance, the government may allow free entry of capital goods, but impose heavy import duties on luxuries. Import quotas are also fixed and the importers are required to take licenses from the authorities in order to import certain essential commodities in fixed quantities. In these ways, imports are reduced in order to correct an adverse balance of payments.

3. Adjustment through Capital Movements

A country can use capital import to correct a deficit in its balance of payments. A deficit can be financed by capital inflows. When capital is perfectly mobile within countries, a small rise in the domestic rate of interest brings a large inflow of capital. The balance of payments is said to be in equilibrium, when the domestic interest rate equals the world rate. If the domestic interest rate is higher than the world rate, there will be capital inflows and the balance of payments deficit is corrected.

4. Adjustment through Income Changes

Given the foreign exchange rate and prices in a country, an increase in the value of exports, causes an increase in the incomes of all persons associated with the

export industries. These, in turn, create demand for goods and services within the country. This will raise the incomes of persons engaged in the latter industries and services. This process will continue and the national income increases by value of the multiplier.

5. Stimulation of Exports and Import Substitutes

A deficit in the balance of payments can also be corrected by encouraging exports. Exports can be encouraged by producing quality products, by reducing exports through increased production and productivity and by better marketing. They can also be increased by a policy of import substitution. It means that the country produces those goods which it imports. In the beginning, imports are reduced but in the long-run exports of such goods start. An increase in exports causes the national income to rise by many times through the operation of the foreign trade multiplier.

6. Expenditure-Reducing policies

A deficit in the balance of payments implies an excess of expenditure over income. To correct it, expenditure and income should be brought into equality. For this expenditure reducing monetary and fiscal policies are used. A contractionary or tight monetary policy relates to cut in interest rates to reduce money supply and a contractionary fiscal policy relates to reduction in government expenditure and/or increase in taxes. Thus, expenditure reducing policies reduce aggregate demand through higher taxes and interest rates, thereby reducing expenditure and output. The reduction in expenditure and output, in turn, reduces the domestic price level. This gives rise to switching of expenditure from foreign to domestic goods. Consequently, the country's imports are reduced and the balance of payments deficit is corrected.

2.1.6 Foreign Exchange Rate

The foreign exchange rate or exchange rate is the rate at which one currency is exchanged for another. It is the price of one currency in terms of another currency. It is customary to define the exchange rate as the price of one unit of the foreign currency in terms of the domestic currency. The exchange rate between the dollar and the pound refers to the number of dollars required to purchase a pound. Thus, the exchange rate between the dollar and the pound from the US viewpoint is expressed as $ 2.50 = £ 1. The Britishers would express it as the number of pounds required to get one dollar, and the above exchange rate would be shown as £0.40 = $ I.

The exchange rate of $ 2.50 = £ 1 or £ 0.40 = $ 1 will be maintained in the world foreign exchange market by arbitrage. *Arbitrage refers to the purchase of a foreign currency in a market where its price is low and to sell it in some other market where its price is high.* The effect of arbitrage is to remove differences in the foreign exchange rate of currencies so that there is a single exchange rate in the world foreign

exchange market. If the exchange rate is $ 2.48 in the London exchange market and $ 2.50 in the New York exchange market, foreign exchange speculators, known as arbitrageurs, will buy pounds in London and sell them in New York, thereby making a profit of 2 cents on each pound. As a result, the price of pounds in terms of dollars rises in the London market and falls in the New York market. Ultimately, it will equal in both the markets and arbitrage comes to an end. If the exchange rate between the dollar and the pound rises to $ 2,60 = £ 1 through time, the dollar is said to depreciate with respect to the pound, because now more dollars are needed to buy one pound. When the rate of exchange between the dollar and the pound falls to $ 2.40 = £ 1, the value of the dollar is said to appreciate because now less dollars are required to purchase one pound. If the value of the first currency depreciates that of the other appreciates, and vice versa. Thus, a depreciation of the dollar against the pound is the same thing as the appreciation of the pound against the dollar and vice versa.

2.1.6.1 Determination of Equilibrium Exchange Rate

The exchange rate in a free market is determined by the demand for and the supply of foreign exchange. The equilibrium exchange rate is the rate at which the demand for foreign exchange equals to supply of foreign exchange. In other words, it is the rate which clears the market for foreign exchange. There are two ways of determining the equilibrium exchange rate. The rate of exchange between dollars and pounds can be determined either by the demand and supply of dollars with the price of dollars in pounds, or by the demand and supply of pounds with the price of pounds in dollars. Whatever method is adopted, it yields the same result. The analysis that follows is based on the dollar price in terms of pounds.

The demand for foreign exchange is a derived demand from pounds. It arises from import of British goods and services into the US and from capital movements from the US to Britain. In fact, the demand for pounds implies a supply of dollars. When the US businessmen buy British goods and services and make capital transfers to Britain, they create demand for British pounds in exchange for US dollars because they cannot make payments to Britain in their currency, the US dollars.

The demand curve for pounds *DD.* is downward sloping from left to right in Figure 1. It implies that the lower the exchange rate on pounds, the larger will be the quantity of pounds demanded in the foreign exchange (US) market, and vice versa. This is because a lower exchange rate on pounds make British exports of goods and services cheaper in terms of dollars. The opposite happens if the exchange rate on pound is higher. It will make British goods and services dearer in terms of dollars, and the demand for pounds will fall in the foreign exchange (US) market.

But the shape of the demand curve for foreign exchange will depend on the elasticity of demand for imports. If a country imports necessities and raw materials,

we may expect the elasticity of demand for imports to be low and the quantity imported to be insensitive to price changes. If, on the other hand, the country imported luxury goods and goods for which suitable substitutes exist, demand elasticities for imports might be high. If the country has many well-developed import competing industries, the elasticity of demand for imports most certainly is high. In the short-run, elasticity of demand for imports may not be very high. In the long-run, however, it is much more probable that the production pattern will alter according to price changes and the demand for imports, therefore, will be more elastic.

The supply of foreign exchange in our case is the supply of pounds. It arises from the US exports of goods and services and from capital movements from the US to Britain. Pounds are offered in exchange for dollars because British holders of pounds wish to make payments in dollars. Thus, the supply of foreign exchange reflects the quantities of pounds that would be supplied in the foreign exchange market at various dollar prices of pounds.

The supply curve for pounds SS is an upward sloping curve as shown in Fig. 58.1. It is a positive function of the exchange rate on pounds. As the exchange rate on pounds increases, the greater is the quantity of pounds supplied in the foreign exchange market. This is because with increase in the dollar price of pounds (lower pounds price of dollars), US goods, services and capital funds become better bargains to holders of pounds. Therefore, the holders of pounds will offer larger quantities of pounds with the increase in the exchange rate.

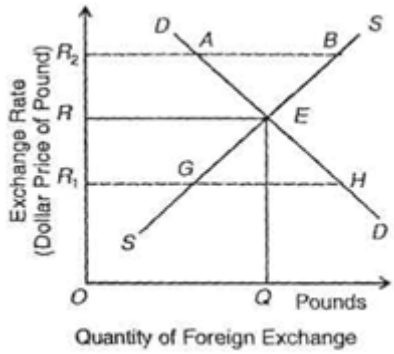


Figure 8.1

But the shape of supply curve of foreign exchange will be determined by the elasticity of the supply curve. As the value of the country's own currency increases, imports become relatively cheaper, and more is imported. As more is imported, more of the home currency is supplied in the foreign exchange market, provided elasticity is greater than unity. When imports become relatively cheap, new goods will start to be imported and domestic import-competing industry will be gradually eliminated by

imports.

Equilibrium Exchange Rate

Given the demand and supply curves of foreign exchange, the equilibrium exchange rate is determined where *DD,* the demand curve for pounds intersects SS, the supply curve of pounds. They cut each other at point *E* in Figure 1. The equilibrium rate is *OR* and *OQ* of foreign exchange is demanded and supplied. At *OR* exchange rate the US demand for pounds equals the British supply of pounds and the foreign exchange market is cleared. At any higher rate than this, the supply of pounds would be larger than the demand for pounds so that some people who wish to convert pounds into dollars will be unable to do so. The price of pounds will fall, less pounds will be supplied and more will be demanded. Ultimately, the equilibrium rate of exchange will be re-established. In Fig. when the exchange rate increases to OR_2, the supply of pounds is more than the demand for pounds. With the fall in the price of pounds, the equilibrium exchange rate OR_2 is again established at point *E.* On the contrary, at an exchange rate lower than this, say OR_1 the demand for pounds is greater than the supply of pounds. Some people who want pounds will not be able to get them. The price of pounds will rise which will reduce the demand and increase the supply of pounds so that the equilibrium exchange rate *OR* is re-established at point *E* where the two curves *DD* and SS intersect.

Suppose there is a shift upward in the US demand for pounds as shown by the upward shifting of the *DD* curve to D_1D_1 in Fig. (A). This may be due to increase in the US tastes for British goods, an increase in the US national income etc. which increases the demand for imported goods in the US. With the shifting up of the demand curve to D_1D_1 the US dollar depreciates and the British pound appreciates which re-establish the new equilibrium exchange rate OR_2 at point E_2 where OQ_2 quantity of foreign exchange is demanded and supplied.

On the other hand, if the supply of pounds increases and the supply curve shifts down in Fig. (B), the value of pounds depreciates and that of dollars appreciates. This automatically brings about a new equilibrium exchange rate OR_1 at point E_1 in Panel (B) where the S_1S_1 curve intersects the *DD* curve. At the new equilibrium exchange rate OR_1 OQ_1 of foreign exchange is demanded and supplied. The supply of pounds may increase due to the increase in the tastes of Britishers for the US goods, the increase in the national income of Britain, etc.

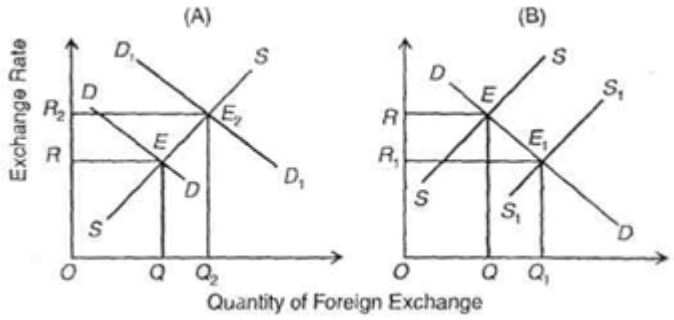


Figure 8.2

Thus, under flexible exchange rates equilibrium rate of exchange will prevail which will clear the market and keep the balance of payments in equilibrium.

2.1.7 The Balance of Payments Theory

According to this theory, under free exchange rates the exchange rate of the currency of a country depends upon its balance of payments. A favourable balance of payments raises the exchange rate, while an unfavourable balance of payments reduces the exchange rate. Thus, the theory implies that the exchange rate is determined by the demand for the supply of foreign exchange.

The demand for foreign exchange arises from the debit side of the balance of payments. It is equal to the value of payments made to the foreign country for goods and services purchased from it plus loans and investments made abroad. The supply of foreign exchange arises from the credit side of the balance of payments. It equals all payments made by the foreign country to our country for goods and services purchased from us plus loans disbursed and investments made in this country. The balance of payments balances if debits and credits are equal. If debits exceed credits, the balance of payments is unfavourable. On the contrary, if credits exceed debits it is favourable. When the balance of payments is unfavourable, it means that the demand for foreign currency is more than its supply. This causes the external value of the domestic currency to fall in relation to the foreign currency. Consequently, the exchange rate falls. On the other hand, in case the balance of payments is favourable, the demand for foreign currency is less than its supply at a given exchange rate. This causes the external value of the domestic currency to rise in relation to the foreign currency. Consequently, the exchange rate rises.

When the exchange rate falls below the equilibrium exchange rate in a situation of adverse balance of payments, exports increase and the adverse balance of payments is eliminated, and the equilibrium exchange rate is re-established. On the other hand, when under a favourable balance of payment situation, the exchange rate rises above the equilibrium exchange rate, exports decline, the favourable balance of

payments disappears and the equilibrium exchange rate is re-established. Thus, at any point of time, the rate of exchange is determined by the demand for and the supply of foreign exchange as represented by the debit and credit side of the balance of payments. "Any change in the conditions of demand or of supply reflects itself in a change in the exchange rate, and at the ruling rate the balance of payments balances from day to day or from moment to moment."

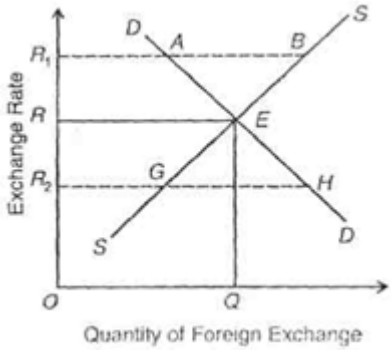


Figure 8.3

The determination of exchange rate under the balance of payments theory is illustrated in Fig. 8.3 *DD* is the demand curve for foreign currency. It slopes downward to the left because when the rate of exchange rises, the demand for foreign currency falls, and vice versa. *SS* is the supply curve of foreign exchange which slopes upwards from left to right. This is because when the exchange rate falls, the amount of foreign currency offered for sale will be less, and *vice versa.* The two curves intersect at *E* where *OR* equilibrium exchange rate is determined. *E* is also the point where the balance of payments is in equilibrium. Any exchange rate above or below *OR* will mean disequilibrium in the balance of payments. Suppose the exchange rate rises to *OR1.* The demand for foreign exchange R_1A is less than its supply R_1B. It means that there is a favourable balance of payments. When the exchange rate is more than the equilibrium rate, exports decline and imports increase. Consequently, the demand for foreign exchange will rise and the supply will fall. Ultimately, the equilibrium exchange rate *OR* will be restored where demand and supply of foreign exchange equals at point *E.* In the opposite case, when the exchange rate falls below the equilibrium rate to *OR2,* the demand for foreign exchange is greater than its supply. It implies an unfavourable balance of payments. But fall in the exchange rate leads to increase in exports and decline in imports. As a result, the demand for foreign currency starts falling and the supply starts rising till the equilibrium exchange rate *OR* is re-established with the equality of demand and supply of foreign exchange at point *E.*

However, according to this theory, the demand and supply of foreign exchange are determined by factors that are independent of changes in the exchange rate. Such

factors are interest on foreign loans, reparation payments etc. Further, the demand for many items that enter into import trade is perfectly inelastic so that exchange rate changes do not affect them at all.

Criticism of the Theory

The balance of payments theory has been criticised by economists on the following counts:

1. **Balance of Payments Independent of Exchange Rate:** The main defect of the theory is that the balance of payments is independent of the exchange rate. In other words, the theory states that the balance of payments determines the exchange rate. This is not wholly true because it is changes in the exchange rate that bring about equilibrium in the balance of payments.
2. **Neglects the Role of Price Level :** The theory neglects the role of the price level in influencing the balance of payments of a country and hence its exchange rate. But the fact is that price changes do affect the balance of payments and the exchange rates between countries.
3. **No Free Trade and Perfect Competition:** The theory is based on assumptions of free trade and perfect competition . This is unrealistic because free trade is not practised these days. Governments impose a number of restrictions to reduce imports and adopt measures to encourage exports. This is how they try to correct disequilibrium in the balance of payments.
4. **Truism:** The theory presupposes that there is an equilibrium exchange rate where balance of payments balances. This is a truism. But the equilibrium exchange rate may not be one of balance of payments equilibrium. In fact, exchange rates between countries continue to prevail under conditions of surplus or deficit in the balance of payments and there is no tendency for the balance of payments to be in equilibrium over the long-run.
5. **Demand for Imported Raw Materials not Inelastic:** The theory has been criticised for the assumption that the demand for imported raw materials is inelastic. There is no raw material in the world the demand for which is perfectly inelastic.

2.1.8 Conclusion

The above analysis is based on the assumption of fixed exchange rates. Thus, a deficit (or surplus) in the balance of payments is possible under a system of fixed exchange rates. But under freely floating exchange rates, there can in principle be no deficit (or surplus) in the balance of payments. The country can prevent a deficit (or surplus) by depreciating (or appreciating) its currency. Further, balance of payments always balances in an ex-post accounting sense, according to the basic principle of accounting.

