

The exchange rate and macroeconomic adjustment

EMU study



HM TREASURY



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The exchange rate and macroeconomic adjustment

*This study has been prepared by HM Treasury to
inform the assessment of the five economic tests*

This study has benefited from review by Professor Charles Goodhart and helpful comments from Professor Michael Artis, both working in a personal capacity as academic consultants to HM Treasury. All content, conclusions, errors and omissions in this study are, however, the responsibility of HM Treasury alone.

This is one of a set of detailed studies accompanying HM Treasury's assessment of the five economic tests. The tests provide the framework for analysing the UK Government's decision on membership of Economic and Monetary Union (EMU). The studies have been undertaken and commissioned by the Treasury.

These studies and the five economic tests assessment are available on the Treasury website at:

www.hm-treasury.gov.uk

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EXECUTIVE SUMMARY

Key issue: do flexible exchange rates promote macroeconomic adjustment?

1 A central question when considering the costs and benefits of joining a monetary union is the role of the exchange rate in the economic adjustment process. If an independent flexible exchange rate were a mechanism that allowed the domestic economy to adjust to shocks and disturbances, then the loss of this mechanism as a result of joining a monetary union would entail a cost. Conversely, if an independent exchange rate were a source of shocks to the economy, for example if its movements were mainly driven by ‘irrational’ movements in financial markets rather than by economic fundamentals, then foregoing the independent exchange rate could be a benefit.

2 The role of the exchange rate in macroeconomic adjustment has been a feature of the debate over whether the UK should join Economic and Monetary Union (EMU). Currie (1997) argues that both views of the exchange rate have some element of truth: “*exchange rates do tend to play a useful role, but also incorporate a large arbitrary and disruptive element*” (page 6). Advocates of EMU entry often highlight the potentially disruptive role of exchange rate movements. For example Layard *et al.* (2002) state: “*An independent exchange rate is... ..often a source of shocks to the economy rather than a means of offsetting them. These shocks may be large and potentially very damaging for an economy of Britain’s size*” (page 9).

3 This issue was not considered in detail in the October 1997 assessment of the five economic tests (HM Treasury, 1997). The issue is more prominent now due to the persistent strength of sterling in relation to the euro during much of the past six years. It has been argued that this represents an overshooting that cannot be explained by economic fundamentals, and is a source of imbalance to the economy. Nevertheless output and inflation outcomes in the UK have compared favourably with those in the euro area.

Equilibrium exchange rates and adjustment

4 HM Treasury has produced four EMU studies on issues relating to the exchange rate. The EMU study by Professor Simon Wren-Lewis *Estimates of equilibrium exchange rates for sterling against the euro*, and the studies by HM Treasury *Modelling shocks and adjustment mechanisms in EMU* and *Modelling the transition to EMU* complement this study. Professor Wren-Lewis’s study focuses on economic models of the medium and long-run real exchange rate, and estimates a medium-run equilibrium rate for sterling. The two HM Treasury studies consider how the macroeconomic costs of adjustment to economic shocks in the UK compare inside and outside of EMU, and the role of the exchange rate in determining the UK’s transition path, if the UK were to decide to join EMU.

Exchange rate adjustment to economic shocks

5 This study focuses on short and medium run movements in the exchange rate and considers whether such movements tend to be a stabilising reaction to changes in aggregate supply and demand, or whether they tend to be destabilising. The study contains both theoretical and empirical analysis.

6 The Government believes that exchange rate stability can only be achieved on the basis of sound economic fundamentals, in particular low and steady inflation, steady and sustainable growth and sound public finances. The exchange rate is, therefore, an outcome that reflects other policies, both in the UK and in other countries.

Real and nominal exchange rates

7 The real exchange rate provides one of the adjustment mechanisms that balances aggregate demand and aggregate supply in the medium and long run. The real exchange rate is defined as the nominal (or market) exchange rate adjusted for price levels at home and abroad, and is a measure of the relative competitiveness of domestic and foreign production.

Real exchange rate adjustment in or out of EMU **8** If the UK were to join EMU then there would no longer be a nominal exchange rate between the UK and the current euro area countries. Within EMU, if a shock occurred that required a change in the real exchange rate, this could only be achieved if UK inflation were different from the rest of the euro area for a period of time. Outside of EMU, part or all of any real exchange rate adjustment may be achieved by a change in the nominal exchange rate.

Adjustment when nominal exchange rates are fixed **9** This point may be illustrated by a simple example. Consider an economic shock that leads to excess demand for UK production, for example an increase in demand for UK exports when the UK economy is already operating at full capacity. When exchange rates are fixed, this excess demand will put upward pressure on UK inflation, leading to a real exchange rate appreciation. This will encourage a switching of demand towards foreign suppliers and a switching of supply towards domestic markets. Both effects reduce, and eventually eliminate, the initial excess demand.

Adjustment in a floating exchange rate regime **10** By contrast, when nominal exchange rates are flexible, the effect of increased demand for UK exports may cause the nominal exchange rate to appreciate. This provides an alternative route for securing the real exchange rate appreciation needed to eliminate the initial excess demand.

Comparing fixed and floating exchange rate regimes **11** A country's real exchange rate will ultimately reflect underlying economic conditions, irrespective of whether nominal exchange rates are fixed or floating. But the adjustment mechanism is different, with adjustment in the domestic price level being greater under a fixed exchange rate regime. Under flexible exchange rates, the movement in the nominal exchange rate cushions some of the impact on the domestic price level, and consequently can be viewed as a shock absorber.

12 The chief advantage of a flexible exchange rate regime is that the nominal exchange rate can react rapidly to changes in economic conditions. Under a fixed exchange rate regime, changes to the level of domestic prices may take longer to occur. This may be especially important when a real exchange rate depreciation is needed, as under a fixed exchange rate system, this would require inflation to be lower than in other countries, and may even require wage cuts. Under both regimes the eventual real effects on the economy will be the same; real relative prices are adjusting even if it is nominal exchange rates that are facilitating the adjustment.

13 A high proportion of foreign currency transactions is associated with transactions relating to the trade of financial instruments and assets rather than transactions relating to the trade of goods and services. This has led some to argue that the exchange rate will often move in a direction that is inconsistent with restoring the balance of aggregate supply and aggregate demand in the economy. In other words, they claim that the exchange rate may fail to depreciate when UK output and employment are weak, or to appreciate when they are strong. According to this view, exchange rate movements may be at best an unreliable means of stabilising the economy, and at worst may be frequently destabilising. For example, Willem Buiter, in his contribution to the EMU study *Submissions on EMU from leading academics* describes sterling exchange movements in the late 1990s as follows: “the UK exchange rate behaved rather like a rogue elephant, going its own way regardless of the behaviour of nominal interest rates . . . and other observable fundamentals”.

14 Whether exchange rate movements help to stabilise the economy or not depends in part on the context in which the exchange rate movement is occurring, including the pressures that are generating the exchange rate change itself. For example, if the domestic economy is already operating at full capacity, then the extra demand created by an exchange rate depreciation will tend to raise domestic inflation. This will take the real exchange rate back to its initial level, giving no permanent change in the price competitiveness of UK production in foreign markets. By contrast, if the domestic economy is operating at below full capacity,

domestic inflation is unlikely to offset fully the initial depreciation, leading to a sustained rise in the price competitiveness of UK products in foreign markets, which should raise the demand for UK exports. In the first case, nominal exchange rate changes will tend to destabilise the economy, while in the second case a depreciation can help to stabilise it.

15 Empirical studies have found that domestic consumer prices tend to react slowly to changes in the nominal exchange rate – a phenomenon known as ‘exchange rate disconnect’. This could imply that the exchange rate has a weaker influence on consumption and production decisions than predicted by standard economic theory, and consequently plays a limited role in macroeconomic adjustment.

