

EMU and trade

EMU study



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

This study has benefited from review by Dr Stephen Redding, working in a personal capacity as an academic consultant 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:

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EXECUTIVE SUMMARY

Background 1 This study focuses on the key issue of the extent to which UK trade with the euro area economies might be increased through participation in EMU. It then relates this to the potential impact this could have on UK output and income over the longer term. The study's conclusions are based on a combination of economic theory, detailed empirical evidence and an examination of UK-specific factors, for example the geographical distribution of trade. In relation to the overall assessment of the five economic tests for UK membership of EMU, this EMU study is most relevant to the fifth test: *“Will joining EMU promote higher growth, stability and a lasting increase in jobs?”*

EMU and trade 2 Section 2 shows that there are good theoretical arguments for expecting the adoption of a common currency to lead to increased trade among the members of a single currency. The key mechanisms are: the reduction in exchange rate uncertainty; lower currency transaction costs; and wider benefits, in particular through greater price transparency, greater specialisation and enhanced competition. Currency union is likely to offer stronger benefits than a simple fixed exchange rate regime. In the European context, it can be seen as a direct complement to the Single Market Programme.

3 Currency transaction costs act as a barrier to trade. Exchange rate volatility likewise discourages trade by making the profitability of overseas transactions uncertain. A lack of price transparency meanwhile stifles competition and prevents consumers and firms from seeking out the best deals. It is likely that smaller firms are most affected by these problems. But many economists doubt that they represent very serious problems for the economy as a whole. It is straightforward for larger UK firms to hedge against short-term exchange rate uncertainty through forward currency markets. Total currency transaction costs in the UK are likely to be less than $\frac{1}{2}$ per cent of GDP.

UK and euro area trade compared 4 The scale of benefits from the adoption of the euro is likely to be higher the greater the degree of UK trade integration with the euro area (although, according to some models, a high starting level of UK-euro area trade may serve to limit the *percentage* expansion in trade). Section 3 shows that the euro area is the UK's dominant trading partner, accounting for about half of UK trade in goods and services. With the prospect of EU enlargement, and with it the future growth and expansion of the euro area, this share may well increase. For the current account, including income transactions and transfers, the share is lower because UK investment income transactions are more focused on non-EU countries. On either measure, the UK's next most important partner regions – the US and Asia – each account for less than one fifth of UK trade.

5 It is sometimes argued, nevertheless, that UK trading patterns are very different to those of the existing euro area economies, making the UK a less natural candidate for EMU. UK trade (exports plus imports) in goods and services with the EU is equivalent to just under 30 per cent of UK GDP. This is slightly lower than for the other larger EU economies, Germany, France and Italy. The share of UK goods trade conducted with the EU has broadly converged with that of Germany and Italy, but to a lesser extent with France and Spain. However, the EU share of trade in services is notably lower in the UK compared with the other large EU countries. The share of UK goods trade with the US economy meanwhile has consistently exceeded that of other large EU countries, a pattern that is likely to persist. However, this is not the case for other non-EU countries, with which the share of UK trade has fallen markedly over time.

The importance of the US dollar **6** Section 3 also notes that this straightforward comparison of the euro area and US shares of UK trade exaggerates the importance to UK trade of the euro relative to the US dollar. Many commentators highlight the existence of a much larger ‘US dollar bloc’ of trading countries. Links between third country currencies and the US dollar (e.g. in Latin America and the Middle East), the US dollar denomination of trade in certain commodities, and the use of the US dollar more generally as a currency of invoicing, all serve to raise the US dollar’s importance well beyond the US share in UK trade.

7 This matters because adoption of the euro could lead to an increase in exchange rate volatility vis-à-vis the US dollar, diluting the benefits of the complete nominal exchange rate stability with the euro area. This issue is discussed in detail in the EMU study *The exchange rate and macroeconomic adjustment*. On the evidence presented in that study, Section 3 concludes that there would be an overall improvement in exchange rate stability if the UK adopted the euro. Very strong assumptions concerning the US dollar’s relative importance are needed to overturn this conclusion.

The link between exchange rate volatility and trade **8** Section 4 concludes that the empirical evidence linking exchange rate volatility with lower trade is very mixed. Many studies fail to identify a meaningful negative relationship between exchange rate volatility and trade, and some even find a weak positive link. However, this might be because many studies have focused on shorter-term measures of volatility, which may be less of a problem due to the availability of hedging instruments. More generally, the studies are limited in that observed exchange rate volatility is an imperfect measure of currency risk; participation in a fixed exchange rate regime, for example, does not necessarily eradicate the risk of sporadic (and major) realignments, as the evolution of the Exchange Rate Mechanism (ERM) demonstrated.

9 Even with those studies that do establish a clearer link, the increase in trade arising from the complete elimination of exchange rate volatility in a given area is not likely to exceed 10 per cent. In the UK case, this has to be weighed against the probability of greater external currency volatility against the US dollar within EMU. On this limited evidence, the potential gains from the elimination of intra-euro area exchange rate volatility within EMU are not likely to be substantial.

Empirical evidence on currency unions **10** Section 5 concludes that the wider benefits could be more substantial, based on empirical work that has been developed only recently and post-dates the October 1997 assessment of the five economic tests. In an influential study, Rose (2000) challenged the view that currency unions have only modest impacts on trade. Controlling for key determinants of trade within the well-established gravity model framework, Rose found that countries in currency unions trade three times more with each other than countries with separate currencies. Furthermore, this increase in trade with other currency union members is not at the expense of trade with non-members. Although this sort of result has been replicated many times, the economic mechanisms underpinning it are not well understood. More importantly, the results mainly reflect the fact that many currency unions are between smaller, poorer countries. Rose and others doubt that they are fully applicable to assessing the trade impact on existing EMU members, or on the UK if it were to join.

11 A number of subsequent studies have attempted to quantify likely increases in the EMU context. Analysis using a larger dataset and exploiting time series variation in currency arrangements still points to a doubling of trade. Studies controlling for observed systematic differences between currency union member and non-member countries put the gains at up to 60 per cent. EMU-tailored calculations based on a relative trade barriers model suggest that EMU could raise trade by between 40 and 60 per cent. The emerging research consensus therefore still signals substantial gains to trade through membership of a currency union,

although much lower than initially estimated by Rose. Moreover, the studies confirm that the increase in trade within a currency union is not at the expense of trade with non-members, with some studies reporting that a currency union raises trade between members and non-members. In other words, not only is a currency union not trade diverting, it is actually trade creating with non-currency union members.

I2 As a complement to cross-country studies, time-series analysis of particular episodes involving a change in currency regime can be instructive. Case study analysis in Section 5 of the dissolution of the Irish punt's 150 year association with sterling in 1979 does not reveal any conclusive evidence that Anglo-Irish trade was significantly affected. But once again there are limits to the extent to which such findings may be extrapolated to the question of possible UK adoption of the euro.

The short-run impact of EMU on intra-euro area trade

I3 Section 6 argues that this representative range is broadly supported by analysis of the impact of EMU on trade within the existing euro area since 1999. Trade intensity within the euro area has increased since the euro's launch. Extra-euro area trade for EMU members has risen more sharply over the same period, though this is perhaps explained through buoyant US growth, oil price rises, ongoing EU integration with Central and Eastern Europe and other fast growing economies and, possibly, the depreciation of the euro against the US dollar since 1999. Detailed studies comparing euro area bilateral trade with trade between otherwise comparable industrialised economies outside EMU support the idea that the euro is already having an appreciable impact. They estimate that EMU has increased trade within the euro area by between 3 and 25 per cent since 1999.

Trade, productivity and long-run growth

I4 The implication of increased trade is that both exports to and imports from the euro area would rise within EMU. However, this study concludes that increased trade integration with the euro area would be beneficial for long-term UK growth. Section 2 sets out the theoretical links between international openness and long-run economic growth derived from theories of international trade. Classical theories focus on one-off improvements in productivity and potential output through increased openness. Newer theories of trade and growth meanwhile highlight the possibility of more durable improvements in growth potential through technological spillovers. The bulk of empirical evidence confirms this. Based on the cross-country empirical evidence reviewed in this study, it seems reasonable to assume that each 1 percentage point increase in the trade to GDP ratio increases real GDP per head by at least $\frac{1}{3}$ per cent in the long run.

Conclusion: the potential impact of EMU on UK trade

I5 Section 7 draws the various strands together to produce illustrative but plausible estimates of the potential long-run increase in UK output and income through increased trade as a result of UK membership of EMU. It is difficult to arrive at a single representative estimate of the long-run gains to UK trade through possible adoption of the single currency. The various studies adopt different methodologies and they highlight and address different perceived problems – none, of course, are above specific criticism. Nevertheless, on the basis of a careful review of the evidence, this study concludes that a reasonable range for the potential increase in UK trade with the euro area resulting from UK membership of EMU is between 5 and 50 per cent, without any trade diversion from the non-euro area. The lower end of this range equates with the lower estimates of the increase in intra-euro area trade that has already occurred between member countries. The upper estimate pays much greater attention to the wider benefits signalled by the evidence in Section 5, and appears closer to the more likely outcome in the long term.

16 With an increase in trade with the euro area at the top of the 5 to 50 per cent range, this suggests that EMU membership could potentially increase the long-term level of output per head in the UK by between $4\frac{1}{2}$ and $9\frac{1}{4}$ per cent, depending on the assumption made about the long-run impact of an increase in the trade to GDP ratio on the level of GDP per head. Spread over a long-term period of – for example – 30 years, this implies an increase in the rate of growth of output per head of between 0.15 and 0.30 percentage points a year. Equally though, the lower end estimates for the increase in trade with the euro area imply little effect on the rate of growth of GDP per head over a 30 year period – at between 0.02 and 0.03 percentage points a year.

17 There are substantial uncertainties and risks surrounding these estimates. It is vital that these are kept in mind when potential trade impacts are considered in any overall assessment of the likely costs and benefits of UK participation in EMU. Moreover, smooth appropriation of such benefits would be critically dependent on sustained convergence of the UK economy with the euro area, as well as the absence of any short to medium-term misalignments in the sterling-euro entry exchange rate.

18 This study is most relevant to the assessment of the growth, stability and jobs test – the fifth of the Government’s five economic tests for EMU entry. It is also relevant in assessing the convergence test – the first test; and the investment test – the third test.

INTRODUCTION

The context **1.1** The well-developed literature on optimal currency areas (OCAs) presents the decision to form a monetary union as a trade-off between the benefits and costs. This EMU study focuses on the benefits side of the equation, as some of the major gains from the adoption of a single currency are thought to come from enhanced trade between its members. This results from a reduction in the barriers to trade inherent under alternative monetary regimes. By way of background, the study also provides the stylised facts on UK trade patterns, themselves an issue of debate.

1.2 There are good theoretical reasons for expecting the adoption of a single currency to lead to increased trade among the members of the currency union. The Treasury's 1997 assessment of the five economic tests summarised the potential impacts on trade as follows:

“The single currency could deepen competition in some parts of the Single Market. It will reduce transaction costs and exchange rate uncertainty on trade with the euro-zone. It will also make prices more transparent and easier to compare across the Single Market. It should also intensify competition. In this way it could open up new trading opportunities and encourage firms to invest in new markets.” (HM Treasury, 1997, page 7.)