2.1.9 Short Answer Type Questions

Write short notes on

1. Deficit in balance of payment
2. Exchange rate
3. Causes of disequilibrium in BOP
4. Equilibrium exchange rate

2.1.10 Long Answer Type Questions

1. Discuss the Balance of Payments Theory of foreign exchange rates.
2. Examine the factors influencing the foreign exchange rates.
3. What are the measures to correct disequilibrium in balance of payments?

2.1.11 Recommended Books

G.K. Shaw: An Introduction to the Theory of Macroeconomic Policy

N.F. Kaiser: Readings in Macroeconomics

MUNDELL-FLEMING MODEL WITH PERFECT CAPITAL MOBILITY

2.2.1 Introduction

In an open economy, domestic spending no longer determines domestic output. Instead, spending on domestic goods determines output. A currency depreciation (increases in R) has two distinct effects on this measure: (i) value effects, and (ii) volume effects. A currency depreciation is equivalent to an increase in the relative price of imports to domestic goods. Even if the volume of trade does not change, the measured value of imports unambiguously increases. The volume effects run in the opposite direction. Exports should rise and imports should fall due to the reason imports are now relatively more expensive. The domestic income is now dependent on both foreign income and the real exchange rate. The IS curve is steeper in an open economy setting due to the marginal propensity to import. The fact that some of our income is spent on imports decreases the amount of induced spending in our economy. For a given reduction in the interest rate, a smaller increase in output and income is required to restore goods market equilibrium.

2.2.2 Objectives of lesson

In this lesson, we will incorporate 'open-economy' concepts (foreign trade) into our IS/LM model of macroeconomic fluctuations.

2.2.3 Capital Mobility

Lets consider a very simplified version of the international economy. Let us assume

the following:

(i) exchange rates are fixed forever at a given level,

(ii) taxes are the same everywhere, and

(iii) foreign asset holders face no political risk.

In this setting, capital would chase the highest return. As such, interest rates would have to equate across economies. These assumptions do not hold in reality. Although a very slightly unrealistic assumption, we will assume perfect mobility of capital, in which investors can purchase assets in any country they choose, quickly, in unlimited amounts, and with little transaction cost. With this assumption, differences in interest rates will induce capital flows between economies. These flows put pressure on interest rates until they are once again equated between nations.

2.2.4 Mundell-Fleming Model with a Floating Exchange Rate

In an open economy with external trade and financial transactions, how are the key macrovariables (GDP, inflation, balance of payments, exchange rates, interest rates, etc) determined and interact with each other? What are the effects of fiscal and monetary policies? The Mundell-Fleming model is the standard open macroeconomic model that tries to answer these questions. Theoretically, it is the most popular model. But its applicability to actual policy making is not as high as we would hope (especially for developing and transition countries). In 1963 when he was young, Prof. Robert Mundell was working with Marcus Fleming at the IMF and wrote a paper which gave birth to this model. He has been at Columbia University (New York) for the last 25 years. He has been a strong advocate of stabilization of major currencies and establishment of euro. In 1999, he won the Nobel Prize in economics, partly because of the Mundell-Fleming model.

The Mundell-Fleming model is an open macro application of the standard IS-LM analysis. More precisely, it is an IS-LM analysis with trade and international capital mobility. Consider the following three aspects of the macroeconomy:

(1) Aggregate demand (IS and LM curves, representing goods and money markets)

(2) Aggregate supply (production function and labor market)

(3) Balance of payments (current account and capital account)

The usual textbook exposition (with no trade or capital mobility) combines (1) and (2), with a downward sloping AD (aggregate demand) curve and an upward-sloping AS (aggregate supply) curve.

The Mundell-Fleming model combines (1) and (3), namely AD and B (balance of payments) curves. This means that the Mundell-Fleming model (in its simplest version) has no supply side constraint. As in the most elementary Keynesian model, it implicitly assumes

that capital and labour are generally underemployed so that any demand stimulus will expand real GDP (rather than cause inflation).

Aggregate Demand - IS curve

Aggregate demand is composed of two parts: absorption (A, namely, domestic demand) and trade balance (T, namely, foreign demand). We ignore service trade, factor income and transfers, so the current account is the same as the trade balance.

$Y = A + T$ (GDP by expenditure decomposition)

where

$A = C + I + G$ (definition of absorption)

$= A(Y, i; G)$ $A_1 > 0$, $A_2 < 0$, $A_3 > 0$; G is an exogenous spending (shift parameter)

[A_1 means partial derivative of A with respect to first variable, etc.]

and

$T = M^* - qM$ (definition of trade balance, measured in domestic currency)

$= T(q, Y^*, Y)$ $T_1 > 0$, $T_2 > 0$, $T_3 < 0$; foreign income Y^* is assumed fixed

(Y: income C: private consumption I: private investment G: government spending M: imports M*: foreign imports (=our exports), i: interest rate)

Note that A and T are defined as real variables (deflated by domestic price P). The real exchange rate q is defined thus:

$q = EP^*/P$ (a rise in q means real depreciation of home currency)

Please note that $T_1 > 0$, namely, partial derivative of trade balance with respect to q is positive. This means that the Marshall-Lerner condition is satisfied, so real depreciation will improve the trade balance (when other variables remain unchanged).

From above, we have

$Y = A(Y, i; G) + T(q, Y^*, Y)$

$= F(Y, i, q; G)$ Note: $0 < F_1 < 1$

Collecting Y to the left-hand side,

$Y = f(i, q; G)$ $f_1 < 0$, $f_2 > 0$, $f_3 > 0$

This is our IS curve. It is downward-sloping in the (i, Y) plane. Moreover, a rise in q (real depreciation) or a rise in G (government spending) shifts the IS curve up and to the right.

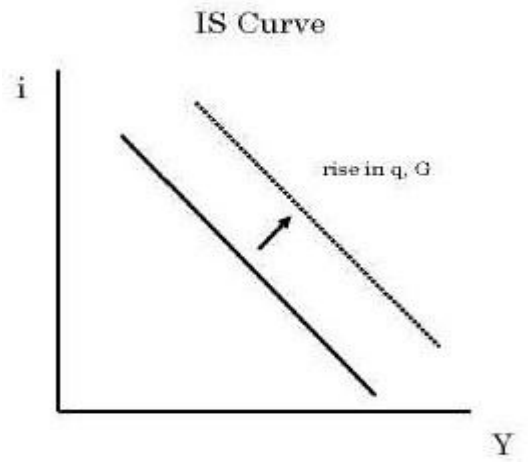


Figure: 2.2.1

Aggregate Demand - LM curve

The LM curve is the same as in the domestic macro version. It shows the condition for money market equilibrium.

In particular, we ignore the possibility of "currency substitution," a phenomenon where domestic citizens hold foreign currency (typically US dollar) as well as domestic currency, and change their relative shares as circumstances change. No currency substitution is a reasonable assumption in developed countries, where people hold only domestic currency. But in many developing countries, currency substitution may be a big factor that influences the money demand.

Currency substitution is also called "dollarization." But dollarization has two meanings: (1) the situation where people use dollars in addition to domestic currency because they do not trust the latter (in this case, the monetary authority usually tries to prevent the use of dollar); (2) the situation where the government declares that the national currency is the US dollar, abolishes the central bank, and gives up independent monetary policy. Currency substitution is equivalent to the first (traditional) meaning of dollarization. The LM curve is simply:

$M^S/P = L^D (i, Y)$ $\quad L^D_1 < 0, \; L^D_2 > 0$

(M^S: money supply P: price level)

As in the domestic version, it is upward-sloping in the (i, Y) plane. A rise in money supply M^S shifts the LM curve down and to the right. In this formulation, the price level P is assumed fixed. This may be unrealistic in a small open economy where exchange rate pass-through (E -> P) is significant.

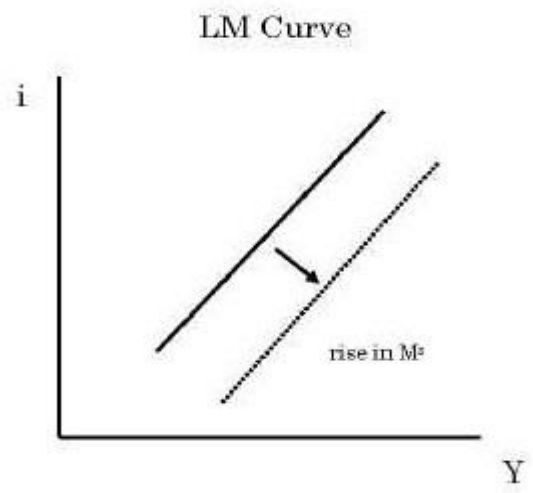


Figure: 2.2.2

Balance of Payments

The balance of payments (B) is the sum of current account (T) and capital account (K). Remember, for simplicity we have assumed away the flows of service, factor income and transfers so that the current account is identical with the trade balance.

$$B = T + K$$
$$= T(q, Y) + K(i - i^*) \qquad T_1 > 0, \quad T_2 < 0; \quad K_1 > 0$$
$$= 0$$

Assumptions:

1. The exchange rate is floating (the real exchange rate q is also flexible).
2. The monetary authority does not intervene in the foreign exchange market. This means that there is no change in international reserves, the monetary account is zero, and, therefore, the current account and the capital account must always add up to zero ($T + K = 0$).
3. Additionally, we assume perfect capital mobility. This means that $i = i^*$, $K_1 = +\infty$, and K is indeterminate. In other words, if $i > i^*$ there will be a massive capital inflow into the home country and if $i < i^*$ there will be a massive outflow, so the only way K can remain finite is when $i = i^*$. When that happens, K can take any value (positive or negative) to offset T, so that $T + K = 0$ holds.
4. The exchange rate expectation is static. That is to say, people expect that the future exchange rate will be the same as today's (even though the exchange rate is floating). This is a simplifying assumption. If we depict this situation in the (i, Y) plane, we have a horizontal line at i*. The domestic interest rate must be equal to the world

interest rate. There will be a massive capital inflow above that line and a massive capital outflow below that line.

Figure: 2.2.3

Equilibrium

Under a freely floating exchange rate and perfect capital mobility, the following three equations derived above determine the equilibrium position.

i) $Y = f(i, q; G)$ $f_1 < 0$, $f_2 > 0$, $f_3 > 0$ <IS>

ii) $M^s/P = L^D(i, Y)$ $L^D_1 < 0$, $L^D_2 > 0$ <LM>

iii) $i = i^*$ <BOP>

Recall that foreign income, foreign interest rate and domestic price are all fixed (Y^*, i^*, P).

The equilibrium can be pictured as follows:

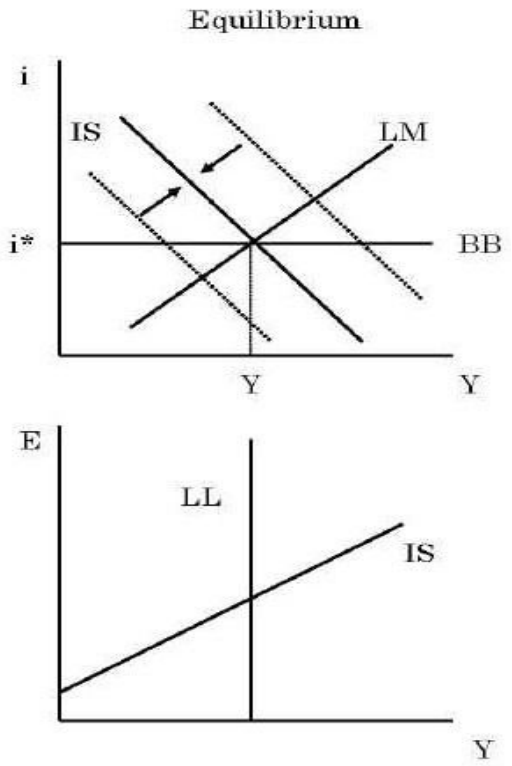
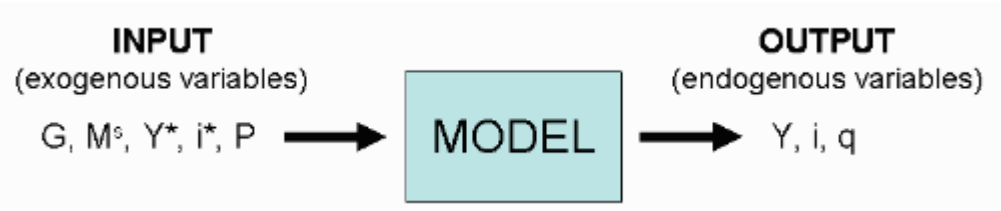


Figure: 2.2.4

Comparative Statics

Comparative statics means checking how the equilibrium changes if one input variable is changed. More technically, it is a matrix of signs (+ or -) indicating the changes in endogenous variables in response to a change in each exogenous variable.



In this model, we ask two specific questions:

(1) Can we increase Y by an expansionary fiscal policy (an increase in G)?

(2) Can we increase Y by an expansionary monetary policy (an increase in M^s)?

G and M^s are the input variables and Y is the output variable in question. (We may add that these questions themselves reflect the rather old-fashioned mentality of macroeconomic fine-tuning. More recently, fiscal and monetary policies are not considered as tools for adjusting real GDP.)

First, consider fiscal expansion,

1. An increase in G shifts the IS curve upward and to the right.
2. This puts an upward pressure on the domestic interest rate ($i > i^*$).
3. But this immediately invites a massive capital inflow.
4. This appreciates the nominal exchange rate E as well as the real exchange rate q.
5. This worsens the trade balance T.

As the model is constructed, no gradual adjustment is allowed; these events are supposed to take place instantaneously. The exchange rate appreciates and the trade balance worsens until the initial increase in G is completely offset. The IS curve is pushed back to the original position and Y cannot increase at all.

What happened is that, in Y = A + T, as A is increased by fiscal spending, T is reduced by exactly the same amount. Y is unchanged, and only the relative composition of Y is changed. The conclusion is that under a floating exchange rate and perfect capital mobility, fiscal policy is ineffective. Here, "ineffective" means unable to increase Y.

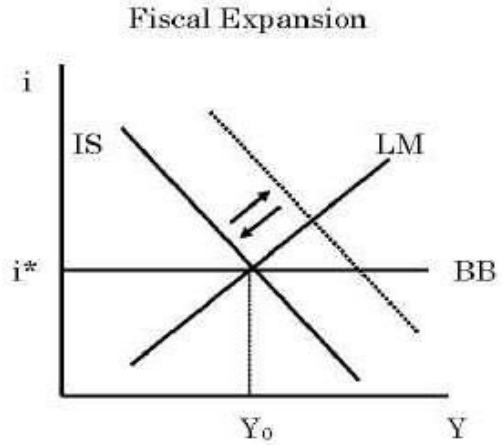


Figure: 2.2.5

Second, consider monetary expansion.

1. An increase in M^s shifts the LM curve downward and to the right.
2. This puts a downward pressure on the domestic interest rate ($i < i^*$).
3. But this immediately invites a massive capital outflow.
4. This depreciates the nominal exchange rate E as well as the real exchange rate q.
5. This improves the trade balance T.

Again, the whole sequence is assumed to take place in an instant. Compared with the domestic version of IS-LM, monetary policy is more powerful because the outward shift of

LM invites an additional outward shift of IS. Both LM and IS cooperate to increase income. The conclusion is that under a floating exchange rate and perfect capital mobility, monetary policy is very effective.

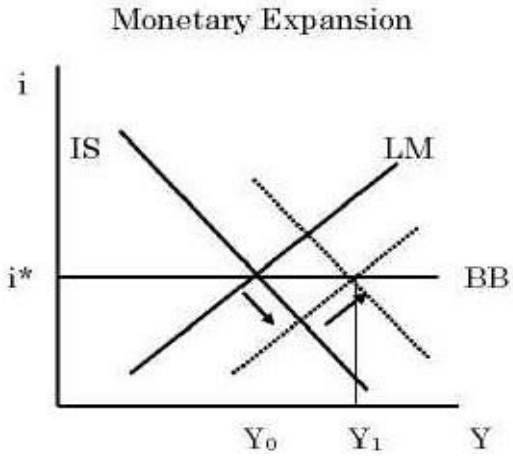


Figure: 2.2.6

These conclusions are significantly different from those of the domestic version of the IS-LM model. In the domestic version, fiscal and monetary policies are both effective, and their relative effectiveness depends on various elasticities and slopes. But in this case, one policy is utterly impotent and the other policy is doubly potent. By now, you should clearly see why (by what mechanism and assumptions) these conclusions are generated.