16 However, exchange rate changes have a much greater impact on the prices of imported goods, including imports that are used to produce other goods, than they do on final consumer goods. This implies that nominal exchange rate changes do change price structures in the domestic economy, even if the impact on consumer prices is muted. The changes in prices that do occur may still influence firms’ purchasing and production decisions in a way that is consistent with macroeconomic adjustment. For example a nominal exchange rate depreciation will still tend to raise the domestic price of UK imports and reduce the foreign currency price of UK exports, and hence improves the competitiveness of UK production relative to foreign production.

Empirical evaluation suggests exchange rate changes act as a safety valve

17 A number of studies have used a range of empirical methods to evaluate the role of the exchange rate in macroeconomic adjustment. Econometric analysis suggests that exchange rate movements have not been a significant source of shocks to the UK economy as a whole. Instead exchange rate changes appear to have absorbed shocks that might otherwise have had a greater impact on UK output and prices. A striking example of this safety valve role is sterling’s strong appreciation after 1996, which did not result in higher unemployment or a collapse in inflation, but nonetheless restrained the net export contribution to demand and probably alleviated some of the inflationary pressure that might otherwise have occurred.

18 Whether exchange rate flexibility is a significant stabilising mechanism or not is harder to resolve. Econometric evidence finds that large exchange rate movements do not typically affect other macroeconomic variables. This could be because the exchange rate change helps to absorb an otherwise unobserved shock. But it could be that observed exchange rate movements are purely extraneous. Both the size and the speed of exchange rate changes can be difficult to explain in terms of movements in fundamentals, suggesting that on occasion exchange rate changes may be at least partly driven by other factors, such as financial market sentiment. Without observing the counter-factual of what would have happened had the exchange rate not moved, it is not possible to establish conclusively the extent to which particular exchange rate movements have or have not been warranted.

19 As the experience of the past few years has confirmed, large exchange rate movements can be destabilising for individual business sectors, even when they help to stabilise the economy as a whole. Exchange rate movements impact more strongly on exporters and importers than on the economy as a whole, with large exchange rate changes posing particular difficulties for those sectors which are highly sensitive to exchange rate changes. But the potential benefit of fixed exchange rates to the traded goods sector may be less than is sometimes claimed. As already noted, real exchange rates can still adjust when nominal rates are fixed, with adjustment coming through movements in relative price levels. Since it is the real exchange rate that influences the price competitiveness of exporters and importers in their respective markets, they will still find their price competitiveness will tend to rise and fall in response to the differences in the strength of economic activity in different markets. Since domestic prices tend to move more slowly than exchange rates, companies tend to have more time to adjust when nominal exchange rates are fixed, but their price competitiveness will still be affected by real exchange rate changes.

- Sterling strength since 1996** **20** In recent years, sterling remained persistently above most estimates of its sustainable rate, including the central estimate derived by Professor Wren-Lewis in his EMU study *Estimates of equilibrium exchange rates for sterling against the euro*. This appreciation appears to be partly attributable to the relatively strong domestic demand growth in the UK compared with the euro area. This may have warranted a degree of sterling appreciation against the euro, both to prevent the UK economy overheating and to bolster demand for euro area production. It is important to emphasise that interpretation of recent events is made more difficult by uncertainty about both the scale and persistence of currency market reactions to the particularly high degree of global political and economic uncertainty.
- Alternative adjustment mechanisms** **21** Empirical evidence also suggests that countries with fixed exchange rates do not tend to experience greater macroeconomic volatility than countries with flexible exchange rates. This is consistent with the insight from optimal currency area theory that fixed exchange rate regimes need not impair an economy's ability to adjust to shocks, provided that alternative adjustment mechanisms operate effectively. These include appropriate levels of wage and price flexibility and the capacity to redeploy resources flexibly in response to changing economic conditions.
- Exchange rate volatility within EMU** **22** A second strand of empirical analysis developed for this study assesses whether entering EMU would lead to an overall reduction in UK nominal exchange rate volatility. If the UK were to join EMU exchange rate volatility against other euro area economies would be eliminated. But exchange rate volatility against other currency areas could conceivably increase. In recent years the euro has been more volatile against the US dollar than sterling has been against the US dollar. If these trends were typical, then the UK exchange rate against the US dollar would be more volatile within EMU than outside. Some studies have claimed that greater volatility against the US dollar would more than offset the elimination of volatility against euro area countries.
- 23** Measures of volatility need to be interpreted carefully. To the extent that exchange rate movements aid macroeconomic adjustment, some exchange rate volatility may be useful. But to the extent that exchange rate volatility disrupts the economy then it may be considered unwarranted. Summary measures of volatility are unable to distinguish whether observed volatility is warranted or not.
- 24** That said, the analysis in this study shows that, in general, overall exchange rate volatility would tend to be lower if the UK were to join EMU. But this result varies in different contexts. The reduction in volatility is greatest in situations where, if sterling were independent, it would be moving against an unchanged euro-US dollar rate. In these circumstances, fixing the sterling-euro rate not only eliminates volatility against the euro, but also eliminates volatility against other currencies as well. By contrast, in circumstances of sharp adjustment in the euro-US dollar rate, the overall volatility of sterling might be higher within EMU than outside. While such circumstances have arisen in the past, and can be expected to arise in the future, this analysis suggests that more typical scenarios are ones in which the elimination of nominal exchange rate volatility against the euro area economies would outweigh any increase in sterling volatility against non-euro currencies.
- Conclusions: the role of the exchange rate** **25** Although it can be difficult to relate exchange rate changes to changes in economic fundamentals, they do appear to have generally helped to stabilise the economy. Consequently, fixing the euro-sterling exchange rate would remove one of the adjustment mechanisms that is currently available to the economy. However, this need not be costly, provided that other adjustment mechanisms, such as labour market flexibility and fiscal stabilisation operate effectively. These issues are considered further in the convergence and flexibility tests – the first and second of the Government's five economic tests for EMU entry.

INTRODUCTION

1.1 A central question when considering the costs and benefits of joining a monetary union is the role of the exchange rate in the economic adjustment process. If an independent flexible exchange rate were an effective mechanism in helping the domestic economy to adjust to shocks and disturbances, then the loss of this mechanism as a result of joining a monetary union would entail a cost to the domestic economy. Conversely, if an independent exchange rate were itself a source of shocks to the economy, for example if its movements were mainly driven by ‘irrational movements’ in financial markets rather than by economic fundamentals, then forgoing the independent exchange rate would be a benefit to the economy.

1.2 This debate has been mirrored in the history of international exchange rate regimes in the twentieth century. Over this period, developed nations alternated between fixed and floating regimes, encountering problems with each.¹ This provides a useful illustration of the dilemmas facing policy makers choosing between fixed and flexible exchange rate systems.

1.3 The role of the exchange rate in macroeconomic adjustment has been a feature of the debate over whether the UK should join Economic and Monetary Union (EMU). Currie (1997) argues that both views of the exchange rate, as either a source of shocks or a shock absorber, have some element of truth: “*exchange rates do tend to play a useful role, but also incorporate a large arbitrary and disruptive element*” (page 6).