1.3 More generally, increasing trade is desirable because theoretical and empirical evidence suggests that more trade leads to higher income, and may increase the long-run growth rate of an economy. It is this belief that underpins the UK Government's policy towards trade. In the White Paper *Eliminating World Poverty: Making Globalisation Work for the Poor* (Department for International Development, 2000), the Government states that it will support continuing reductions in barriers to trade, both in developed and developing countries.

1.4 This study supports the overall assessment of the five economic tests, drawing on the growing body of academic research stimulated by the EMU debate. This literature looks directly at the impact currency unions have had on the trade of their members. The findings of Rose (2000), that currency union membership could triple trade between member countries, sparked considerable interest in this area. Subsequently a large number of academic studies have focused in great depth on explaining and questioning this finding. Recent research has also examined whether the single currency has already increased trade among the existing euro area countries.¹

Standpoint and relationship to the five tests **1.5** In relation to the overall assessment, this study is most relevant to the fifth of the five economic tests: *“Will joining EMU promote higher growth, stability and a lasting increase in jobs?”*. Since trade and investment are closely linked, it is also relevant in assessing the third test: *“Would joining EMU create better conditions for firms making long-term decisions to invest in Britain?”*. At least part of the potential beneficial impact of EMU on UK investment would be likely to flow from enhanced trading opportunities afforded by the adoption of the single currency. As discussed below, the study is also relevant to the assessment of the convergence test – the first test.

¹ The extent of this interest is evident from the number of academics who refer to the issue in their contributions to the EMU study *Submissions on EMU from leading academics*.

1.6 The standpoint for this study is an analysis of the potential impact of the adoption of the euro on UK trade and hence growth over the medium to long run. Importantly, it does not consider:

- transitional issues;
- sustainable convergence; and
- foreign direct investment (FDI).

1.7 The first of these issues is dealt with in two other EMU studies: *Modelling the transition to EMU* by HM Treasury, and *Estimates of equilibrium exchange rates for sterling against the euro* by Professor Simon Wren-Lewis. The issue is important because successful appropriation of potential trade benefits would be conditional upon the absence of any short to medium-term misalignment in the real exchange rate from the level justified by economic fundamentals.

1.8 The second issue, sustainable convergence, is covered in a number of EMU studies including *Modelling shocks and adjustment mechanisms in EMU* and *EMU and the monetary transmission mechanism* by HM Treasury, and *Analysis of European and UK business cycles and shocks* by Professor Michael Artis. Sustainable convergence is important with respect to trade because the realisation of long-term benefits for trade is clearly dependent on the sustainable convergence of the UK with the euro area economy. Joining the single currency in the absence of durable convergence would lead to greater economic instability, with harmful consequences for trade and investment, and, ultimately, growth and jobs.

1.9 Finally, cross-border investment such as FDI may, in some circumstances, either facilitate or act as a substitute for foreign trade. Increased ability to trade facilitates industrial restructuring along the lines of comparative advantage or economies of scale. This will clearly have an impact on FDI flows. These interactions are discussed more fully in the EMU study by HM Treasury *EMU and business sectors*.

The Single Market

1.10 The reference to the EU Single Market in the 1997 assessment is a reminder that the Single Market itself can be considered as a useful cross-reference for the impact of EMU, as it too focused on the reduction of transaction costs and removing barriers to trade. The potential impact of the Single Market Programme was set out in what is commonly known as the Cecchini Report (1988).² The report suggested that the Single Market could impart large gains on member countries. Depending on the method of measurement used, estimates in 1998 of the Single Market's impact over the medium term ranged from 3.2 to 6.4 per cent of European Community GDP.

1.11 More recently, the European Commission (2002) has examined the impact the Single Market has actually had. The estimates suggest that EU GDP in 2002 was 1.8 per cent higher than it would have been in the absence of the Single Market. Put another way, over the ten years since its launch in 1992, the Single Market has added just under 0.2 percentage points to annual GDP growth. Although this does not sound like much relative to the estimates in the Cecchini Report, according to the European Commission the cumulative effect still represents an average gain of €5,700 per household. This provides a useful cross-reference to the results presented later in this study for the potential impact of EMU.

1.12 Clearly, there are potential synergies between a single currency and a Single Market. The impact of each comes through reducing transaction costs, reducing barriers to trade and increasing price transparency. Given these synergies, the total benefit of both may exceed the sum of the two projects when taken separately. But equally, one must guard against double-counting. With reference to trade, this further complicates the already difficult task of assessing the impact of the euro.

² The report was titled '1992: The European Challenge – the Benefits of a Single Market'.

Enlargement I.13 Additionally, the imminent enlargement of the EU ensures that EMU, and the Single Market, is part of a dynamic process. The European Commission (2002) notes that EU enlargement in 2004 is likely to mean a “*second harvest as the Internal Market expands across the continent*” (page 4). The same is true for EMU, with an expectation that new EU members will also join the euro at a later date. But what does this imply for the UK? On current trade shares, a single currency spanning the enlargement countries would be unlikely to yield large benefits for UK GDP from increased trade relative to the existing euro area. However, membership of the EU prior to joining the euro will lead to greater integration between existing EU members and the enlargement countries. The trade benefits of sharing a currency with the enlargement countries will be greater in the future than they are at present. Equally though, the costs of living with a common monetary policy for a currency area in which the UK has less weight may also be greater. Monetary policy is discussed in the EMU study by HM Treasury *Policy frameworks in the UK and EMU*.

I.14 The underlying messages here are that:

- synergies between a single currency and a Single Market mean the benefits of each are likely to be interdependent, so identifying the marginal benefits relating solely to the euro will be more difficult; and
- the benefits (and costs) of EMU membership will change if the EU enlargement countries adopt the euro at a later date.

I.15 These messages have a bearing on how the results in this study are interpreted. Although the studies presented later attempt to separate the effect of EU membership from that of euro membership, the interdependence of the two means that the precise values placed on the individual effects may be subject to error. Furthermore, this study does not consider the role enlargement may play in determining the overall impact of the euro on trade, as this would depend on the level of integration achieved between the existing EU and the enlargement countries. Attempting to second-guess this process *ex ante* would add a further layer of uncertainty to the results. The most that can be said is that omitting this factor from the analysis probably means the potential trade-related benefits brought about by EMU membership are underestimated in this study.

Structure of the study I.16 Section 2 of this study discusses the theoretical arguments for enhanced trade within EMU in greater detail. This is followed by a discussion of the theory and evidence that increased trade in turn raises incomes through higher productivity and, potentially, longer-term economic growth. Lower transaction costs, reduced exchange rate uncertainty and enhanced price transparency can be viewed as the major trade-enhancing benefits of currency unions in general. But the potential trading gains of possible UK membership of EMU would, of course, depend on a number of more specific factors.

I.17 Most obviously, absolute gains arising from the elimination of separate currencies are likely to be positively related to the existing degree of integration between the UK and euro area economies. At the same time, it is sometimes argued that the pattern of UK trade is very different from that of existing euro area countries, making the UK a much less natural candidate for EMU. Section 3 therefore reviews the geographic distribution of UK trade and compares this with the trading patterns of euro area countries, establishing the key stylised facts in the process.

I.18 The remaining sections provide an overview and analysis of the empirical evidence concerning these effects, and are the core of this study. Section 4 focuses on quantitative assessments of the impact of exchange rate uncertainty as a barrier to trade. Section 5 reviews those studies that have attempted to identify the total trade-enhancing potential of membership of a currency union. The reliability of such estimates and their relevance to the specific question of possible UK adoption of the euro are, of course, key issues. Section 6 examines whether there is any evidence that the adoption of the single currency has already had a beneficial impact on trade among the existing euro area economies. Section 7 draws all this evidence together and concludes on the potential impact on UK trade and output of membership of EMU.

Economic theory highlights three key mechanisms whereby adoption of the single currency is likely to lead to enhanced bilateral trade between the euro area economies: lower transaction costs, reduced exchange rate uncertainty and enhanced competition through greater price transparency.

Direct estimates suggest the overall financial savings from reduced transaction costs are relatively modest. Within the total, smaller firms are likely to make the greatest proportionate gains because, relative to larger firms, informational disadvantages, lower leverage with financial institutions and perceived lower creditworthiness currently mean they are less able to secure the most favourable terms.

Exchange rate uncertainty may also act as a barrier to trade by increasing the risks associated with international trade. Traders are able to hedge against unanticipated short-term movements in the exchange rate through forward currency markets. However, cover against longer-term currency risks is less comprehensive and typically much more expensive.

There are good theoretical arguments linking increased trade with higher productivity and hence potential output. Traditional trade theories emphasise one-off efficiency gains through specialisation based on comparative advantage or economies of scale. Newer theories of trade and growth suggest that increased openness may boost longer-run growth through technological spillovers.

The bulk of empirical evidence confirms this view. Cross-country studies typically find that real income per head is positively related to measures of international openness such as the trade to GDP ratio. Recent studies have helped to show that this is more than just a statistical association: increased trade does appear to cause increased incomes.

Point estimates of the impact of trade on income and growth are, nevertheless, imprecise and vary significantly between studies. Based on the cross-country empirical evidence reviewed in this study, it seems reasonable to assume that each 1 percentage point increase in the trade to GDP ratio increases real GDP per head by at least $\frac{1}{3}$ per cent in the long run.

2.1 This section focuses on the impact that any increase in trade would have on the wider economy in terms of increased output. The first half discusses the main mechanisms by which membership of the single currency might be expected to boost trade. This is followed by an examination of the links between trade, income and economic growth more generally.

TRADE AND EMU

Determinants of trade

2.2 Traditional theories of international trade and other academic research highlight a number of important influences on the level of bilateral trade between countries:

- **supply factors.** Traditional trade theory states that countries will specialise in production and trade with each other on the basis of comparative advantage or relative factor endowments. New trade theory, by contrast, suggests that specialisation is more arbitrary, driven by a desire to exploit economies of scale in production;

- **preferences.** Against supply factors have to be set the tastes and preferences of consumers. Two countries might produce entirely different baskets of goods and services, but would engage in little or no trade if the tastes of their consumers were highly dissimilar;
- **geography.** Unsurprisingly, most empirical studies find that geographical factors are a key determinant of trade. So called ‘gravity’ models are relatively successful in explaining bilateral trade, mainly through geographical factors such as the distance between the countries, their size and the existence of common borders (see Section 4); and
- **barriers to trade.** Beyond formal trade barriers, theory and empirical studies also highlight a number of market imperfections and impediments which prevent trade reaching optimal levels. Transaction costs and exchange rate risk associated with the existence of many units of exchange are important examples.

Main impacts of EMU on trade

2.3 Policy can have a significant influence in reducing barriers to trade. The EU has already made a concerted effort in this area through the Single Market Programme. Building on this, economic theory and research suggests at least three mechanisms by which the adoption of a single currency might be expected to increase bilateral trade among the members:

- **reduced exchange rate uncertainty.** Exchange rate volatility is commonly thought to be an important barrier to trade and also investment;
- **reduced transaction costs.** Direct savings on the costs of currency exchange were highlighted in Mundell’s seminal work on optimal currency areas;¹ and
- **heightened competition through increased price and cost transparency.** In the EU context, formation of EMU may be seen as an important complement to the Single Market.

These main mechanisms are discussed below in greater detail.

Reduced exchange rate uncertainty

2.4 Free-floating exchange rates may be seen as a beneficial adjustment mechanism. They help to minimise disruptions to trade in the face of external demand shocks as well as permitting greater flexibility in the operation of domestic economic policy. On the other hand, exogenous movements in the exchange rate may themselves act as a source of instability, discouraging trade and also investment. The IMF (1984) distinguishes between the flexibility and variability of exchange rates. Flexibility allows shocks to the economy to be more easily absorbed, but variability creates uncertainty that may have adverse effects. The EMU study *The exchange rate and macroeconomic adjustment* considers the extent to which nominal exchange rate flexibility in the UK has helped to absorb shocks.