In the next section, we will examine the case where the exchange rate is fixed. You will see that conclusions on the two policies are completely reversed. The Mundell-Fleming model produces extreme results.

2.2.5 Mundell-Fleming Model with a Fixed Exchange Rate

Fixed versus floating: a warning

The previous section looked at an open economy with a floating exchange rate. This lecture examines an open economy with a fixed exchange rate.

In the Mundell-Fleming framework, the two versions (fixed and float) produce diametrically opposed results concerning the effectiveness of fiscal and monetary policies. As we recall, under a floating rate, fiscal policy was ineffective and monetary policy was very effective. Under a fixed rate, monetary policy is ineffective and fiscal policy is very effective.

Endogeneity of Money under a Fixed Exchange Rate

The key point to remember here is: under a fixed exchange rate, money supply is

endogenous. The term "endogenous" means that its magnitude is determined as a result of the working of the entire model and, therefore, cannot be pre-determined by outside forces (including by the policy authority). In plain English, we can say as follows: "When the exchange rate is fixed, money supply must be used to keep the exchange rate stable, so the government cannot determine money supply freely." In other words, a fixed exchange rate ties the hands of the monetary authority.

According to the principle of money multiplier, a country's money supply (M) is a certain multiple of "high-powered money" (H). High-powered money is also called "base money" or "monetary base." Below, m is called the money multiplier (assumed stable in the short-run).

$M = mH$

In the balance sheet of the central bank, H is the central bank's liabilities. It is also equal to its assets, which are the sum of international reserves (IR) and domestic credit (DC). DC includes government bonds and bills, loans to the public sector and loans to commercial banks (the central bank does not lend directly to the private business or household sectors).

$H = IR + DC$

By controlling H, the central bank controls money supply. There are two ways for the central bank to increase or decrease H:

(1) *Open market operation*: the central bank purchases domestic assets (typically government bonds). DC increases and the payment for it (in cash or in credit to bank deposits) increases H by the same amount. The reverse happens when the central bank sells domestic assets.

(2) *Foreign exchange market intervention*: the central bank purchases foreign assets (typically US dollar assets including dollar deposits, US government securities, etc). IR increases and the payment for it also increases H. The reverse happens when the central bank sells foreign assets.

However, under a fixed exchange rate system, the central bank has the obligation to keep the exchange rate fixed by passive foreign exchange intervention. This means that it must continue to sell or buy IR so that the nominal exchange can remain stable. Therefore, IR is uncontrollable while DC is controllable (at least for the moment) under a fixed rate regime.

What does the balance of payments equilibrium look like under this circumstance? Remember the BOP equation in the previous section:

$B = T(q, Y) + K(i - i^*) - [\text{increase in IR}] = 0 \qquad T_1 > 0, \quad T_2 < 0; \quad K_1 > 0$

where T is the trade balance and K is the capital account. We have added -[increase in IR] to represent the central bank intervention. This is because the central bank must now ensure that there is no pressure in the foreign exchange market to either appreciate or depreciate the home currency (B=0). If the overall balance is in surplus (T+K>0), the central bank must buy dollars and sell domestic currency. This increases IR, H and ultimately M. If the overall balance is in deficit, it must do the opposite. The overall balance must always be offset by such an operation.

But complications arise depending on the degree of capital mobility.

If capital is not mobile internationally, then K=0, always. The balance of payments is now the same as the trade balance, plus intervention. The balance of payments equilibrium (B=0 without intervention) is achieved only when T=0. But there is only one Y (GDP) that makes that happen, because q (real exchange rate) cannot be changed remember, P is constant and E is also fixed by the central bank, by assumption. The balance of payments line becomes vertical in the (i, Y) plane.

To the right of this line, the trade balance is in deficit (T<0) so the central bank must sell dollars, and IR and M are decreasing. To the left of this line, we have T>0, and IR and M are increasing.

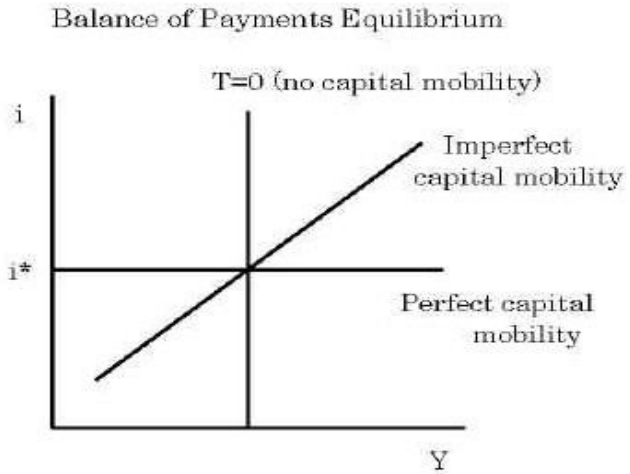


Figure: 2.2.7

If, by contrast, there is perfect capital mobility, we must have $i = i^*$ for the reason explained in the previous lecture. If not, there is a massive capital inflow or outflow so B=0 cannot be maintained. Thus, the balance of payments line is horizontal at $i = i^*$. Above it, we have a big capital inflow; below it, a big capital outflow.

If capital mobility is imperfect (between zero and perfect), we have a middle situation. We ignore this case.

Sterilization

Let us ask the question: even with a fixed exchange rate, can the central bank still control money supply through open market operation (changes in DC) to offset the effect of passive foreign exchange intervention (changes in IR)?

Even though IR is uncontrollable, we can still use DC to keep H (=IR+DC) constant at some desirable level. Then we can insulate money supply from external effects and regain monetary independence. For example, even if T+K<0, money supply need not shrink. More generally, the central bank can set H and M independently, regardless of the balance of payments situation.

This idea of off setting the change in IR by manipulating DC is called "sterilization." It means sterilizing (=killing, cutting off) the effect of foreign exchange intervention on domestic money supply.

Again, whether this is possible depends on the degree of capital mobility.

If capital movement is controlled, sterilization may be possible for a considerable time. Suppose the economy is to the right of the T=0 line above, and the central bank is losing IR. But it can sustain the situation by increasing DC, until finally IR is depleted (when IR reaches zero, that is the end of the game). You can also remain to the left of T=0 and gain IR.

But if capital is perfectly mobile, i ($=i^*$), Y and M^s are all given by IS, LM and BOP conditions. In particular, money supply M^s is determined by money demand L^D. Any attempt to increase DC will be immediately offset by a loss of IR of the same amount. The central bank cannot change money supply at all; it can only change its composition (relative shares of IR and DC). In this case, sterilization is not possible.

Equilibrium with no Capital Mobility

With a fixed exchange rate and no capital mobility, how does the equilibrium look? Our three equations are as follows:

$Y = f(i, q; G)$	$f_1 < 0,\ f_2 > 0,\ f_3 > 0$	<IS>
$M^s/P = L^D(i, Y)$	$L^D{}_1 < 0,\ L^D{}_2 > 0$	<LM>
$T(q, Y) = 0$	$T_1 > 0,\ T_2 < 0$	<BOP>

But since the real exchange rate q is given and unchanged by assumption, we can ignore it for now. q will matter only when the government devalues or revalues the exchange rate.

Since the trade balance must be zero, output Y and the interest rate i are determined by IS and LM as if in a purely domestic macro model. IS is downward sloping and LM is upward sloping in the (i, Y) plane. The economy goes to the intersection of IS and LM. This

is the short-run equilibrium.

But this is not the final outcome. This short-run equilibrium may be off the BOP line (T=0). If it is to the right of T=0, there is a trade deficit because Y is too large. To keep the exchange rate fixed, the central bank is obliged to sell dollars, lose IR and reduce H. Gradually, money supply M^s falls and the LM curve shifts up and to the left until the three lines (IS, LM, T=0) intersect at the same point. After that, there is no more movement; we have reached the long-run equilibrium.

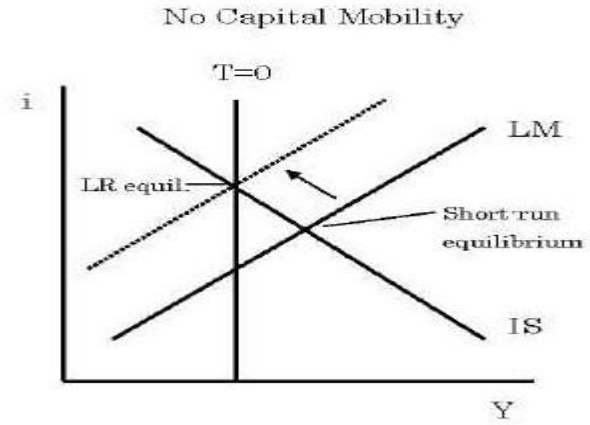


Figure: 2.2.8

As we said before, the government can resist the shift of LM by sterilization. But eventually, it will run out of international reserves. Then the process above must continue.

Equilibrium under Perfect Capital Mobility

With a fixed exchange rate and perfect capital mobility, what is the equilibrium situation? Consider the following set of equations

$Y = f(i, q; G)$ $\quad f_1 < 0,\ f_2 > 0,\ f_3 > 0$ $\quad$ <IS>

$M^s/P = L^D(i, Y)$ $\quad L^D{}_1 < 0,\ L^D{}_2 > 0$ $\quad$ <LM>

$i = i^*$ $\quad$ <BOP>

The only difference from the case of no capital mobility is the BOP condition. Instead of trade balance, we have interest rate equalization.

Let us do comparative statics with this model. Are monetary and fiscal policies effective (can they change Y)?

We already said that money is endogenous under a fixed exchange rate and any attempt for sterilization is futile when capital is perfectly mobile. So we know monetary policy can do nothing.

To be more precise, consider an attempt at monetary expansion by increasing DC (open market purchase of domestic government bonds). The LM curve wants to shift down

and to the right, but this movement is immediately countered by a massive capital outflow and a loss of IR, at the slightest fall of the domestic interest rate. So the total high-powered money H (=DC+IR) remains constant. LM cannot shift. The conclusion is that under a fixed exchange rate and perfect capital mobility, monetary policy is ineffective.

In the previous section with a floating exchange rate, a massive capital outflow prompted currency depreciation and an export boom. Here with a fixed exchange rate, it simply leads to the loss of international reserves.

Monetary Policy under Perfect Capital Mobility

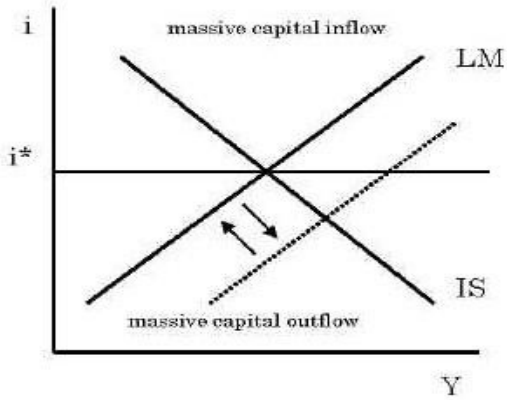


Figure: 2.2.9

If government spending G is increased, the IS curve is pushed up and to the right. But this tends to raise i and generate a massive capital inflow. To prevent an appreciation of the domestic currency, the central bank must buy up dollars, which will increase IR and H. Money supply M^s jumps up and the LM curve shifts out as a consequence. Note that this occurs instantaneously. Unlike the case of no capital mobility, there is no distinction between short-run and long-run. Everything takes place at once.

Since both IS and LM shifts to the right, Y is doubly increased. The conclusion is that under a fixed exchange rate and perfect capital mobility, fiscal policy is very effective.

Devaluation: does it work?

Suppose your country has a trade deficit and the IMF wants you to devalue. Does this really work? We have already raised this question in the previous lectures where the ever-higher yen hypothesis and the elasticities approach were discussed. But it may be useful to summarize the argument again.

It is assumed that the monetary authority has some control over the exchange rate.

Typically, it is under an adjustable peg, a crawling peg, a currency basket, or a substantially managed float. (If the currency is freely floating under capital mobility, the exchange rate is not a policy variable and the central bank cannot devalue it at will.)

Here is a list of possible effects of currency devaluation.

Positive or intended effect

(1) **Relative-Price Effect:** When the domestic currency is devalued, domestic products become relatively cheap compared with foreign products. The improvement in price competitiveness should improve the trade balance as long as the Marshall-Lerner condition is satisfied (i.e., trade volumes respond sufficiently to the change in price competitiveness). Consumers switch from foreign products to domestic products (this is called the expenditure-switching effect).

Negative or ambiguous effects

(2) **Laursen-Metzler Effect:** This says that devaluation worsens the terms of trade, which lowers real income.

Note: the *terms of trade* (TOT) generally means the price ratio of (what you sell)/(what you buy). In the context of countries, it means the ratio of (export price)/(import price). For farmers, it is the ratio of (farm product price)/(input price), and so on. Devaluation usually worsens (lowers) the country's terms of trade, and reduces its real income as well; exports become relatively cheaper and imports become relatively more expensive, and you must work harder and produce more to buy the same amount of imports.

As real income declines, Prof. Laursen and Prof. Metzler argue that the saving propensity (S/Y) goes down as people try to maintain the previous living standard (spend a larger share of income). Absorption rises relative to income (A>Y), so the trade deficit worsens.

(3) **J-curve Effect:** This effect suggests that quantity responses of both exports and imports may be quite weak immediately after the devaluation. If so, the initial impact of devaluation is to temporarily *increase* the trade deficit. In the long-run, if the Marshall-Lerner condition holds, the positive effect will dominate.

(4) **Reverse Absorption Effect:** This effect may also be called the "investment effect." After a devaluation, investment (both domestic and FDI) may be stimulated because the country now is a low cost producer. But since investment is part of absorption, an investment boom means the trade deficit worsens, rather than improves.

(5) **Pass-Through Effect:** The pass-through of exchange rate changes to domestic prices may be high. This is particularly true in the case of a small open economy with a high

degree of dollarization or wage and price indexation to the exchange rate (prices and transactions are often quoted and invoiced in USD). Higher the pass-through, the smaller is the change in the real exchange rate (i.e., competitiveness), and the intended relative-price effect is offset accordingly.

(6) Expansionary Monetary Policy: Unless the exchange rate is determined by decrees, its change must be indirectly generated by monetary expansion and lower interest rates. But this change in monetary policy will shift the LM curve and upset the entire macroeconomic balance. Normally, higher inflation or output will result, both of which contribute to the worsening of the trade deficit.

2.2.6 Conclusion

In the previous sections we have seen that with a floating exchange rate, a massive capital outflow prompted currency depreciation and an export boom and with a fixed exchange rate, it simply leads to the loss of international reserves. The conclusion is that under a floating exchange rate and perfect capital mobility, monetary policy is very effective and under a fixed exchange rate and perfect capital mobility, fiscal policy is very effective.

2.2.7 Short answer type questions

1. What is capital mobility?
2. What do you mean by fixed exchange rate?
3. What do you mean by flexible exchange rate?
4. Write a short note on Mundel-Fleming model.

2.2.8 Long answer type questions

1. Explain the effectiveness of monetary and fiscal policies in Mundell-Fleming model with respect to fixed and flexible exchange rates.
2. What are the effects of devaluation?
3. Explain Mundell-Fleming model with fixed exchange rate.
4. Explain Mundell-Fleming model with flexible exchange rate.

2.2.9 Suggested Readings

Edwards, Sebastian, *Real Exchange Rates, Devaluation, and Adjustment: Exchange Rate Policy in Developing Countries*, MIT Press, 1989.

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ASSET MARKET, EXCHANGE RATE AND INTEREST RATE

2.3.1 Introduction

Interest rate parity, or known as international Fisher effect, is an economic concept, expressed as a basic algebraic identity that relates interest rates and exchange rates. The identity is theoretical, and usually follows from assumptions imposed in economic models. There is evidence to support as well as to refute the concept. Interest rate parity is a non-arbitrage condition which says that the returns from borrowing in one currency, exchanging that currency for another currency and investing in interest-bearing instruments of the second currency, while simultaneously purchasing futures contracts to convert the currency back at the end of the holding period, should be equal to the returns from purchasing and holding similar interest-bearing instruments of the first currency. If the returns are different, an arbitrage transaction could, in theory, produce a risk-free return. Looked at differently, interest rate parity says that the spot price and the forward, or futures price, of a currency incorporate any interest rate differentials between the two currencies assuming there are no transaction costs or taxes.

