can be sub-divided into foreign bonds and Eurobonds. During those years there were also some moderate changes in the location of the true international financial centres.

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13 The exchange rate explained

13.1 Introduction

The term 'exchange rate' has already been mentioned many times in preceding chapters. Chapter 2 described the close link between the balance of payments and the exchange rate. Every balance of payments entry, or every international transaction, leads to a foreign exchange market transaction and therefore influences the price level on that market, namely the exchange rate. All balance of payments entries together therefore determine the exchange rate. Thus, the exchange rate is the result of a large number of determinants: every variable which influences an international transaction also has an effect – albeit small – on the exchange rate. The previous chapter showed that capital transactions unrelated to trade in goods and services dominate the foreign exchange market. They therefore largely determine the exchange rate.

This composite impression of the exchange rate gives only a superficial idea of the economic forces which determine it. This chapter will provide a more detailed picture. It is not sufficient to know that capital movements, in particular, influence the exchange rate. Information about the particular form of capital transaction is required too. Furthermore, it is useful to have some knowledge of the latent forces behind these different forms of capital movement and the precise way in which they affect the exchange rate. Do these latent forces also include determining factors of the international trade in goods and services? Has this international trade perhaps even an independent influence?

Everyone involved in international transactions has a great need for the best possible information on which to base forecasts of the future trend in the value of the exchange rate. In order to ascertain that outlook it is essential to know what factors determine the exchange rate. This applies not only to a company involved in international trade in goods, but certainly also to an international investor and a government which has to decide on its policy. Case studies 13.1 and 13.2 make this clear.

Case study 13.1 Exchange rate uncertainty and the business world

Gasunie, which we met in Case study 12.1, has to contend with exchange rate uncertainty on two fronts. A soundly based forecast of future exchange rate

rate values would be very welcome to the company. Gasunie supplies natural gas to various West European countries.

Every contract with a new customer confronts the company with the problem of *exchange rate uncertainty*. A contract on the international market of natural gas is usually expressed in dollars and concerns an obligation to supply natural gas for many years. A large proportion of Gasunie's costs are expressed in guilders. It is therefore important for the company's future profitability to achieve maximum certainty about the future guilder value of the contract to be concluded. As we shall see in Chapter 15, there are financial instruments which a company can use to eliminate exchange rate uncertainty for the first year or two. But such a contract with Gasunie – and with many other exporting companies – often runs for a much longer period than that, usually more like ten years. It is not possible in practice to hedge exchange rate uncertainty for such a long period. It is a matter of making the most accurate possible prediction of the trend in the value of the dollar expressed in guilders. The question then is what to base such a prediction on: expected interest rates in the Netherlands and United States, perhaps, because the exchange rate is so greatly influenced by international capital flows? Or should we look more at real world factors, such as the expected competitiveness of the two countries, in order to obtain an idea of the exchange rate in the more distant future?

Gasunie is also subject to an exchange rate risk on its foreign currency investments. The nature of these investments was outlined in Case study 12.1, where we saw that they are usually short-term in character, so that the risk of a change in the value of these foreign currencies also concerns the short term. As we said, there are ways of hedging this risk, but investors certainly do not always make use of them. One reason is that there are costs associated with hedging facilities. Another reason is that investors can also have clearly defined exchange rate expectations which, if they come true, are more advantageous to the investor than hedging this risk. Naturally, these expectations also apply to the short term, in accordance with the life of the investment. Instinctively, you would think that the forces affecting exchange rate expectations in the short term would be different from those in the long term. But what are those differences? Since those operating on the foreign exchange market can be expected to act rationally, the said forces will tend to be a combination of the theoretical factors determining the exchange rate and empirical phenomena – which are often also already incorporated in the theory. The suggested difference in the forces determining the exchange rate implies that short-term exchange rate theory can sometimes differ from the longer term theory.

Case study 13.2 Determination of the equilibrium exchange rate

Until mid 1994, Surinam officially adopted a fixed exchange rate for its currency, the Surinam guilder. The official exchange rate was such that a Surinam guilder was worth roughly the same as a Dutch guilder. This vastly overvalued the Surinam guilder. A strong indication of *overvaluation* of a currency is the absence

of a free foreign exchange market where trading takes place at roughly the official exchange rate. Who would be willing to buy the overvalued Surinam currency? More particularly, in the case of overvaluation, if the central bank wants to give the official exchange rate any practical significance then it has to require all foreign exchange transactions to be conducted through the central bank, as we saw in the previous chapter. An overvalued (domestic) currency means that the central bank has to contend with a demand for foreign currency which exceeds the supply, because the artificially expensive domestic currency makes foreign currencies cheap, prompting strong demand from importers and investors. On the other hand, exporters who earn foreign currency will be very reluctant to offer this currency to the central bank. Essentially, they will get far too little domestic currency in return. It is therefore not surprising that a black market in foreign exchange tends to develop where a domestic currency is officially overvalued. On the black market, exporters can sell their foreign currency at a far more attractive – and realistic – price. The characteristic of a *black market* in foreign exchange is that it is not officially permitted, and is illegal therefore. Such a market is also known by the – rather more neutral – name of *parallel market*. There is in fact such a market in Surinam: in April 1993, for example, the price was 25 to 30 Surinam guilders for one Dutch guilder. By mid 1994 this price had already risen to over 100 Surinam guilders.

In this situation it is advisable for a government to liberalise foreign exchange dealings. A very unrealistic official price causes severe disruption in the domestic economy and also undermines authority. This is exactly what happened in Surinam. The crucial question then, of course, is what the new official exchange rate should be. What is the equilibrium exchange rate at any particular moment in time? What determining factors can be used to estimate that rate?

This chapter which, as we have said, deals with factors determining exchange rates, is arranged as follows. First, section 13.2 will give an idea of the different exchange rate terms and how they are used. The way in which the exchange rate is presented, or listed, in the financial press will also be described. The factors which determine exchange rates form the subject of sections 13.3, 13.4 and 13.5. Section 13.3 describes the macro-economic context of the balance of payments and the exchange rate. This will lead us on to relevant conditions for the balance of payments equilibrium and thus for the equilibrium exchange rate. A coherent chains of causal relations on the essential factors determining the level of the exchange rate is called an *exchange rate theory*. Exchange rate theories can be divided into long- and short-term explanations of the exchange rate. The long-term explanation forms the subject of section 13.4. The key element of such an explanation will prove to be the equality of a currency's internal and external purchasing power. The short-term explanation is discussed in section 13.5: it centres on international capital movements.

An important factor which helps to determine the exchange rate will be disregarded in this chapter, namely: how exchange rates are influenced by international agreements on the international monetary system. The very

existence of such an agreement can influence the exchange rate. Moreover, a precisely defined government policy on the exchange rate normally forms part of such an agreement, and that usually influences the level of the exchange rate as well. The next chapter will consider these international agreements.

13.2 Exchange rate concepts and presentation

The exchange rate which we have always been talking about so far is the *nominal bilateral exchange rate*. 'Nominal' because the value of the foreign currency is expressed in terms of money, viz. the domestic currency. The rate is also 'bilateral' because it concerns the relative mutual value of currencies of *two* countries. The price of a foreign currency and with it the price of the domestic currency cannot, of course, be expressed any more precisely than that. This rate tells us much about the bilateral relationship concerned. However, it is less appropriate for other purposes such as ascertaining the position of one currency among others in the world. The nominal exchange rate of a currency also offers only limited information on the competitive position of the two countries concerned. Modified expressions have been developed for that purpose: effective and real exchange rates.

The nominal *effective exchange rate* is a weighted average of nominal bilateral exchange rates. For the economy of a country, the exchange rate of one foreign currency is likely to be much more important than that of another. The level of a country's international trade with its individual partners is a good indicator of that economic importance, which is why that level is normally expressed in the weightings when determining the average of nominal bilateral rates. Thus, the flow of exports to trading partners in proportion to the total exports of the country concerned is used as a factor for weighting the bilateral exchange rates. The share of imports or the sum of import and export flows in proportion to the total volume of imports and exports is also used for weighting. Several effective exchange rates can therefore be constructed for one and the same currency. The bilateral rates cannot just be added together to determine an effective exchange rate. The number of guilders per dollar and the number of Belgian francs per dollar cannot be totalled to find the effective dollar rate. Their dimensions differ. This would be the same mistake as adding together apples and pears. To avoid this mistake, the bilateral nominal rates are first converted to index numbers with a certain base period for which the values of all bilateral rates involved in the calculation are set at 100. If the weighted average of these index numbers of bilateral rates increases, then the average value of the currency (the dollar in our example) rises against that of other currencies (the guilder and the Belgian franc).

