The ***Current Account (NX)*** is equal to the sum of the trade balance, the net investment income received from abroad, and transfers. The ***trade balance*** is the difference between ***exports***, sales of domestic goods and services to foreign residents and ***imports***, purchases of foreign goods and services by domestic residents. A positive trade balance is called ***trade surplus***, whereas a negative trade balance is called ***trade deficit***. The ***net investment income from abroad*** is the balance between, on the one hand, dividends and interests received by domestic residents for their investment abroad and, on the other hand, dividends and interest paid to foreigners for their investment in domestic firms. ***Net transfers from abroad*** includes the balance between income (remittances, aids, grants, gifts, etc) sent by domestic residents abroad and income received from abroad by domestic residents. Note that, in most countries, the current account balance is mainly determined by the trade balance. For this reason, in the guide, as in many macroeconomics textbooks, the two terms are used interchangeably, even though they are exactly the same.

The ***Capital Account (CA)*** includes two sections: the Net Capital Inflow and the Foreign Currency Reserves. The ***Net Capital Inflow (CF)*** records all capital transactions carried out by the domestic private sector (individuals and firms) with the rest of the world, as it includes the balance between purchases of foreign assets (such as bonds, stocks, bank deposits, lands, etc) by domestic residents and sales of domestic assets to foreigners. Strictly speaking, a ***net capital inflow*** occurs when receipts from the sale of domestic assets to foreigners exceeds payments for the purchase of foreign assets by domestic residents. Vice versa, a ***net capital outflow*** occurs when the purchase of foreign assets, by domestic residents, exceed receipts from the sale of domestic assets to foreigners. The ***Foreign Currency Reserves (FCR)*** includes the quantity of foreign currency, held by the public sector, as it records purchases and sales of foreign currency (and gold) carried out by the domestic central bank with the rest of the world.

Table 3.1 The balance of payments

1. Current Account =
Trade balance (exports-imports)
+ Net investment income from abroad (net dividends, interests, royalties, etc)
+ Net transfers from abroad (net remittances, aids, grants, gifts, etc)
2. Capital Account =
Net Capital Inflow
+ Foreign Currency Reserves
3. Statistical discrepancy
BP=1+2+3

Apart from a statistical discrepancy, the current account and the capital account sum to zero by construction, which implies a fundamental external equilibrium condition:

$$BP = NX + \Delta CA = 0 .^{11} \qquad (3.1)$$

Equation (3.1) shows the existence of a fundamental link between international trade and capital flows. A current account surplus corresponds to an outflow of domestic capital to the

rest of the world. This is because the current account surplus means that receipts from exports exceeds payments for imports, and this excess of capital is lent to the rest of the world. Vice versa, a current account deficit leads to an inflow of foreign capital into the domestic economy, since, if payments for imports exceed receipts from exports, the gap has to be financed by borrowing from the rest of the world. In other words, a country experiencing a current account surplus is a net lender to the rest of the world, whereas a country, with a current account deficit, is a net borrower from the rest of the world.

Since the capital account includes the net capital inflow and the foreign currency reserves, $\Delta CA = \Delta CF - \Delta FCR$, the equilibrium condition in equation (3.1) can also be written as:

$$NX = -\Delta CF + \Delta FCR, \qquad (3.2)$$

which shows that any current account deficit must be financed either by the private or the public sector, or both of them. In fact, a current account deficit can be cleared by the private sector (ΔCF), either through the sale of domestic assets or through the purchase of foreign bonds. The domestic central bank can also clear the deficit by reducing its reserves of foreign currency ($-\Delta FCR$). Conversely, the income, arising from a current account surplus, can be spent by the private sector ($-\Delta CF$) to purchase foreign assets or bonds from the rest of the world. The domestic central bank can cash the surplus increasing its reserves of foreign currency (ΔFCR).