2.3.2 Objectives of lesson

In this lesson we will study interest rate parity, uncovered interest parity, real interest rate, output, expenditure and exchange rate and lastly monetary policy, interest rates and the exchange rate.

2.3.3 Interest Rate Parity

Two versions of the identity are commonly presented in academic literature: *covered interest rate parity* and *uncovered interest rate parity*.

The following common approximation is valid when S is not too volatile:

$$(1 + i_{\$}) = (F/S)(1 + i_c).$$

In short, assume that

$$(1 + i_{\$}) < (F/S)(1 + i_c).$$

This would imply that one dollar invested in the US < one dollar converted into a foreign currency and invested abroad. Such an imbalance would give rise to an arbitrage opportunity, where in one could borrow at the lower effective interest rate in US, convert to the foreign currency and invest abroad.

2.3.3.1 Covered Interest Rate Parity

The following rudimentary example demonstrates covered interest rate arbitrage (CIA). Consider the interest rate parity (IRP) equation,

$$(1 + i_{\$}) = (F/S)(1 + i_c)$$

Assume:

- the 12-month interest rate in US is 5%, per annum
- the 12-month interest rate in UK is 8%, per annum
- the current spot exchange rate is 1.5 $/£
- the forward exchange rate implied by a forward contract maturing 12 months in the future is 1.5 $/£.

Clearly, the UK has a higher interest rate than the US. Thus, the basic idea of covered interest arbitrage is to borrow in the country with lower interest rate and invest in the country with higher interest rate. All else being equal this would help you make money riskless. Thus,

- Per the LHS of the interest rate parity equation above, a dollar invested in the US at the end of the 12-month period will be,

$1 · (1 + 5%) = $1.05

- Per the RHS of the interest rate parity equation above, a dollar invested in the UK (after conversion into £ and back into $ at the end of 12-months) at the end of the 12-month period will be,

$1 · (1.5/1.5)(1 + 8%) = $1.08

Thus, one could carry out a covered interest rate (CIA) arbitrage as follows,

1. Borrow $1 from the US bank at 5% interest rate.
2. Convert $ into £ at current spot rate of 1.5$/£ giving 0.67£
3. Invest the 0.67£ in the UK for the 12 month period
4. Purchase a forward contract on the 1.5$/£ (i.e., cover your position against exchange rate fluctuations)

At the end of 12-months

1. 0.67£ becomes 0.67£(1 + 8%) = 0.72£
2. Convert the 0.72£ back to $ at 1.5$/£, giving $1.08
3. Pay off the initially borrowed amount of $1 to the US bank with 5% interest, i.e., $1.05

The resulting arbitrage profit is $1.08 − $1.05 = $0.03 or 3 cents per dollar.
Obviously, arbitrage opportunities of this magnitude would vanish very quickly.
In the above example, some combination of the following would occur to re-establish covered interest parity and extinguish the arbitrage opportunity:

- US interest rates will go up
- Forward exchange rates will go down
- Spot exchange rates will go up
- UK interest rates will go down

2.3.3.2 Uncovered Interest Rate Parity

The **uncovered interest rate parity** postulates that

$$(1 + i_{\$}) = \frac{E[S_{+1}]}{S}(1 + i_{£}).$$

The equality as sumes that the risk premium is zero which is the case if investors are risk-neutral. If investors are not risk-neutral then the forward rate (F_{+1}) can differ from the expected future spot rate ($E[S_{+1}]$), and covered and uncovered interest rate parities cannot both hold.

The uncovered parity is not directly testable in the absence of market expectations of future exchange rates. Moreover, the above rather simple demonstration assumes no transaction cost, equal default risk over foreign and domestic currency denominated assets, perfect capital flow and no simultaneity induced by monetary authorities. Note also that it is possible to construct the UIP condition in real terms which is more plausibl**e.**

Uncovered Interest Parity Example

An example for the uncovered interest parity condition: Consider an initial situation, where interest rates in the home country (e.g., U.S.) and a foreign country (e.g., Japan) are equal. Except for exchange rate risk, investing in the US or Japan would yield the same return. If the dollar depreciates against the yen, an investment in Japan would become more profitable than a US investment in other words, for the same amount of yen, more dollars can be purchased. By investing in Japan and converting back to the dollar at the favourable exchange rate, the return from the investment in Japan, in the dollar terms, is higher than the return from the direct investment in the US. In order to persuade an investor to invest in the US nonetheless, the dollar interest rate would have to be higher than the yen interest rate by an amount equal to the devaluation (a 20% depreciation of the dollar implies a 20% rise in the dollar interest rate).

Technically, however, a 20% depreciation in the dollar only results in an approximate rise of 20% in U.S. interest rates. The exact form is as follows: change in spot rate (Yen/Dollar) equals the dollar interest rate minus the yen interest rate, with this expression being divided by one plus the yen interest rate.

2.3.4 Real Interest Rate

The "**real interest rate**" is approximately the nominal interest rate minus the inflation rate (see Fisher equation and below for exact equation). It is the rate of interest an investor expects to receive after subtracting inflation. This is not a single number, as different investors have different expectations of future inflation. If, for example, an investor were able to lock in a 5% interest rate for the coming year and anticipated a 2% rise in prices, he would expect to earn a real interest rate of 3%.

Since the inflation rate over the course of a loan is not known initially, volatility in inflation represents a risk to both the lender and the borrower.

In economics and finance, an individual who lends money for repayment at a later point in time expects to be compensated for the time value of money, or not having the use of that money while it is lent. In addition, they will want to be compensated for the risks of having less purchasing power when the loan is repaid. These risks are systematic risks, regulatory risks and inflation risks. The first includes the possibility that the borrower will default or be unable to pay on the originally agreed upon terms, or that collateral backing the loan will prove to be less valuable than estimated. The second includes taxation and changes in the law which would prevent the lender from collecting on a loan or having to pay more in taxes on the amount repaid than originally estimated. The third takes into account that the money repaid may not have as much buying power from the perspective of the lender as the money originally lent, that is inflation, and may include fluctuations in the value of the currencies involved.

- **Nominal interest rates** include all three risk factors, plus the time value of the money itself.
- **Real interest rates** include only the systematic and regulatory risks and are meant to measure the time value of money.
- **Real** rates = **Nominal** rates minus inflation and currency adjustment. The "real interest rate" in an economy is often the rate of return on a risk free investment, such as US treasury notes, minus an index of inflation, such as the CPI, or GDP deflator.

See Fisher equation

$$1 + i = (1 + r)(1 + E(I))$$

where

- i = nominal interest rate;
- r = real interest rate;
- $E(I)$ = expected inflation rate.

For example, if somebody lends $1000 for a year at 10 percent, and receives $1100 back at the end of the year, this represents a 10 percent increase in his purchasing power if prices for the average goods and services that he buys are unchanged from what they were at the beginning of the year. However, if the prices of the food, clothing, housing, and other things that he wishes to purchase have increased 20 percent over this period, he has in fact suffered a real loss of about 10 percent in his purchasing power.

The inflation rate will not be known in advance. People often base their expectation of future inflation on an average of inflation rates in the past, but this gives rise to errors. The real interest rate ex post may turn out to be quite different from the real interest rate that was expected in advance. Borrowers hope to repay in cheaper money in the future, while lenders hope to collect on more expensive money. When inflation and currency risks are underestimated by lenders then they will suffer a net reduction in buying power.

The complexity increases for bonds issued for a long-term, where the average inflation rate over the term of the loan may be subject to a great deal of uncertainty. In response to this, many governments have issued real return bonds (also known as inflation indexed), in which the principle value and coupon rises each year with the rate of inflation, with the result that the interest rate on the bond is a real interest rate. In the US, Treasury Inflation Protected Securities (TIPS) are issued by the US Treasury.

The expected real interest rate can vary considerably from year to year. The real interest rate on short-term loans is strongly influenced by the monetary policy of central banks. The real interest rate on longer term bonds tends to be more market driven, and in recent decades, with globalized financial markets, the real interest rates in the industrialized countries have become increasingly correlated. Real interest rates have been low by historical standards since 2000, due to a combination of factors, including relatively weak demand for loans by corporations, plus strong savings in newly industrializing countries in Asia. The latter has offset the large borrowing demands by the US Federal Government, which might otherwise have put more upward pressure on real interest rates.

Related is the concept of "risk return", which is the rate of return minus the risks as measured against the safest (least-risky) investment available. Thus, if a loan is made at 15% with an inflation rate of 5% and 10% in risks associated with default or problems repaying then the "risk adjusted" rate of return on the investment is 0%.

Importance in Economic Theory

Economics relies on measurable variables, chiefly price and objectively measurable production. Since production is "real", while prices are relative to the general price level, in order to compare an economy at two points in time, nominal

price variables must be converted into "real" variables. For example, the number of people on payrolls represents a "real" variable, as does the number of hours worked. But in order to measure productivity, the nominal prices of the goods and services that labour produces must be converted to the "real" purchasing power. To do this requires adjusting prices for inflation.

The same is true of investment. Investment produces real gains in efficiency, and purchases productive capacity - factories, machines and so on - which is also real. To find the return on this capital, it is necessary to subtract the increases in its nominal value that are the result of increases in the general level of prices. To do this means subtracting the inflation rate from the nominal rate of return. For example, a portfolio of stocks that returns 10%, when inflation is running at 4% has a 6% real rate of return.

The real interest rate is used in various economic theories to explain such phenomena as the capital flight, business cycle and economic bubbles. When the real rate of interest is high, that is demand for credit is high, then money will, all other things being equal, move from consumption to savings. Conversely, when the real rate of interest is low, demand will move from savings, to investment and consumption. Different economic theories, beginning with the work of Knut Wicksell have had different explanations of the effect of rising and falling real interest rates. Thus, international capital moves to markets that offer higher real rates of interest from markets that offer low or negative real rates of interest triggering speculation in equities, estates and exchange rates.

Related to this concept is the idea of a "natural rate of interest", that is, the expected return on savings and capital invested.

Negative Real Interest Rates

The real interest rate solved from the Fisher equation is

$$\frac{1+\text{ Interest}}{1+\text{ Inflation}}-1=\text{ Real}$$

If there is a negative real interest rate, it means that the inflation rate is greater than the interest rate. If the Federal funds rate is 2% and the inflation rate is 10%, then the borrower would gain 7.27% of every dollar borrowed,

$$\frac{1+2\%}{1+10\%}-1=-7.27\%$$

2.3.5 Output, Expenditure and Exchange Rate

The balance of payment (BOP) accounts record, the international factors that affect the demand and supply of the economy's currency in flow terms and as current account transactions make up one complete side of the BOP, they continue to have major implications for exchange rate behaviour. To assist understanding of the many factors that can determine exchange rates are macroeconomic fundamentals, the

current account, expectations and capital flows. Capital account exchange rate expectations and the current account are central to exchange rate determination.

$$A - Y = CAD \qquad (1)$$

A = National expenditure (= C + I + G)
Y = National output or income
CAD = Current account deficit

The real exchange rate R, influences aggregate output and expenditure and hence the current account balance

$$R = eP^*/P \qquad (2)$$

Where e is the nominal effective exchange rate, P* is the foreign price level and P is the domestic price level. The foreign and domestic price levels are assumed to be invariant so that nominal exchange rate movements alone affect the real exchange rate in short periods.

National expenditure function = A = f(R, C, I, G) (3)

The stronger is the exchange rate the higher is total spending including imports, resulting in a decreasing absorption schedule in expenditure – real exchange rate.

The aggregate output function = Y = f{R; L(w), K, T} (4)

L and K are labour and capital stock, T is the technology or productivity.

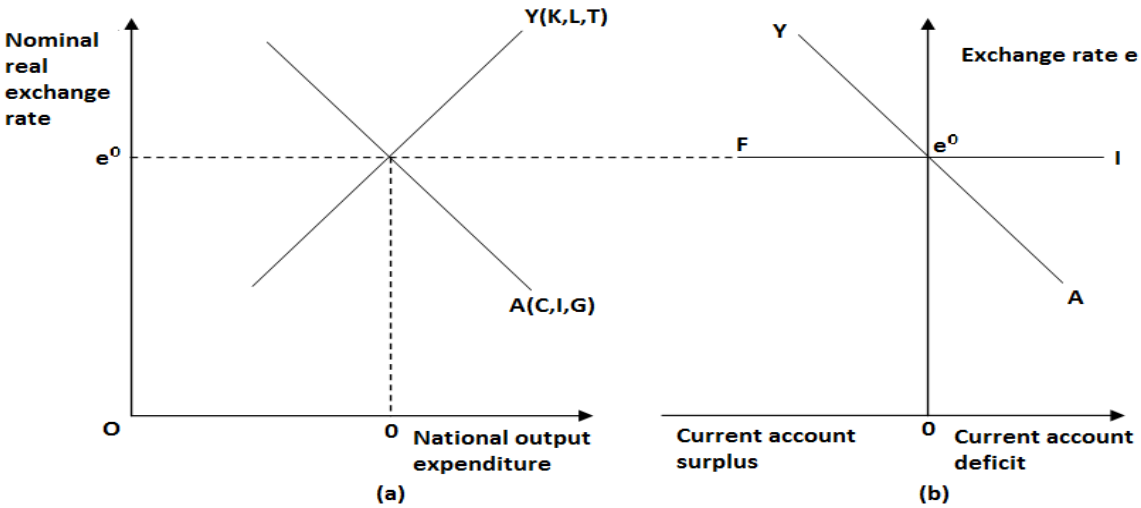


Figure 2.3.1

Prevailing wage w will determine hours worked L, presumed sticky over the period of analysis. Real exchange rate depreciations improve competitiveness

resulting in increased exports of goods and services. As national product includes exports as well so total product is positively related to the exchange rate and is represented by the figure 2.3.1. When capital flows are absent then the trade account is balanced and nominal exchange rate is settled at the point where national spending equals national product. In panel (a) if demand for goods and services is more than supply then in panel (b) there is current account deficit which is shown in above part of the figure and if D< S then there is current account surplus.

Expectations and the Exchange Rate

If international capital mobility is perfect, foreign exchange will flow into the small economy whenever foreign investors expect the total return from holding newly issued domestic bonds to exceed the world interest rate. The excess demand for foreign currency arising from divergences between domestic expenditure and output as shown by YA schedule in the right panel of the figure, whereas the FI schedule depicts the inflow of foreign exchange to finance the economy's output expenditure gap. The time horizon is limited to two period only, the present (period 1) and the future (period 2). The key point is that the exchange rate itself becomes important to the external adjustment process.

- Exchange rates depend on inflation expectations and expected changes in exchange rates.
- % changes in expected inflation will lead to equal % changes in exchange rates
- Using uncovered interest argument- an expected change in exchange rate will lead to real change in exchange rate.
- Foreign and domestic bonds are perfect substitutes.
- i= i* = EA(expected %change in forex)- appreciation of foreign currency to domestic currency)

Productive v/s Unproductive Spending

First, imagine there is extra domestic investment spending by resident firms because the real perspective return on new capital equipment is expected to exceed the world interest rate other things being equal. This shifts the left panel expenditure schedule in figure 2.3.2 rightwards in period one from A to A' and create a CAD and foreign financing requirement equivalent to distance E"F. If the capital inflow in the first period equals the CAD the economy's capital stock will rise and produce more output in second period. Hence the YA schedule is expected to shift back in the future implying that the future exchange rate will not depreciate. This is because the additional output attributable to the initial CAD should at least cover capital and interest repayments and even any additional consumption arising from the higher income. Now consider what happens when there is a rise in domestic consumption from higher public spending or monetary expansion. This would shift the YE schedule rightward, although in this case the additional spending would not enhance the

economy's future potential output. Accordingly foreign investors anticipating a future depreciation would not finance any CAD, causing an upward shift in the FI schedule.