Short-run volatility

2.5 The main theoretical argument that trade may be adversely affected by exchange rate uncertainty rests on the observation that most shorter-term movements in the exchange rate are unanticipated.² With expected cost and revenue streams usually denominated in different currencies, profitability of trade contracts is therefore uncertain. Risk averse agents will require a higher expected rate of return on the transaction to compensate for this risk. Consequently this depresses the number of transactions individual firms regard as profitable and hence the level of aggregate trade. While exporters can eliminate their own risk by demanding payment in domestic currency to match the denomination of their costs, this only transfers the exchange rate risk to the importer.

¹ See Mundell (1961).

² This issue is discussed in the EMU study *The exchange rate and macroeconomic adjustment*.

2.6 Since relative prices are slow to adjust, short-run volatility is typically measured by movements in the nominal exchange rate around some trend level. Academic economists have tended to play down the argument that this volatility reduces international trade on the grounds that shorter-term exchange rate risk can be hedged using forward exchange contracts and other derivatives. A forward market can be thought of as a guaranteed forecast of the exchange rate that will prevail at a given point in the future. While hedging currency risk in forward markets is not costless, Dell’Ariccia (1999) argues that “*short-term [forward] contracts are available for all major currencies and they are relatively cheap*” (page 319), so the effect of currency risk on international trade between developed countries is likely to be small.

2.7 Forward markets for foreign exchange are indeed well developed for the major currencies over periods of up to one year. But beyond that, availability of hedging instruments is less comprehensive. This particularly affects firms trading from smaller countries where financial markets in the domestic currency are likely to be much less well developed. But even in the case of the more important internationally traded currencies, forward markets are not fully developed at horizons longer than one year. With the potential for larger-scale trading contracts to be spread over a period of several years, this means that exchange rate uncertainty could still be a major problem. As the European Commission (1990) notes, alternative indirect insurance mechanisms to insure longer-term transactions or to cover firms bidding for contracts are typically much more expensive, and only viable for larger firms.

**Longer-run
exchange rate
misalignment**

2.8 Although some international trade is conducted on a short-term basis, the IMF (1984) suggests the normal planning horizon for trade is much longer than three months. This is because entering and developing foreign markets involves sunk costs and takes time. Dell’Ariccia (1999) notes that what matters to firms “*is the real exchange rate: firms are interested in the evolution of their revenues relative to their costs*” (page 319). It is also important to remember that longer-term real exchange rate misalignments can also impact on domestic traders who face competition in home markets from foreign firms.

2.9 Investigations of long-run exchange rate uncertainty therefore tend to focus on the real exchange rate. It is worth noting that, as the real exchange rate incorporates relative movements in domestic and foreign prices as well as changes in the nominal rate, EMU will not eliminate real exchange rate volatility (and indeed real exchange rate flexibility may be a useful adjustment mechanism). Furthermore, while short-run volatility is concerned with period-to-period movements around a trend, longer-run volatility is related to movements in the trend, or at least sustained deviations from the trend. In other words, if firms are looking to enter long-term trading relationships, they will be concerned with what will happen to the real exchange rate ‘on average’ over the period in which they plan to service the foreign market. They are likely to be less interested in how the exchange rate moves from one three-month period to the next.

2.10 Longer-term real exchange rate risk poses the more serious risk to traders in that it is not possible to hedge against it using financial products. Firms can attempt to mitigate such risks by diversifying production across the countries in which they sell goods. In this way, investment in foreign countries can be seen as a substitute for trade. But again, this is only an option for large-scale enterprises and may raise the cost of supplying a foreign market substantially.

2.11 It is also worth noting the existence of a counter-theoretical view, which states that exchange rate volatility may actually be beneficial for exports.³ This is addressed more fully in Annex A, but put simply, the argument rests on the idea that firms are able to vary export sales quickly and easily in the face of exchange rate changes. Firms, it is argued, will export disproportionately heavily to generate high profits when the exchange rate moves favourably,

³ See, for example, McKenzie (1999) and European Commission (1990).

i.e. after a depreciation which stimulates external demand. Conversely, firms disengage from foreign markets when the exchange rate moves against them. By increasing the likelihood of the high profit periods, it is argued that higher exchange rate volatility may boost trade overall.

2.12 There are clearly some problems with this view of trade as a one-way bet. In the short term at least, it ignores the fact that firms are often bound by existing contracts with both suppliers and buyers. This makes it very difficult to adjust overseas output to boost profits or avoid losses as firms might wish. Beyond that, it is not clear that all firms supplying a given market will be able to increase exports at the same time in response to a favourable exchange rate movement. Moreover, firms may face capacity constraints. If the exchange rate rises, firms that are strongly dependent on overseas sales may not be in a position to strongly curtail exports when the exchange rate moves against them.

2.13 Overall, it seems more likely that exchange rate volatility will have a negative impact on the volume of international trade, assuming that firms are risk averse. However, because of the ability to hedge the risk resulting from short-run currency movements, the negative impact may not be very significant. Also, the currency risk from short-term variations in the exchange rate may be unimportant relative to other risks. It is more likely that a significant effect would be observed over the longer run where hedging is either not possible or prohibitively expensive.

Lower transaction costs **2.14** By its very nature, joining EMU would reduce transaction costs on trade between the members of the euro area. For firms the savings would come in two forms:

- they would no longer have to pay the direct financial costs of exchanging sterling for euro, either at the spot rate or using hedging products for future transactions (see Box 2.1); and
- there would also be 'in-house' savings in the form of lower expenditures on specialist personnel engaged in the management of exchange rate risk between the two currencies. Costs of managing risk between the euro and other currencies would, of course, remain.

Box 2.1: Transaction costs

Foreign currency can be exchanged either at the spot rate or, in order to hedge against unexpected currency movements, at a forward rate. The cost to a firm of spot transactions is the spread between the market rate and the rate available to them through a bank, plus any commission charged. For large deals this spread could be next to nothing, or even used as a loss leader.

Unlike spot rate transactions, the cost of forward rate transactions must also take into account credit risk, which will depend on the size of the deal and the creditworthiness of the company concerned. This is because the bank commits itself to buying a certain amount of a currency at the forward rate, which it sells onto the client firm at the agreed rate (the forward rate plus a spread). However, if the client firm pulls out of the deal the bank would be left with an outright and undesired foreign exchange position.

In 1990 the European Commission estimated the potential savings in transaction costs through the elimination of national currencies at around 0.4 per cent of European Union GDP. The bulk of this was expected to come in the form of direct financial savings from currency conversion. However, the potential savings were expected to vary markedly between countries. The European Commission suggested that the larger countries whose currencies are heavily traded might experience savings in the region of 0.1 to 0.2 per cent of GDP, compared to gains of around 1.0 per cent of GDP for the smaller EU economies.

2.15 Overall, there are good reasons for thinking that transaction costs are proportionately larger for smaller firms:

- because of their relative lack of knowledge and expertise, they do not necessarily go to the best provider;
- the size of deals they require means they have less leverage with financial institutions to negotiate a better deal; and
- for forward transactions, they may well be thought of as worse credit risks than larger firms.

2.16 Unfortunately, because the cost of a foreign exchange deal is specific to that deal, there are no standard figures that represent the cost of these activities to firms. Moreover, it is reasonable to assume that banks would be unwilling to release details of their deals for confidentiality reasons. Therefore, neither representative cost figures nor actual cost figures are readily available.

2.17 Anecdotal evidence, nevertheless, suggests that smaller firms do in fact pay more for foreign currency services. However, the difference does not seem to be exceptional. The main problem appears to be a lack of information resulting in smaller firms going to the wrong providers. For example, they may go to the local branch of their bank that deals with small businesses to arrange a deal, whereas it would be cheaper to go direct to a wholesale provider in the City. Moreover, some banks have subscription websites which allow businesses to gain better deals directly through the trading floor.

2.18 A further advantage that large, multinational, firms have over smaller, domestic, firms is the ability to engage in transfer pricing. This is possible if the firm engages in intra-industry trade, i.e. trading between its subsidiaries in goods at different stages of production. The transfer price is the price at which components are supplied between the subsidiaries.

2.19 If the subsidiaries are in different countries, with different currencies, there is scope for the transfer price to be altered in response to movements in the bilateral exchange rate of the two countries. In essence, a multinational can hedge currency risk internally, so reducing its need for external hedging products. This option is not available to firms that only sell in foreign markets, rather than moving components in both directions. For this reason, exchange rate volatility may be less of a hindrance to trade for multinationals than for smaller firms.

Conclusion on trade theory

2.20 Overall, the theory suggests that all firms which trade within the euro area and, perhaps more importantly, those firms currently discouraged from doing so due to transaction costs and exchange rate uncertainty, would gain from membership. Furthermore, the greatest gains are likely to accrue to smaller firms, for which anecdotal evidence suggests that the costs of currency exchange and risk management are currently proportionately higher. But, at the same time, there are theoretical arguments for believing that the scale of such gains overall might be relatively modest. Certainly, direct estimates of the scale of the likely financial savings, for example in terms of reduced transaction costs, are quite small. The European Commission (1990) estimated the reduction in transaction costs brought about by the euro would be about 0.4 per cent of EU GDP, if all EU members adopted the euro. However, for larger Member States the figure was lower, at 0.1 to 0.2 per cent of GDP.

2.21 These small estimates of the direct gains of a currency union have to be compared with a growing body of empirical work which suggests that the overall gains to trade resulting from membership of a currency union are much more substantial (Section 5). To some extent, the theoretical justifications underpinning such estimates are not very well understood. They may partly reflect enhanced price transparency within a monetary union, which would be expected to have a longer-term beneficial impact on competition and trade. But they may

also reflect more indirect benefits of currency unions that are much less relevant to EMU. For example, membership of a currency union may encourage the adoption of stability-oriented macroeconomic policies that are beneficial to trade.

TRADE, OPENNESS, PRODUCTIVITY, INCOME AND GROWTH

Theoretical links **2.22** Trade is of interest primarily as a determinant of economic growth. Theories of international trade provide strong justifications for believing that increased openness can increase productivity and hence real output and incomes. These arguments are summarised briefly below and discussed in greater detail in Annex B.

2.23 Classical trade theories focus on efficiency improvements through specialisation based on comparative advantage or relative factor endowments. According to this view, trade allows countries to focus production on goods and services in which they have some inbuilt or exogenous comparative advantage. Traditional trade theories, however, are not able to account for the fact that the bulk of trade, particularly between developed economies, involves the exchange of ostensibly similar goods and services. In other words, the majority of trade is intra-industry as opposed to the inter-industry exchange of strongly heterogeneous goods implied by traditional theory.

2.24 New trade theories, by contrast, emphasise the role of economies of scale in encouraging an essentially arbitrary specialisation in particular goods and services not based on any inbuilt advantage. Where such economies exist, international trade allows firms to reorganise production on a larger and more efficient scale. While countries may be engaged in the exchange of seemingly similar goods and services, firm level specialisation is achieved in two ways. A firm can focus on either goods at different stages of the production process or, since consumers value product diversity, items designed for niche markets.