The nominal exchange rate is of limited value as an indicator of the *competitiveness* of the country in question. Of course, *devaluation* of a currency makes a country cheaper for the rest of the world. But if this reduction in the currency's value is in response to high inflation in the country during the

preceding period, the change in the exchange rate serves only to compensate for that. This already shows us that the exchange rate tells us far more about the country's competitiveness when considered in conjunction with prices at home and abroad. Real exchange rates combining the nominal exchange rate with these prices are therefore constructed to indicate this competitive position. In practice, the *real exchange rate* is produced by taking the nominal exchange rate, multiplying it by the price in one country and dividing it by the price in the other. For example, in the case of the real exchange rate of the dollar against the guilder, with the nominal rate expressed in the number of guilders per dollar, this rate is multiplied by the price level in the United States and divided by the price level in the Netherlands. The numerator then comprises the product of the nominal rate and the American price level, or the American price level converted to guilders. The denominator consists purely of the Dutch price level in guilders. Thus, numerator and denominator provide a very direct comparison (in the same currency) of the price levels in the two countries and hence their relative attractiveness as suppliers of goods and services for the world's consumers. If this real exchange rate rises then the competitiveness of the United States deteriorates in comparison with the Netherlands – and vice versa. In practice the three components of the real exchange rate are first produced in the form of an index number. The real exchange rate itself is then also in the form of an index number.

Like the nominal exchange rate, the real exchange rate can be stated in both bilateral and effective form. The real bilateral rate is a useful indicator of the trend in a country's competitive position, particularly in relation to one other country. As regards a country's competitive position in general, the real effective exchange rate is a better indicator.

Box 13.1 Daily information on exchange rates

Information on the level of exchange rates is published daily in the financial sections of newspapers. The kind of information differs, however. In American newspapers, such as the *New York Times* and the *Wall Street Journal* you will find for the last two working days in New York selling rates for trading among banks in amounts of $1 million and more. These exchange rates are published in dollars per foreign currency and its reverse, the number of foreign currencies per dollar. But the information can be more extensive, especially for retail transactions. For example, in Dutch newspapers each day two price lists are published for nominal bilateral exchange rates: the rate for electronic transfers and the rate for notes. The buying and selling rates for funds transfer (Table 13.1b) apply to payments to and from other countries through bank accounts. The first figure after a foreign currency indicates the price which the bank pays for one unit of that currency, the second figure gives the price which the bank charges for the same unit. The advantageous margin between the two prices does not only yield a profit for the bank but also serves as the necessary premium to cover the risk incurred by a bank

in foreign exchange transactions. These funds transfer rates are much more attractive to customers than the buying and selling rates applied by a bank if foreign notes are offered or requested over the counter. This is evident from the figures under the 'banknotes' heading in Table 13.1a. The keen prices for cash-less foreign exchange conversions are due to the larger volume of the transactions and lower labour costs per transaction in comparison with dealing in foreign exchange over the bank counter.

Table 13.1c shows effective exchange rates for a number of currencies. These are both nominal and real rates. 1985 was taken as the base year for the index numbers, the values for that year being set at 100. In the case of the guilder the column shows that, with some fluctuations, the nominal effective rate rose by 22.8 per cent on average from the base date to 1994. However, this does not mean that

Table 13.1 The Amsterdam foreign exchange market

Table 13.1a *Banknotes*
The recommended rates in guilders given below are GWK Bank's buying and selling rates for banknotes in foreign currencies.

	Previous day	29/6
$	1.490–1.610	1.490–1.610
Aus$	1.05–1.17	1.05–1.17
BFr 100	5.29–5.59	5.29–5.59
Can$	1.065–1.185	1.065–1.185
Dkr 100	27.15–29.65	27.15–29.65
DM 100	109.40–113.40	109.40–113.40
£	2.32–2.57	2.32–2.57
FinM 100	35.05–37.55	35.05–37.55
Frfr 100	30.40–33.10	30.40–33.10
Drachma 100	0.60–0.77	0.60–0.77
Hong Kong $ 100	17.50–21.50	17.50–21.50
Irish £	2.45–2.70	2.45–2.70
Israeli sheqel	0.48–0.63	0.48–0.63
Italian lira 10,000	8.55–10.25	8.55–10.25
Yen 10,000	180.50–186.50	179.50–185.50
Nkr 100	23.60–26.10	23.60–26.10
Austrian shilling 100	15.64–16.14	15.64–16.14
Escudo 100	0.96–1.14	0.96–1.14
Peseta 100	1.21–1.37	1.21–1.37
Turkish lira 100	0.0027–0.0047	0.0027–0.0047
S.A. rand	0.35–0.50	0.35–0.50
Skr 100	19.90–22.40	19.90–22.40
Swiss fr 100	132.50–137.00	132.50–137.00

Source: *Het Financieele Dagblad*, 29 June 1995.

the Dutch competitive position deteriorated to the same degree. The facts confirm this, since the real effective rate of the guilder rose by only 5.6 per cent over the same period. Inflation in the Netherlands was evidently more moderate than in its trading partners. In comparison with its main trading partner, Germany, the Netherlands' worldwide competitive position actually improved according to the table: the real effective rate of the German mark went up by 13.7 per cent over the same period. For countries such as the United States and Japan, the changes are much greater. In both nominal and real terms, the value of the dollar declined by about 25 per cent, while the yen rose by 104 per cent in nominal terms and 70 per cent in real terms. All these trends have continued strongly in 1995. However, these changes should be placed in perspective by remembering that the choice of base period is essential and random here, particularly as the dollar was subject to major fluctuations in the 1980s: at the end of 1985 this currency was still only just past its peak.

Table 13.1b *Funds transfers*
The rates in guilders below, established at 13.15 hours, apply to funds transfers effected by GWK bank

	Previous day	28/6
$	1.54925–1.55175	1.55475–1.55725
Antillian guilders	0.8600–0.8900	0.8600–0.8900
Aus$	1.1060–1.1160	1.1090–1.1190
Bfr 100	5.4475–5.4525	5.4445–5.4495
Can$	1.12675–1.12925	1.13075–1.13325
Dkr 100	28.655–28.705	28.655–28.705
DM 100	111.990–112.040	111.980–112.030
£	2.4565–2.4615	2.4615–2.4665
Frfr 100	31.885–31.935	31.865–31.915
Drachma 100	0.6420–0.7420	0.6400–0.7400
Hong Kong $ 100	19.935–20.185	19.995–20.245
Irish £	2.5250–2.5350	2.5330–2.5430
Italian lire 10,000	9.5050–9.5550	9.5150–9.5650
Yen 10,000	184.500–184.600	183.950–185.050
NZ	1.0380–1.0480	1.0380–1.0480
Nkr 100	25.100–25.150	25.095–25.145
Austrian schilling 100	15.9200–15.9300	15.9200–15.9300
Escudo	1.0400–1.0800	1.0380–1.0780
Peseta	1.2770–1.2870	1.2780–1.2880
SKr 100	21.935–21.445	21.415–21.465
Swiss fr 100	135.495–135.545	135.305–135.355
ECU	2.0585–2.0635	2.0600–2.0650

Source: see Table 13.1a

Table 13.1c *Effective exchange rates*
(base 31.12.1985 = 100)
The nominal effective exchange rate of a currency is established by weighting the currencies of trading partners on the basis of bilateral trade weights. The real effective exchange rate is produced by a weighted adjustment, using the same weights, for retail price index differentials. A rise in the real index reflects a deterioration in the competitive position of the country concerned.