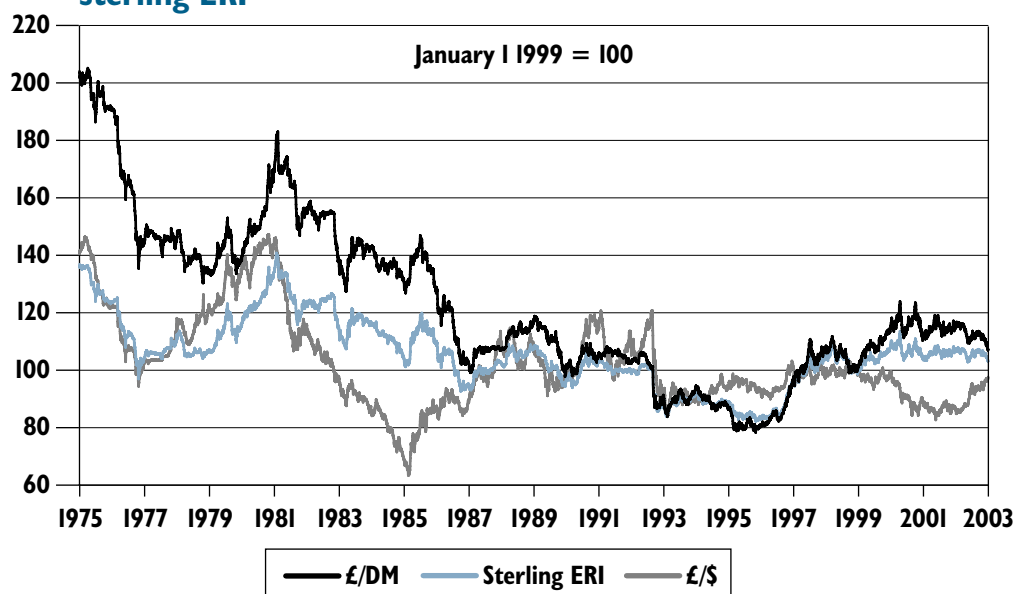
1.4 Those who advocate EMU entry often highlight the potentially disruptive role of exchange rate movements. For example, Layard *et al.* (2002) state: “*An independent exchange rate is... often a source of shocks to the economy rather than a means of offsetting them. These shocks may be large and potentially very damaging for an economy of Britain’s size*” (page 9).

1.5 Chart 1.1 shows the bilateral nominal exchange rates of sterling-deutschmark (sterling-euro from 1 January 1999), sterling-US dollar and the sterling exchange rate index (ERI)² since 1975. It is clear that the exchange rate is fairly volatile. The question is the extent to which these movements in nominal, and real, exchange rates are stabilising responses to actual, or perceived, changes in fundamental factors affecting the economy, and the extent to which they are simply unwarranted and destabilising shocks. This issue was not considered in detail in the October 1997 assessment of the Government’s five economic tests (HM Treasury, 1997). However, the issue is more prominent now, partly due to the persistent strength of sterling in relation to the euro during much of the intervening five and a half years.

¹ For a brief history of exchange rate regimes in the twentieth century, see the 2002 Cairnross lecture given by Ed Balls, Chief Economic Adviser to the Treasury (Balls, 2002).

² The exchange rate index is a weighted average of sterling’s bilateral exchange rates against other countries. The weights broadly reflect each currency’s importance in UK foreign trade. See Annex B of this study for more detail.

Chart I.1: Sterling-deutschmark (sterling-euro from 1 January 1999) and sterling-US dollar bilateral exchange rates and sterling ERI



Source: Bloomberg, Bank of England and HM Treasury calculations.

Relation to other EMU studies

I.6 To inform the assessment of the five economic tests, HM Treasury has produced four EMU studies relating to the exchange rate. The EMU study by Professor Simon Wren-Lewis *Estimates of equilibrium exchange rates for sterling against the euro* and the studies by HM Treasury *Modelling shocks and adjustment mechanisms in EMU* and *Modelling the transition to EMU* complement this study. Professor Wren-Lewis's study focuses on economic models of the medium and long-run real exchange rate, and estimates a medium-run equilibrium rate for sterling. This is done using a methodology that calculates the exchange rate that is consistent with internal and external balance.³ The HM Treasury studies consider how the macroeconomic costs of adjustment to economic shocks in the UK compare inside and outside of EMU, and the role of the exchange rate in determining the UK's transition path, if the UK were to decide to join EMU.

I.7 This study focuses on the role of the nominal exchange rate when the economy is away from equilibrium. It considers how the real exchange rate responds to imbalances between aggregate supply and demand, and the part that real exchange rate movements play in enabling the economy to adjust to unexpected events or shocks. The real exchange rate is an important concept since it represents the price competitiveness of UK production relative to foreign production. It is defined as the level of the nominal exchange rate adjusted for relative price levels at home and abroad. In practice, this adjustment can be done in a number of different ways and there are several different measures of the real exchange rate (see Box 1.1).

I.8 The analysis presented in this study helps to provide an explanation of why the real exchange rate may depart from the equilibrium level in the short to medium run. The implications of this for the possible exchange rate for entry to EMU are considered further in the EMU study *Modelling the transition to EMU*. All these studies inform HM Treasury's assessment of the convergence test – the first of the five economic tests for EMU entry.

³ Internal balance is defined as the level of output consistent with maintaining inflation at target. External balance is a sustainable external current account balance.

Box 1.1: Nominal, real and effective exchange rates

A number of different exchange rate concepts are used in this study.

Nominal exchange rates are the rates that are determined in the currency markets. They simply represent the price of one currency in terms of another.

Real exchange rates adjust the nominal exchange rate to take account of cross-country differences in price levels. By using different measures of prices, different real exchange rate measures can be derived. There are two main approaches:

- the first approach is relevant for assessing the extent to which nominal exchange rate movements affect the price competitiveness of its exports. If country A has a higher inflation rate than country B, then its products will lose price competitiveness unless there is an offsetting depreciation of its nominal exchange rate. Real exchange rate measures based on price measures such as relative export prices or relative unit labour costs show whether a nominal exchange rate change has changed a country's price competitiveness or merely served to offset the effect of difference in inflation rates; or
- alternatively, measures based on relative consumer prices provide an indication of how nominal exchange rate changes have affected consumers' purchasing power. Such measures include the prices of goods and services that are not traded across borders.

Effective (or trade-weighted) exchange rate indices are a weighted average of bilateral exchange rates. For example, if sterling appreciated against the euro but depreciated against the dollar, the effective exchange rate provides a measure of whether these movements cancel each other out or not. The weights in an effective exchange rate generally reflect the relative importance of different foreign currencies for the home country's trade. Effective exchange rate indices can be constructed either as a weighted average of nominal bilateral exchange rates or real bilateral exchange rates.

Structure of the study 1.9 The study is structured as follows:

- Section 2 of the study considers how the exchange rate is determined;
- Section 3 considers the role of the exchange rate in the adjustment process, and also the question as to whether nominal exchange rate flexibility provides an additional source of shocks to the economy;
- Section 4 examines the empirical evidence on the role of the exchange rate;
- Section 5 provides an interpretation of sterling's strength against the euro since 1996;
- Section 6 looks at how the overall volatility of the exchange rate might compare inside and outside of EMU;
- Section 7 sets out the study's conclusions on the role of the exchange rate;
- Annex A presents the results of a new structural vector autoregression (SVAR) model of the UK economy; and
- Annex B examines the weightings used to construct the UK ERI.

2

MODELS OF EXCHANGE RATE DETERMINATION

At any point in time, the exchange rate is determined in the currency markets, as the price which clears the supply of and demand for currencies. The aggregate supply and demand for currency is generated by different types of transaction: trade in goods and services, investment income flows and asset market transactions.

The uncovered interest parity (UIP) condition states that the interest rate differential between two currencies must be equal to the expected change in the exchange rate between those currencies. This suggests that interest rate differentials provide some information about expected short-term movements in the exchange rate, and also that the current exchange rate should be determined in large part by expectations of its future value. But it provides no information about what influences these expectations.

Purchasing power parity (PPP) provides a long run explanation of exchange rate levels. It states that the exchange rate moves to equate the price of goods across countries. However, there are several reasons, both theoretical and empirical, why PPP may not hold over shorter time horizons.

Macroeconomic models note that the exchange rate must move to balance the external balance of payments and that this will entail balancing current account flows with financial account flows. This balancing will determine the level of the exchange rate.

To the extent that misalignments in relation to the medium-term level assist the short run adjustment process, they may not be undesirable. But large and persistent deviations from medium-term levels may be of greater concern, since they may affect the equilibrium to which the economy eventually returns.

Over the short term, no structural model of the exchange rate provides better forecasts of future exchange rates than simple models which predict the exchange rate will be unchanged from current levels. This has sparked research into characteristics of foreign exchange markets that may explain why the exchange rate moves independently of fundamentals over the short run.