2.25 Such arguments suggest that increased trade can be expected to promote one-off step improvements in the level of productivity, and so potential output, over a long period of say 20 to 30 years. This, however, does not imply any improvement in potential longer-run economic growth. That said, there are a number of channels through which increased trade could lead to lasting improvements in underlying economic growth. Most obviously:

- increased openness heightens competitive pressures, encouraging firms to continuously adopt more efficient production and management practices; and
- similarly, increased competition may encourage an increased pace of technological innovation reflected in higher levels of R&D and investment expenditure.

2.26 Moreover, more modern theories of trade and economic growth raise the possibility of further gains from increased openness. New theories of economic growth highlight the scope for economy-wide productivity gains as a result of technological spillovers from rapidly innovating firms. In an international context, therefore, increased openness and contact with foreign firms may speed the diffusion of relevant technology and know-how, thus raising the long-run potential growth rate of the economy.

Empirical studies **2.27** A large number of studies have attempted to quantify the relationship between trade and productivity or income. Some studies have gone down to firm level to investigate the impact of trade liberalisation programmes. For example, Pavcnik (2002) looks at the impact on Chilean firm-level productivity of increased competition from abroad, which resulted from substantial trade liberalisation during the 1970s and 1980s. By differentiating between

exporting and non-exporting firms, Pavcnik was able to conclude that the productivity of firms in the traded sector improved on average by 3 to 10 per cent more than that of firms in the non-traded sector – the implication being that increased exposure to foreign competition raises efficiency.

2.28 However, while such specialised approaches add to the body of evidence on the benefits of international trade, they do not give much insight to the impact of trade on productivity in the economy as a whole. A more general approach has been to estimate a cross-country regression of real income per capita on the ratio of exports and imports to GDP, or some other measure of openness to trade. Additional variables are included in such studies to ‘control’ for other well known determinants of income. The methodology is described in Box 2.2.

2.29 The vast majority of such studies suggest that increased openness has a positive and statistically significant impact on country income. Rodrik (1993) provides a survey of the literature. While specific criticisms may be levelled at the individual studies, the weight of empirical evidence backs up the theoretical arguments for a positive link from trade to income.

Box 2.2: Regressing income on trade

A regression to establish the relationship between real income per capita and trade, or some other measure of openness, requires control variables to account for other factors that affect income. These control variables include measures of country size, on the grounds that larger countries enjoy greater resource diversity or are better able to exploit scale economies. Additional controls are inspired by neoclassical theories of growth, such as the investment to GDP ratio and measures of schooling, representing physical and human capital respectively. Finally, the regressions are typically conditioned on each country’s initial level of income per capita in some earlier period, reflecting ‘catch up’ between developing and developed economies.

Despite using these controls, the early studies in this area are susceptible to the generic criticism that the results do not necessarily imply that increased trade actually causes higher incomes. Indeed the reverse may be true; increases in income due to other factors might drive higher trade. For example, several authors suggest that higher investment may be associated with higher incomes but also increased imports of capital goods. Simple estimates of the link between trade and incomes may therefore be biased upwards.

Comprehensive studies by Frankel and Romer (1996) and also Frankel and Rose (2000) have attempted to correct for the so called ‘simultaneity bias’ problem. The approach involves identifying that part of each country’s openness or trade which is not influenced by its income (or the determinants of its income). This constructed measure of openness is then used to explain cross-country variations in income per head as described earlier. In both studies, proxy measures for each country’s total trade to GDP ratio are constructed by aggregating bilateral trade predictions based on geographical factors. These include size, distance, the existence of a common border or language and so on. Such factors are not likely to be correlated with country income or its determinants, and seem preferable to alternative instruments, for example measures of trade policy.

These studies also find a positive and statistically significant relationship between trade to GDP ratios and per capita incomes across countries. By allowing for possible simultaneity, the authors can be more confident that the trade actually helps to determine income and not vice versa.

2.30 Unfortunately, the results of two of the most comprehensive studies (Frankel and Romer (1996) and Frankel and Rose (2000), discussed in Box 2.2) differ quite markedly in terms of the estimated magnitude of the effect:

- Frankel and Romer conclude that a 1 percentage point increase in the trade to GDP ratio raises real income per capita by around 1 per cent; and
- the later study by Frankel and Rose suggests that the impact may be considerably smaller, at around $\frac{1}{3}$ per cent.

With both studies controlling for the level of income at the beginning of their 20 to 25 year sample periods, the gains can be thought of as accruing over such a period of time.

2.31 Although the studies adopt very similar approaches, in terms of both the control variables and the construction of the openness proxy, as the authors acknowledge, the results are only as good as the constructed measures of openness. In both cases, these show a fairly high degree of correlation with actual trade to GDP shares (with correlation coefficients of the order of 0.6 to 0.7), although perhaps not sufficient for this type of work. The result is that the point estimates in each study are estimated fairly imprecisely. Any reasonable confidence bands around the estimated income effects from the two studies will certainly be wide and probably overlapping.

2.32 While the evidence confirms a positive and statistically significant impact of trade on income per head as predicted by theory, it would not be prudent to adopt Frankel and Romer's estimate as a central view. Their own comprehensive results confirm that the estimated income effect is sensitive to the precise construction of the trade share proxy. On the basis of a more sophisticated and powerful instrumentation of actual trade to GDP ratios,⁴ the authors find a reduced estimated impact of a 1 percentage point increase in the trade ratio, raising income per head by only around 0.4 per cent. On the other hand, similar research by Irwin and Tervio (2000) identifies an impact comparable to the higher estimate of 1 per cent and, moreover, provides evidence that this relationship has been stable over time.

2.33 A further point is that, although both studies use a variety of control variables, the models estimated are linear, so constraining the effect of trade on income to be the same regardless of the initial level of trade. It seems plausible that a developed country, which is already relatively open, may gain less than a developing country, which is less open, from the same marginal increase in trade.

Conclusion on the effect on income **2.34** All this argues for a good deal of caution in the interpretation of the results. There are as many risks in adopting too low an estimate of the relationship as there are in adopting too high an estimate. Based on the cross-country empirical evidence reviewed in this study, it seems reasonable to assume that each 1 percentage point increase in the trade to GDP ratio increases real GDP per head by at least $\frac{1}{3}$ per cent in the long run.

⁴As well as the geography variables, bilateral trade predictions are also conditioned on variables that proxy the partner country's income.

The potential benefits from adoption of the euro depend positively on the degree of trade integration between the UK and euro area economies. A high level of integration implies more scope for gains through the elimination of currency fluctuations and transaction costs.

The euro area, and the EU more generally, dominate the UK's international trade. Since the 1960s, UK integration with the EU has increased and today the EU accounts for over half of UK trade in goods and services. The prospect of EU enlargement, and with it eventual euro area enlargement, will push up the European share of UK trade.

The UK's next most important trading partner is the US, closely followed by Asia. Both regions represent just under one fifth of total UK trade in goods and services and total current account transactions. A relatively higher proportion of UK service and income transactions are conducted with non-EU countries, especially the US.

UK trade integration with the EU is similar to that of other larger Member States. UK trade in goods and services (exports and imports) with the EU accounts for just under 30 per cent of UK GDP. This is below the EU average, but close to that of other large EU economies such as Italy, France and Germany.

The UK tends to trade more with the US than do other large Member States. In addition, the importance of the US dollar in conducting trade is greater than that implied by the share of the US in UK trade alone. If joining EMU implied greater UK volatility vis-à-vis the US dollar, this would partially offset the benefits of stability with the euro.

3.1 A higher level of bilateral trade implies greater scope for efficiency and welfare gains through the elimination of currency transaction costs and exchange rate volatility. This section sets out the key facts concerning the geographical distribution of UK trade, focusing on the relative degree of trade with the EU and euro area. It compares this with the degree of EU integration in other Member States, both currently and over time. All components of the current account are considered: trade in goods and services, investment income flows and transfers.¹ Finally, the relative importance of the use of the euro and the US dollar in conducting trade is assessed.

UK TRADE

The UK current account

3.2 A geographical breakdown of credits (exports) and debits (imports) for the UK current account, averaged over the period 1999 to 2001 to smooth the data, is presented in Tables 3.1 and 3.2. The tables show clearly that the EU dominates the UK's international trade. The EU accounts for over half of all UK trade in goods and services, while the euro area accounts for just under half. For the current account as a whole, which includes both trade in goods and services, investment incomes flows and transfers, the EU represents close to half of all UK debits and credits.

3.3 The US is the next most important region for UK current account transactions, accounting for just under 20 per cent of credits and over 15 per cent of debits. Within this total, transactions with the US are most prominent in services and investment income flows. Asia is of slightly less importance than the US in terms of current account transactions, accounting for around 15 per cent of UK trade and transactions generally.

¹ Transfers represent the flow of resources between residents and non-residents in exchange for transactions of no economic value (for example, the provision of food aid).

Table 3.1: UK current account credits by region, per cent of category total (1999-2001 average)

	Total	Goods and services	Goods	Services	Income	Transfers
Euro area	45.3	49.1	54.5	36.0	41.1	13.9
add ECB and EU institutions	47.1	49.2	54.5	36.4	41.4	60.2
add rest of EU	50.1	52.7	58.0	39.8	43.7	61.2
add rest of Europe	57.8	60.0	65.0	48.0	52.5	63.0
US	19.1	17.6	15.3	23.3	22.3	18.1
Asia	13.3	13.6	12.3	16.6	13.1	10.6
Other	9.6	8.9	7.7	11.7	11.3	7.9
£million, 2001	426,826	267,771	190,050	77,721	142,660	16,395

Source: Office for National Statistics.

Table 3.2: UK current account debits by region, per cent of category total (1999-2001 average)

	Total	Goods and services	Goods	Services	Income	Transfers
Euro area	42.9	48.8	48.8	48.6	34.5	14.5
add ECB and EU institutions	45.6	48.8	48.8	48.6	35.4	61.1
add rest of EU	48.3	51.9	52.2	50.9	37.5	61.9
add rest of Europe	58.9	60.7	60.9	60.0	53.4	66.1
US	16.3	14.5	13.0	19.5	22.1	7.2
Asia	16.8	17.0	19.0	10.5	17.4	10.4
Other	8.2	7.9	7.4	9.6	7.3	16.6
£million, 2001	443,197	290,080	223,659	66,421	130,046	23,071

Source: Office for National Statistics.

A COMPARISON OF UK AND EU TRADE

Current account in EU Member States

3.4 This sub-section assesses the UK position relative to other EU countries. Table 3.3 shows the proportion of current account transactions with the EU in 2001, for all 15 Member States. The table splits the current account into its three main components: trade in goods, trade in services and investment income. Transfers are not shown separately due to their relatively small weight.

3.5 The most striking overall feature is that in smaller Member States transactions with the EU account for a much greater proportion of the total. For example, in Portugal, the Netherlands, Belgium and Luxembourg, the EU accounts for around three quarters of total current account credits. In the larger economies, such as Germany, France, the UK and Italy, the EU accounts for between 50 and 60 per cent of current account transactions.

3.6 As discussed above, the EU's share of UK current account transactions is around 50 per cent. This is significantly below the average level for smaller Member States, but only slightly lower than the average for the larger EU economies. This is largely a consequence of the fact that EU shares of UK services and investment income are lower. The main features of UK and EU trade in current account components are described in turn below.