Equation (3.2) can also be written as:

$$NX + \Delta CF = \Delta FCR, \qquad (3.3)$$

which shows the links between international trade, capital flows, and foreign currency reserves, namely that the sum of the current account, and the net capital inflow, must be equal to the change in the foreign reserves. The increase, in foreign reserves, is called ***BP surplus***, whereas the reduction, in foreign reserves, is denominated ***BP deficit***.

National income accounting in an open economy

The trade (current account) balance in equation (3.1) implies that, in an open economy, the aggregate demand also includes net foreign demand for goods and services, so that the income identity can be written as:

$$Y = C + I + G + NX,$$

where $C+I$ denotes the domestic private sector demand, G is the public sector demand, and NX is the net demand from the external sector. The definition of disposable income, $YD=Y-T$, can be combined with the aggregate demand to obtain:

$$YD + T = C + I + G + NX.$$

Since disposable income can be either consumed or saved, $YD=C+S$, the national income identity becomes:

$$C + S + T = C + I + G + NX,$$

which can be solved as:

$$S - I = BD + NX\,, \qquad (3.4)$$

where the term $BD=G-T$ indicates the budget deficit. Equation (3.4) shows that, in an open economy, the private sector excess of saving over investment, $S-I$, equals the sum of the budget deficit, BD, and the trade surplus. In other words, any saved income, that is not employed to finance investment, $S - I > 0$, can be loaned to finance the government excess of spending over taxation, $BD>0$, or can be loaned to the foreign sector to finance the purchase of domestic goods and services. Alternatively, equation (3.4) can also be written as:

$$S = BD + NX + I\,, \qquad (3.5)$$

which shows that domestic saving can be loaned to the public sector, to the foreign sector, or to domestic investors. Equation (3.5) can be employed to speculate about the likely effects of changes in the main macroeconomic aggregates. For instance, equation (3.5) shows that an increase in investment spending must lead to either a reduction in the budget deficit, or a reduction in the trade (current account) deficit, or to an increase in domestic saving. Equation (3.5) also implies that:

$$S = I \Leftrightarrow BD + NX = 0\,,$$

which shows that, if saving equals investment, then the domestic budget deficit, $BD>0$, can only be financed by a trade (current account) deficit, $NX<0$ (twin deficit).

International trade

Aside from exchange rates, there are several factors influencing the decision of whether or not to trade goods, services and assets, either in the domestic or in a foreign market. A deep knowledge of all these factors is beyond the scope of this unit, and you only need to be aware of how trade patterns are affected by barriers and limitations imposed by the government, and the size of a country.

Government barriers can take the form of physical barriers, such as **exports and imports quota,** which fix the total amount of goods and services that can be legally traded with foreign countries. Alternatively, governments can impose **tariffs** on foreign goods, bought by domestic residents, in order to encourage domestic rather than foreign trade. Governments can **limit capital movements** by either legislating against foreign borrowing and lending, or imposing quotas on foreign asset purchases by domestic residents, or by limiting the sale of domestic assets to foreigners. The size of a country influences its trade patterns, since large economies can produce a greater variety of goods, thus they are more likely to satisfy domestic demand than small economies. However, the distinction between small and large open economies mainly relies upon the determinants of the domestic interest rate. In a **small open economy**, such as Canada and Japan, the interest rate is determined outside the economy and it is equal to the **world interest rate**, i.e. the interest rate prevailing in the

world financial market. In a **large open economy**, such as the United States, the interest rate is determined also internally, as a result of the interaction between the domestic and the world financial market. In other words, a small open economy has a negligible effect on the world interest rate, whereas a large open economy has a greater effect.

Real exchange rate

As well as the nominal exchange rate, the choice of whether to buy goods and services, in either the domestic or the foreign market, also depends on the relative price of similar goods across countries. In principle, the advantage of a domestic currency, with high value in terms of a foreign currency, may be compensated for by the fact that goods, in that foreign country, may be relatively more expensive than domestic goods.