2.1 This section contains a brief review of models of exchange rate determination, emphasising the role of product market and asset market demands in influencing the overall supply of and demand for different currencies. The section also examines the unpredictability of short-term movements in the exchange rate and considers how this is related to the efficient markets principle.

2.2 At any point in time, the exchange rate moves to clear the supply of, and demand for, currencies. For analytical purposes, it is helpful to distinguish between the demand for foreign currency associated with product market flows and the demand associated with asset market flows. By focusing on each of these in turn, economic theory has developed plausible models of the factors that determine exchange rates in the short, medium and long term.

2.3 For the purposes of this study, the short term simply reflects the existing state of the economy; the medium term reflects expectations as to how the economy will evolve, as the economy adjusts to bring aggregate supply and demand into balance, and the long term reflects the further evolution of the economy in response to slower moving trends, such as changes in demographic structure.¹ By combining these theories, it is possible to provide a coherent view of exchange rate determination. However, as is explained below, that does not make exchange rates predictable, particularly over short horizons.

¹ The EMU study by HM Treasury *The five tests framework* considers various different definitions of the short, medium and long run, and their relevance to analysis of EMU.

**Arbitrage in
asset markets:
uncovered
interest parity**

2.4 Financial asset holders aim to maximise their return from holding either domestic or overseas assets. The return from holding overseas assets depends on both the nominal return from these assets, in foreign currency terms, and the expected capital gain from movements in the exchange rate. In perfect capital markets and abstracting from risk, this leads to the uncovered interest parity condition (UIP), which states that the interest rate differential between two currencies (comparing domestic and foreign assets that have the same characteristics apart from their currency of denomination) must be equal to the expected change in the exchange rate between those currencies. Hence if interest rates were one percentage point higher in the UK than in the euro area, the expected return on holding sterling and euro area assets would only be equal if investors expected sterling to depreciate by one per cent over the following 12 months.

2.5 This relationship suggests that interest rate differentials should determine the path that the exchange rate is expected to take in the future. But it also highlights that the expected future value of the exchange rate is an important influence. This determines not only the eventual level of the exchange rate, but also, when combined with the expected paths of domestic and foreign interest rates, the current level of the exchange rate. Hence the UIP condition needs to be combined with theories that consider medium and long-term influences on the exchange rate, with the UIP relation helping to explain the path by which the exchange rate is expected to adjust to its long term level.

**Arbitrage in
product
markets:
purchasing
power parity**

2.6 Purchasing power parity (PPP) provides a long run explanation of exchange rate levels. It states that the exchange rate moves to equate the price of goods across countries. Suppose there was just one, uniformly traded, good and transport costs were zero. If this good could be bought more cheaply overseas than in the UK, everyone would buy the good overseas. The demand for sterling would fall, leading to a depreciation, which would continue until the two goods had the same sterling price.

2.7 There are several reasons, both theoretical and empirical, why PPP may not hold. The extent to which purchasing power parity holds depends on how easy it is to engage in arbitrage when price differentials exist. This varies considerably depending on the characteristics of individual goods and services. Many financial instruments can be arbitrated readily and at low cost, while arbitraging of goods and services may be slow and costly. This may be a result of the time and cost required to set up distribution networks. Arbitrage opportunities may also be affected by transport costs, regulations and currency risk. For a more detailed discussion see the EMU study by HM Treasury *Prices and EMU*.

2.8 PPP, in terms of consumer prices, would also break down if consumers' preferences differed between countries (so they bought a different basket of goods). For goods that are traded, barriers to trade will also lead to a 'home bias' in consumption, causing an effect similar to that arising from different preferences. In addition, if producers of any type of good have market power, then this will enable them to price to market (see Section 3), so the mark-up on costs becomes specific to the destination where the goods are sold. A fuller account of the theory of PPP can be found in the EMU study by Professor Simon Wren-Lewis *Estimates of equilibrium exchange rates for sterling against the euro*.

**Macroeconomic
balance models**

2.9 Macroeconomic balance models highlight the fact the exchange rate must move to balance the external balance of payments. This will entail balancing current account flows with financial account flows.

2.10 The EMU study by Professor Simon Wren-Lewis *Estimates of equilibrium exchange rates for sterling against the euro* uses a medium-term version of this approach. It considers the exchange rate consistent with internal and external balance, where internal balance is defined as the level of output consistent with maintaining inflation at target, and external balance as a sustainable external current account balance. These additional conditions may not be satisfied in the short run, when the economy is in the process of adjusting to a supply or demand shock, but they need to be satisfied once the adjustment processes are complete.

Exchange rate misalignments

2.11 Deviations of the exchange rate from its medium to long run levels are often viewed as misalignments or evidence of over or under valuation. Such descriptions need to be interpreted with care. In particular, it is important to recognise that deviations of the exchange rate from its medium or long-term level may be an important part of the process that restores equilibrium following a shock, just as fluctuations of the real interest rate around its long-run level can help to bring the economy back to balance.² To the extent that misalignments in relation to the medium term level assist the short-run adjustment process, they may not be undesirable (see Section 5). But large and persistent deviations from medium-term levels may be of greater concern, since they may affect the equilibrium to which the economy eventually returns.

Exchange rate predictability ...

2.12 Although the models discussed above provide valuable insights into exchange rate determination, they are only of limited use in making short-term predictions of future exchange rate movements. In practice, exchange rates have exhibited much greater volatility over short-term horizons than these models would suggest. Analysis presented in Section 6 shows that the sterling-euro exchange rate has typically fluctuated by 1.3 per cent around its average value over a 60 day period, and the US dollar-euro exchange rate by 2 per cent (Table 6.1). It should be noted that these are average values, and in some periods the fluctuation has been much greater, and in other periods much less.

2.13 Meese and Rogoff (1983) found that no structural model of the exchange rate, including variants of all the models described above, could provide better forecasts of future exchange rates than a simple 'random walk' model that predicts that the exchange rate will be unchanged from its existing level. Subsequent research suggests that the explanatory power of structural models is superior over the long run, which is consistent with the idea that, for example, PPP holds over the long run. And some researchers are now optimistic about the forecasting ability of short and medium-run models. Nonetheless, the conclusion that, over short-run time horizons, the current level of the exchange rate is as good a predictor of future exchange rates as other models is generally accepted.³

... and the role of the market

2.14 The efficient markets hypothesis provides an explanation of why exchange rate changes are difficult to predict. Markets are considered to be efficient if prices incorporate all publicly available information, including expectations of future policies. If the price of an asset were generally expected to rise tomorrow, traders, anticipating this, would buy the asset today. This would drive the price of the asset up until the total expected return was the same. If the markets were not efficient, the possibility of making arbitrage profits would exist, and traders could consistently make quick speculative gains. In efficient markets, the possibility of making speculative gains still exists but, provided that the individual trader does not have privileged information that is unavailable to the market as a whole, any speculative position is as likely to yield losses as gains.

² The EMU study *Modelling shocks and adjustment mechanisms in EMU* examines in detail the role that the exchange rate plays in facilitating this adjustment.

³ Taylor (1995), and Frankel and Rose (1995) contain comprehensive reviews of empirical studies of exchange rates. Meese and Rogoff (1983) showed that structural models are poor predictors of future exchange rates. Mark (1995) and Chinn and Meese (1996) find evidence that they work better over long horizons. Macdonald (1999) suggests that short and medium term models can help to improve forecasts. Frankel and Rose (1995) conclude that "the Meese and Rogoff analysis at short horizons has never been convincingly overturned or explained".