Table 3.3: Percentage of credits and debits of current account transactions with the EU15 (2001)

Per cent	Current account		Goods		Services		Income	
	Credit	Debit	Credit	Debit	Credit	Debit	Credit	Debit
UK	50	48	58	52	41	52	44	39
Germany	56	59	55	56	51	56	61	73
France	60	66	61	68	46	51	64	71
Italy	56	60	54	58	59	55	57	70
Spain	–	–	72	67	74	63	–	–
Bel-Lux	73	69	76	70	65	64	71	68
Finland	57	67	54	64	55	54	67	81
Greece	46	58	48	62	38	40	51	74
Ireland	61	51	61	57	58	42	60	50
Netherlands	75	57	79	53	62	62	69	64
Austria	63	70	61	72	67	66	56	71
Portugal	75	73	80	74	71	70	58	70
Denmark	62	66	65	70	55	54	63	76
Sweden	56	59	54	65	54	56	64	45

Source: Eurostat.

Goods 3.7 For trade in goods:

- the smaller countries, such as Portugal, the Netherlands, Denmark and Ireland, tend to be more integrated into the EU. However, the picture is not uniform, and Greece has somewhat lower exports to the EU at around 50 per cent;
- of the bigger EU countries, France and Spain have the greatest EU exposures both on the credit and debit sides;
- with 58 per cent of goods exports destined for other EU countries in 2001, the UK position is comparable to that of Germany and Italy; and
- the share of goods the UK imports from EU countries is lower than average, although once again among the larger countries the biggest divergences are with France and Spain.

Services 3.8 For services, the pattern is that:

- in the UK 41 per cent of services credits (exports) are from EU countries, somewhat lower than average. This mainly reflects the relatively large number of non-EU tourists coming to the UK, and also the wide range of business and financial services the UK offers; and
- for the large EU countries, with the exception of Spain, the EU accounted for around a half of service credits and debits in 2001. For some smaller countries and Spain, this figure is closer to two thirds or higher.

Income 3.9 With reference to income flows:

- the UK also has a significantly lower than average share of EU-related income credits and debits. For most EU countries this share is typically between a half and two thirds, in comparison to around 40 per cent in the UK. This is because the UK is a major recipient of inward investment from non-EU countries, particularly the US. Similarly, the UK is also a much larger outward investor in non-EU countries. This explains, in large part, the low share of EU-related income flows.

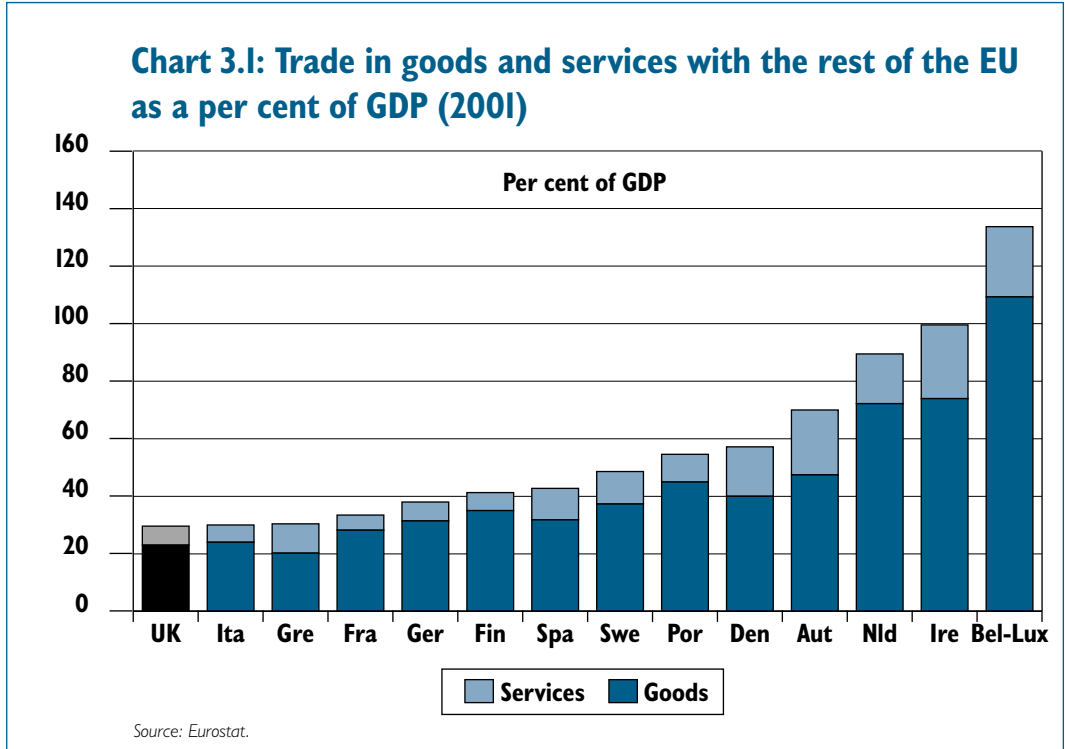
Trade with the EU as a proportion of GDP

3.10 Looking at trade with the rest of the EU as a percentage of GDP provides a clearer indication of how much economic activity in each Member State depends directly on their EU partners. This provides a somewhat different picture of the divergences between the UK and the other large Member States.

3.11 Chart 3.1 shows that UK trade in goods and services with the EU is equal to nearly 30 per cent of GDP.² This is in line with Italy, but slightly lower than in Germany, France and Spain. The differences are generally less pronounced than looking at relative proportions of trade with the EU alone. However, differences between the relative importance of goods and services trade are more apparent. For example, while shares of goods trade with the EU are similar in Germany and the UK, as a proportion of GDP they are higher in Germany because German goods trade carries a much greater weight in German GDP.

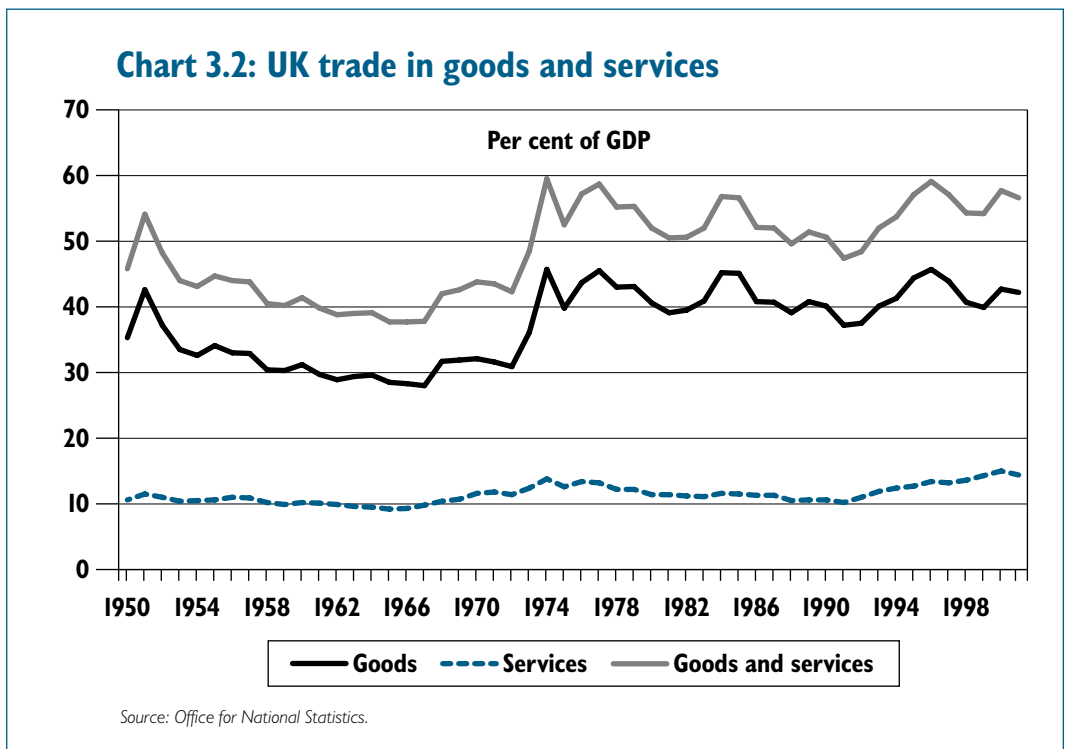
3.12 Services trade, by contrast, is relatively more important to the UK economy, in total, accounting for nearly 15 per cent of GDP compared to nearer 10 per cent in France, Germany and Italy. So despite the EU accounting for a lower share of such trade in the UK, services trade with the EU as a per cent of GDP for the UK is greater than for Germany, France or Italy. This partially offsets the lesser importance of goods trade. The same argument applies to investment income. UK income flows have accounted for nearly 10 per cent of GDP in recent years, compared to around 6 per cent of GDP in France, Germany and Italy.

² Defined as goods and services exports plus imports divided by GDP.



Longer-term trends

3.13 Analysing longer-term trends allows the current situation to be put in context. Chart 3.2 shows UK trade as a proportion of GDP (measured in current prices) since the 1950s. Total UK trade, defined as imports plus exports of goods and services, is equivalent to well over half of UK GDP. This has been the case since the mid 1970s, following a marked increase in goods trade as a percentage of GDP, from 30.9 per cent to 45.7 per cent, between 1972 and 1974.



3.14 The increase in goods trade in the early 1970s corresponds with a number of important changes in the UK and global economies. Notably, the movement coincides with the UK joining the EU – then the European Economic Community (EEC) – in 1973. However, oil prices also rose sharply in the early 1970s and the Bretton-Woods fixed exchange rate system came to an end.

3.15 Determining the relative importance of these factors in explaining the rise in goods trade as a percentage of GDP in the early 1970s is challenging. Oil prices directly explain part of the rise. Trade in oil rose by 4.1 percentage points between 1972 and 1974. However, that leaves around 10 percentage points of the rise unexplained. The impact of joining the EEC and the ending of the Bretton-Woods system are more difficult to quantify. Generally, Foreman-Peck (1991) – who discusses post-War trends in UK trade and the balance of payments – highlights that isolating the trade effect on the UK of the Common Market has proved difficult in practice because UK trade with Western Europe was already increasing before the UK joined the EEC.

3.16 Nevertheless, Winters (1987) reviews studies into the effect of EEC membership on UK trade and also investigates the issue himself. Winters' analysis suggests that EEC accession increased UK trade with other members, and also with some non-members. Therefore, following the discussion in Section 2, it would seem reasonable to conclude that the reduction in trade barriers between the UK and the rest of the EEC would have increased trade between the two.

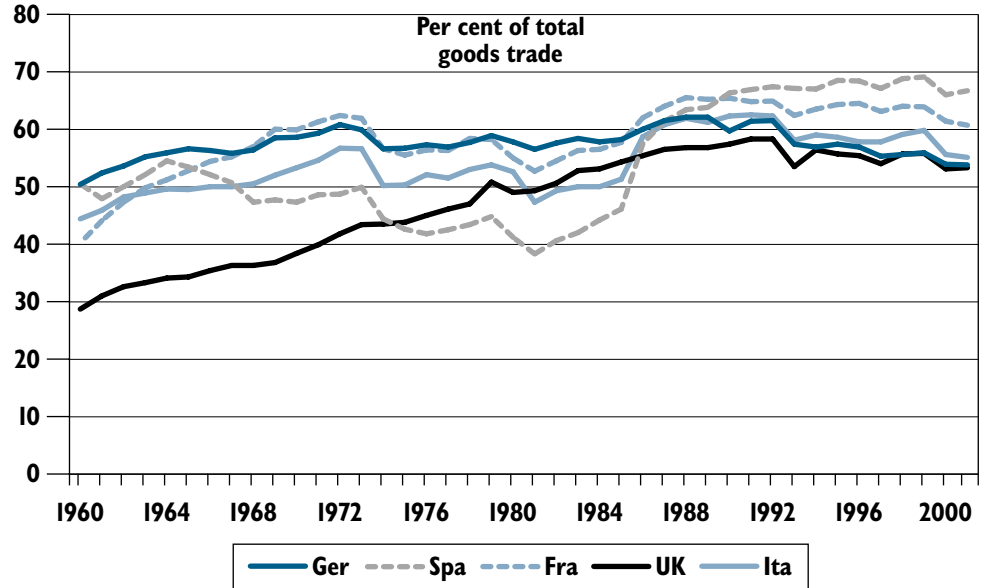
3.17 Chart 3.2 also shows a rise in both goods and services trade as a percentage of GDP in the early 1990s. This rise coincides with a period of more rapid EU integration related to the Single Market Programme. As mentioned in Section 2, this aimed to reduce significantly the barriers to trade between European member countries, thus encouraging trade.