As a result, the key variables in determining whether or not to trade, in the domestic or in a foreign market, is the ***real exchange rate***, defined as the ***relative price of foreign goods in terms of domestic goods***. The real exchange rate, ε, depends on the nominal exchange rate (E), the domestic price level (P), and the foreign price level (P^*), and analytically this is written as:

$$\varepsilon = \frac{EP}{P^*}, \qquad (3.6)$$

which shows that the real exchange rate is given by the product of the nominal exchange rate and the domestic price level, as a proportion of the foreign price level.

Note that since P and P^* are price indices computed over baskets of goods, the real exchange rate measures the price of a basket of goods, in the home country, in terms of a similar basket of goods in the foreign country. For example, if P and P^* refer to consumer price indices, CPIs, then the real exchange rate measures the relative price of domestic goods, consumed in the home country, in terms of goods consumed in the foreign country. If P and P^* refer to the GDP deflator, then the real exchange rate measures the price of goods, produced in the home country, in terms of goods produced in the foreign country.

A **real appreciation** occurs when the relative price of domestic goods, in terms of foreign goods, increases. This corresponds to an **increase** in the real exchange rate. In contrast, a **real depreciation** occurs when the relative price of domestic goods, in terms of foreign goods, reduces, which corresponds to a **decrease** in the real exchange rate.

The FOREX market

The exchange rate, i.e. the price of the domestic currency in terms of foreign currency, is determined by the interaction between individuals, firms and financial institutions, that purchase and sell foreign currency in order to carry out international transactions. The market, in which foreign currency is traded, is called the foreign exchange rate (FOREX) market.

In order to buy foreign goods and assets, domestic residents need to purchase foreign currency in exchange for domestic currency: the more goods and assets domestic residents buys from abroad, the higher is the demand for foreign currency.

Conversely, foreign residents exchange foreign currency for domestic currency to purchase domestic goods and assets: the more goods and assets foreign residents buy in the domestic market, the higher is their supply of foreign currency. Also, the central bank can intervene in the FOREX market, as it can deploy its reserves to alter the foreign currency supply. Broadly speaking, a BP deficit increases the demand for foreign currency, whereas a BP surplus increases supply of foreign currency.

Note that if the exchange rate E is quoted as the price of the domestic currency in terms of the foreign currency, the price of the foreign currency in the domestic FOREX market is $1/E$. Foreign currency demand is inversely related to $1/E$: an increase in the demand for foreign currency raises the price of the domestic currency, in terms of the foreign currency, thus reducing $1/E$. Foreign currency supply is positively related to $1/E$: an increase, in the foreign currency supply, reduces the price of the domestic currency, in terms of the foreign currency, thus increasing $1/E$.

This point is illustrated in Table 3.2, which considers a simplified balance sheet of the central bank in an open economy. The central bank's liabilities include the domestic currency (money) in circulation, whereas the central bank's assets include bonds and foreign currency reserves. The Table shows that a reduction in foreign currency reserve, caused by the central bank intervention into the domestic FOREX market, can be compensated for by a reduction in money supply. Alternatively, the central bank could neutralise this operation by selling bonds. This type of policy is called **sterilised foreign exchange intervention**, since the domestic central bank can change the level of foreign reserves without affecting the domestic monetary base, and thus inflation. However, under most fixed exchange rate arrangements, this second channel cannot be employed by the central bank to keep the central parity; and changes in foreign currency reserves lead to one-for-one changes in the money supply. For example, a BP deficit determines a reduction of the foreign currency reserves, which, in turn, triggers a monetary contraction. As well as reducing the price level in the medium run, the monetary contraction increases the interest rate, thus reducing domestic demand and output. Conversely, a BP surplus leads to a monetary expansion, which causes the interest rate to fall, thus increasing domestic demand and output.

Table 3.2: Central bank balance sheet in a open economy

Central Bank	
Assets	**Liabilities**
Bonds	Money
Foreign currency reserves	

A **currency board** is an exchange rate arrangement, under which a country fixes an exchange rate between its currency and a foreign currency (normally the United States dollar), and the domestic central bank signs an explicit legislative commitment to operate in the home FOREX market only through non-sterilised interventions. As a result, under a currency board, the domestic monetary base changes one-to-one in response to changes in the foreign currency reserves. This implies that under a currency board regime the domestic central bank loses control over monetary policy.