2.15 If this is the case, then movements in the exchange rate away from the expected path given by UIP should be driven by unanticipated developments (including economic shocks). These should be equally likely to cause the exchange rate to appreciate as to depreciate. Empirical evidence suggests that the effect of such unpredictable information will tend to dominate the short-term predictability arising from the UIP condition.⁴

Alternative explanations

2.16 The weak relationship between the actual exchange rate and longer-term determinants has sparked research into characteristics of the foreign exchange market that might cause the exchange rate to move independently of economic fundamentals. This includes how the positions taken by foreign exchange traders and by investors operating on technical analysis might influence outcomes. This research indicates that while such behaviour may influence day-to-day movements, it typically has limited effects over longer horizons when flows associated with fundamental factors are more dominant (Box 2.1). However, such strategies may be influential when there is increased uncertainty about whether existing levels are sustainable or not.

Box 2.1: Effect of trading strategies on the exchange rate.

One strand of research on exchange rate determination analyses how trading strategies may affect exchange rate levels by examining the microstructure of the foreign exchange market (for example see Lyons, 1993). This approach is made more difficult because foreign exchange traders deal bilaterally, rather than through a central exchange like a stock market. This means that transactions have generally not been observable, though this condition is now changing as more trading takes place through electronic market places. This research suggests that traders in the foreign exchange market operate at very short-term horizons, and the average holding period for foreign exchange transactions is found to be short, i.e. less than one day. Surveys of market players suggest that, over the short-term, non-fundamental factors dominate trading, but that over the long run traders believe fundamental economic factors are important (Cheung *et al.*, 2000).

Another line of research has focused on whether expectations are stabilising or destabilising. An example of the latter case is the ‘bandwagon’ effect, where, for example, an exchange rate appreciation leads to expectations of a further appreciation. Empirical research suggests different types of expectations operating over different time periods. Over the short term, expectations can be shown to be destabilising, with traders extrapolating current currency movements. But over the longer-term expectations can be shown to be stabilising, consistent with the idea that over the long run fundamentals anchor the exchange rate (Frankel and Froot 1987, 1990; Ito 1994).

Research has also considered the influence of technical analysts, such as ‘chartists’, who advise traders on the basis of historical patterns in prices. Surveys by Allen and Taylor (1989) find that the advice of such analysts is used widely in the markets. An implication is that the foreign exchange market is far from the homogeneous entity implied in most of the theoretical models. Rather it is made up of diverse groups of agents who interpret the same information in different ways. Goodhart (1988) and Frankel and Froot (1990) devise models where chartists operate alongside ‘fundamentalists’. These models show that exchange rate movements may be influenced by chartists for a period but that fundamentals eventually reassert themselves.

⁴ Some recent research, for example Taylor *et al.* (2001) suggests that the real exchange rate may revert to equilibrium (in this case given by PPP) more quickly than previously thought, and that the rate of reversion is non linear, i.e. it is faster the further away the actual rate is from equilibrium. A possible explanation for this is that transaction costs create a real exchange rate band, inside which PPP will not hold because the marginal cost of arbitrage exceeds the marginal benefits. However, outside the band arbitrage opportunities increase rapidly, so the pressures for the real exchange rate to return to equilibrium are much greater.

Under both floating and fixed nominal exchange rate regimes, the real exchange rate provides one of the adjustment mechanisms that balances aggregate demand and aggregate supply in the medium and long run.

When nominal exchange rates are fixed, all of the adjustment in real exchange rates is brought about by differential movements in domestic and foreign price levels.

When nominal exchange rates are flexible, part or all of any real exchange rate adjustment may be achieved through adjustment of nominal exchange rates.

Even though the pass-through from exchange rate changes into consumer prices is slow in the UK, the pass-through into the domestic prices of intermediate goods and import prices is relatively rapid. This provides a channel through which exchange rate changes affect purchasing, supply and investment decisions.

The foreign exchange market is dominated by asset market flows. Some have argued that this makes flexible exchange rates an additional source of shocks to the economy.

But asset market flows are likely to reflect the strength or weakness of economic activity in different countries. Asset inflows into strong economies will tend to contribute to an exchange rate appreciation, and outflows from weak economies to contribute to an exchange rate depreciation. Hence it is likely that exchange rate movements generated by asset market flows will, on average, tend to assist macroeconomic adjustment.

3.1 This section reviews how nominal exchange rate changes impact on the wider economy, with a particular focus on whether or not the exchange rate moves to stabilise the economy when there is an imbalance between aggregate supply and aggregate demand:

- the starting point is a review of optimal currency area (OCA) theory which investigates the conditions under which nominal exchange rate flexibility may enable an economy to adjust to macroeconomic imbalances more efficiently than fixed exchange rates;
- the second subsection considers how flexible exchange rates may promote macroeconomic adjustment, comparing this with how real exchange rate adjustment is achieved when nominal exchange rates are fixed;
- the third subsection considers how the pass-through from exchange rates into domestic prices may affect the extent to which exchange rate movements promote macroeconomic adjustment; and
- the final subsection considers contexts in which exchange rate flexibility fails to promote macroeconomic adjustment, and the argument that exchange rate flexibility more often destabilises than stabilises the economy, notably when volatile asset market flows dominate exchange rate movements.

Optimal currency areas

3.2 Economists have long debated the merits of fixed versus flexible exchange rates. One of the central themes of this debate has been whether flexible exchange rates provide a mechanism that allows economies to make adjustments to economic change and disturbances, or whether the exchange rate is itself a source of volatility to the economy. This

debate led to the theory of optimal currency areas, first set out by Mundell in 1961, which addresses the issue of how best to choose which geographical areas should share a single currency.¹

Optimal currency area theory ...

3.3 OCA theory suggests that the balance of advantages and disadvantages between fixed and floating exchange rates varies according to the manner and extent of economic integration between countries. It identifies those features that tend to favour countries maintaining fixed exchange rates and those that tend to favour flexible exchange rates. Flexible exchange rates would be preferred where they enhance the ability of the economy to absorb economic shocks. Fixed exchange rates would be preferred where their benefits outweigh the additional cost of achieving macroeconomic adjustment via other mechanisms, such as relative wage and price movement and/or factor mobility.

3.4 OCA theory assumes that factors of production, such as labour and capital, are mobile internally but immobile externally. For example, it is assumed that labour moves between regions of an OCA, but does not move significantly into or out of the OCA. OCA theory also assumes that there is limited price and wage flexibility in the economy. With limited price and wage flexibility, it is the internal mobility of factors of production which allows the OCA's economy to adjust smoothly to an *internal* asymmetric shock. For example, if demand for a good produced in a sub-region of the OCA falls, mobility of labour prevents unemployment from occurring in the sub-region.

... and the role of the exchange rate

3.5 Because it is assumed that factors are not as mobile externally, this adjustment mechanism cannot stabilise the economy following a shock with asymmetric effects on the domestic and foreign economies. Instead, and in the absence of price and wage flexibility, stabilisation is achieved by adjustment of the nominal exchange rate, which brings about the necessary adjustment of the real exchange rate to restore balance of payments equilibrium. An OCA hit by a shock that decreases demand for its exports would undergo a nominal exchange rate depreciation, as decreased foreign demand for exports drives down the price of domestic currency. This depreciation will decrease the price of exports and so increase foreign demand, countering the impact of the shock without causing domestic unemployment. Conversely, a positive demand shock will lead to a nominal exchange rate appreciation rather than cause domestic inflation.

3.6 In each case, nominal exchange rate flexibility has smoothed the effects of a shock; preventing inflation in the case of the positive demand shock, and unemployment in the case of the negative demand shock. The flexible exchange rate has in effect allowed real wages to adjust quickly to a disturbance; this adjustment could not easily take place directly through wages and prices, due to their limited flexibility.

3.7 The subsequent development of OCA theory has deepened the analysis of the conditions that determine whether the exchange rate is an efficient stabilising mechanism. Various authors have argued that other conditions may affect the OCA criteria, including the extent of trade integration, fiscal integration and whether an economy's production structure is concentrated in a few industries or is diversified across industries. Mundell (1973) noted that a common currency could enable different regions to share risks more efficiently.