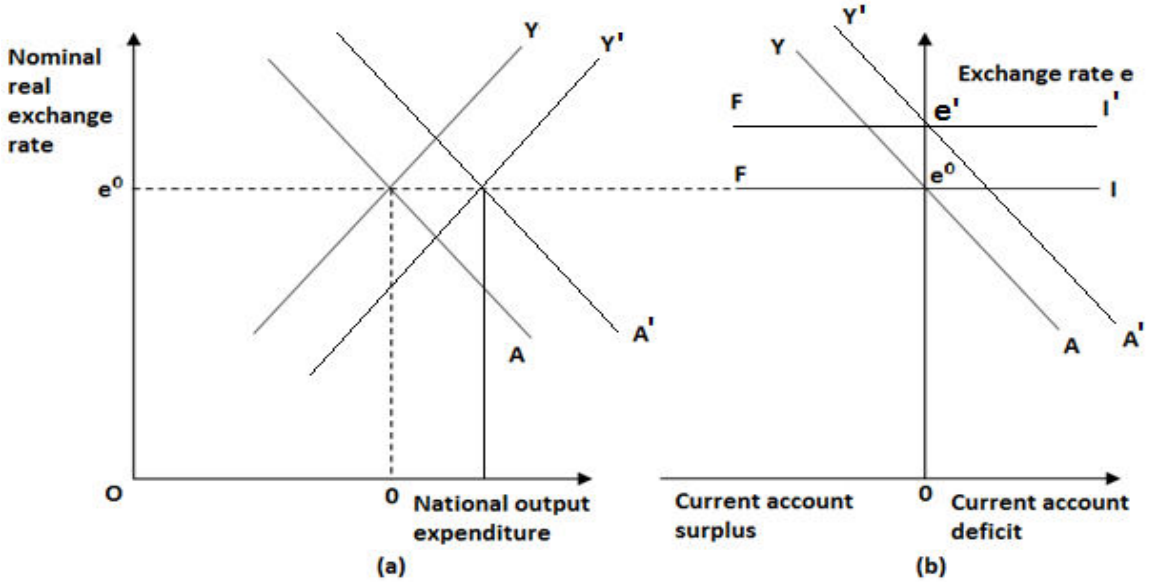


Figure 2.3.2

Therefore, it suggests that exchange rate movements may be related to changes in the domestic savings behaviour, other things being equal, decreased thrift, could depreciate the nominal and real exchange rate to the extent that foreigners are unlikely to underwrite consumption expenditure outpacing output growth. On the other hand, improved productivity that enables output, to outpaced expenditure, other things being equal, would appreciate the currency.

It has been implicitly assumed that the foreign exchange market is efficient and bases exchange rate expectations on the correct macroeconomic fundamentals. However, there is considerable evidence to suggest that exchange rates can become misaligned at times, seemingly detached from fundamentals. The most likely reason exchange rates could depart from fundamentals is that there may be serious information problems, including asymmetries that distort exchange rate expectations and persist for extending periods.

Economic Policy Implications

Exchange rate determination is based on the macroeconomic fundamentals of national spending and production. It has important implications for the conduct and effectiveness of fiscal and monetary policies. It suggests that conditions where international capital is highly mobile, investors can exercise a strong external discipline over domestic policy makers by rebalancing portfolios, for instance, on the fiscal front if there is a rise in unproductive government expenditure, international

investors may expect a few depreciation of the currency because the extra public spending may only add to the future demand for foreign currency and not to future supply via increased production in the economy. Similarly, the increased integration of domestic and international capital markets has imposed an even greater discipline over monetary policy that may help in explaining how inflation outcomes improved for so many economies.

In general, supply side factors that promote greater productivity relative to unproductive spending should strengthen the currency, whereas factors encouraging unproductive spending relative to output depreciate it.

2.3.6 Monetary Policy, Interest Rates and the Exchange Rate

Where foreign bonds are deemed riskier, than cross border interest differentials can be explained by both expected exchange rate movements and a risk premium. There are many factors which influence the size of the risk premium, it can be currency risks or country risks. This leads us to consider another approach to short-run exchange rate and interest rate determination, which allows for different perception of risk, called the asset market or portfolio balance approach to exchange rate determination.

The general theory of portfolio behaviour explains how financial asset prices and yields adjust to equate overall asset demands and the available supply, which is a measure of overall financial wealth. Demand for alternative financial assets depends on their riskiness and yields. A key assumption of portfolio theory is that the demand for any financial asset responds positively to increase in its own rate of return and negatively to increase in the yields on alternative assets. This is called the gross substitutability assumption.

The portfolio balance approach to the exchange rate assumes that domestic residents satisfy their demands for financial assets by choosing between national money, domestic bonds and foreign bonds. Domestic bonds represent the class of all interest earning financial assets denominated in domestic currency, whereas foreign bonds include all interest earning assets denominated in foreign currency. It is further assumed that domestic residents have no demand for foreign money.

Assumptions of Portfolio Balance Approach

According to the Portfolio Balance Approach, the economic agents have to choose from a portfolio of domestic and foreign assets. These assets, may be in the form of bonds or money, have an expected return, which had arbitrage opportunity. This opportunity helps to determine exchange rates.

The Portfolio Balance Approach is based on the following assumptions:

The Purchasing Power Parity, which is based on the law of one price, is not applicable here since goods are not assumed to be identical.

The size of the domestic country is so small that it cannot have any effect on the

foreign rate of interest. Exchange rate is fixed.

Portfolio Balance Approach In Determining Exchange Rates

Three types of assets are available to the economic agents. One is cash that does not yield any interest, but is useful for the purpose of purchasing products. Two s domestic Bonds (B) that yield an interest rate, i. Foreign Bonds yield an interest rate, i*. The government provides all the three types of assets that are mentioned.

The household sector then makes a choice from these three types of assets to form of portfolio.

Now, let us come to the wealth of an individual. It is expressed as $W = B + eB^* + M$,

Dividing both sides by the price level,

$W/P = B/P + eB^*/P + M/P$,

We get the wealth in real terms

The portfolio balance approach determines the equilibrium exchange rate, domestic and international interest rate that would clear the domestic bond market, money market and the foreign bond market.

Money Market

Let us assumes that the dollar suffers 10% depreciation. This would increase the foreign asset value by 10%. This in turn causes an increase in the total wealth, which would lead to an expansion in the demand for all kinds asset, which would also include money. The wealth effect of this depreciation in currency would lead to a rise in the domestic interest rate. With all parameters fixed, currency depreciation is accompanied by a rise in the money market interest rate.

Domestic Bond Market

In the face of dollar depreciation, by say 10%, the demand of domestic bonds will be on a high. This would result in a low domestic interest rate.

Domestic and foreign bonds have different risk exposures although they may be a part of the same portfolio.

Foreign Bond Market

In response to 10% dollar depreciation the supply of foreign bonds increases. Due to the wealth effect the demand for foreign bonds also rises. Keeping all parameters fixed, depreciation in currency would lead to a fall in the domestic interest rate via the foreign bond market.

The portfolio balance approach gives the equilibriums interest rate, both domestic and foreign as well as the exchange rate that would clear all the three markets, domestic money and bond market and foreign bond markets.

EXCHANGE RATE DETERMINATION

1) Asset Approach

The exchange rate is a financial asset price*assume "perfect capital mobility"
2) Monetary Approach

$$\hat{E} = \hat{D} - \hat{P}^F - \hat{Y}$$

*the exchange rate changes with changes in money demand and money supply.
*Domestic and foreign bonds are perfect substitutes (so no foreign exchange risk)
3) Portfolio Balance Approach

$$\hat{E} = \hat{D} + \hat{B} - \hat{B}^F - \hat{P}^F - \hat{Y}$$

B is the supply of domestic bonds
B^F is the supply of foreign bonds

*domestic and foreign bonds are imperfect substitutes
*as supply of domestic bonds rises relative to foreign bonds, there is an increased risk premium on domestic bonds which causes the domestic currency to depreciate

Sterilization

Central bank offsetting international reserve flows so the domestic money supply is unaffected by changes in international reserves.
*Monetary approach pressures must work slowly so that an excess demand or supply of money does not lead to immediate reserve changes.
*Instead of changes in D causing changes in R, now view the reverse causality:

$$\hat{D} = a - b\hat{R}$$

where b is the sterilization coefficient
*b=0, no sterilization
*b=1, complete sterilization. Sterilized intervention that leaves money supplies unchanged can affect exchange rate through portfolio balance channel of altering relative bond supplies or else changing expectations of policy.

Exchange Rates and the Trade Balance

Models so far focus on “fundamentals” in a macroeconomic sense, intra daily movements also depend on “micro-level” interactions among participants.
**Inventory Control Effect:* traders adjust quotes in response to inventory position.

**Asymmetric Information Effect:* traders adjust quotes to protect against trading with better informed counterparties.

Modern asset approach models still are affected by international trade flows,

*surpluses mean accumulating foreign currency balances

*deficits mean losing foreign currency balances

Exchange rates adjust so that existing money balances are willingly held

*as surplus (deficit) country holdings of foreign money rise (fall) relative to domestic, the domestic currency appreciates

(depreciates)

Expectations of trade flows will move exchange rates e.g., large supplies of oil discovered in Vietnam, expected trade surplus rises, expected foreign currency holdings rise ,dong appreciates as people try to exchange foreign money for dong (and there are fixed amounts of domestic and foreign money existing)

Have an initial jump in the exchange rate followed by further appreciation over time as trade flows actually occur.

Overshooting Exchange Rates

How could the exchange rate move "too much" in the short-run?

*Financial asset markets adjust faster than goods markets.

Consider an increase in the money supply

Money demand: $M^d = aY + bi$

Y is national income

i is the nominal interest rate

An increase in money supply, Y rises, i falls to increase money demand

IRP: $(i_A-i_B)/(1+i_B) = (F-E)/E$

A drop in i_A, given i_B lowers (F-E)/E

E, the A currency price of B currency, is expected to rise over time since P_A will rise

*F rises today

*E must rise more so that (F-E)/E falls

Currency Substitution

Flexible exchange rates are thought to provide countries with independent monetary policies.

If people hold more than their own currencies, this no longer holds

*shifts in demand for currencies add exchange rate variability

*substitutability among currencies add constraints to policymaking

Perfect substitutes would require that currencies have same inflation rates

*people are indifferent between currencies

*a higher inflation currency would have demand fall to zero

The higher the degree of substitutability, the greater the exchange rate volatility if central banks follow different policies.

Currency substitution will be most important in a regional setting like Western Europe.

News and Exchange Rates

Knowledge of fundamentals underlying exchange rates are not of much help in forecasting.

Unexpected events affect expectations and change exchange rates,

*volatile exchange rates reflect turbulent times

*periods with important news will have volatile exchange rates

2.3.7 Conclusion

The uncovered parity is not directly testable in the absence of market expectations of future exchange rates. Moreover, the above rather simple demonstration assumes no transaction cost, equal default risk over foreign and domestic currency denominated assets, perfect capital flow and no simultaneity induced by monetary authorities. Note also that it is possible to construct the UIP condition in real terms, which is more plausibl**e.** The balance of payment (BOP) accounts record, the international factors that affect the demand and supply of the economy's currency in flow terms and as current account transactions make up one complete side of the BOP, they continue to have major implications for exchange rate behaviour. To assist understanding of the many factors that can determine exchange rates, are macroeconomic fundamentals, the current account, expectations and capital flows. Capital account exchange rate expectations and the current account are central to exchange rate determination.

2.3.8 Short answer type questions

1. What do you mean by uncovered interest parity?
2. Write short note on expectations and exchange rate.
3 Write short note on exchange rates and the trade balance.
4. What are the assumptions of portfolio balance approach?

2.3.9 Long answer type questions

1. Explain interest rate parity in detail.
2. Explain portfolio balance approach and determination of exchange rate.

2.3.10 Recommended books

Advanced Macroeconomics : David Romer
Macroeconomics : John. H. Makin
Macroeconomics Theories : M. J. C. Surrey
Macroeconomics : Rudifer Dornbusch and Stanley Fischer

11. INFLATION, MONEY GROWTH, AND INTEREST RATES, SEIGNIORAGE AND INFLATION

2.4.1 Introduction

Monetary policy is very important to achieve some objectives in any economy most importantly the stabilization. How policymakers should act in the face of the various disturbances that impinge on the economy. In most countries today, short-run stabilization is done mainly by monetary rather than fiscal policy.

Monetary policy often causes high rates of inflation over extended periods and fiscal policy often causes persistent high budget deficits. In many cases, these inflation rates and budget deficits appear to be higher than is socially optimal. That is, it appears that in at least some circumstances, there is *inflation bias* in monetary policy and *deficit bias* in fiscal policy. Let's begin our analysis of monetary policy by explaining why inflation is almost always the result of rapid growth of the money supply; they also investigate the effects of money growth on inflation, real balances, and interest rates. We then turn to inflation bias. There are two main sets of explanations of how such bias can arise. The first set emphasizes the output-inflation tradeoff. If monetary policy has real effects (or if policymakers believe that it does), policymakers may increase the money supply in an effort to increase output.

2.4.2 Objectives of the lesson

We will focus on two main aspects of policy. The first is its short-run conduct:

we would like to know how policymakers should act in the face of the various disturbances that impinge on the economy. The second central aspect of policy is its long-run performance.

2.4.3 Inflation and Money Growth

Both expansions of aggregate demand and contractions of aggregate supply raise the price level. Thus, there are many potential sources of inflation. Negative technology shocks, downward shifts in labour supply and other factors that shift the aggregate supply curve to the left cause inflation; the same is true of increases in the money stock, downward shifts in money demand, increases in government purchases, and other factors that shift the aggregate demand curve to the right. Since all these types of shocks occur to some extent, there are many factors that affect inflation.

Nonetheless, when it comes to understanding inflation over the longer term, economists typically emphasize just one factor: growth of the money supply. The reason for this emphasis is that no other factor is likely to lead to persistent increases in the price level. Repeated increases in prices require either repeated falls in aggregate supply or repeated rises in aggregate demand. Given technological progress, repeated falls in aggregate supply are unlikely. And although there are many factors that can increase "aggregate demand most "are limited in scope.

To see more clearly why money is crucial to inflation, consider the money market. With the specification of money demand the condition for equilibrium in the money market is

$$M/P = L(i,Y) \tag{1}$$

where M is the money stock, *P* the price level, *i* the nominal interest rate, Y real income and L the demand for real money balances. This condition implies that the price level is given by

$$P = M/L(i,Y) \tag{2}$$

Thus, money growth plays a special role in determining inflation not because money affects prices more directly than other factors do, but because empirically variations in money growth account for most of the variation in the growth of aggregate demand.

2.4.4 Money Growth and Interest Rates

Since money growth is the main determinant of inflation, it is natural to examine its effects in greater detail. As we will see, there are interesting links between the growth of the nominal money stock and the behaviour of inflation, real and nominal interest rates and real balances.

We begin with the case where prices are completely flexible; this is presumably a good description of the long-run. As we know from our analysis of fluctuations, this

assumption implies that the money supply does not affect real output or the real interest rate. For simplicity, we assume that these are constant at $\bar{Y}$ and $\bar{r}$ respectively. By definition, the real interest rate is the difference between the nominal interest rate and expected inflation. That is, $r \equiv i - \Pi^e$, or

$$i \equiv r + \Pi^e \tag{3}$$

Equation (3) is known as the *Fisher identity.*

Using (3) and our assumption that *r* and Y are constant, we can rewrite (2) as

$$P = M/L(\bar{r} + \Pi^e, \bar{Y}) \tag{4}$$

Assume that initially M and *P* are growing together at some steady rate (so that *M/P* is constant) and that Π^e equals actual inflation. Now suppose that at some time, time t_0, there is a permanent increase in money growth. The resulting path of the money stock is shown in the top panel of figure 1. After the change, since *M* is growing at a new steady rate and r and *Y* are constant by assumption, *M/P* is constant; that is, (4) is satisfied with *P* growing at the same rate as *M* and with Π^e equal to the new rate of money growth.

But what happens at the time of the change? Since the price level rises faster after the change than before, expected inflation jumps up when the change occurs. Thus, the nominal interest rate jumps up and so the quantity of real balances demanded falls discontinuously. Since M does not change discontinuously, it follows that P must jump up at the time of the change. This information is summarized in the remaining panels of figure 1.