	Netherlands		Germany		UK		US		Japan	
	nom.	real	nom.	real	nom.	real	nom.	real	nom.	real
1985	100.0	100.0	100.0	100.0	99.9	100.0	100.1	100.0	100.0	100.0
1986	107.2	105.1	108.5	105.3	92.1	92.9	84.4	83.7	130.2	128.2
1987	112.5	106.8	115.0	108.6	90.9	93.1	75.8	76.0	144.0	137.4
1988	112.3	104.5	114.7	106.1	96.7	100.8	70.7	71.7	159.9	148.5
1989	111.2	100.2	113.7	103.4	93.5	100.8	72.6	74.0	151.4	136.9
1990	115.1	101.3	118.8	105.2	92.1	103.9	69.5	71.3	139.1	123.1
1991	114.5	99.4	118.1	103.1	92.9	106.0	68.5	69.9	150.1	131.2
1992	117.5	101.6	121.9	106.7	90.0	102.9	68.3	70.1	158.6	136.6
1993	122.0	104.8	127.3	112.5	83.0	93.3	72.0	74.3	188.1	159.3
1994	122.8	105.6	128.2	113.7	83.9	94.1	72.5	75.7	204.1	169.9
Jan. 95	125.3	107.1	131.5	116.5	83.7	93.9	72.3	75.8	207.2	170.8
Feb. 95	126.4	108.1	133.0	117.7	82.6	92.9	71.6	75.1	209.4	171.5
March 95	130.1	111.6	138.2	121.9	81.7	91.9	70.1	73.7	225.1	183.0
April 95	130.9	112.6	139.0	122.2	81.0	91.1	68.3	72.0	241.9	195.1
May 95	129.7	111.6	137.1	120.4	80.5	90.7	68.2	72.0	239.2	191.7
%	6.3	6.6	7.8	6.7	–3.6	–3.7	–7.1	–5.9	18.3	13.7
19/6	129.8	111.2	137.2	121.1	80.5	90.6	68.5	72.0	240.3	195.8
20/6	129.9	111.3	137.3	121.2	80.6	90.6	68.4	71.9	239.9	195.5
21/6	129.8	111.3	137.2	121.2	80.6	90.6	68.2	71.7	240.8	196.2
22/6	130.0	111.5	137.4	121.4	80.5	90.4	68.2	71.6	240.7	196.1
23/6	129.7	111.2	137.1	121.0	80.1	90.0	68.3	71.7	239.6	195.2
26/6	130.0	111.5	137.5	121.3	79.9	89.8	68.1	71.6	240.5	195.8
27/6	130.2	111.7	137.8	121.6	79.3	89.1	68.1	71.6	240.9	196.1
28/6	130.2	111.7	137.7	121.5	79.4	89.3	68.3	71.8	239.8	195.1

%: percentage change for May 1995 against May 1994.
Source: see Table 13.1a

13.3 The macro-economic framework for the exchange rate

The exchange rate is a macro-economic variable par excellence. As argued previously, all sorts of international transactions come together on the foreign exchange market. The starting point for a macro-economic review is the *income identity*. This indicates that a country's domestic production is made up of various components. Expressed as a formula, that identity looks like this:

$$Y = C + I + G + EX - IM \qquad (13.1)$$

The meanings of the symbols are as follows: Y is domestic production, C is consumption by residents, I is investment by residents, G is the country's government spending, while EX and IM respectively denote the country's exports and imports. All these economic quantities are expressed in domestic currency units. The sum of the first three variables (C + I + G) on the right-hand side of the identity equation is also known as aggregate spending by residents or *absorption*, A. By deducting imports we arrive at residents' expenditure on domestic products. If we add exports – i.e. foreign purchases of domestic products – we obtain the total expenditure on goods produced in the country. This total expenditure on domestic goods will always correspond to domestic production. If, for example, expenditure is liable to be lower, then companies are forced to stockpile unsold products; however, these stocks are included in investments, voluntary or enforced, so that equation (13.1) still holds true.

By substituting A for (C + I + G) in equation (13.1) and after a minor rearrangement of the remaining variables we arrive at the following identity:

$$EX - IM = Y - A \qquad (13.2)$$

This shows that the export surplus (EX – IM), corresponding to the net result on visible and invisible transactions in the balance of payments, is equal in value to the difference between domestic production Y and absorption A. Equation (13.2) is merely an identity. Unlike behaviourial equations it therefore does not indicate any causal relationships. Equation (13.2) merely expresses the fact that a balance of payments problem in the form of an import surplus is necessarily associated with surplus spending of residents. This is the essence of a theory which has become known as the *absorption approach* to the balance of payments.[1] The equation clearly shows that if a country succeeds in increasing domestic production and/or reducing expenditure by residents, this is bound to be associated with an improvement in the balance of visible and invisible transactions of the country in question.

Equation (13.2) can be developed somewhat further. For one thing, the left-hand side comprises only part of the current account balance on the balance of payments. Net income earned abroad by domestic factors of production is still

1. The absorption approach became known mainly through the work of Alexander (1952).

lacking, as is the balance of payments item 'net inflow of unilateral transfers'. We therefore add these balances, R, to the left-hand side. If we also add R to the right-hand side, equation (13.2) still balances. We also add taxes, T, twice to the right-hand side: once with a plus sign and once with a minus sign. This does not alter the value of the right-hand side. Finally, if the absorption is replaced by its component parts, we arrive at the following equation:

$$X - M + R = Y + R - T - C - I + T - G \tag{13.3}$$

Here, (Y + R) is *national income*.[2] Private savings are defined as the part of national income not spent on consumption, investment or payment of taxes. The first four terms on the right-hand side of equation (13.3) are therefore equal to private savings, S. If we replace them by S, the result is:

$$X - M + R = (S - I) + (T - G) \tag{13.4}$$

The left-hand side shows the current account balance. The first term on the right-hand side gives the difference between private savings and investment. The second term gives the difference between tax revenue and government spending; this is the budget surplus or the government's saving. Equation (13.4) shows that the current account balance is closely linked with private savings surplus and the government's budget surplus. Once again, there is no causal relationship. We can only state that any current account deficit must imply a simultaneous private savings deficit and/or government deficit. We can also state that in order to reduce such a current account deficit it is necessary either to reduce the private savings deficit or the government deficit (or both).

Since all current account entries imply transactions on the foreign exchange market, equation (13.4) contains important information on factors influencing the exchange rate – the real subject of this chapter. If everything else remains the same, changes in the private savings surplus have a direct effect on the value of the currency. If this surplus falls, then the current account balance also falls as a result of the identity, and demand for foreign currency will increase. A decline in the government budget surplus has a similar influence on the exchange rate. These macro-economic relations for the exchange rate are not derived from any specific economic theory. As already stated, the above equations are the outcome of the use of a set of identities without the addition of any behaviourial equations

2. As we know, domestic production is output produced within the national borders. National production is production by individuals who are nationals of that country. National production differs in two ways from domestic production. First, there are individuals with that nationality who produce abroad: that production has to be added to domestic production. Second, individuals with a different nationality contribute to the production process within the national borders. To ascertain national production, that production has to be deducted from domestic production. The balance of the income earned abroad by the factors of production, capital and labour, portrays these two differences. National production is therefore defined as domestic production plus this balance – a balance which may equally well be negative, of course. National income in turn is obtained from national production if 'net inflow of unilateral transfers' and terms of trade improvements are added.

at all.[3] The earnest attention paid to this type of identity in practical policy-making dates mainly from the 1980s. A well-known example is the debate since 1985 on the reduction of the American trade deficit, which was considered to be worryingly large, and the associated macro-economic requirements.

Equation (13.4) does not only give an idea of the macro-economic influences on the current account and the exchange rate; it also forms the foundation for analysing the scale of these influences. If, for convenience, we reduce the current account to visible trade and invisibles by setting R at zero, we can write the left-hand side of equation (13.4) as follows:

$$X - M = P_x .ex - P_m .im = E.P^*_X .ex - E.P^*_m .im \tag{13.5}$$

Here, P_x is the export price level and P_m the import price level. Addition of an asterisk (*) to a variable indicates that it is denominated not in domestic but in foreign currency. The symbol E expresses the nominal exchange rate and the small letters ex and im represent the volume of exports and imports respectively. E is the number of domestic currency units per unit of foreign currency. In the case of a current account deficit, equation (13.5) shows the variables which can be used to achieve the eventual restoration of equilibrium on the current account via devaluation of the domestic currency. However, in order to effectuate that, we cannot avoid introducing behaviourial assumptions for these variables. In the simplest situation, we assume that prices are determined entirely on the world market: the country in question is merely a price taker and is therefore evidently small in comparison with the world economy. This means that the foreign prices on the far right-hand side of equation (13.5) are fixed.