Conclusions on OCA theory

3.8 Although these extensions provide for a richer analysis, they do not alter the two main insights from optimal currency area theory, namely:

¹ The EMU study by HM Treasury *The five tests framework* has a detailed discussion of the theory of optimal currency areas. McKinnon (1963) and Kenen (1969) made important early contributions to this literature. McKinnon (2002) and the contributions of Robert Mundell, Peter Kenen and George Tavlas to the EMU study *Submissions on EMU from leading academics* consider how OCA theory applies to EMU.

- the ease with which labour and capital can flow between different activities in response to changing patterns of supply and demand will determine how well an economy can respond to economic shocks; and
- that, under certain conditions, for example in the absence of wage and price flexibility, exchange rate flexibility may be a useful way of aiding macroeconomic adjustment.

The exchange rate as a stabilising mechanism

3.9 This section considers the role of real exchange rate adjustment in stabilising the economy under both fixed and floating exchange rate regimes.

Definition of the real exchange rate

3.10 Box 1.1 in Section 1 explains that the real exchange rate is defined as the level of the nominal exchange rate adjusted for relative price levels at home and abroad. When nominal exchange rates are fixed, all of the adjustment in real exchange rates must be brought about by differential movements in the domestic and foreign price levels. But when nominal exchange rates are flexible, part or all of any real exchange adjustment may be achieved through adjustment of nominal exchange rates.

3.11 The real exchange rate is an important concept, since it represents a country's terms of trade – the relative price of domestic and foreign production. Movements in the real exchange rate can therefore influence the balance of supply and demand between domestic and foreign goods and services. In doing so, real exchange rate adjustment can help to eliminate macroeconomic imbalances and stabilise the economy.

Effect of economic shocks

3.12 At a macroeconomic level, unexpected economic events, or 'shocks', affect the balance between aggregate demand and aggregate supply. By definition, they will mean that an economy that was previously in internal and external balance will no longer be so. This section describes the impact of macroeconomic imbalances on the real exchange rate, and how, in principle, movements in the real exchange rate can act to eliminate the initial imbalances, and hence to stabilise the economy.

Adjustment in a fixed exchange rate regime

3.13 When exchange rates are fixed, and there is a situation where there is excess demand for domestic production, then upward pressures on the domestic price level will cause the real exchange rate to appreciate. This will encourage a switching of demand towards foreign suppliers, and a switching of supply towards domestic markets. Both effects reduce, and eventually eliminate, the initial excess demand. A similar argument can be used to demonstrate that a real exchange rate depreciation, brought about by falling relative price levels, will eliminate excess supply. If wages and prices are slow to adjust, this could lead to prolonged periods of real exchange rate misalignment. This may be particularly so if the requisite shift in relative prices should require a cut in nominal wage levels domestically, an outcome that is more likely in a low inflation environment.²

3.14 In other words, when nominal exchange rates are fixed, any adjustment in the real exchange rate that may be needed to maintain or restore macroeconomic balance can only come about through differential movements in inflation. That means that if the UK were in EMU, then UK inflation would tend to be higher or lower than the euro area average if a real exchange rate appreciation or depreciation were needed. Such changes have already occurred within the existing euro area, where inflation in the Netherlands and Ireland has been relatively strong and inflation in Germany relatively weak (see Box 3.1).

² The possibility that it may be more difficult to achieve a real depreciation than a real appreciation within EMU is considered further in the EMU study by Professor Simon Wren-Lewis *Estimates of equilibrium exchange rates for sterling against the euro*. The issue of wage flexibility is reviewed in the EMU study *EMU and labour market flexibility*.

Box 3.1: Inflation divergence within the euro area

The experiences of the Netherlands, Ireland and Germany illustrate the point that national inflation rates may be different within EMU, depending on whether demand is relatively weak or relatively strong.

Between 1999 and 2002 euro area inflation averaged 2 per cent a year. But inflation in Ireland averaged 4.1 per cent a year and in the Netherlands 3.3 per cent a year. In both cases these figures were boosted by tax changes, but even allowing for this, their inflation rates remained higher than in other euro area countries. This reflected strong demand growth and tight labour markets. By contrast, relatively weak demand growth and high unemployment has contributed to lower inflation in Germany, averaging 1.4 per cent a year.

Average inflation rates since 1999

	1999	2000	2001	2002
Germany	0.6	1.5	2.1	1.3
The Netherlands	2.0	2.3	5.1	3.9
Ireland	2.5	5.3	4.0	4.7
Euro area	1.1	2.1	2.4	2.2

These developments have been recognised as providing each economy with appropriate real exchange rate changes. For example, Blanchard (2001) argues that inflation had a clear role to play in alleviating excess demand in Ireland and warns against ‘demonising’ inflation differentials in EMU. The OECD (2002) concluded that inflation had played an important role in eroding the overly competitive position of the Netherlands in relation to other euro area countries. Similarly, the European Commission (2001) note that “domestic inflation may well be a desirable part of an adjustment process in a monetary union. If external demand is the main source of overheating, inflation is the natural instrument to return to equilibrium”.

3.15 However, other adjustment mechanisms are also available. The EMU study *Modelling shocks and adjustment mechanisms in EMU* examines alternative mechanisms that can reduce the required response of the real exchange rate to external shocks when the nominal rate is fixed. The study also further examines how the UK economy would respond to shocks in EMU compared to outside.

Adjustment in a floating exchange rate regime

3.16 Similar adjustment processes operate in a floating exchange rate regime. But in this case, movements in the nominal exchange rate provide an alternative route for achieving the required real exchange rate adjustment. Some, or indeed all, of the required real exchange rate adjustment may be achieved by an appropriate change in the nominal exchange rate, so that the required adjustment in domestic and foreign price levels will tend to be smaller.

3.17 A particular case to note is where both the home and foreign economies are following identical inflation targets. Under these conditions both monetary authorities will tend to adjust their respective policies to ensure that they meet their targets, with the result that the real exchange rate adjustment will be predominantly achieved through the nominal exchange rate. By contrast, in a monetary union, when a country experiences a shock that requires its real exchange rate with respect to other countries in the union to change, this can only be achieved by a period in which its inflation rate is temporarily above or below inflation in the rest of the monetary union.

Conclusions on real exchange rate adjustment **3.18** The preceding analysis implies a country's real exchange rate will ultimately reflect underlying economic conditions, irrespective of whether nominal exchange rates are fixed or floating. But the adjustment mechanism is different, with adjustment in the domestic price level being greater under a fixed exchange rate regime. Under flexible exchange rates, the movement in the nominal exchange rate can cushion some of the impact on the domestic price level, and consequently may act as a shock absorber.

Exchange rate changes and domestic prices

Imperfect pass-through may reduce the impact of nominal exchange rates **3.19** For a flexible nominal exchange rate to act as an effective stabilisation mechanism, nominal exchange rate changes must 'pass-through' into changes in the domestic price level. Pass-through is defined as a relationship between the nominal exchange rate and the domestic price level. If a flexible nominal exchange rate is to operate as an adjustment mechanism, a nominal depreciation must raise the consumer price of imported goods relative to domestic goods, thereby encouraging consumers to buy domestic rather than foreign goods. But some evidence suggests that nominal exchange rate movements are not fully passed through to consumer prices. This limits the impact on relative prices experienced by consumers, which determines whether they opt to buy domestic or foreign goods.

Pricing strategies **3.20** The effect of an exchange rate change on relative prices experienced by domestic consumers will depend on the pricing strategy of exporting firms:

- the effect is greatest when exporters set prices in domestic currency and then translate this price into foreign currency at the prevailing exchange rate (known as producer currency pricing – PCP); or
- an alternative is that an exporting firm keeps its price fixed in foreign currency and accepts the resulting domestic price at the prevailing exchange rate (this is local currency pricing – LCP). In this case, a nominal exchange rate appreciation reduces the exporter's profit margin, but may not affect the consumer price or the quantity sold in the importing country.