This analysis has two messages:

i. the change in inflation resulting from the change in money growth is reflected one-for-one in the nominal interest rate. The hypothesis that inflation affects the nominal rate one-for-one is known as *the Fisher effect.* It follows from the Fisher identity and the assumption that inflation does not affect the real rate.

ii. Second, a higher growth rate of *the nominal* money stock reduces the real money stock. The rise in money growth increases expected inflation, thereby increasing the nominal interest rate.

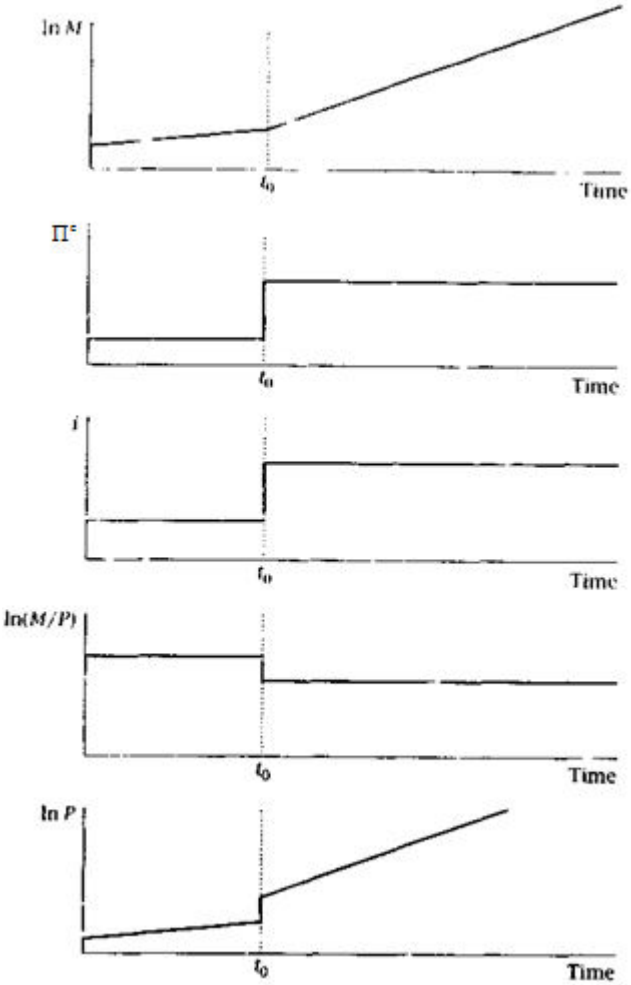


Figure 2.4.1: The effects of an increase in money growth

A corollary is that a reduction in inflation can be accompanied by a temporary period of unusually high money growth. Suppose that policymakers want to reduce inflation and that they do not want the price level to change discontinuously. What path of M is needed to do this? The decline in inflation will reduce expected inflation, and, thus, lower the nominal interest rate and raise the quantity of real balances demanded.

Thus, the monetary policy that is consistent with a permanent drop in inflation is a sudden upward jump in the money supply, followed by low growth.

2.4.5 The Case of Incomplete Price Flexibility

An increase in money growth increases nominal interest rates. In practice, however, the immediate effect of a monetary expansion is to lower short-term nominal rates. This negative effect of monetary expansions on nominal rates is known as the

liquidity effect.

The conventional explanation of the liquidity effect is that monetary expansions reduce real rates. If prices are not completely flexible, an increase in the money stock raises output, which requires a decline in the real interest rate. If prices are fully flexible in the long-run, then the real rate eventually returns to normal following a shift to higher money growth. Thus, if the real-rate effect dominates the expected-inflation effect in the short-run, the shift depresses the nominal rate in the short-run, but increases it in the long-run. As Friedman (1968) pointed out, this appears to provide an accurate description of the effects of monetary policy in practice.

2.4.6 Seigniorage and Inflation

Inflation sometimes reaches extraordinarily high levels. The most extreme cases are *hyperinflations* which are traditionally defined as periods when inflation exceeds 50 percent per month. Many of the most important hyperinflations occurred in Europe in the aftermaths of World War I and World War II, in Latin America in the 1980s and 1990s and in the former Soviet Union in the 1990s. The all-time record inflation took place in Hungary between August 1945 and July 1946. During this period, the price level rose by a factor of approximately 10^{27}. In the peak month of the inflation, prices on average tripled daily. And many countries experience high inflation that falls short of hyperinflation: there are many cases where inflation was between l00 and 1000 percent per year for extended periods.

The existence of an output inflation tradeoff cannot plausibly lead to hyperinflations, or even to very high rates of inflation that fall short of hyperinflation. By the time inflation reaches triple digits, the costs of inflation are almost surely large, and the real effects of monetary changes are almost surely small. No reasonable policymaker would choose to subject an economy to such large costs out of a desire to obtain such modest output gains.

The underlying cause of most, if not all, episodes of, high inflation and hyperinflation is government's need to obtain seigniorage —that is revenue from printing money. Wars, falls in export prices, tax evasion, and political stalemate frequently leave governments with large budget deficits. And often investors do not have enough confidence that the government will honour its debts to be willing to buy its bonds. Thus, the government's only choice is to resort to seigniorage.

2.4.7 The Inflation Rate and Seigniorage

As we have assumed that real money demand depends negatively on the nominal interest rate and positively on real income.

$$M/P = L(i, Y) = L(r + \Pi^e, Y),\ L_i < 0,\ L_y > 0 \qquad (5)$$

Since we are interested in the government's revenue from money creation, *M* should be interpreted as high-powered money (that is, currency and reserves issued by the government). Thus, L(•) is the demand for high-powered money.

For the moment we focus on steady states. It is, therefore, reasonable to assume that output and the real interest rate are unaffected by the rate of money growth and that actual inflation and expected inflation are equal. If we neglect output growth for simplicity, then in steady state the quantity of real balances is constant. This implies that inflation equals the rate of money growth. Thus,

$$M/P = L((\bar{r} + g_M, \bar{Y}) \quad (6)$$

where $\bar{r}$ and $\bar{Y}$ are the real interest rate and output and where g_M is the rate of money growth, $\dot{M}/M$.

The quantity of real purchases per unit time that the government finances from money creation equals the increase in the nominal money stock per unit time divided by the price level:

$$S = \dot{M}/P = \dot{M}/M * M/P = g_M\, M/P \quad (7)$$

Equation (7) shows that in steady state, real seigniorage equals the growth rate of the money stock times the quantity of real balances. The growth rate of money is equal to the rate at which nominal money holdings lose real value, Π. Thus, seigniorage equals the "tax rate" on real balances Π times the amount being taxed M/P. For this reason, seigniorage revenues are often referred to as *inflation-tax* revenues.

Substituting (6) into (7) yields

$$S = g_M L(\bar{r} + g_M, \bar{Y}) \quad (8)$$

Equation (8) shows that an increase in g_M increases seigniorage by raising the rate at which real money holdings are taxed, but decreases it by reducing the tax base. Formally,

$$\frac{dS}{dg_M} = L(\bar{r} + g_M, \bar{Y}) + g_M L_1(\bar{r} + g_M, \bar{Y}). \quad (9)$$

where *L1* (•) denotes the derivative of L(•) with respect to its first argument.

The first term of (9) is positive and the second is negative. The second term approaches zero as g_M approaches zero (unless $L_1(\bar{r} + g_M, \bar{Y})$ approaches minus infinity as g_M approaches zero). Since $L(\bar{r}, \bar{Y})$ is strictly positive, it follows that $dS/d\,g_M$ is positive for sufficiently low values of g_M. That is, at low tax rates, seigniorage is increasing in the tax rate. It is plausible, however, that as g_M becomes large, the second

term eventually dominates; that is, it is reasonable to suppose that when the tax rate becomes extreme, further increases in the rate reduce revenue. The resulting "inflation-tax Laffer curve" is shown in Figure 2.

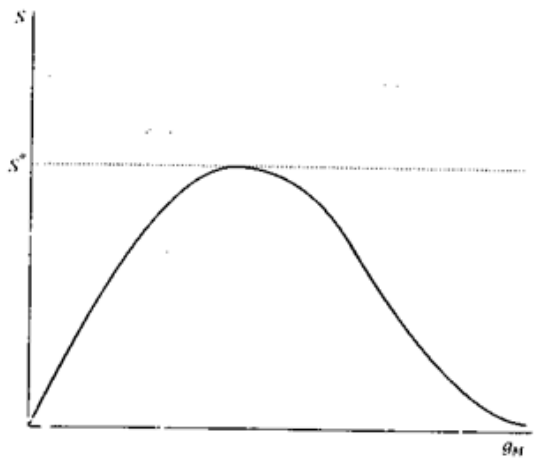


Figure 2.4.2: The inflation-tax Laffer curve

This implies that the peak of the inflation-tax Laffer curve occurs when g_M is between 2 and 3. This corresponds to a continuously compounded rate of money growth of 200 to 300 percent per year which implies an increase in the money stock by a factor of between e^2 =7.4 and e^3 = 20 per year. Cagan suggests that for most countries seignoiorage at the peak of the Laffer curve is about 10 percent of GDP.

Now consider a government that has some amount of real purchases *G,* that it needs to finance with seigniorage. Assume that *G* is less than the maximum feasible amount of seigniorage, denoted S*. Then, as Figure 3 shows, there are two rates of money growth that can finance the purchases. With one, inflation is low and real balances are high; with the other, inflation is high and real balances are low. The high inflation equilibrium has peculiar comparative statics properties; e.g., a decrease in the government's seigniorage needs raises inflation. Since we do not appear to observe such situations in practice; we focus on the low inflation equilibrium. Thus, the rate of money growth-and hence the rate of inflation is given by g_1. This analysis provides an explanation of high inflation: it stands from government's need for seigniorage.

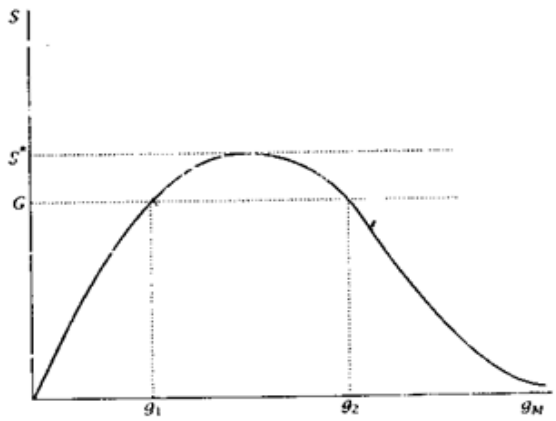


Figure 2.4.3: Seigniorage determines inflation

2.4.8 Conclusion

The quantity of real purchases per unit time that the government finances from money creation equals the increase in the nominal money stock per unit time divided by the price level.In steady state, real seigniorage equals the growth rate of the money stock times the quantity of real balances. The growth rate of money is equal to the rate at which nominal money holdings lose real value. Thus, seigniorage equals the "tax rate" on real balances times the amount being taxed . For this reason, seigniorage revenues are often referred to as *inflation-tax* revenues.

2.4.9 Short answer type questions

1. What is seigniorage?
2. Write a short note on inflation rate and money growth.
3. Write a short note on the inflation rate and Seigniorage.

2.4.10 Long answer type questions

1. How money growth plays a special role in determining inflation?
2. Explain the inflation rate and Seigniorage.

2.4.11 Recommended books

Advanced Macroeconomics : David Romer
Macroeconomics : John. H. Makin
Macroeconomics Theories : M. J. C. Surrey
Macroeconomics : Rudifer Dornbusch and Stanley Fischer

12. BUDGET DEFICIT AND FISCAL POLICY

2.5.1 Introduction

Fiscal policy through variations in government expenditure and taxation profoundly affects national income, employment, output and prices. An increase in public expenditure during depression adds to the aggregate demand for goods and services and leads to a large increase in income via the multiplier process; while a reduction in taxes has the effect of raising disposable income thereby increasing consumption and investment expenditures of the people. On the other hand, a reduction of public expenditure during inflation reduces aggregate demand, national income, employment, output and prices; while an increase in taxes tends to reduce disposable income and thereby reduces consumption and investment expenditures. Thus, the government can control deflationary and inflationary pressures in the economy by a judicious combination of expenditure and taxation programmes.

2.5.2 Objectives of lesson

In this lesson we will study the instruments of fiscal policy and how fiscal policy is helpful at the time of fiscal deficit.

2.5.3 Instruments of Fiscal Policy

1. Budgetary Policy

Budgetary Policy is also called Contracyclical Fiscal Policy. The budget is the principal instrument of fiscal policy. Budgetary policy exercises control over size and relationship of government receipts and expenditures. Lets see how this policy works in budget deficit and surplus budget.

(1) *Budget Deficit—Fiscal Policy during Depression.* **Deficit budgeting is** an important method of overcoming depression. When government expenditures exceed receipts,

larger amounts are put into the stream of national income than they are withdrawn. The deficit represents the net expenditure of the government which increases national income by the multiplier times the increase in net expenditure. If the MPC is 1/2, the multiplier will be 2; and if' the net increase in government expenditure is Rs 100 crores it will increase national income to Rs 200 crores (= 100 x 2). Thus, the budget deficit has an expansionary effect on aggregate demand whether the fiscal process leaves marginal propensities unchanged or whether a redistribution of disposable receipts occurs. The expansionary effect of a budget deficit is shown diagrammatically in Figure 1.

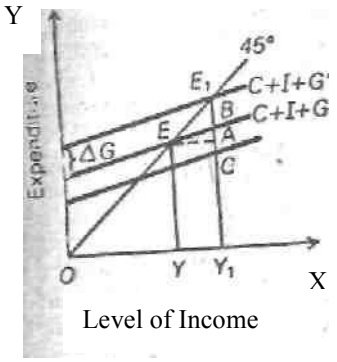


Figure 2.5.1

C is the consumption function. C+I+G represents consumption, investment and government expenditure (the total spendings function) before that budget is introduced. Suppose government expenditure of AG is injected into the economy. As a result, the total spendings function shifts upward to *C+I+G'*. Income increases from *OY* to OY_1 when the equilibrium position moves from *E* to E_1. The increase in income YY_1 (= EA= E_1A) is greater than the increase in government expenditure $E_1 B$ (= ΔG). *BA* ($E_1A - E_1B$) represents increase in consumption. Thus, the budget deficit is always expansionary, the rise in national income being (YY_1) greater than the actual amount of government spending (ΔG = E_1B). In this method of budget deficit taxes are kept intact.

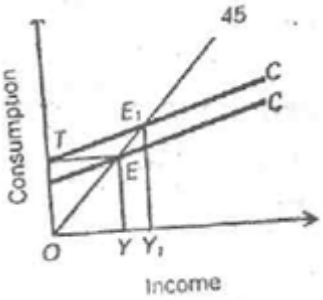


Figure 2.5.2

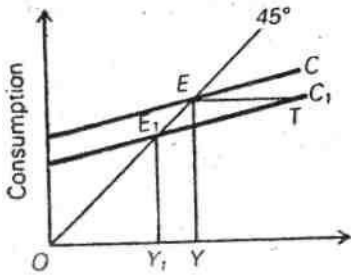
Budget deficit may also be secured by reduction in taxes and without government spending. Reduction in taxes tends to leave larger disposable income in

the hands of the people and, thus, stimulates increased consumption expenditure. This, in turn, would lead to increase in aggregate demand output, income and employment. This is illustrated in Figure 2, where C is the original consumption function. Suppose tax is reduced by *ET,* it will shift-the consumption upward to *C.* Income will increase from OY to OY_1.

However, reduction in taxes is not so expansionary via increased consumption expenditure because the tax relief may be saved and not spent on consumption. Businessmen may not also invest more if the business expectations are low. Therefore, to safeguard against such eventualities the government should follow the policy of reduction in taxes with increased government spending and its multiplier effect will be much higher in case we also assume that some consumption and investment expenditures increase due to tax relief.