In the case of the said devaluation we assume a 1 per cent increase in E. This reduction in the value of the domestic currency then causes the current account to deteriorate by the same percentage as the depreciation via variable E in equation (13.5). The export and import prices in domestic currency units both increase by this percentage depreciation (since prices expressed in a foreign currency do not change), so that the same must be true for the balance on the current account. On the far right-hand side of (13.5) the increase in E causes both terms to rise by the percentage devaluation and, thus, their difference too. Consequently, any existing trade deficit will increase by the percentage of depreciation. The desired improvement in the current account will therefore have to come subsequently from volume effects. In terms of domestic currency, the depreciation causes an increase in the price of goods traded internationally. This will inhibit domestic demand and stimulate production. If there is production at home which competes with imports, this will also be boosted by the price increase. All these volume effects of depreciation lead towards an increase in the available volume of exports and a fall in the required volume of imports, in short

3. Behaviourial equations describe the behaviour of economic subjects, the private sector and government. It is in the specific assumptions regarding this behaviour that economic theories differ from one another.

to an improvement in the trade balance. Clearly, these volume effects only will more than offset the negative price effect of the depreciation on the current account providing they are sufficiently large. Only then will the depreciation lead to a net improvement in the trade balance. The so-called *Marshall-Lerner condition* describes this requirement: it states the price elasticities of the volumes of exports and imports in relation to the devaluation percentage. The exact form of this criterion depends on both the initial trade balance, the size of supply elasticities, and the degree to which depreciation pushes up import and export prices expressed in foreign currency. In its most simple form the Marshall-Lerner condition requires that the sum of the (absolute) values of the price elasticities of both export demand and import demand exceeds the value one. Only then a devaluation improves the current account.

The right-hand side of both equation (13.2) and (13.4) shows that the Marshall-Lerner condition in fact goes beyond just the balance of trade. If domestic demand for imports and exports is to be reduced by devaluing the domestic currency, then in general absorption must fall in relation to domestic production and the national savings deficit (made up of net private and government's savings) must be reduced. If that does not happen, then the trade balance cannot improve either. In other words, domestic production and demand must offer scope for more exports and fewer imports after the depreciation of the domestic currency. An extension of production of these tradables would be easy in the event of unemployment and spare production capacity. Otherwise, the extension would need a shift of production factors from the nontradable sector.

In addition, other countries will also have to give the country in question the opportunity to improve the trade balance. Thus, it must be possible to exploit the enhanced export potential by expanding foreign sales. Our simplified assumption in the preceding analysis that prices of imports and exports are determined on the world market offers the country that scope for expansion. The reason is that that assumption implies that the country concerned is so small in relation to the world market that the world market can readily absorb changes in this country's demand and supply at current prices. However, if that is not so then the country will be able to sell on the world market only part, if any, of the enlarged supply of exports resulting from the depreciation. The rest will be left unsold and the producer will be forced to stockpile the goods. This will be expressed as follows in equation (13.2). If domestic production is stepped up in order to expand exports, the right-hand side of (13.2) increases. However, the associated improvement in the trade balance does not occur now: the goods cannot be sold on the world market. This leads to an increase in domestic 'investment' in the form of forced investment in stocks. The investments form part of the absorption, so that the right-hand side of equation (13.2) again falls in value by the same amount as the original increase. In other words, the initial tendency towards an increase on the right-hand side is negated by this forced increase in investments. From this it is clear that equation (13.2) expresses a two-way traffic: this corresponds to the earlier finding that the equation does not incorporate any causality.

Up to now the Marshall-Lerner condition has been interpreted as the requirement for an improvement in the trade balance as a result of a reduction in the value of the domestic currency. The significance of the Marshall-Lerner condition goes beyond that. The exchange rate is the price on the foreign exchange market. The question which the Marshall-Lerner condition answers is essentially this: under what exchange market condition will a price change have the effect of restoring equilibrium. In other words, under what condition is the exchange market *stable*. If the equilibrium on the exchange market is disrupted, then a stable market implies that the disruption leads to a price change such that the disruption is rectified. Let us assume that there is a current account deficit. This implies excess demand for foreign currency. If the resulting increase in the price of foreign currency brings that excess demand back down, the market is stable. If it does not, then we have an erratic or *unstable* market. In the case of an unstable exchange market, the forces of demand and supply push the exchange rate further away from its equilibrium value.

In practice, even just from the point of view of current account transactions, the foreign exchange market certainly need not be stable in the short term. This phenomenon has even been given a name: the *J-curve effect*. It ties in with our previous analysis of the price and volume effects of depreciation. The additional assumption is that the price effect takes place immediately after depreciation but the volume effects take some time to appear. This means that the deterioration in the current account based on the price effect is manifest immediately after the devaluation at time t_0. If a country is able to influence international trade prices, import prices will initially tend to rise faster than export prices. This will further aggravate the original deterioration in the trade balance. The positive volume effect on the current account balance will only gradually become apparent. Thus this balance produces a pattern like that exemplified in Figure 13.1.[4] From time t_1 onwards, the volume effects gain the upper hand, after which it is not until time t_2 before the effect of the devaluation wears off. If the prior calculation, which underlies the devaluation policy, was correct, the current account balance will then have attained the desired value B, so that the balance has improved to the amount of AB. In the short term the exchange market is unstable because the depreciation of the domestic currency initially increases the deficit on the foreign exchange market. But in the end it is stable after all, since in the longer term such a depreciation reduces the deficit on the foreign exchange market.

4. The name of the curve is easier to understand if Figure 13.1 is turned slightly in an anti-clockwise direction.

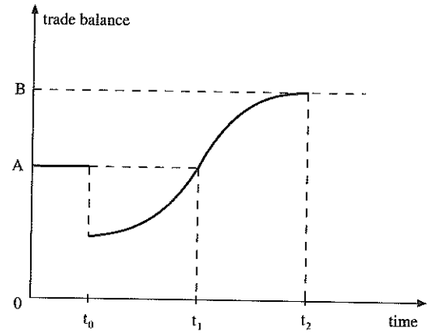

Figure 13.1 The J-curve

13.4 Exchange rate theory: the long term

13.4.1 Purchasing power parity

The oldest theory explaining the exchange rate is the Purchasing power parity theory. The basic idea is found in the *Law of one price*: disregarding trade barriers and transport costs there will be a tendency for a given product to have the same price in different countries. Goods arbitrage is responsible for this result. If prices of the same product are different in two countries, it is profitable to buy the product in the cheaper country and sell it in the dearer one. This buying and selling activity will cause the price to rise in the cheap country and fall in the expensive one. The arbitrage activity ceases once the prices are the same in both countries. A change in the exchange rate can contribute to this price equalisation tendency or may actually be entirely responsible for it, because the prices in two countries are only genuinely comparable if the price in one country is multiplied by the exchange rate to give the price in the other country. International buying and selling also influence the exchange rate in such a way that changes in that rate contribute towards price equalisation. If the prices of goods are rigid in the short term, price equalisation will actually have to come about entirely via changes in the exchange rate.

The retail price index is a weighted average of prices of individual (types of) goods. It is tempting to state that the law of one price also applies to countries' price indices via the concept of price aggregation. The idea then is that if prices of individual goods are the same, a composite set of prices will also be identical. Expressed as a formula, this gives us the following equation:

$$P = E.P^* \tag{13.6}$$

This equation expresses *purchasing power parity* or the international equivalence of national purchasing powers. The name in itself indicates – as shown by equation (13.6) – that a certain collection of goods can be bought with a particular sum of money at home, given price level P in that country. However, the same sum of money enables the same collection of goods to be bought abroad at price P* after conversion at the current rate of exchange. If the price level expressed in domestic currency units is higher abroad than at home, demand will switch to domestic goods. This is associated with a decline in demand for foreign currency and increased demand for domestic currency. As a result, the domestic currency rises in value: E falls in value. This engenders the restoration of purchasing power parity. Interpreted in this way, purchasing power parity is an equilibrium condition for the exchange rate:

$$E = P / P^* \tag{13.7}$$

If the domestic price rises, demand for domestic goods and thus for domestic currency will fall. This will reduce the value of the domestic currency (and E will therefore increase). This contributes to the restoration of equilibrium on the foreign exchange market. The same effect occurs in the case of a foreign price fall.