Pricing to market **3.21** Exporting firms may use LCP in order to maintain price stability for their consumers. This may occur when firms trading overseas operate in markets dominated by domestically produced goods, and so 'price to market'. Krugman (1989) argues that if there are high sunk costs to trading, for example in setting up trading infrastructure and establishing relationships, then exchange rate fluctuations, within a certain range, are unlikely to cause a firm to exit the market. Rather, firms may remain in the market in the expectation that the exchange rate movement will be temporary. He observes that the large nominal appreciation and then depreciation of the US dollar in the mid 1980s did not have as big an impact on US manufacturing exports and production as might have been expected. He attributes this in large part to the presence of 'price to market' strategies.

3.22 A firm's pricing strategy may also depend on the price elasticity for its goods and on the structure of costs:

- if demand is price inelastic, the firm may prefer to pass-through a domestic currency rate appreciation to the foreign currency price, as the quantity sold will not fall significantly;
- if demand is price elastic, the firm may prefer to keep the foreign price fixed to maintain output levels; and

- similarly, if the firm has increasing returns to scale or high fixed costs, it may prefer to keep foreign price levels stable in the face of an appreciation in order to maintain output levels, but there may be some resultant cost to profit margins that will make it cease to export at all.

3.23 Another explanation for the weak pass-through of exchange rate changes to consumer prices is that for many goods, the production cost of the good is only a small part of the final price paid by the consumer. Other costs such as retail, transport, marketing costs may be little affected by exchange rate changes.

Exchange rate adjustment with LCP

3.24 For goods and services where local currency pricing is strong, adjustment to exchange rate changes may be primarily driven by the way that firms react to changes in their profit margins. For example, exporters may decide that margins are too low to continue trading, or low margins may deter other firms from entering the export market.

3.25 In addition, if imports are intermediate goods then the effect of exchange rate changes on firms' input costs may be much greater than the effect on consumer prices. If this is the case, expenditure switching behaviour by firms rather than consumers allows exchange rates to have an adjustment role.³ For example, importing companies may switch between domestic and foreign suppliers in the face of exchange rate changes. Equally, firms that have production facilities in a number of overseas locations may switch the source of imports in the face of exchange rate changes. In each case, consumer prices may not change after an exchange rate change, but there will have been a change in the demand for foreign and domestic goods.

Empirical evidence on pass-through

3.26 Empirical studies offer evidence in support of the argument that there is not a strong pass-through from exchange rate changes to consumer prices, but that there is at least partial pass-through to import prices:

- McCarthy (2000) looks at surveys of pass-through from exchange rate to **domestic inflation**, reporting several studies that have found this effect to be comparatively weak. The author then analyses pass-through to domestic inflation for several industrialised countries and finds evidence of only a modest pass-through of the exchange rate to consumer prices — including in the UK, Germany and France — over the 1980s and 1990s. Debelle and Wilkinson (2002) find that pass-through to inflation is also muted, and that in the case of Australia it has become more muted over the past two decades. However, for the UK the relationship has been fairly constant; and
- Goldberg and Knetter (1996) review the empirical evidence on pass-through from nominal exchange rate changes to **import prices**. They conclude: *“although there is substantial variation across industries, in many cases half or more of the effect of an exchange rate change is offset by destination specific adjustments of mark-ups over costs”* (Goldberg and Knetter 1996, page 37).

3.27 Tables 3.1 and 3.2 reproduce analysis by Kara and Nelson, which presents correlations between nominal UK exchange rates and UK import and consumer prices. Table 3.1 shows a weak relationship between the nominal exchange rate and UK retail price inflation, both over the period since 1958 and in a sub-sample since 1980. The results hold even after controlling for the impact of large tax changes on the retail price index. However, there is found to be a stronger relationship between UK import prices and the nominal exchange rate (Table 3.2).

³ See, for example, Obstfeld (2002).

Table 3.1: Correlations between UK retail price inflation and the nominal effective exchange rate

1958 Q4 – 2002 Q2	0.103
1958 Q4 – 2002 Q2, controlling for 1979 and 1990 tax changes	0.153*
1958 Q4 – 1979 Q2	0.289*
1980 Q1 – 2002 Q2	–0.073
1980 Q1 – 2002 Q2, controlling for 1990 tax changes	–0.071

*Statistically different from zero at 0.05 significance level.

Source: Kara and Nelson, 2002.

Table 3.2: Correlations between UK import price inflation and the nominal effective exchange rate

1958 Q4 – 2002 Q1	0.499*
1958 Q4 – 1979 Q2	0.478*
1980 Q1 – 2002 Q1	0.575*

*Statistically different from zero at 0.05 significance level.

Source: Kara and Nelson, 2002.

3.28 Campa and Goldberg (2002) examine the degree of pass-through from exchange rates into import prices across 25 OECD countries. Their main findings are:

- there is strong evidence of partial pass-through in the short run — average pass-through across countries is around 60 per cent after three months and around 75 per cent over the longer run;
- UK pass-through is found to be lower than the average at 39 per cent in the short run and 47 per cent in the long run; and
- there is a trend toward lower pass-through over time, which can mainly be attributed to changes in the composition of imports toward manufactured goods as intra-industry trade has increased.

3.29 Taylor (2000) argues that there may be lower pass-through in low inflation countries, as overseas producers are unlikely to raise prices if they expect relative price stability in domestic prices. If firms are less willing to increase prices where inflation is low and stable, then if EMU is a low inflation environment this may lead to convergence in the degree of pass-through in participating countries. Campa and Goldberg (2002) find some evidence to support Taylor's hypothesis, though the relationship is found to be weak.

Exchange rate 'disconnect'

3.30 The substantial empirical evidence on the limited pass through of nominal exchange rate movements has recently led to the development of theoretical models of 'exchange rate disconnect'. In these models the presence of LCP alongside some additional assumptions means that the nominal exchange rate becomes entirely 'disconnected' from the real economy⁴; movements in the nominal exchange rate do not affect the underlying situation of the real economy. This is because low rates of pass-through mean that there is little response of consumer and producer behaviour to nominal exchange rate movements. In this scenario, a flexible nominal exchange rate is unable to provide the equilibrating real exchange rate adjustment anticipated in the earlier analysis.

⁴See, for example, Devereux and Engel (2002).

Conclusion on exchange rates and domestic prices

3.31 Overall, pricing to market effects show that the stabilising role of the nominal exchange rate is unlikely to be as straightforward as predicted in simple models. But the evidence suggests that nominal exchange rates can influence the price of domestic production relative to foreign production. Studies show that pass-through to domestic inflation is not complete, but that there is significant pass-through to import prices. Firm level adjustment to import price changes may then provide the necessary economic adjustments. Even assuming full LCP, firms may adjust trade in the face of movements in profit margins.

3.32 The effect of the existence of pricing to market is to modify rather than eliminate the role of flexible exchange rates in the adjustment mechanism. It suggests that the stabilising role of flexible rates may operate more gradually and through different channels than simple theory predicts. But this does not necessarily imply that the additional adjustment mechanism available under flexible rates can be relinquished costlessly to a system of fixed exchange rates.

Circumstances where nominal exchange rates do not stabilise the economy

Nominal exchange rate flexibility does not always aid adjustment

3.33 Optimal currency area theory highlights the circumstances in which flexible nominal exchange rates can play an important role in aiding adjustment. However, these particular circumstances may often not apply. For example, Buitier (1999a) sets out circumstances under which flexible exchange rates may not, in practice, serve as a useful adjustment mechanism as:

- nominal exchange rate flexibility does not provide adjustment to imbalances caused by long-term real rigidities in the economy;
- over the short and medium run the nominal exchange rate often fails to play a stabilisation role; and
- instead, in the short and medium term the exchange rate is frequently an exogenous source of shocks to the economy.