Under a **fixed peg system, with oscillation bands,** a country pegs its currency vis-à-vis either another currency or a weighted basket of all major trading or financial partners, and establishes some margins around the central parity. Therefore, the central bank interventions, in the domestic FOREX market, are limited to prevent fluctuations of the exchange rate outside the oscillation bands. The degree of flexibility, of this type of arrangement, depends on the dimension of the margins (narrow margins or large bands), and on how strict the commitment is to keep the central parity. Moreover, the peg can be either unilateral or multilateral.

A **crawling peg** occurs when a country announces a predetermined rate of depreciation against a foreign currency, usually the United States dollar. This type of regime is mainly followed by high inflation countries, in order to avoid the real depreciation that would result from pegging the domestic currency to that of a low inflation country. Under a crawling peg system, countries choose a predetermined rate of depreciation for the nominal exchange rate in order to keep the real exchange rate constant over time.

A **managed floating** system occurs when the domestic central bank intervenes in the home FOREX market, without announcing a specific exchange rate target. Interventions depend upon factors, such as the BP balance, the level of foreign currency reserves, and the implicit exchange rate target. However, they are normally limited and left to the discretion of the domestic central bank.

An **independently floating** system, such as that adopted by the United States and Japan, occurs when the exchange rate is almost entirely determined by the domestic FOREX market, with very limited central bank interventions.

Purchasing-power parity

The ***purchasing-power parity*** (*PPP*) condition states that, in a competitive goods market, exchange rates should adjust to equalise the price of goods and services around the world. For example, suppose that a basket of goods costs more at home than abroad:

$$P > \frac{P^*}{E}.$$

Under this circumstance, investors have an incentive to purchase the relatively cheaper basket, from the foreign country, and resell it in the higher priced domestic country. This behaviour has three effects: first, it reduces the domestic price level, since domestic demand falls. Second, it increases the foreign price level since demand for foreign goods rises. Third, it leads to a depreciation of the domestic currency, because the increasing demand for foreign currency raises the price of foreign currency in the home FOREX market. In the absence of transportation and other transaction costs, this adjustment process continues until the price of the two baskets of goods equates between the two countries:

$$P = \frac{P^*}{E}.$$

The above is the PPP condition which can also be written as:

$$\varepsilon = 1 \Leftrightarrow E^{PPP} = \frac{P^*}{P} \qquad (3.7)$$

where E^{PPP} indicates the nominal exchange rate under the PPP condition. In particular, equation (3.7) shows that, in the long run, the real exchange rate converges to one or, equivalently, the long run nominal exchange rate between two currencies is entirely determined by the price levels in the two countries. If the domestic price level increases, relative to the foreign price level, then, in the long run, the exchange rate must reduce. In other words, equation (3.7) shows that high inflation countries should also experience a depreciation of the nominal exchange rate.[17]

The equilibrium exchange rate, in the home FOREX market, is determined by the PPP condition, since changes in foreign currency demand and supply are driven by adjustment in the price levels across countries.

Uncovered Interest Parity condition

In an open economy, domestic residents can trade financial assets, such as stocks and bonds, with foreign firms and governments. The choice of whether to purchase either a domestic or a foreign asset depends on the relative returns between home and foreign assets.

The UIP condition describes this type of choice, under the assumption that domestic and foreign assets are perfect substitutes, and there is free capital mobility. **Perfect assets substitutability** implies that:

1. Financial assets are equally risky, meaning that domestic and foreign financial assets carry the same risk in terms of restrictions to asset transfers and government default
2. Financial transaction costs are zero or negligible
3. Taxes on interest and capital gains are similar in all jurisdictions

Perfect capital mobility implies that investors can quickly purchase and sell any assets and in unlimited amounts.