There are two ways of specifying the purchasing power parity theory of the exchange rate which mitigate some of the drawbacks of the absolute version as given in equation (13.7). In addition to this version of the theory there is also a relative version. The formula for it is this:[5]

$$\Delta E/E = \Delta P/P - \Delta P^*/P^* \tag{13.8}$$

The practical advantage of this version is that transport costs and trade barriers do not play a part so long as they do not alter significantly during the period in question. Another important advantage is that the baskets of goods on which the price indices are based need not be exactly the same. For the relative version it is sufficient if the relative price increases in equation (13.8) accurately reflect inflation in the two countries concerned.

The other variant of the purchasing power parity theory stresses the facet that the law of one price and goods arbitrage are possible only for goods which can, in principle, be traded internationally. Non-tradable goods include many services such as medical services, the renting of houses and the services of hairdressers. In principle, of course, everything can also be obtained from abroad, i.e. including services or goods which are difficult to transport. But in practice, apart from some rare exceptions, there will clearly be no international transportation of quite a few goods and services, so that no international competition is possible. Elaborating on this idea, purchasing power parity can apply only to

5. This formula follows from equation (13.7) by taking the natural logarithms of the left- and right-hand side and differentiating the result. By approximating the differentials by the first differences we arrive at equation (13.8).

goods which can be traded internationally. Taking this view, the exchange rate theory of purchasing power parity looks like this:

$$E = P_t/P_t^*$$

Here, P_t stands for the price of tradables, goods which can be traded internationally.

Case study 13.3 The 'Big Mac' index

Since 1986 *The Economist* has published the Big Mac index every year. This compares the prices of Big Macs in 79 countries. By comparing hamburger prices we can see whether an exchange rate is under or overvalued in relation to its (long-term) equilibrium rate. If purchasing power parity applies, prices of Big Macs expressed in one currency must be identical.

Table 13.2 is taken from the 15 April 1995 issue of *The Economist*. The first column shows the price of a Big Mac expressed in local currency. The second column gives the price of the same Big Mac in dollars which would result when the actual exchange rate against the dollar is used. If we divide the local price of a Big Mac by the American dollar price used in the US we obtain an exchange rate at which the Big Mac purchasing power parity applies. According to this exchange rate, the price of a Big Mac is the same in the different countries. In the table this is the column 'Implied PPP of the dollar'. If we take the exchange rate applicable in the case of Big Mac purchasing power parity and compare it with the actual exchange rate (the fourth column), we can see whether the actual exchange rate is under- or overvalued. The table shows in the second column that the cheapest Big Mac is sold in China and the most expensive in Switzerland. In China a hamburger costs $1.05 and in Switzerland it costs $5.20. According to the fifth column the Chinese yuan is the most undervalued currency and the Swiss franc is the most overvalued currency.

According to the Big Mac index, the dollar is undervalued in relation to the leading currencies. The Big Mac purchasing power parity gives a dollar/yen rate of 169 yen. On 7 April the actual rate was 84 yen. This means that the yen was 100 per cent overvalued against the dollar, or conversely, the dollar was 50 per cent undervalued against the yen. Similarly, the Deutschmark and the Dutch guilder are respectively 50 per cent and 52 per cent overvalued against the dollar. But this indication of an undervalued dollar is countered by the fact that overall in the table there are almost as many currencies undervalued against the dollar as overvalued.

The Big Mac index is a creative way to approach the law of one price. It concerns a homogeneous good: the recipe is the same worldwide. Nevertheless, the index does have its shortcomings:

1. The purchasing power parity theory applies only to tradables and the Big Mac is not traded internationally.
2. The production of Big Macs requires local inputs. They can differ in price because they are internationally traded.
3. Local prices can differ widely as a result of the presence of trade barriers or differences in rates of tax.

Table 13.2 The hamburger standard

Country	Big Mac prices		Implied PPP* of the dollar	Actual $ exchange rate 7/4/95	Local currency under (–)/over (+) valuation†, %
	in local currency	in dollars			
United States§	$2.32	2.32	–	–	–
Argentinia	Peso 3.00	3.00	1.29	1.00	+ 29
Australia	A$ 2.45	1.82	1.06	1.35	– 22
Austria	Sch 39.0	4.01	16.8	9.72	+ 73
Belgium	BFr 109	3.84	47.0	28.4	+ 66
Brazil	Real 2.42	2.69	1.04	0.90	+ 16
Britain	£ 1.74	2.80	1.33††	1.61††	+ 21
Canada	C$ 2.77	1.99	1.19	1.39	– 14
Chile	Peso 950	2.40	409	395	+ 4
China	Yuan 9.00	1.05	3.88	8.54	– 55
Czech Republic	CKr 50.0	1.91	21.6	26.2	– 18
Denmark	DKr 26.75	4.92	11.5	5.43	+112
France	FFr 18.5	3.85	7.97	4.80	+ 66
Germany	DM 4.80	3.48	2.07	1.38	+ 50
Netherlands	FL 5.45	3.53	2.35	1.55	+ 52
Hong Kong	HK$ 9.50	1.23	4.09	7.73	– 47
Hungary	Forint 191	1.58	82.3	121	– 32
Indonesia	Rupiah 3,900	1.75	1,681	2,231	– 25
Israel	Shekel 8.90	3.01	3.84	2.95	+ 30
Italy	Lira 4,500	2.64	1,940	1,702	+ 14
Japan	¥ 391	4.65	169	84.2	+100
Malaysia	M$ 3.76	1.51	1.62	2.49	– 35
Mexico	Peso 10.9	1.71	4.70	6.37	– 26
New Zealand	NZ$ 2.95	1.96	1.27	1.51	– 16
Poland	Zloty 3.40	1.45	1.47	2.34	– 37
Russia	Rouble 8,100	1.62	3,491	4,985	– 30
Singapore	S$ 2.95	2.10	1.27	1.40	– 9
South Korea	Won 2,300	2.99	991	769	+ 29
Spain	Ptas 355	2.86	153	124	+ 23
Sweden	SKr 26.0	3.54	11.2	7.34	+ 53
Switzerland	SFr 5.90	5.20	2.54	1.13	+124
Taiwan	NT$ 65.0	2.53	28.0	25.7	+ 9
Thailand	Baht 48.0	1.95	20.7	24.6	– 16

*Purchasing power parity: local price divided by price in the United States
†Against dollar
§Average of New York, Chicago, San Francisco and Atlanta
††Dollars per pound
Source: *The Economist*, 15 April 1995, p. 74.

4. Profit margins need not be the same everywhere because of differences in competing substitutes.

Therefore, the Big Mac index only gives a quite rough indication of the long-term equilibrium exchange rate.

Goldman Sachs,[6] an American firm of stock brokers, also calculated the dollar/yen rate applicable according to purchasing power parity. They arrived at a rate of 185 yen. According to their calculations the dollar is therefore actually even more undervalued than the Big Mac index would indicate.

Empirical research offers only limited support for the purchasing power parity theory. The theory does not hold good in the short term. However, viewed over a number of years there is a tendency towards purchasing power parity. The theory is therefore usually regarded as the essential part of the explanation for the longer term exchange rate.

Of course, the idea comes up immediately whether it is possible to improve the long-term explanation of the exchange rate in the form of the purchasing power parity. Although there is a long-term tendency towards this parity, apparently something is missing. It means that it is realistic to adapt equation (13.7) in the following way:

$$E = \pi . P/P^* \qquad (13.9)$$

The variable π functions as a bridge between the values of E and P/P*. This variable is referred to as the real exchange rate. This can be explained by rewriting the equation:

$$\pi = E.P^*/P \qquad (13.10)$$

Now π expresses the ratio of the prices in the countries with the domestic currency as the common denominator. Looking at the dimensions of the ratio, it becomes clear that the dimension of the numerator is: domestic currency per foreign consumer package. The dimension of the denominator of the ratio is: domestic currency per domestic consumer package. Combined, π has the dimension domestic consumer package per foreign consumer package. In other words, π expresses the real price (in units of the domestic consumer package) of the foreign consumer package. This explains π's name: the real exchange rate.