(2) *Surplus Budget—Fiscal policy during Boom:* Surplus in the budget occurs when the government revenues exceed expenditures. The policy of surplus budget is followed to control inflationary pressures within the economy. It may be through *increase in taxation or reduction in government expenditure or both.* This will tend to reduce income and aggregate demand by the multiplier times the reduction in government or/and private consumption expenditure (as a result of increased taxes). This is explained with the aid of Figure 1, where the economy is at the initial equilibrium position E_1. Suppose the government expenditure is reduced by ΔG so that the total spending function C+I+G' shifts downward to *C+I+G.* Now *E* is the new equilibrium position which shows that the income has declined to OY from OY_1 as a result of reduction in government expenditure by E_1B. The fall in income Y_1Y (=AE) > E_1B the reduction in expenditure because consumption has also been reduced by *BA.*

There may be budget surplus without government spending when taxes are s raised. Enhanced taxes reduce the disposable income with the people and encourage reduction in consumption expenditure. The result is fall in aggregate demand, output, income and employment. This is illustrated in Figure 3. C is the consumption function before the imposition of the tax. Suppose a tax equal to *ET* is introduced. The consumption function shifts downward to C_1. The new equilibrium position is E_1. As a result, income falls from 0Y to $0Y_1$.



Level of Income

Figure 2.5.3

2. Compensatory Fiscal Policy

The compensatory fiscal policy aims at continuously compensating the economy against chronic tendencies towards inflation and deflation by manipulating public expenditures and taxes. It, therefore, necessitates the adoption of fiscal measures over the long-run rather than once-for-all measures at a point of time. When there are deflationary tendencies in the economy, the government should increase its expenditures through deficit budgeting and reduction in taxes. This is essential to compensate for the lack in private investment and to raise effective demand, employment, output and income within the economy. On the other hand, when there are inflationary tendencies, the government should reduce its expenditures by having a surplus budget and raising taxes in order to stabilise the economy at the full employment level. The compensatory fiscal policy has two approaches:

(1) Built-in stabilisers

(2) Discretionary fiscal policy

(1) *Built-in Stabilisers:* The technique of built-in-flexibility or stabilisers involves the automatic adjustment of the expenditures and taxes in relation to cyclical upswings and downswings within the economy without deliberate action on the part of the government. Under this system, changes hubs budget are automatic and hence this technique is also known as one of automatic stabilisation. The various automatic stabilisers are corporate profits tax, income tax, excise taxes, old age, survivors and unemployment insurance and unemployment relief payments. As instruments of automatic stabilisation, taxes and expenditures are related to. national income. Given an unchanged structure of tax rates, tax yields vary *directly* with movements in national income, while government expenditures vary *inversely* with variations in national income. In the downward phase of the business cycle when national income is declining, taxes which are based on a percentage of national income automatically decline, thereby reducing *the* tax yield. At the same time, government expenditures on

unemployment relief and social security benefits automatically increase. Thus, there would be automatic budget deficit which would counteract deflationary tendencies. On the other hand, in the upward phase of the business cycle when national income is rising rapidly, the tax yield would automatically increase with the rise in tax rates. Simultaneously, government expenditures on unemployment relief and social security benefits automatically decline. These two forces would automatically create a budget surplus and are, thus, inflationary.

Built-in stabilisers have certain *advantages* as a fiscal device.

(i) *built*-in stabilisers serve as a cushion for private purchasing power when it falls and lessen the hardships on the people during deflationary period.

(ii) they prevent national income and consumption spending from falling at a low level.

(iii) there are automatic budgetary changes in this device and the delay in taking administrative decisions is avoided

(iv) automatic stabilisers minimise the errors of wrong forecasting and timing of fiscal measures.

(v) they integrate short-run and long-run fiscal policy.

Limitations

The effectiveness of built-in stabilisers as an automatic compensatory device depends on the elasticity of tax receipt, the level of taxes and flexibility of public expenditures. The greater the elasticity of tax receipts the greater will be the effectiveness of automatic stabilisers in controlling inflationary and deflationary tendencies. But the elasticity of tax receipts is not so high as to act as an automatic stabilizer.

Second, with low level of taxes even a high elasticity of tax receipts would not be very significant as an automatic stabiliser during a downswing.

Third, the built-in stabilisers do not consider the secondary effects of stabilisers on after-tax business incomes and of consumption spending on business-expectations.

Fourth, this device keeps silent about the stabilising influence of local bodies, state governments and of the private sector economy.

Fifth, they cannot eliminate the business cycle. At the most, they can reduce its severity.

Sixth, their effects during recovery from recession are unfavourable.

(2) *Discretionary Fiscal Policy :* Discretionary fiscal policy requires deliberate changes in the budget by such actions as changing tax rates or government expenditures or both. It may generally take three forms:

(i) changing taxes with government expenditure constant,

(ii) changing government expenditure with taxes constant, and

(iii) variations in both expenditures and taxes simultaneously.

First, when taxes are reduced, while keeping government expenditure

unchanged, they increase the disposable income of households and businesses. This increases private spending. But the amount of increase will depend on whose taxes are cut, to what extent, and on whether the taxpayers regard the cut temporary or permanent. If the beneficiaries of tax cut are in the higher middle income group, the aggregate demand will increase much. If they belong to the lower income group, aggregate demand will not increase much. If they are businessmen with little incentive to invest, tax reductions will not induce them to invest. Lastly, if the taxpayers regard tax reductions as temporary, this policy will again be less effective. So this policy is more effective in controlling inflation by raising taxes because high rates of taxation will reduce disposable income of individuals and businesses thereby curtailing aggregate demand.

The *second* method is more useful in controlling deflationary tendencies. When the government increases its expenditure on goods and services, keeping taxes constant, aggregate demand goes up by the full amount of the increase in government spending. On the other hand, reducing government expenditure during inflation is not so effective because of high business expectations in the economy which are not likely to reduce aggregate demand.

The *third* method is more effective and superior to the other two methods in controlling inflationary and deflationary tendencies. To control inflation, taxes may be increased and government expenditure reduced. On the other hand, taxes may be increased and government expenditure be raised to fight depression.

Limitations

The discretionary fiscal policy depends *upon proper timing* and *accurate forecasting. First,* accurate forecasting is essential to judge the stage of cycle through which the economy is passing. It is only then that appropriate fiscal action can be taken. Wrong forecasting may accentuate rather than moderate the cyclical swings. Economics is not an exact science in correct forecasting. As a result, fiscal action always follows after the turning points in the business cycles. *Second,* there are delays in proper timing of public spending. In fact, discretionary fiscal policy is subject to two time lags. First, there is the "decision lag," the time required in studying the problem and taking the decision. The lag involved in this process may be too long. Second, once the decision is taken, there is an "execution lag." It involves expenditure which is to be allocated for the execution of the programme. In a country like USA it may take two years and less than a year in the UK. *Third,* certain public works projects are so cumbersome that it is not possible to accelerate or slow them down for the purpose of raising or reducing public spending on them.

2.5.4 Conclusion

Budget deficit may also be secured by reduction in taxes and without government spending. Reduction in taxes tends to leave larger disposable income in the hands of the people and, thus, stimulates increased consumption expenditure. If

the budget deficit is *money-financed,* it will have an expansionary effect. Despite the higher multiplier effect of government spending as against changes in tax rates, the latter can be operated more promptly than the former. Emphasis has, thus, shifted to taxation as the best fiscal device for controlling cyclical fluctuations. Thus, when the turning point of a business cycle is already underway, discretionary fiscal action tends to strengthen the built-in-stabilizers.

2.5.5 Short answer type questions

1. What is budget deficit?
2. What are the instruments of fiscal policy?
3. What do you mean by built- in-stabilisers?

2.5.6 Long answer type questions

1. Explain budgetary and compensatory policies.
2. How can fiscal policy be helpful in solving problem of budget deficit?

2.5.7 Recommended books

G.K. Shaw: An Introduction to the Theory of Macroeconomic Policy
N.F. Kaiser: Readings in Macroeconomics
Edward Shapiro : Macroeconomic Analysis
T.F. Dernberg and D.M. Dougall: Macroconomics

13. THE RICARDIAN EQUIVALENCE DEBATE, COST OF DEFICIT AND DEBT CRISIS

2.6.1 Introduction

Traditional economic models, and many informal discussions, assume that a shift from tax to bond finance increases consumption. Traditional analyses of consumption often model consumption as depending just on current disposable income, Y-T. With this assumption, a bond-financed tax cut raises consumption. The Ricardian and traditional views of consumption have very different implications for many policy issues. For example, the traditional view implies that the United States's large budget deficits in the 1980s and 1990s increased consumption, and thus reduced capital accumulation and growth. But the Ricardian view implies that they had no effect on consumption or capital accumulation. To give another example, governments often cut taxes during recessions to increase consumption spending. But if Ricardian equivalence holds, these efforts are futile.

2.6.2 Objectives of lesson

In this lesson we will study:

(i) Ricardian Equivalence Debate
(ii) Cost of Deficit and
(iii) Debt Crisis

2.6.3 The Ricardian Equivalence Debate

An enormous amount of research has been devoted to trying to determine how much truth there is to Ricardian equivalence. There are, of course, many reasons that Ricardian equivalence does not hold exactly. The important question, however, is

whether there are large departures from it. One reason that Ricardian equivalence is likely not to be exactly correct is that there is turnover in the population. When new individuals are entering the economy, some of the future tax burden associated with a bond issue is borne by individuals who are not alive when the bond is issued. As a result, the bond represents net wealth to those who are currently living, and thus affects their behavior. This possibility is illustrated by the Diamond overlapping-generations model.

There are two difficulties with this objection to Ricardian equivalence. First, a series of individuals with finite lifetimes may behave as if they are a single household. In particular, if individuals care about the welfare of their descendants, and if that concern is sufficiently strong that they make positive bequests, the government's financing decisions may again be irrelevant. This result, like the basic Ricardian equivalence result, follows from the logic of budget constraints. Consider the example of a bond issue today repaid by a tax levied several generations in the future. It is possible for the consumption of all the generations involved to remain unchanged. All that is needed is for each generation, beginning with the one alive at the time of the bond issue, to increase its bequest by the size of the bond issue plus the accumulated interest; the generation living at the time of the tax increase can then use those funds to pay the tax levied to retire the bond.

Although this discussion shows that individuals can keep their consumption paths unchanged in response to the bond issue, it does not establish whether they do. The bond issue does provide each generation involved (other than the last) with some possibilities it did not have before. Because government purchases are unchanged, the bond issue is associated with a cut in current taxes. The bond issue, therefore, increases the lifetime resources available to the individuals than alive. But the fact that the individuals are already planning to leave positive bequests means that they are at an interior optimum in choosing between their own consumption and that of their descendants. Thus, they do not change their behaviour. Only if the requirement that bequests not be negative is a binding constraint—that is, only if bequests are zero—does the bond issue affect consumption. Since we have assumed that this is not the case, the individuals do not change their consumption; instead they pass the bond and the accumulated interest on to the next generation. Those individuals, for the same reason, do the same, and the process continues until the generation that has to retire the debt uses its additional inheritance to do so.

The result that intergenerational links can cause a series of individuals with finite lifetimes to behave as if they are a household with an infinite horizon is due to Barro (1974). It was this insight that started the debate on Ricardian equivalence, and it has led to a large literature on the reasons for bequests and transfers among generations, their extent, and their implications for Ricardian equivalence and many

other issues.

The second difficulty with the argument that finite lifetimes cause Ricardian equivalence to fail is more prosaic. As a practical matter, lifetimes are long enough that if the only reason that governments' financing decisions matter is because lifetimes are finite, Ricardian equivalence is a good approximation (Poterba and Summers, 1987). For realistic cases, large parts of the present value of the taxes associated with bond issues are levied during the lifetimes of the individuals alive at the time of the issue. For example, Poterba and Summers calculate that most of the burden of retiring the United States's World War II debt was borne by people who were already of working age at the time of the war, and they find that similar results hold for other wartime debt issues. Thus, even in the absence of intergenerational links, bonds represent only a small amount of net wealth.

Further, the fact that lifetimes are long means that an increase in wealth has only a modest impact on consumption. For example, if individuals spread out the spending of an unexpected wealth increase equally over the remainder of their lives, an individual with 30 years left to live increases consumption spending in response to a one-dollar increase in wealth only by about three cents. Thus, it appears that if Ricardian equivalence fails in a quantitatively important way, it must be for some reason other than an absence of intergenerational links.

2.6.4 Ricardian Equivalence and the Permanent-Income Hypothesis

The issue of whether Ricardian equivalence is a good approximation is closely connected with the issue of whether the permanent-income hypothesis provides a good description of consumption behaviour. In the permanent-income model, only a household's lifetime budget constraint affects its behavior; the time path of its after-tax income does not matter. A bond issue today repaid by future taxes affects the path of after-tax income without changing the lifetime budget constraint. Thus, if the permanent-income hypothesis describes consumption behavior well, Ricardian equivalence is likely to be a good approximation. But significant departures from the permanent-income hypothesis can lead to significant departures from Ricardian equivalence.

The permanent-income hypothesis in fact fails in important ways: most households have little wealth, and predictable changes in after-tax income lead to predictable changes in consumption. This strongly suggests that Ricardian equivalence fails in a quantitatively important way: if current disposable income has a significant impact on consumption for a given lifetime budget constraint, a tax cut accompanied by an offsetting future tax increase has a significant impact on consumption.

The details of how failures of the permanent-income hypothesis can lead to failures of Ricardian equivalence depend on the sources of the failures.

Here we consider two possibilities. The first is liquidity constraints. When the government issues a bond to a household to be repaid by higher taxes on the household at a later date, it is in effect borrowing on the household's behalf. If the household already had the option of borrowing at the same interest rate as the government, the policy has no effect on its opportunities, and thus no effect on its behaviour. But suppose the household faces a higher interest rate for borrowing than the government does. If the household would borrow at the government interest rate and increase its consumption if that were possible, it will respond to the government's borrowing on its behalf by raising its consumption

This discussion omits a potentially important complication. Liquidity constraints are not exogenous. Instead, they reflect calculations by potential lenders of borrowers' likelihood of repaying their loans. When the government issues bonds today to be repaid by future taxes, households' future liabilities are increased. If lenders do not change the amounts and terms on which they are willing to lend, the chances that their loans will be repaid therefore fall. Thus, rational lenders respond to the bond issue by reducing the amounts they lend. Indeed there are cases where the amount that households can borrow falls one-for-one with government bond issues, so that Ricardian equivalence holds even in the presence of liquidity constraints (Hayashi, 1987; Yotsuzuka, 1987).

This possibility arises only when taxes are lump-sum, however, in realistic cases, bond issues have little impact on the amounts households can borrow. The intuition is that when a borrower fails to repay a loan, it is usually because his or her income turned out to be low. But if taxes are a function of income, this is precisely the case when the borrower's share of the tax liability associated with a bond issue is small. A bond issue is, therefore, likely to have only a small effect on the borrower's probability of repaying the loan, and hence only a small effect on the amount he or she can borrow (Bernheim, 1987). Thus, if liquidity constraints are the source of important failures of the permanent-income hypothesis, there are likely to be large departures from Ricardian equivalence.

The second possible source of failures of the permanent-income hypothesis we will consider is the combination of a precautionary-saving motive and a high discount rate. This combination can account for buffer-stock saving and the large role of current disposable income in consumption choices. Suppose that these forces are important to consumption, and consider our standard example of a bond issue to be repaid by higher taxes in future. The impact on consumption again turns out to hinge on the fact that taxes are not lump-sum. With lump-sum taxes, the bond issue has no impact on the household's budget constraint; that is, the present value of the household's lifetime after-tax income in every state of the world is unchanged. As a result, the bond issue does not affect consumption. Intuitively, the household's prime

motive for saving in this environment is to avoid low consumption if its future income turns out to be low. With lump-sum taxes, the household's tax liability when income is low is higher by its full share of the taxes needed to pay off the bond. To keep this from reducing its consumption in this situation, the household saves the tax cut.

Since taxes are a function of income, however, in practice the situation is very different. The bond issue causes the household's future tax liabilities to be only slightly higher if its income turns out to be low. That is, the combination of the tax cut today and the higher future taxes raises the present value of the household's lifetime after-tax income in the event that its future income is low, and reduces it in the event that its future income is high. As a result, the household has little incentive to increase its saving. Instead it can indulge its high discount rate and increase its consumption, knowing that its tax liabilities will be high only if its income is high.