To illustrate the UIP condition, consider the choice of a United States resident to invest a dollar for a period of time *t,* by purchasing either domestic or Chinese bonds. Let i_t be the end of period interest rate on United States bonds and i_t^* the interest rate on Chinese bonds. Investing one dollar, in United States bonds, yields $1+i_t$ dollars at the end of period *t*. To invest in the Chinese bond market, a United States resident has first to exchange one dollar for E_t Chinese Yuan. Next, the investor can buy E_t Chinese bonds, with a return at the end of period *t* equal to $(1+i_t^*)E_t$. Finally, this amount has to be converted in United States dollars at the exchange rate in period E_{t+1}. As a result, investing one dollar in foreign bonds yields $(1+i_t^*)\frac{E_t}{E_{t+1}}$ dollars at the end of period *t*. Note that, because in period *t* the future period's exchange rate E_{t+1} is unknown, the return from investing in the foreign bond market is normally given by $(1+i_t^*)\frac{E_t}{E_{t+1}^e}$, where E^e_{t+1} is the investor's expectation of the future exchange rate. The **Uncovered Interest Parity** (UIP) **condition** states that the returns from investing in the domestic and in the foreign assets' market must be the same:

$$1+i_t=(1+i_t^*)\frac{E_t}{E_{t+1}^e}. \qquad (3.8)$$

Suppose the return, on domestic assets, increases, $1+i_t>(1+i_t^*)\frac{E_t}{E_{t+1}^e}$. This is going to have three effects. First, it raises the demand for domestic bonds, thus causing an increase in the price of domestic bonds and, consequently, a reduction in the domestic interest rate. Second, the higher demand, for domestic bonds, reduces demand for foreign bonds, thus causing a fall in the price of foreign bonds and, consequently, an increase in the foreign interest rate. Third, the higher demand for domestic bonds, relative to foreign bonds, reduces the demand for foreign currency in the home FOREX market. This reduction leads to a fall in the price of foreign currency (*1/E*) and, thus, an appreciation in the domestic exchange rate. This process of adjustment continues until the UIP condition in equation (3.8) is restored.

The UIP condition can be approximated as:

$$i_t-i_t^*\cong-\frac{E_{t+1}^e-E_t}{E_t} \qquad (3.9)$$

which shows that the interest rate differential, between domestic and foreign bonds, must be equal to the expected rate of appreciation of the domestic currency. Note that, since the expected appreciation rate, of the domestic currency, is equal to the expected depreciation rate of the foreign currency, equation (3.9) also implies that the interest rate differential, between domestic and foreign bonds, must be equal to minus the expected depreciation rate of the foreign currency. If $i_t-i_t^*=0.05$, equation (3.9) implies that investors are indifferent to domestic and foreign bonds only if they expect the foreign currency to appreciate by 5 per cent in the following period.
The UIP condition yields two fundamental results:

1. To the extent that perfect assets substitutability and mobility hold, international capital movements are determined by interest rate differentials across countries;
2. Interest rates differentials can be regarded as a measure of markets' expectations about future exchange rates between currencies.

A useful way, of testing the implications of the UIP condition, is to compare the **London Interbank Offer Rate** (LIBOR) between two different currencies. A LIBOR rate is the rate of interest at which a bank is prepared to make a loan to another bank. Banks quote 1-month, 3-month, 6-month, and 12-month LIBOR in all major currencies. For instance, on the 19 November 2007, the 3-month United States dollars LIBOR ($i_3^{\$}$) was 4.98, the 3 – month British pound LIBOR ($i_3^{£}$) was 6.45, and the spot exchange rate was 0.4873 GBP/USD.[19] The UIP condition implies that:

$$\frac{4.98 - 6.45}{4} = -0.37 ,$$

that is the dollar is expected to appreciate, vis-à-vis the British pound, by about 0.37 per cent over the next three months. Therefore, there is an expected capital gain, attached to investment in dollars, coming from the expected appreciation of the exchange rate, which compensates the lower interest rate. Clearly, this capital gain is based on markets expectations which may turn out to be wrong, as the dollar can appreciate vis-à-vis the pound by more or less 0.37 per cent over the next three months.