By means of this economic contents of the real interest rate π, we are able to indicate the economic interpretation of its addition in equation (13.9). Suppose that there is a demand shift from domestic to foreign goods while there is no single change in the two money markets. The latter means that the two price

6. *The Economist*, 11 March 1995.

levels will not change, as we will see in the next sub-section. The demand shift nevertheless affects the mutual price of the two consumer packages. The foreign package will become more expensive. This implies an increase in π and, according to (13.9), an increase in the nominal exchange rate E. It is in this way, due to a more expensive foreign currency, that the more expensive foreign goods package manifests itself. Not through a higher price level P*. It turns out that through an explanation of π, we are able to explain an absence of purchasing power parity.

13.4.2 *The monetary approach*

The beginnings of the purchasing power parity theory date back several hundred years. It was not until the 1920s that the Swede Cassel perfected the theory and gave it its present interpretation. In the latter half of the 1970s the purchasing power parity theory was further developed into the *monetary approach* to the exchange rate: here, the longer term exchange rate is again explained by the ratio of the price levels in the two countries, but this approach delves deeper than the purchasing power parity theory. It does not end with prices as an explanation for the exchange rate: the prices themselves need to be explained. For that purpose the monetary approach uses the equilibria on the money markets in the countries concerned.

The domestic money market equilibrium is as follows:

$$M = P.L\,(y, i) \qquad (13.11)$$

M stands for the money supply and L is the real demand for money, so that P.L is the nominal demand for money (in currency units). The widespread assumption is that the real demand for money depends on real income, y, and the (nominal) interest rate, i. If y increases, the demand for money is reckoned to increase because of the increase in the stock of money needed in the country to pay for transactions. Money supply consists of cash and sight deposits at a bank that do not produce interest. If the interest rate in the country increases, it thus becomes more expensive to hold money and people will tend to reduce the amount of money in stock. In this way an increase in the interest rate depresses demand for money. The interest rate can be regarded as the cost of holding money; that does not mean real costs (unless one has to borrow) but the return which one is foregoing by not investing the money at interest. For this reason one usually speaks of the opportunity cost of holding money.

The assumption is that the money market is continually in equilibrium. This is part of the idea that financial markets in general find a new equilibrium immediately (within a few minutes!) after a disruption, by means of change in the price. In this context the money market price is the interest rate. An increase in the money supply (e.g. because of an easing of monetary policy on the part of the central bank) leads to a short-lived excess supply on the money market, but almost immediately this will cause the interest rate to fall. This makes it cheaper to hold money, which immediately increases the real demand for money. The fall in

interest rates continues until the money market equilibrium is restored.

The widely accepted assumption is that the interplay of the money supply and real demand for money determines the longer term price level. The idea is that the prices of goods tend to be rigid in the short term, so that money market equilibrium cannot be achieved by adjusting prices in the short run. The interest rate therefore (temporarily) does the job. In the long term, however, the price level is able to perform that function. Thus, in the longer term:

$$P = M/L\ (y, i) \tag{13.12}$$

If there is a permanent increase in the money supply, the price level will ultimately rise if the real demand for money remains the same. Conversely, if there is a permanent increase in the real demand for money (because incomes rise or the interest rate falls), the price level will ultimately fall – at least if the money supply remains unchanged.

Internationally, there is a similar relationship between the price level, the money supply and real demand for money, comparable to equation (13.12). We assume that this equation also applies for the same variables, but with the addition of an asterisk. If we now substitute for P and P* in equation (13.7), we arrive at the following equilibrium equation for the exchange rate in the longer term:

$$E = M/M^* \times L^*/L \text{ in which } L = L\ (y, i) \text{ and } L^* = L^*\ (y^*, i^*) \tag{13.13}$$

This equation shows that if the domestic money supply increases by, say, 10 per cent the exchange rate will also eventually rise by 10 per cent. Eventually, because the equation only holds for the long run. In view of the background to equation (13.13) – and particularly equation (13.12) – the connecting link between M and E here is the domestic price level which eventually also rises by 10 per cent.

13.5 Exchange rate theory: the short term

13.5.1 The uncovered interest rate parity

What can we say about the short-term change in the exchange rate? For that we need a theory. The overriding explanation of the short-term exchange rate is nothing other than the uncovered interest parity already introduced in Chapter 12 and materialised in equation (12.2). For our convenience, it will be repeated here:

$$i = i^* + (E^e - E)/E.100 \tag{13.14}$$

It expresses the fact that a foreign exchange speculator reacts to differences in the expected rate of return on investments in two countries. The left-hand side shows the domestic rate of return consisting only of the domestic interest rate, i, measured as a percentage. The right-hand side expresses the rate of return on

an investment abroad. This rate of return has two components: the foreign interest rate, i*, and the exchange gain[7] anticipated during a possible investment abroad. Both components are expressed as percentages. The numerator of the second component indicates the difference between the expected exchange rate, E^e, and the present exchange rate, E. The period to which the expectation applies is the same as the investment period. If we divide this difference by the present value of the exchange rate, we find the expected relative change in the exchange rate. If we multiply it by 100 it becomes a percentage.[8]

Equation (13.14) is the short-run equilibrium condition for the foreign exchange market. It brings the exchange rate together with the three factors which determine it, namely the domestic interest rate, the foreign interest rate and the expected value of the exchange rate. Changes in these affect the equilibrium value of the exchange rate. For example, if the foreign interest rate rises, investment abroad immediately becomes more attractive than domestic investment starting from an equilibrium situation. This prompts a mass tendency to exchange the domestic currency for foreign currency in an attempt to invest abroad. As soon as this tendency is perceived on the foreign exchange market, there is an increase in the value of the foreign currency and thus in the value of E. Given the value of the expected exchange rate, this means that the expected exchange gain declines. This compensates for the more attractive foreign interest rate, so that a new equilibrium is almost immediately reached at a higher value for E. In other words, the domestic currency has depreciated. The influence on the exchange rate of other changes in the factors which determine it can be deduced in the same way. Thus, in the short term the international value of the domestic currency is evidently influenced in a negative direction by an increase in the foreign interest rate and in the expected exchange rate value, and by a fall in the domestic interest rate.

This explanation of the exchange rate in the short term can be easily combined with the long-term exchange rate model as expressed in equation (13.13). This composite model consists of equations (13.12), (13.13) and (13.14) plus the assumptions of national income determined exogenously and a speculator acting rationally. This means that the speculator knows the model and hence sees the consequences of any change in model variables. The consequences still hidden in the future are discounted by the speculator in his expectations based on this model.

This model can explain the remarkable practical phenomenon of over-

7. That profit may well be negative, of course, and thus expresses a loss situation.

8. The second component on the right-hand side is only a fair approximation of the expected exchange gain. It concerns only the gain expected on the principal. The expected exchange gain on the foreign interest yield (which is paid out in foreign currency, of course) is ignored. However, this amount is quite small compared to the other components so that its exclusion does not affect the essence of the subsequent conclusions.

9. This variant is not alone here. There are other variants which also produce this phenomenon.

reaction (*overshooting*) by the exchange rate.[9] We shall illustrate this on the basis of the example of a monetary disturbance in the form of an unexpected and permanent 10 per cent increase in the money supply on the part of the monetary authorities. This policy change affects the model in two ways. First, the money market equilibrium is disturbed by this increase in the money supply. Since the price level is sticky in the short term, there is only one variable in equation (13.11) which can restore the money market equilibrium. That is the interest rate, which will fall to the point where equilibrium is restored via a sufficient increase in real demand for money. Second, the expected value of the exchange rate will also increase in response to the larger money supply, because the rational speculator knows that, according to equation (13.13), the permanent 10 per cent increase in the money supply will eventually also lead to a 10 per cent increase in the exchange rate. The speculator will adjust his expectation similarly and notice that his investment equilibrium for interest-bearing assets has currently been upset in two ways: in equation (13.14) the left-hand side has fallen in the form of the lower domestic interest rate while the right-hand side has increased in value as a result of a 10 per cent rise in the expected exchange rate.