3.18 Looking at the proportion of UK goods trade with the EU (Chart 3.3) shows that the EU share of UK trade has risen close to levels in other large Member States in the past 40 years. The EU's share in UK goods trade rose steadily until the early 1990s, at which point UK exposure to the other Member States reached levels similar to Germany and Italy, though still somewhat lower than in France and Spain. Since then, the EU share has fallen back modestly both in the UK and other large EU economies. Notably, the share in EU goods trade does not display any sharp changes, rather a fairly gradual increase between the early 1960s and 1990s.

3.19 Outside the EU, UK trade with the US has generally been higher than in other large Member States. Chart 3.4 shows that the US has consistently been a more important trading partner for the UK than for the other large EU Member States and that this divergence has widened over time. The proportion of UK trade with the US has risen gradually since the 1960s. By contrast it has remained constant or declined for the other large Member States.

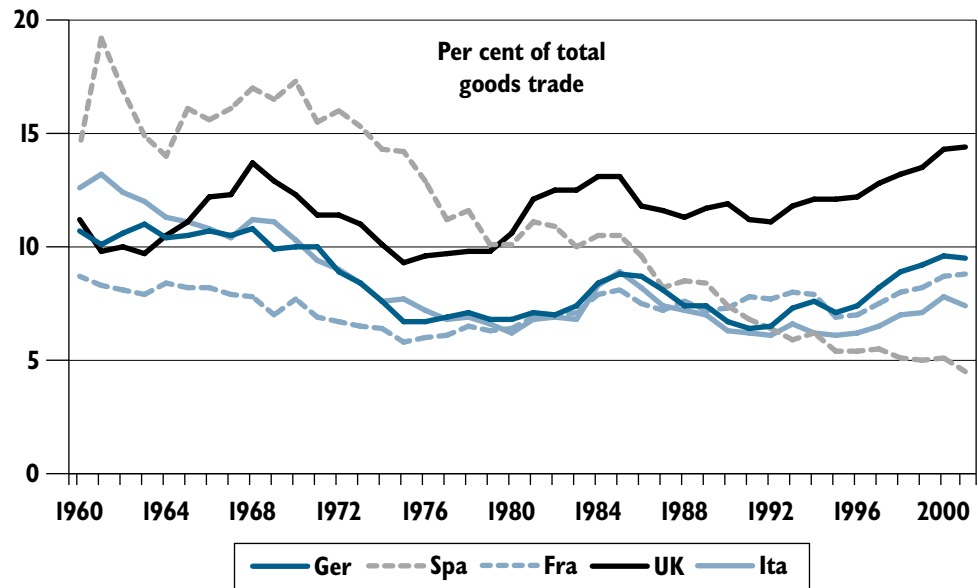
3.20 The gradual increase in UK trade with the US and EU also reflects a relative decline in trade with other countries. This is illustrated in Chart 3.5, which shows trade with the world outside the EU and US – the rest of the world (RoW). Since 1960, the proportion of the UK's goods trade accounted for by countries outside of the EU and US has roughly halved, and is now fairly closely in line with the other large Member States.

Chart 3.3: Goods trade with the EU

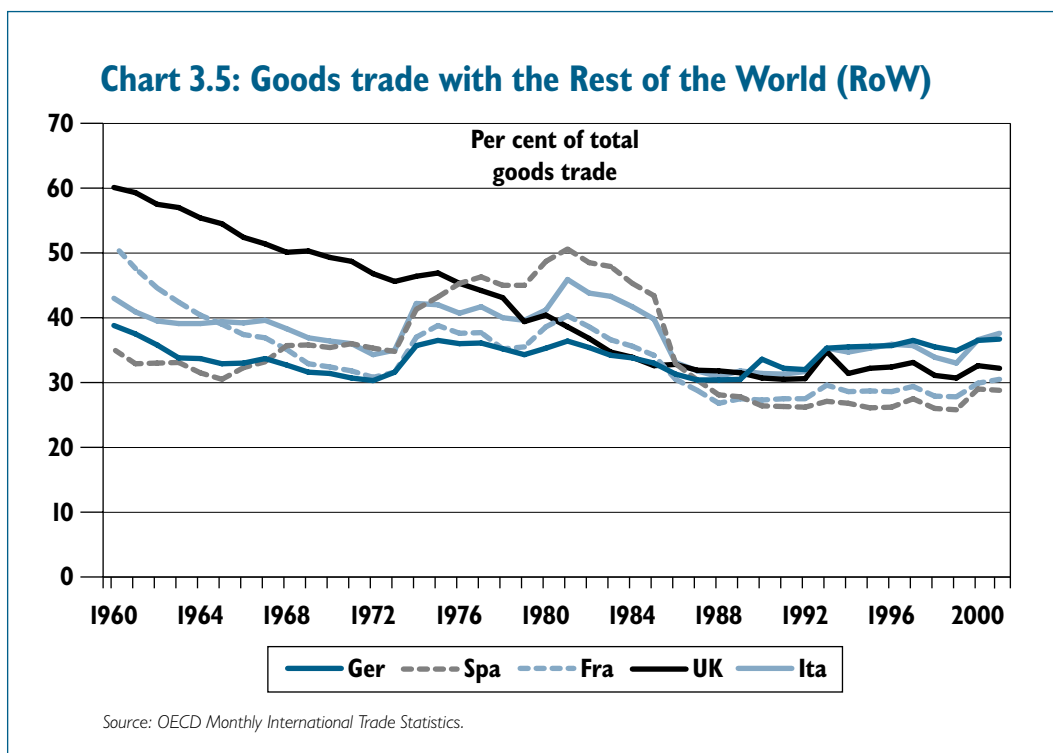


Source: OECD Monthly International Trade.

Chart 3.4: Goods trade with the United States



Source: OECD Monthly International Trade.



3.21 This analysis has focused on goods trade only, although a full appraisal would consider trade in services and other current account components over time. Unfortunately, these data are only gradually becoming available. As trade in goods is the dominant item in the current account, this is not a significant concern, although, as discussed above, some key differences between the UK and other EU countries lie in trade in services and income. Data issues, including a summary of the sources used in this section, are discussed further in Annex C.

3.22 The geographic distribution of trade may change in the period ahead. The prospect of EU enlargement, and with it the eventual expansion of the euro area, will push up the European share of UK trade. Although the accession countries currently account for only just over 1.5 per cent of UK trade in goods and services,³ EU membership and the potential for rapid growth in these countries will encourage greater trade integration in the future. On the other hand, developing countries outside the US and EU are likely to experience relatively high rates of economic growth, reducing the overall importance of the UK's two current major trading partners over time.

3.23 In summary, the UK's trading patterns are not radically different from those of other EU Member States of comparable size. In terms of goods trade, it remains the case that the UK economy is more reliant on the US as a major trading partner. However, since the 1960s the EU share of UK trade has moved much closer to the EU share of other large Member States' trade. Remaining divergences are concentrated on trade in services and income flows, where the EU share of UK transactions is well below the average of other large EU countries. Even then, due to the UK's stronger trade in services overall, UK service trade with the EU is higher as a proportion of GDP than in France, Germany and Italy.

³ Based on trade with the Czech Republic, Poland, Hungary, Slovakia, Slovenia, Latvia, Lithuania and Estonia. The two remaining 2004 accession countries, Cyprus and Malta, are not included.

THE IMPORTANCE OF THE US DOLLAR AND THE EURO

3.24 The relative importance of different currencies in conducting trade is also an important consideration. While analysis of the geographical distribution of trade shows that the euro area is the UK's most important trading region, if the majority of trade outside the euro area is conducted in US dollars, the importance of the euro relative to the US dollar may be overplayed.

3.25 The volatility of the euro against the US dollar also warrants further discussion. If the euro is more volatile than sterling against the US dollar, then, while EMU entry would eliminate nominal sterling-euro volatility, UK volatility against the US dollar might increase. If a large proportion of UK trade is conducted in US dollars, the increase in volatility vis-à-vis the US dollar could partially offset the trade benefits arising from the elimination of UK volatility vis-à-vis the euro.

3.26 This issue is discussed in greater detail in the EMU study by HM Treasury *The exchange rate and macroeconomic adjustment* and summarised in Box 3.1. The study concludes that entry to the euro should reduce overall UK exchange rate volatility, though by rather less than the straightforward elimination of sterling-euro exchange rate variability would suggest. The implication for trade is that while entry to the euro may well provide the stability necessary to boost UK trade with the euro area, to the extent that this results in greater UK volatility vis-à-vis the US dollar, trade with the US dollar bloc may be somewhat lower.

Box 3.1: The volatility of sterling against the euro and the US dollar

On the basis of UK current account figures presented in Tables 3.1 and 3.2, the EMU study *The exchange rate and macroeconomic adjustment* suggests a plausible estimate of the share of UK trade related to the euro bloc^a would be between 55 and 60 per cent. Assuming the yen accounts for only 5 per cent, this leaves a substantial share of between 35 and 40 per cent for the US dollar. So although the importance of the US dollar stretches well beyond the borders of the US, the euro is more significant for UK trade.

Turning to exchange rate volatility, the study concludes that for UK entry to EMU not to reduce the volatility of a UK Exchange Rate Index (ERI) requires very strong assumptions about the importance of the US dollar relative to the euro. It also relies on sterling continuing to trace a stable path between the euro and the US dollar. Although this has occurred for much of the period since the euro's launch in 1999, it has not been a consistent feature of sterling's behaviour (including over the past year), so cannot be relied upon in the period ahead.

Using reasonable assumptions about the weight of the US dollar in UK trade suggests that adoption of the euro would have reduced overall exchange rate volatility measured over periods of up to one year or so. On balance, it seems reasonable to assume that exchange rate volatility would be lower if the UK adopted the euro, though by rather less than the straightforward elimination of sterling-euro exchange rate volatility.

^a Made up of the EU, the European Free Trade Association (EFTA) economies, some African countries with colonial links and Central and Eastern Europe (CEE) excluding Russia.

Conclusion 3.27 The degree of EU trade integration with the UK is similar to that of other large EU Member States. However, services are more important in UK trade relative to goods, compared with other EU Member States. Thus UK trade stands to benefit potentially from EMU to much the same extent as other large Member States.

3.28 Current account links with the US are more important to the UK than many other EU Member States. This would make the volatility of the euro-US dollar rate a more important issue for the UK than for other US euro members, if the UK joined EMU. This is especially so, bearing in mind that the importance of the US dollar in UK trade is greater than the share of the US as a market for UK exports or a source of UK imports.