Long-term real rigidities and the nominal exchange rate

3.34 The first strand of Buitier's critique is that nominal exchange rate flexibility does not provide a solution to problems caused by real rigidities. Such rigidities impede the required adjustment of relative prices within a currency area, whereas exchange rate changes can only change relative prices between currency areas. Real structural problems, such as excessive non-wage labour costs, rigid industrial structure and weak corporate governance cannot be addressed through the exchange rate, but only by microeconomic reform. Worse, repeated use of nominal devaluations may actually delay much needed structural reforms, as they provide countries with a short-term way of alleviating the cost of adjustment, which may appear more attractive than undertaking difficult structural reforms.

3.35 This rightly suggests that exchange rate flexibility does not provide a solution to problems that require a change in relative prices within the currency area. But this does not mean that nominal exchange rate flexibility does not provide a solution to other problems. In particular, as OCA theory highlights, exchange rate flexibility can be helpful in a context when real exchange rates need to adjust but the adjustment of domestic and/or foreign prices is sluggish. As noted earlier in this section, nominal exchange rate flexibility is the only way in which the real exchange rate can change when two authorities are independently targeting their domestic price levels.

Nominal exchange rate flexibility and adjustment

3.36 The second part of Buitier's critique is that, in practice, nominal exchange rates have largely failed to aid the adjustment process in the short and medium term. As already noted, nominal exchange rate flexibility is only helpful when it facilitates the real exchange rate changes needed to adjust to a particular shock. So it is useful to analyse the contexts under which this condition may fail.

3.37 The relationship between nominal and real exchange rates is influenced by the openness of the economy. In an open economy, changes in the nominal exchange rate may feed through quickly into the domestic wage and price level. For example, a nominal exchange rate depreciation will raise the price of imported goods. If these account for a high proportion of consumer purchases, and/or of inputs into non-traded goods and services, then the domestic wage and price level may rise in response. This will counteract the impact of the nominal exchange rate depreciation. This gives small, open economies less scope to use nominal exchange rate flexibility as a means of obtaining a real exchange rate devaluation.⁵

3.38 The UK is a relatively open economy, with exports and imports each accounting for around 28 per cent of GDP. But the size of the non-traded sector is sufficiently large to mean that nominal exchange rate changes are not necessarily offset by changes in UK inflation and especially so when aggregate demand for UK products is weak.

3.39 The relation between nominal and real exchange rate changes varies according to context, including the pressures that are causing the exchange rate to move. If the domestic economy is already operating at full capacity, domestic prices will tend to rise in response to the extra demand created by a nominal depreciation, taking the real exchange rate back to its initial level. But if the domestic economy is operating at below full capacity, domestic prices will tend to rise by less than the initial nominal depreciation, leading to a sustained real devaluation. Indeed during the past fifteen years the UK has experienced large and persistent changes in its real exchange rate (Box 3.2).

Box 3.2: Nominal and real exchange rate changes in the UK

In the past fifteen years, there have been two striking episodes where the context in which a large movement in the nominal exchange rate has occurred has enabled a persistent change in the real exchange rate:

- **the sharp decline in the nominal exchange rate in 1992 was not eroded by an increase in domestic inflation, since it occurred in the context of substantial excess supply in the UK market; and**
- **the sharp appreciation of the exchange rate in 1997 did not lead to an equivalent drop in the UK price level, since it occurred against the backdrop of strong demand for UK production.**

In the first instance, recovery from the 1990-92 recession would probably have been much more subdued, and may have been delayed, if sterling had not depreciated. And in the second instance, inflationary pressures would probably have been much stronger had sterling not appreciated. The historical evidence on the link between the exchange rates and macroeconomic conditions in the UK is considered further in Section 4. Section 5 contains a more detailed appraisal of sterling's appreciation in 1997.

The exchange rate as a source of shocks

Asset market flows as a potential source of shocks

3.40 The third part of Buiters's critique is that the exchange rate is determined primarily by developments in the international capital market. While these flows may take the exchange rate in the same direction as required to achieve product market equilibrium, they do not necessarily do so. In his view, capital market developments subject the nominal exchange rate to large and persistent changes that may have little relation to imbalances in product markets. This reduces the effectiveness of a flexible exchange rate as a stabilising mechanism.

⁵ This issue is addressed in Mundell (1961), which acknowledges that the size of an economy puts a lower limit on the size of an OCA. Mundell notes that a smaller economy is likely to have a higher proportion of imports in total consumption, and so more likely to see wages rise in response to a nominal exchange rate depreciation.

**Transmission of
asset market
related shocks
under currency
unions**

Indeed, in some circumstances capital market developments may lead to an exchange rate change that exacerbates rather than reduces imbalances in product markets.

3.41 In a currency union, the way in which asset market demands are transmitted is different. Those asset market flows that are motivated by the desire to either hedge currency risk, or to exploit the chance that the nominal exchange rate may change, no longer exist. However, even in the absence of floating exchange rates there is still the possibility that country specific risk premia⁶ may emerge in asset prices. But since cross-border demands for both financial and real assets will no longer be transmitted through the currency markets, they will impact directly on individual asset market prices. As they will no longer affect exchange rates within the monetary union, the spillover to price signals in product markets will no longer exist.

3.42 The argument that asset market flows may lead to exchange rate changes that are inconsistent with product market equilibrium is potentially a valid one. But it does not necessarily follow that asset market flows are, in practice, destabilising. Asset market flows are determined by investors' wish to create and maintain portfolios that adequately balance risk and return. While investors are far from omniscient, they are not, as a group, wilfully irrational.⁷

3.43 Investor rationality implies that asset markets should not misprice the exchange rate consistently, nor indeed any other asset price. Cross-currency asset flows are determined by investors' evaluations of the relative value of assets in each currency area. These in turn are likely to reflect the underlying strengths and weaknesses of economic activity within each currency area.

3.44 In short, asset prices, including exchange rates, are unlikely to be strong when the economy is weak, and vice-versa. This argument provides theoretical grounds for questioning whether the exchange rate is as frequently or as powerfully a source of shocks as is sometimes claimed. Section 4 considers the empirical evidence on the issue.

Conclusions

3.45 Under both fixed and floating exchange rate regimes, a real exchange rate change may be required to enable the economy to adjust to a disturbance to the balance of aggregate supply and demand. This will generally be the case when the disturbance is asymmetric across countries. Optimal currency area theory analyses the conditions in which nominal exchange rate adjustment may be a more efficient way of achieving real exchange rate adjustment than by allowing inflation rates to differ for a period.

3.46 The chief advantage of a flexible exchange rate regime is that price adjustment in the foreign exchange market reacts rapidly to changes in the supply and demand for a country's goods, services and assets. This may be especially desirable when the alternative, under a fixed exchange rate system, would entail lower inflation than in other countries, and potentially wage cuts. However, under both regimes the real effects on the economy will be the same; real relative prices are adjusting even if it is nominal exchange rates that are facilitating the adjustment.

⁶ A risk premium is the difference between the expected rate of return on an investment and the risk-free return (e.g. on a government stock) over the same period. If there were any risk element at all (e.g. in investing in a particular country), both the price of the asset and the rate of return would be higher than that if no risk is involved.

⁷ In other words, their investment decisions will typically have a rational base, even if subsequent developments lead to some expectations being disappointed. Actual outcomes only consistently match expected outcomes when there is certainty. In an uncertain world, actual outcomes will more often than not either exceed or disappoint expectations. When this happens, it does not necessarily mean that the initial expectations were ill-founded, since expectations need to price in all possible outcomes, including those that fail to materialise.

3.47 In theory, flexible exchange rates may not always act to stabilise the economy, and some have argued that they tend more often to be destabilising. However, asset market demands are, in general, likely to reflect the underlying strengths and weaknesses of economic activity within each currency area. Consequently they will tend to push the exchange rate up when the economy is strong and cause a depreciation when the economy is weak. Such movements should boost the stabilising properties of flexible exchange rates. The next section considers the empirical evidence relating to this question.