This discussion suggests that there is little reason to expect Ricardian equivalence to provide a good first approximation in practice. The Ricardian equivalence result rests on the permanent-income hypothesis and the permanent-income hypothesis fails in quantitatively important ways. Nonetheless, because it is so simple and logical, Ricardian equivalence (like the permanent-income hypothesis) is a valuable theoretical baseline.

2.6.5 The Costs of Deficits

The costs of deficits are poorly understood like the costs of inflation. In the case of inflation, the difficulty is that the popular perception is that inflation is very costly, but economists have difficulty identifying channels through which it is likely to have important effects. In the case of deficits, it is not hard to find reasons that they can have significant effects. The difficulty is that the effects arc complicated. As a result, it is hard to do welfare analysis in which one can have much confidence. Deficits are likely to have larger welfare effects as a result of failures of Ricardian equivalence.

The Effects of Sustainable Deficits

The most obvious cost of excessive deficits is that they involve a departure from tax-smoothing. If the tax rate is below the level needed for the government's budget constraint to be satisfied in expectation then the expected future tax rate exceeds the current tax rate. This means that the expected discounted value of the distortion costs from raising revenue is unnecessarily high. Unless the marginal distortion costs of raising revenue rise sharply with the amount of revenue raised, however, the costs of a moderate period of modestly excessive deficits through this channel are probably small. But this does not mean that departures from tax-smoothing are never important.

Deficits almost surely raise aggregate consumption and, thus, lower the economy's future wealth. Unfortunately, obtaining estimates of the resulting welfare effects is very difficult, mainly for three reasons:

(i) First, simply obtaining estimates of deficits' impact on the paths of such variables as consumption, capital, foreign asset holdings, and so on requires estimates of the magnitude of departures from Ricardian equivalence. Here we do not have a precise figure. Nonetheless, one can make a rough estimate and proceed.

(ii) Second, the welfare effects depend on not just the magnitude of the departures from Ricardian equivalence, but also the reasons for the departures. For example, suppose Ricardian equivalence fails because of liquidity constraints. This means that the marginal utility of current consumption is high relative to that of future consumption and, thus, that there is a large benefit to greater current consumption. In this case, running a higher deficit than is consistent with tax-smoothing can raise welfare.

(iii) The third difficulty is that deficits have distribution effects. Since some of the taxes needed to repay new debt fall on future generations, deficits redistribute from future generations to the current one. "In addition, to the extent that deficits reduce the capital stock, they depress wages and raise real interest rates, and thus redistribute from workers to capitalists. The fact that deficits do not create Pareto improvements does not imply that one should have no opinion about their merits i.e, most individuals believe that a policy that benefits many people but involves small costs to a few is desirable, even if the losers are never compensated. In the case of the redistribution from workers to capitalists, the fact that workers are poorer than capitalists may be a reason to find the redistribution undesirable. The redistribution from future generations to the current one is more complicated. On one hand, future generations are likely to be better off than the current one; this is likely to make us view the redistribution more favourably. On the other hand, the common view that saving is too low has implicit in it the view that rates of return are high enough to make redistribution from those currently alive to future generations desirable; this suggests that the redistribution from future generations to the current one may be undesirable. Due to all this the welfare effects of sustainable deficits are difficult to evaluate.

Effects of Unsustainable Deficit

Forced change is likely to take a form of crisis rather than a smooth transition. The possibility of crises adds to additional costs to deficits. Sometimes cost arises due to the crisis is likely to increase the price of foreign goods greatly.

When the budget deficit falls sharply, the capital account surplus is likely to fall sharply as well. That is, the economy is likely to move from a situation where foreigners are buying large quantities of the country's assets to one where they are buying few or none. But this means that the trade balance must swing sharply toward surplus. For this to happen, there must be a large depreciation of the real exchange

rate.

Such real depreciation reduces welfare through several channels. Because it corresponds to a rise in the real price of foreign goods, it lowers welfare directly. Further, it tends to raise output in export and import-competing sectors and reduce it elsewhere. That is, it is a sectoral shock that induces a reallocation of labour and other inputs among sectors. Since reallocation is not instantaneous, the result is a temporary rise in unemployment and other unused resources. Finally, the depreciation is likely to increase inflation. Because workers purchase some foreign goods, the depreciation raises the cost of living and, thus, creates upward pressure on wages, in addition, because some inputs are imported, the depreciation raises firms' costs. These effects act to increase inflation.

Some other major costs of crises stem from the fact that they disrupt capital markets. Government default, plummeting asset prices and falling output are likely to bankrupt many firms and financial intermediaries. In addition, because firms' and intermediaries' debts are often denominated in foreign currencies, real depreciation directly worsens their financial situations and, thus, further increases bankruptcies. These cause a loss of information and long-term relationships that help direct capital and other resources to their most productive uses. And even when firms and intermediaries are not bankrupted by the crisis, the worsening of their financial positions magnifies the effects of financial-market imperfections. One effect of these financial-market disruptions is that investment is lower. This effect, however, can be offset by expansionary (or less contractionary) monetary policy. But another effect is that for a given amount of investment, the average quality of projects is lower, since the financial system now allocates capital less effectively. Similarly, output is lower for a given level of employment, since many firms with profitable production opportunities are unable to produce because of bankruptcy or an inability to obtain loans to pay their wages and purchase inputs. Crises can have other costs as well. Since crises are unexpected, trying to follow an unsustainable policy increases uncertainty. Default and other failures to repay its debts can reduce a government's ability to borrow in the future. Finally, a crisis can lead to harmful policies, such as broad trade restrictions, hyperinflation and very high tax rates on capital. One way to summarize the effects of a crisis is to note that it typically leads to a sharp fall in output followed by only a gradual recovery.

2.6.6 A Model of Debt Crises

We now turn to a simple model of a government attempting to issue debt. We focus on the questions of what can cause investors to be unwilling to buy the debt at any interest rate, and of whether such a crisis is likely to occur unexpectedly.

Assumptions of the Model

Consider a government that has quantity *D* of debt that it wants investors to hold for a period. The government offers an *interest factor* of *R:* that is, it offers a real interest rate of R - 1. It has a potential tax revenue of *T* during the following period. If *T* exceeds the amount due on the debt, *RD* the government pays the debt holders. If T is less than *RD,* the government defaults. *T* is random, its cumulative distribution function, f(•), is continuous.

It is natural to think of the period as one out of a long history. With this interpretation, one can think of *D as* the sum of previously issued debt that is coming due and any new debt the government wants to issue. And we can think of *T* as the sum of the tax revenue the government can raise the following period and the debt it can induce investors to hold then. Our main goal in examining the model is to determine when the government is not able to induce Investors to purchase its debt. Since we can think of this as a situation where the government cannot roll over debt that is coming due, we will interpret this as a crisis.

Two simplifying assumptions make the model tractable:

i. default is all-or-nothing: if the government cannot pay *RD,* it repudiates the debt entirely.

ii. investors are risk-neutral, and the risk-free interest factor, $\overline{R}$, is independent of *R* and *D.*

Analyzing the Model

Equilibrium is described by two equations in the probability of default, denoted Π, and the interest factor on government debt, *R.* Since investors are risk-neutral, the expected payoff from holding government debt must equal the risk-free payoff, $\overline{R}$. Government debt pays *R* with probability 1 - Π and 0 with probability Π. Thus, equilibrium requires

$$(1 - \Pi) R = \overline{R} \tag{1}$$

For comparison with the second equilibrium condition, it is useful to rearrange this condition as an expression for Π as a function of *R.* This yields

$$\Pi = \frac{R - \overline{R}}{R} \tag{2}$$

The locus of points satisfying (2) is plotted in (R, Π) space in Figure 1. When the government is certain to repay (that is, when Π = 0), *R* equals $\overline{R}$. As the probability of default rises, the interest factor the government must offer rises; thus the locus is upward-sloping. Finally, *R* approaches infinity as the probability of default approaches 1.

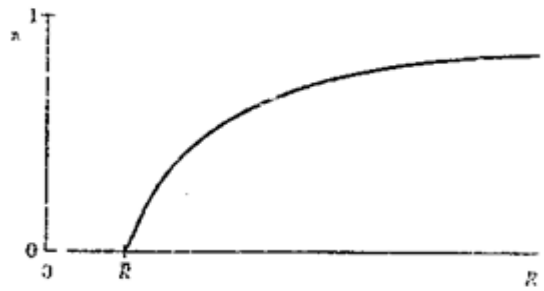


Figure 2.6.1: The condition for investors to be willing to hold government debt

The ether equilibrium condition comes from the fact that whether the government defaults is determined by its available revenue relative to the amount due bondholders. Specifically, the government defaults if and only if, *T* is less than *RD.* Thus, the probability of default is the probability that *T* is less than *RD.* Since T's distribution function is F(•), we can write this condition as

$$\Pi = F(RD) \qquad (3)$$

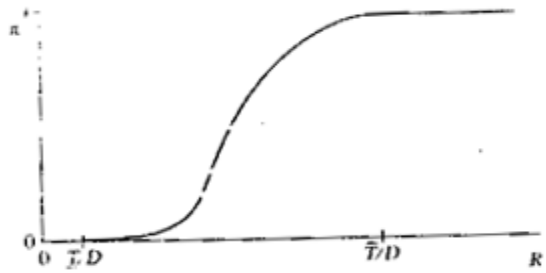


Figure 2.6.2: The probability of default as a function of the interest factor

The set of points satisfying (3) is plotted in Figure 2. If there are minimum and maximum possible values of T, $\underline{T}$ *and* $\overline{T}$, the probability of default is 0 for R < $\underline{T}/D$ and 1 for R > $\overline{T}/D$ and if the density function of T is bell-shaped, the distribution function has an S shape like that shown in the figure 2.

Equilibrium occurs at a point where both (2) and (3) are satisfied. At such a point, the interest factor on government debt makes investors willing to hold the debt given the probability of default, and the probability of default is the probability that potential tax revenue is insufficient to pay off the debt given the interest factor. In addition to any equilibria satisfying these two conditions, however, there is always an equilibrium where investors are certain the government will not pay off the debt and are, therefore, unwilling to hold the debt at any interest factor. If investors refuse to hold the debt at any interest factor, the probability of default is 1; and if the probability of default is 1, investors refuse to hold the debt at any interest factor. This equilibrium

corresponds to the point R = ∞, Π = 1 in the diagram. If the government is issuing debt to pay off debt coming due, in this equilibrium the government defaults on that debt.

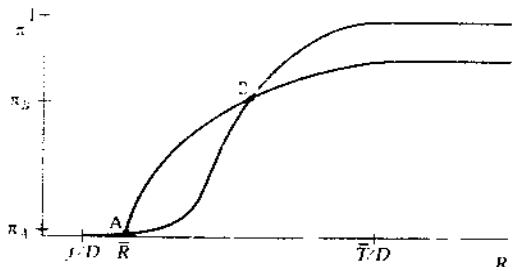


Figure 2.6.3: The determination of the interest factors and the probability of default

Implications of the Model

The model has at least four interesting implications:

(i) The first is that there is a simple force tending to create multiple equilibria in the probability of default. The higher the probability of default, the higher the interest factor investors demand; but the higher the interest factor investors demand, the higher the probability of default. In terms of the diagram, the fact that the curves showing the equilibrium conditions are both upward-sloping means that they can have multiple intersections.

Figure 3 shows one possibility. In this case, there are three equilibria. At point A, the probability of default is low and the interest factor on government debt is only slightly above the safe interest factor. At point B, there is a substantial chance of default and the interest factor on the debt is well above the safe factor. Finally, there is the equilibrium where default is certain and investors refuse to hold the government's debt at any interest factor.

Under plausible dynamics, the equilibrium at B is unstable and the other two are stable. Suppose, for example, investors believe the probability of default is slightly below Π_B. Then at the interest factor needed to induce them to hold the debt given this belief, the actual probability of default is less than what they conjecture. It is plausible that their estimate of the probability of default, therefore, falls and that this process continues until the equilibrium at point A is reached. A similar argument suggests that if investors conjecture that the probability of default exceeds Π_B, the economy converges to the equilibrium where investors will not hold the debt at any interest factor. Thus, there are two stable equilibria.

(ii) Large differences in fundamentals are not needed for large differences in outcomes. One reason for this is the multiplicity just described: two economies

can have the same fundamentals, but one can be in the equilibrium with low R and low Π and the other in the equilibrium where investors refuse to buy the debt at any interest factor. A more interesting source of large differences stems from differences in the set of equilibria. Suppose the two curves have the form shown in Figure 3 and suppose an economy is in the equilibrium with low R and low Π at point A. A rise in $\overline{R}$ shifts the Π = (R - $\overline{R}$)/R curve to the right. Similarly, a rise in D shifts the Π = F(RD) curve to the left. For small changes, Π and R change smoothly in response to either of these developments. Figure 4, for example, shows the effects of a moderate change in $\overline{R}$ from $\overline{R}_0$ to $\overline{R}_1$. The equilibrium with low *R* and low Π changes smoothly from A to A'. But now suppose $\overline{R}$ rises further. If $\overline{R}$ becomes sufficiently large - if it rises to $\overline{R}_2$, for example: the two curves no longer intersect, in this situation, the only equilibrium is the one where investors will not hold the debt. Thus, two economies can have similar fundamentals, but in one there is an equilibrium where the government can issue debt at a low interest rate while in the other the only equilibrium is for the government to be unable to issue debt at any interest rate.

(iii) Third, the model suggests that default, when it occurs, may always be quite unexpected. That is, it may be that for realistic cases, there is never an equilibrium value of Π that is substantial, but strictly less than 1. If there is little uncertainty about *T,* the revenue the government can obtain to pay off the debt, the Π=*F(RD)* locus has sharp bends near Π=0 and Π=1 as in Figure 4. Since the Π=$(R - \overline{R})/R$ locus does not bend sharply, in this case the switch to the situation where default is the only equilibrium occurs at a low value of Π. That is, there may never be a situation where investors believe the probability of default is substantial, but strictly less than 1; as a result, defaults are always a surprise.

(iv) Default depends not only on self-fulfilling beliefs, but also on fundamentals. In particular an increase in the amount the government wants to borrow, an increase in the safe interest factor and a downward shift in the distribution of potential revenue all make default more likely. Each of these developments shifts either the Π = $(R - \overline{R})/R$ locus down or the Π = *F(RD)* locus up. As a result each development increases Π at any stable equilibrium. In addition, each development can move the economy to a situation where the only equilibrium is the one where there is no interest factor at which investors will hold the debt. Thus, one message of the model is that high debt, a high required rate of return and low future revenues all make default more likely.

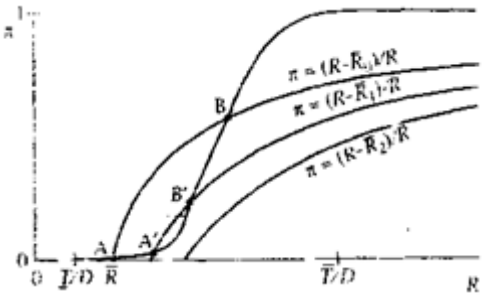


Figure 2.6.4: The effects of increases in the safe interest factor

2.6.7 Conclusion

In this lesson we have studied Ricardian equivalence debate, cost of deficit and debt crisis.

There are two difficulties with this objection to Ricardian equivalence. First, a series of individuals with finite lifetimes may behave as if they are a single household. In particular, if individuals care about the welfare of their descendants, and if that concern is sufficiently strong that they make positive bequests, the government's financing decisions may again be irrelevant

2.6.8 Short answer type questions

1. Write a short note on Ricardian equivalence debate.
2. What are the effects of unsustainable deficit?
3. What are the implications of the model of debt crises?

2.6.9 Long answer type questions

1. According to the Ricardian view of the government debt, how does a debt financed tax cut affects public saving, private saving and national saving.
2. Give an idea of Ricardian view of financing of government debt.
3. Explain the model of debt crises.

2.6.10 Recommended books

Advanced Macroeconomics : David Romer
Macroeconomics : John. H. Makin
Macroeconomics Theories : M. J. C. Surrey
Macroeconomics : Rudifer Dornbusch and Stanley Fischer

Type Setting :
Department of Distance Education, Punjabi University, Patiala.