There is a lack of convincing evidence that exchange rate volatility has a strongly negative direct impact on trade. The results from individual studies are often inconclusive, and some research even identifies a positive relationship between currency volatility and trade.

Where studies have found a statistically significant negative impact from exchange rate volatility on trade, the effect is not very large. Complete elimination of exchange rate variability is typically shown to imply a maximum increase in trade of around 15 per cent, but with consensus estimates typically below 10 per cent.

However, most studies have focused on shorter-term volatility, whereas long-run exchange rate uncertainty may be the main impediment to trade. Studies making a clearer distinction between short and long-run impacts have had some success in identifying the expected negative relationship over the longer term.

The studies also raise a number of technical issues. There is no real agreement on how exchange rate uncertainty should be measured, although the distinction between nominal and real exchange rate volatility does not appear to matter greatly in practice. More importantly, observed exchange rate volatility is an imperfect measure of exchange rate risk. Participation in a fixed exchange rate regime, for example, does not necessarily eradicate the risk of sporadic (and major) realignments.

Relative as opposed to absolute bilateral currency risk may also be important for trade, although most studies do not take this into account. Sectoral studies also suggest that firms react differently to currency risk over particular horizons, depending on the nature of their trading relationships. The general conclusion remains that currency volatility of itself does not represent a very serious problem for developed economies as a whole.

On this evidence, the potential gains from reduced exchange rate volatility against the euro area are not likely to be large. In the UK case, any gains from the elimination of exchange rate risk within EMU have to be weighed against the probability of greater external currency volatility against the dollar.

4.1 Section 2 outlined the theoretical arguments about why exchange rate uncertainty should have a negative impact on trade. It also noted that most economists are sceptical that such effects could be very substantial. In particular, it is argued that most shorter-term exchange rate risks can be hedged fairly inexpensively through forward currency markets, implying that the impact on trade is likely to be modest. In the light of these arguments, a large number of researchers have attempted to settle the matter through empirical investigations.

METHODOLOGIES: THE GRAVITY MODEL

4.2 The various studies differ in scope and approach. For example, some studies are conducted at the aggregate level while others focus on bilateral measures of trade and exchange rate variability. As explained later, there are reasons for preferring bilateral trade investigations, most of which are couched within the framework of gravity models of trade (see Annex D). Gravity models are generally favoured for their consistent empirical success in modelling bilateral trade flows. As such, they provide a strong foundation for investigations of specific influences on trade including exchange rate uncertainty and also the influence of membership of a currency union more generally (see also Section 5).

4.3 Basic gravity models suggest that trade flows between two countries are positively related to their economic size (GDP and/or population) and negatively related to the distance between them. The size variable reflects the straightforward fact that larger countries are expected to trade more in volume terms (though not as a proportion of GDP). The distance variable meanwhile is expected to capture transport and information costs, although geographic distance is a far from perfect proxy variable for such costs. Beyond this core, additional variables such as the existence of common borders, language or membership of free trade areas may also be employed.

**Exchange rate
volatility**

4.4 Investigations of the impact of exchange rate uncertainty augment the basic gravity model with some measure of exchange rate volatility. Exchange rate volatility acts as a proxy for exchange rate uncertainty since the latter is not directly observable. This may be an important limitation. Low measured exchange rate volatility within fixed exchange rate regimes, for example, could go hand-in-hand with strong uncertainties concerning the possibility of revaluations. Moreover, there are many ways of measuring observed exchange rate volatility, but no agreement in the literature as to which is best. The key choices are between short or longer-term measures of volatility, based on either the nominal or real exchange rate.

4.5 The literature also raises some important technical issues regarding estimation of the models and the interpretation of the results. One potential problem is that trade may influence exchange rate volatility and not vice versa. This would occur if monetary authorities pursue deliberate policies of stabilisation of the bilateral exchange rate against their most important trading partners. More generally, there is a concern that simple models of bilateral trade may produce unreliable estimates of the impact of exchange rate volatility by failing to account for other important influences on trade. Some studies make explicit attempts to deal with such problems, while others do not.

EMPIRICAL RESULTS

4.6 Despite the existence of a large body of research, no firm conclusion can be reached as to the size of the impact of currency volatility on trade. In fact, there are even doubts that any negative relationship exists at all. Dell’Ariccia (1999) notes that “*a quite extensive literature has tested the effects of exchange rate regimes on trade, but the results are not always significant and they change across studies*” (page 316). This echoes earlier reviews, including the European Commission (1990) and IMF (1984). The IMF conclude that “*the large majority of empirical studies on the impact of exchange rate variability on the volume of international trade are unable to establish a systematically significant link between measured exchange rate variability and the volume of international trade, whether on an aggregate or bilateral basis*” (page 36).

4.7 Box 4.1 briefly reviews a number of studies that do find evidence of a statistically significant impact from exchange rate volatility on trade. In most cases, the studies may be used to estimate the increase in trade that might have resulted from the complete elimination of exchange rate volatility between the specific countries and over the sample period under consideration. This is the relevant parameter in terms of possible membership of EMU, which would provide a complete elimination of nominal exchange rate uncertainty within the euro area. The overall conclusion, even from this subset of evidence, is that negative impacts are not very large. Estimates of the maximum gains to trade from the complete elimination of exchange rate volatility are in the region of 15 per cent, while the consensus estimate of these studies is typically less than 10 per cent.

Box 4.1: Studies on exchange rate volatility and trade

De Grauwe (1987) finds that the impact of exchange rate volatility on trade is negative, and significantly different from zero. In the study, De Grauwe estimated the average yearly growth rate of bilateral exports for European Monetary System (EMS) countries, European non-EMS countries and non-European countries for the periods 1973-1978 and 1974-1979. Averaging the data means the study looks at the long-run impact of exchange rate volatility on trade growth. The two main conclusions were that: the reduction in real exchange rate volatility resulting from the EMS added 0.1 percentage points to export growth between EMS countries; and that if EMS countries had experienced the same level of volatility as non-EMS countries, export growth would have been 1.2 percentage points lower.

Rose (2000) estimates a similar model to that of Dell’Ariccia (1999, and discussed in paragraphs 4.8 to 4.10) and suggests that eliminating exchange rate volatility over his sample period of 1970-1990 would have increased bilateral trade by around 13 per cent. He uses a far larger cross section than previous studies, 186 countries in all, but observations are only taken every five years and pooled into a cross section. The study does not attempt to control for bias arising from simultaneity or omitted variables. Beyond the impact of exchange rate volatility, Rose also explicitly models the effect of a currency union. These results are the focus of Section 5.

Anderton and Skudelny (2001) also find a statistically significant negative impact on trade from exchange rate volatility. They again use panel data for the US, Japan, Denmark, Sweden, the UK and Switzerland covering a period spanning most of the 1990s. Their central estimate is that extra-euro area exchange rate volatility may have decreased extra-euro area imports by about 10 per cent, rising to as much as 14 per cent in the long run.

More recently, some studies have applied cointegration analysis to the link between exchange rate volatility and trade. This allows for a sharper distinction to be made between any short-run dynamic and long-run level relationships between exchange rate uncertainty and trade. Two papers that apply this methodology are Arize (1998) and Fountas and Aristotelous (1999).

Fountas and Aristotelous (1999) generally find a significant, negative, short-run relationship between exchange rate volatility and export volumes among the larger EU economies. The evidence for a long-run relationship is less convincing, suggesting that any such gains are transient. Their findings are based on error-correction models of export volumes for Germany, France, Italy and the UK. Perhaps strangely, given the discovery of a short-run relationship between exchange rate volatility and export volumes, the authors also find that the ERM had no discernable effect on intra-EU exports.

Arize (1998) is able to identify a negative impact of real exchange rate volatility on long-run import demand after controlling for real GDP and the ratio of import prices relative to domestic prices. The model was applied to eight countries: Belgium, Denmark, Finland, France, the Netherlands, Spain, Greece and Sweden. Although a positive relationship is identified for the latter two, the remaining countries display the expected negative relationship between trade and exchange rate volatility. For these six countries, the long-run elasticity of import demand with respect to exchange rate volatility ranges from -0.01 to -0.16 . This implies that total real exchange rate stability would increase imports by a maximum of around 15 per cent.

Using bilateral trade data 4.8 Evidence from a substantive study by Dell’Ariccia (1999) falls into the same range. This study is interesting in that it is based on bilateral trade data for the full cross section of the 15 EU countries plus Switzerland, and also makes explicit attempts to deal with the technical

issues and uncertainties noted earlier. Potential trade impacts are also tested against a wide range of measures of exchange rate variability. Simple estimates from a panel regression suggest that total elimination of exchange rate variability in 1994 could have increased bilateral trade among these countries by about 12 per cent. The choice between nominal or real measures of exchange rate uncertainty was shown to have little or no impact on the conclusion.

4.9 On the basis of more sophisticated estimation techniques, the study suggests that the true impact of exchange rate variability on trade, while still statistically significant, could be rather lower. After controlling for the possibility that trade may influence exchange rate volatility through exchange rate policy, the estimated impact falls to 10 per cent. The study then attempts to control for any bias due to the omission of specific factors that may determine trade between particular country pairs. Allowing for so called ‘fixed effects’, the estimated impact of exchange rate volatility falls below 5 per cent. But this is still statistically significant according to standard tests. Because the fixed effects methodology attempts to deal with both forms of bias, omitted and simultaneity, it is likely to be the most reliable of the four estimates.

4.10 The bilateral approach used by Dell’Ariccia seems preferable to studies that use aggregate data, which have the potential to mask offsetting movements in country flows that may reflect bilateral exchange rate movements. However, whole economy bilateral analysis might also represent still too high a level of aggregation. Individual sectors and indeed firms may well react differently to uncertainty, as well as being concerned with volatility over different time frames depending on the scale and duration of their commitment to foreign markets. Unfortunately, the data required for such analysis are in short supply, and so it is not easy to adopt a more disaggregated approach. Nevertheless, some studies have attempted a sectoral level analysis. This is discussed in the EMU study by HM Treasury *EMU and business sectors*.

INTERPRETING THE RESULTS

4.11 The most obvious conclusion to draw is that the impact of exchange rate uncertainty on trade, to the extent that a negative relationship exists at all, is relatively modest. However, a number of alternative explanations have been offered. To some extent, these may help to reconcile the relatively weak conclusions of the empirical studies with anecdotal evidence from the business sector suggesting that exchange rate variability is a rather bigger concern.

4.12 The possible explanations, discussed in Box 4.2, are that:

- studies focusing on longer-run misalignment generally find a stronger negative relationship between trade and volatility than those studies using short-run volatility;
- the focus on absolute exchange rate volatility may explain the finding of a positive relationship between exchange rate volatility and trade; and
- a simple relationship may not exist. Trade has risen continuously since the 1960s, yet exchange rates have gone through periods of greater and lesser volatility.

Box 4.2: The measurement of exchange rate volatility

There is no consensus on how observed exchange rate volatility should be measured. The choice between nominal and real exchange rates, however, does not appear to be important. In practice, for empirical results this finding (see for example McKenzie, 1999) probably reflects the focus of most studies on shorter-term measures of volatility, in which changes in the nominal rate are likely to dominate.

The emphasis on shorter-term volatility in itself could be more important. Availability of hedging instruments suggests that longer-term exchange rate uncertainty may be the major risk. Despite this, the bulk of empirical studies focus on exchange rate volatility over periods of less than one year. Taylor (2002) suggests that those studies focusing on longer-run exchange rate misalignments have been much more successful in identifying a link between the exchange rate and trade.