The speculator will respond to this two-sided disturbance of the equilibrium with a mass shift from domestic to foreign investments. This causes a huge increase in demand for foreign exchange, so that the exchange rate rises. A 10 per cent increase in the actual value of the exchange rate is not enough to alter the speculator's behaviour: although such an increase does restore the right-hand side of equation (13.14) to its original value (because both the expected and the actual exchange rate have now risen by 10 per cent), there is still no reason for the domestic interest rate to rise again. As a result, the left-hand side of equation (13.14) remains below the original level, so that speculators still have reason to transfer their investments abroad. It is not until the actual exchange rate has risen so far that in equation (13.14) the right-hand side is just as far below its original value as the left-hand side that the speculator is again indifferent as regards the country where he wishes to invest. At that point the excess demand for foreign exchange ceases and the actual exchange rate stabilises.

The trend in the actual and expected exchange rates over time is shown in Figure 13.2. At the present stage of our analysis, the actual rate is at level C. This situation may persist for some time. The length of this period depends on the rigidity of the price level. As said before, the long-term exchange rate model is based on the fact that prices are to some extent rigid. Once the domestic price level gradually begins to rise after a time, the temporary equilibrium with the exchange rate at level C is left. According to equation (13.11), the money market equilibrium is now disrupted again: there is excess demand on the money market. This causes the domestic interest rate to rise. According to equation (13.14), this prompts an inflow of speculative capital, which is accompanied by rising demand for the domestic currency. As a result, the exchange rate begins to fall, keeping pace with the rise in the interest rate – in accordance with equation (13.14). Eventually, the price reaches its long-term equilibrium level. As a consequence its rise and that of the interest rate ceases as does the fall of

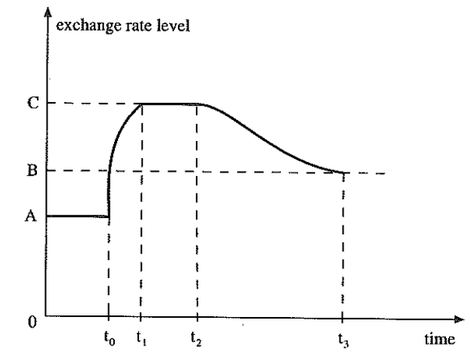

Figure 13.2 Overshooting behaviour of the exchange rate

the exchange rate. It has now reached level B in Figure 13.2, the level which the expected exchange rate had already reached immediately after the monetary disturbance. The pattern of the actual exchange rate over time in Figure 13.2 clearly shows why one states that exchange rate over-reacts.[10]

Case study 13.4 The trend in the principal exchange rates

Figure 13.3 shows the trend in the mutual values of the three leading exchange rates in the world since 1970. Apart from the presence of upward and downward trends, substantial fluctuations are particularly evident. These did much to fuel ideas on exchange rate overshooting. In the 1980s the American dollar, in particular, produced an equally spectacular rise and fall. The explanation put forward for this ties in with the explanation of exchange rate overshooting presented in this section. In response to the continuing rise in inflation in the 1970s, the American central bank, the Federal Reserve Board, introduced a very restrictive monetary policy around 1980. This caused the American interest rate to rise. An expansionary fiscal policy further contributed to this. The greater demand for goods caused an additional increase in the interest rate in the United States. The high American interest rate attracted a large amount of foreign investment capital. The associated strong demand for dollars caused a massive increase in the value of the dollar. To compensate for the interest rate advantage, the value of the dollar had to rise beyond its eventual equilibrium value so that people expected it to appreciate. It was not until the price rises in the United States diminished after a while as a result of the tight monetary policy that the US interest rate could drop back again, and with it the rate of the dollar.

10. The name of the American economist, Dornbusch, is associated with exchange rate overshooting. He was the one who first offered a model to explain this phenomenon which so obviously occurred in practice. See Dornbusch (1976).

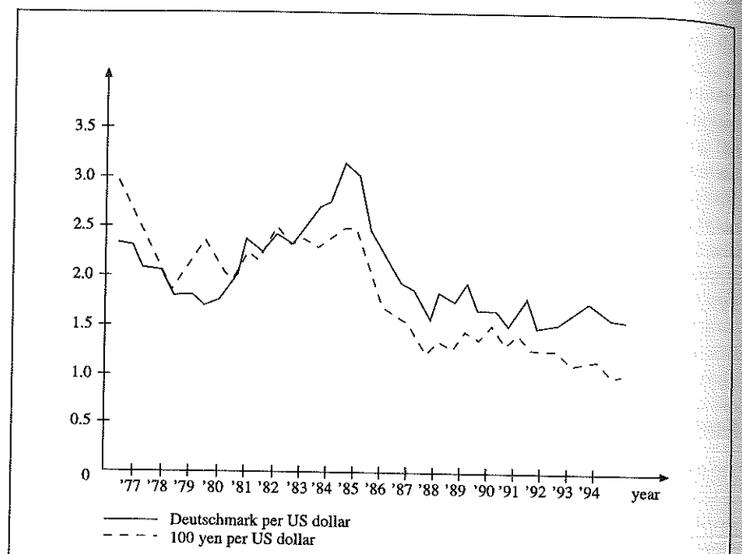

Figure 13.3 Nominal exchange rates, 1977–94 (yen/dollar and D-mark/dollar)
Source: IMF, International Financial Statistics, several issues.

13.5.2 *The portfolio model*

The exchange rate theory was further developed in two ways in the 1980s. In the first, least radical development, the constraint that domestic money can only be in domestic hands was dropped. This led to the *currency substitution model* of the exchange rate. The deciding factor for substitution between domestic and foreign currency is uncertainty about the future value of the exchange rate and, particularly, the direction in which the rate is expected to move. If people anticipate a depreciation, they will put their money into other currencies. The differential between the domestic and foreign interest rates naturally plays no part in this because cash and sight deposits at banks do not yield interest. This expansion of the theory did not produce any important new explanations for practical phenomena, but the theory has interesting practical implications for hyperinflation countries where the national currency is at risk of being displaced by more stable foreign currencies, and particularly the American dollar.

A more interesting expansion of the theory is the *portfolio approach* to the exchange rate. In addition to the monetary approach, this now explicitly incorporates the equilibria on a country's domestic and foreign bond markets.

In the monetary approach, such interest-bearing investments are already an implicit alternative to holding money. This is hinted at by the interest rate in the

money demand function owing to the opportunity cost of holding money. However, no distinction was made between domestic and foreign interest-bearing assets. They were implicitly treated as equal, because the foreign rate of return is not presented as a second indicator of the opportunity cost in the money demand function. In the adjustment process following a monetary disturbance, however, there was an incipient distinction between domestic and foreign assets, but only until equilibrium was restored.

The essence of the portfolio approach concerns the desired allocation of the financial assets over the portfolio of a country's private sector. These assets involved are domestic money, domestic bonds and foreign bonds. Changes in the desired allocation occur on the basis of the (expected) rates of return on the financial assets concerned. In the simplest form, the rate of return is zero for money and the relevant interest rates for both types of bonds. But in this approach, these bonds are incomplete substitutes. For example, if the foreign interest rate rises then the (desired) proportion of foreign bonds in private assets will increase at the expense of money and domestic bonds. But despite that the domestic bonds remain desirable in the portfolio, although with a smaller proportion. If the volume of private asset holdings increases, these proportions do not change; demand for and hence ownership of the assets will increase proportionately to the previous asset holdings. On the supply side, the supply of money domestic bonds is assumed to be exogenous as it is considered to be determined by, respectively, the central bank and the government. In contrast, the supply of foreign bonds is endogenous and changes as a result of any current account surplus or deficit on the balance of payments. A surplus means an increase in foreign claims: owing to the simplicity of the model of the portfolio approach, this is entirely in the form of foreign bonds. The domestic supply of foreign bonds does not increase in this way alone; it can also rise as a result of an increase in the value of the foreign currency, because in the model the supply of and demand for foreign assets are denominated in domestic currency units. If the exchange rate rises (so that the foreign currencies become dearer), then the value of the foreign bonds in the portfolios will also rise in terms of domestic currency units.

Case study 13.5 Financial liberalisation in Japan

After the Second World War, Japan's financial system was initially largely closed. The 1973 oil price shock led to a temporary current account deficit for Japan. In response to that, Japan eased restrictions on capital imports to help finance the increased oil account. In subsequent years Japan gradually liberalised its international capital movements more and more. When there seemed to be no stopping to the rise of the American dollar in the first half of the 1980s (see Figure 13.3), President Reagan brought great pressure to bear on the Japanese government to open up its borders still further to financial transactions. The pressure led to the intended Japanese measures, but not to the intended behaviour, as the main result

was a sharp increase in Japanese capital *exports*. Since most of these went to the US, the dollar received a further upward boost. But Japanese capital imports also increased, also from the US. The portfolio approach, in particular, can explain such an increase in mutual capital inflows between two countries following the capital liberalisation. In both countries people are adjusting their investment portfolios to the new possibilities which have been opened up.

To ensure a proper understanding of the portfolio approach to the exchange rate, we shall describe the adjustment process which occurs after a disturbance. Say, the central bank increases the money supply. In this model that means more than just an increase in the money supply, because the central bank usually puts the additional money into circulation by buying domestic bonds. The alternative in this model is an exchange of money for foreign bonds. This is in fact a form of foreign exchange market intervention in which foreign currency in the form of foreign bonds is bought by the central bank for domestic currency. This transaction does not alter the level of private asset holdings, but excess supply occurs on the money market and excess demand on the foreign bond market. This excess demand also means excess demand for foreign currency, which leads to an increase in the price of that currency. This means a fall in the value or depreciation of the domestic currency. As a result, there is an increase in the *value* of the supply of foreign bonds, caused not by a larger volume of bonds in the country but an increase in their value in domestic currency. This rise in value also means an incipient increase in the value of the financial assets of private persons in that country. This in turn leads to increased demand for all assets, depressing the excess supply of money and causing excess demand for domestic bonds, resulting in an increase in the value of those bonds and a decline in the domestic interest rate. This in turn generates higher demand for money and a lower demand for domestic bonds. Thus, the markets in money and domestic bonds tend towards a new equilibrium. On the foreign bond market the increased demand leads to a further rise in the *value* of foreign currency, instigating another round of changes, until the financial markets have gained equilibrium.

The financial equilibrium is again disturbed by the fact that the decline in the domestic currency brings a current account improvement over a period of time, and this leads to an increase in the *number* of foreign bonds held by the domestic private sector. This new development implies a surplus of foreign bonds causing the exchange rate to decline. The temporary financial equilibrium was apparently characterised by overshooting of the exchange rate. Under certain realistic assumptions a new equilibrium is eventually reached on all three domestic financial markets. The end result is that the central bank's action causes an increase in the stock of reserves held by the central bank, a fall in the domestic interest rate, a net decline in the value of the domestic currency on the foreign exchange market, and a new current account equilibrium.

The current account is indeed in equilibrium again, but with changed balances

of its sub-accounts. As the country experienced a net inflow of foreign financial assets during the adjustment period, the inflow of foreign capital earnings has increased compared to the initial equilibrium. In the new equilibrium the goods and services balance must, therefore, necessarily be unfavourably compared to the initial situation. The new equilibrium is only compatible with domestic goods that have become dearer. This outcome is due to higher domestic prices, whereby relative to the initial equilibrium, the percentage rise of prices exceeds that of the exchange rate. This price increase is a response to higher foreign and domestic demand for domestic goods. The initial cause of this higher demand is depreciation. The permanent cause is an increase in the real value of private holdings of financial assets, being a determining factor of domestic expenditure.

13.6 Summary

1. The exchange rate takes many forms. Normally, when we refer to the 'exchange rate' we mean the nominal bilateral exchange rate. This expresses the value of a foreign currency in domestic currency units. A general idea of the trend in the value of the domestic currency is obtained by determining its nominal effective rate. This expresses the value in relation to a weighted average of foreign currencies relevant to the country's international trade. A better picture of a country's competitive position is provided by its real exchange rate. Here, the nominal exchange rate forms part of a larger whole in which the domestic price is expressed in relation to the foreign price, measured in one and the same currency. This real exchange rate is also available in bilateral and effective form.
2. Exchange rate theories aim to explain the nominal exchange rate. They give an indication of the relevant factors determining the exchange rate. These theories can offer support in attempts to predict the value of the exchange rate. Sound exchange rate predictions are very useful in both international trade in goods and the investment world. The government also finds exchange rate theories helpful in its exchange rate policy where indications of the equilibrium level of the exchange rate are of importance. In this chapter the exchange rate theories have been divided into three categories.
3. The first category of theories is based on economic definition equations. The income identity leads to the absorption approach in which growth of domestic production and a decline in absorption (spending by a country's residents) boost the trade balance surplus and hence the value of the domestic currency. The definition of the current account forms the framework for the Marshall-Lerner condition. This states that the effect of a devaluation on the volume of imports and exports must be sufficiently great to outstrip the detrimental effect of the devaluation itself on the trade balance via higher import and export prices. Only then will a devaluation yield the expected improvement in the current account. In the short term that will not always happen: then the J-curve effect occurs.

4. The second category of theories focuses on explaining the exchange rate in the long term, this means over a number of years. In the purchasing power parity theory there is a close link between the exchange rate and the ratio of domestic and foreign price levels. Apart from this absolute version, there is also a relative version of this theory. Here, the relative increase in the exchange rate is equal to the difference between the domestic and foreign inflation rates. The absolute version of the purchasing power parity forms part of the monetary approach to the exchange rate, in which the exchange rate is linked via the price ratio to the ratio between the domestic money supply and demand compared to that ratio abroad.
5. In short-term exchange rate theories the emphasis shifts from an explanation based on goods to one based on financial assets. The basic assumption is that imbalances in the financial sphere are rectified immediately whereas a longer or shorter adjustment period is necessary where goods are concerned. Thus, the uncovered interest rate parity can serve as the starting point to explain the phenomenon of overshooting, so characteristic of the behaviour of exchange rates. The uncovered interest rate parity is characterised by the complete substitutability of domestic and foreign interest-bearing assets. As soon as that substitution is incomplete, which means that domestic and foreign interest-bearing assets are considered to be different, the portfolio approach to the exchange rate becomes relevant. Apart from markets for domestic money and domestic interest-bearing assets, this approach also distinguishes a market for foreign interest-bearing assets.

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14 Exchange rate effects

14.1 Introduction

The previous chapter discussed the influence of various factors on the exchange rate. These influences are incorporated in theories to explain the exchange rate. In this chapter the interest shifts from the exchange rate as the *consequence* of certain effects to the exchange rate as the *cause* of economic effects. In other words, the subject matter now concerns the influences produced by the exchange rate itself. We shall see that a change in the value of the exchange rate may have a range of consequences: for the purpose of analysing those consequences, it is reasonable to distinguish between the influence of the exchange rate on economic policy *objectives* and its influence on the policy's *effectiveness*.

The principal economic variables influenced by the exchange rate are international trade in general and bilateral trade flows in particular. These also alter the ultimate underlying economic variables including those which are the target of policy. This does not only concern the balance of payments: the whole set of variables comprising wage rates, business profits and ultimately inflation is also affected, as are the objectives associated with them: domestic production, economic growth and employment. All these influences of the exchange rate form the subject of sections 14.2–14.4.

In macro-economic policy we distinguish between monetary policy and fiscal policy (this is also known as the government's budgetary policy). The government uses these two forms of policy to try to achieve its macro-economic objectives. In sections 14.6 and 14.7 we see that the possibility of changes in the value of the exchange rate is very important for policy effectiveness. This in turn is connected with the system of determining exchange rates applicable to the currencies involved in the exchange rate concerned. Before examining that, in section 14.5 we shall therefore consider the various exchange rate systems. As well as describing the systems we shall look at their consequences for exchange rate stability and for the instruments with which a central bank can influence the value of the exchange rate.

14.2 International trade

Variations in the exchange rate add an element of uncertainty to international trade transactions which does not apply to domestic trade, because a foreign