Sekkat (1997) confirms this through a small trade model containing separate equations for the change in volumes and prices, in the national currency, for both exports and imports. The exchange rate is also modelled explicitly, allowing trade flows to impact on currencies as well as vice versa. The system is applied to France, Germany, Italy, Belgium and the UK. A clear negative impact from short-run exchange rate volatility on trade was only detected for two of the five countries. For long-run misalignment this rose to four of the five. Both short and long-run impacts were identified in the case of the UK.

Perée and Steinherr (1989) suggest that the empirical estimates may be affected by a third country effect. This is best illustrated through a simple example. Country A exports goods to countries B and C. However, exchange rate volatility increases against the currencies of B and C, but the increase against B is smaller. This means the risk of trading with country B has fallen relative to the risk of trading with country C. Therefore, it is possible that country A will divert exports towards country B despite the absolute increase in risk. Perée and Steinherr claim this is a possible explanation for why some empirical studies actually find a positive link between exchange rate volatility and trade flows.

Rose (2000) meanwhile notes that nominal exchange rate volatility was low in the 1960s for most OECD countries, high in the 1970s and 1980s and moderate in the 1990s. But over the same period, trade has risen continuously making it difficult to find a simple relationship. A corollary to this is that periods of low volatility would often have coincided with periods of fixed exchange rates, such as the Bretton-Woods agreement. Although observed volatility would have been low in these periods, the potential for large and possibly unexpected revaluations of the exchange rate might still have been a major source of exchange rate uncertainty. It is virtually impossible to hedge against infrequent realignments within fixed exchange rate regimes.

4.13 Some authors go as far as to question the very basis of the investigations. The IMF (1984) suggest that the question of what would be the effect on trade if exchange rates were stable and all other conditions remained the same is not really meaningful. This view is echoed by Perée and Steinherr (1989) who note that, “*the exchange rate is not a truly exogenous variable, but a function of macroeconomic fundamentals*” (page 1255). On this view, trade flows are seen as an important determinant of the long-run exchange rate and so changes in the exchange rate driven by trade imbalances can be seen as an important adjustment mechanism. Hence, far from the elimination of such changes via monetary union or other policy regimes being beneficial, there would in fact be substantial costs.

Conclusion: 4.14 Overall there is a lack of firm evidence demonstrating that exchange rate volatility has anything more than a fairly modest negative effect on trade. A caveat to this is that studies addressing longer-run volatility or taking a sectoral view seem to have been more successful in identifying the expected negative relationship. Nonetheless, even among that subset of studies which does find a statistically significant impact, the estimated gains to trade arising from the elimination of volatility is typically found to be not more than 10 per cent. On this evidence, the potential gains from the elimination of intra-euro area exchange rate volatility within EMU are not likely to be at all large.

An influential study by Rose (2000) appeared to turn on its head the hypothesis and evidence that currency union leads to only modest increases in trade. The original Rose cross-country analysis suggested that members of currency unions may trade over three times more with each other than do non-currency union countries, although this is not the same as saying that a given country would necessarily experience such a gain on entering a currency union.

The Rose study has generated a large body of subsequent research addressing two broad concerns. First, that strong estimates of the likely gains may be biased upwards because the original analysis failed to take account of other 'fixed effects' that are important in determining bilateral trade. Second, that there may be simultaneity or selection bias in the results, in that membership of a currency union cannot be considered independent of the level of trade or its key determinants.

Allowing for omitted variables has some impact, but does not appear to overturn the general conclusion that currency union effects could still be very large. Studies allowing for possible selection bias meanwhile estimate the likely gains to be significantly smaller at around 60 per cent or lower. Other studies, based on extended datasets, have exploited time-series as well as cross-country variation in currency regimes to show that entering a union may still lead to a doubling in trade.

All of these studies are based on datasets in which the vast majority of currency unions are formed between smaller, poorer countries. A structural approach, based on the idea that relative as opposed to absolute trade barriers are what matters, suggests that a full union of the 15 current EU Member States including the UK could raise trade between members by over 40 per cent.

Overall, more recent work suggests that the likely gains from currency union membership are lower than initially estimated, though still substantial. This might be viewed as a consensus, but it is still only an emerging one, and more research is needed.

As a complement to cross-country studies, time-series analysis of particular episodes involving a change in currency regime can be instructive. Case study analysis of the dissolution of the Irish punt's 150 year association with sterling in 1979 does not reveal any conclusive evidence that Anglo-Irish trade was significantly affected. But once again there are limits to the extent to which such findings may be extrapolated to the question of possible UK adoption of the euro.

5.1 Section 2 described the main channels through which membership of a currency union should increase trade among the members of the union. Theory suggests that lower exchange rate uncertainty should act as an incentive to increased trade, though, based on the empirical evidence presented in Section 4, it appears that such gains may not be large. Membership of a currency union, nevertheless, represents a far more serious commitment to nominal exchange rate stability than a fixed exchange rate regime. The reduction in risk therefore should be correspondingly greater. This should be most beneficial to agents involved in trade over relatively long time horizons, during which a country could choose to revalue or even leave a fixed exchange rate system.

5.2 From a theoretical standpoint, it is difficult to judge how significant the overall gains to trade from monetary union might be, but there has been some presumption among academic economists that they may not be large. This section reviews those empirical studies which attempt explicitly to quantify the gains to trade from membership of a currency union. The formation of EMU has stimulated a great deal of research in this field. This section provides an overview of the key strands in this work; more detail is provided in Annex D. Finally, it is important to note that this is a highly topical research area, and the conclusions of such work are not yet fully established.

BORDER EFFECTS

5.3 McCallum (1995) was the first to show that the boost to trade from using a common currency might be significantly greater than gains arising from simply fixing the exchange rate. McCallum looked at the trading patterns of US states and Canadian provinces using a gravity-based model of bilateral trade and data for 1988. Gravity models were introduced briefly in Section 4 and again more detail is provided in Annex D. Put simply, they estimate bilateral trade flows based on the economic size of the countries involved, the distance between them and other factors relevant to trade.

5.4 After controlling for regional incomes and distance between the various regions in the two countries, McCallum concluded that Canadian provinces traded around 20 times more with each other than with US states of a similar size and proximity. This phenomenon is known as ‘home bias’ – the clear tendency to trade more *within* countries rather than *across* borders. Since the existence of separate national currencies is one factor underpinning border trading costs, the implication was that separate currencies might act as a major disincentive to trade.

5.5 Of course, the existence of separate national currencies is not the only explanation for the large border effect. For example, the US and Canada have different legal frameworks. Equally, information may not flow so freely across the border as within the countries, perhaps because advertising tools operate primarily at a national rather than international level. The Canadian and US transport infrastructure is generally designed with East-West trade as opposed to North-South trade in mind. A further point is that bilateral trade may still have been depressed by existing tariff barriers in 1988 (the US and Canada only concluded their free-trade agreement that year), though a later study still shows a large inter-provincial trade effect.

5.6 Nitsch (2000) applied a similar methodology to the question of home bias in trade within the EU. His results suggest that over sample periods covering the 1980s and 1990s the average EU country traded seven to ten times more with itself than with a partner country, after accounting for size, distance, common language, common border and remoteness. Once again, this may mean that border costs and, by inference, separate national currencies may have a significant negative impact on trade.

5.7 Anderson and van Wincoop (2001), however, argue that McCallum’s results, and those of subsequent studies using the same methodology, over-estimate the impact of borders on trade. Their main insight is that regional trade depends on relative as opposed to the absolute trading costs which underpin the McCallum study. On this basis, they find that bias towards provincial trade is much lower than McCallum suggests and, moreover, that the remaining effect may largely be explained by Canada’s small size. Box 5.1 discusses this work in greater detail.

Box 5.1: Home bias and ‘multilateral resistance’

Anderson and van Wincoop (2001) argue that the gravity model of trade used by McCallum in his investigation of home bias did not correspond closely to the underlying theory of trade between regions. Specifically, it failed to take account of the fact that relative as opposed to absolute trade costs are what matter for trade between regions. The intuition is fairly simple: it is more attractive to trade with a country or region that has low trade costs relative to the average trading costs across all countries and regions (including regions in the same country).

Anderson and van Wincoop develop an augmented gravity model within which they re-run McCallum’s investigation of regional trade in Canada and the US. Critically, as well as including measures of absolute trade costs between two regions (proxied by distance and the existence of a common border), their augmented model also includes ‘multilateral resistance’ terms – that is, measures of average trading costs between the two regions and all other regions in the model.

Omission of the multilateral resistance terms from McCallum’s earlier study is shown to impart a significant bias in the estimate of the degree to which the Canadian provinces trade with each other relative to the US states. Based on the new model and data for 1993, the authors estimate that the ratio of inter-provincial to province-state trade is under 11 (against a revised estimate of more than 16 when relative trade costs are ignored, as in McCallum’s original study).

In addition, the authors show that this effect reflects the small size of the Canadian economy. Any barrier between Canada and the US significantly reduces the relative cost of inter-provincial trade within Canada because average trade costs (multilateral resistance) are higher for nearly all other potential trading partners. Multilateral resistance for US states, by contrast, is less affected in that the border barrier does not impact on costs between a state and the rest of the larger US economy. Repeating the McCallum regression for US states, they find that trade between US states is only 1½ times greater than between US states and Canadian provinces.

The Anderson and van Wincoop methodology also allows them to estimate the impact of national borders on trade between the countries. They conclude that borders reduce trade between the US and Canada by 44 per cent. Extending the analysis to a three area model (US, Canada and the rest of the world), they conclude that national borders reduce trade among the other industrialised economies by 29 per cent.

As described later in this section, failure to account for the importance of relative as opposed to absolute trade costs may significantly affect the conclusions of other gravity-based investigations of international trade. In particular, most analyses of the impact of membership of a currency union have been conducted within the same framework, which is based on absolute costs.

THE DIRECT IMPACT OF A CURRENCY UNION – EARLY WORK

5.8 Although studies of home bias imply that borders may have a significant effect on international trade, it is difficult to gauge to what extent such effects are directly related to costs of maintaining separate currencies. Ideally, estimation of the impact of currency unions on trade should be based on long, robust, time-series datasets covering a wide variety of countries which have adopted a common currency. Unfortunately, the available evidence base is limited and primarily involves small countries in long standing monetary unions. The cross-country nature of the evidence also provides only an indirect measure of the potential gains to trade from the adoption of a common currency for a particular country.

Rose (2000) 5.9 This issue was tackled first by Rose (2000) using a cross-country gravity model in which trade between two countries is positively related to their incomes and negatively related to the distance between them. The study also controls for a number of factors that could reasonably be expected to increase ties, and therefore trade, between two countries. These include a common language, past and present colonial relationships, joint membership of a common free trade area and exchange rate volatility. Identification of the impact of common membership of a currency union is achieved via the inclusion of a dummy variable that takes a value of one if a country-pair share the same currency and zero otherwise.

5.10 Rose's influential original study suggested that the currency union effect is very large, with countries in a currency union estimated to trade over three times more than countries outside unions. The model also suggested that membership of a common free trade area increases trade by a factor slightly greater than two and a half – a substantial effect but less than the impact of single currencies. (The impact of the EU Single Market Programme is discussed in the Introduction.) In line with other studies reviewed in Section 4, gains from the elimination of exchange rate volatility alone were estimated at less than 15 per cent. The wider benefits to trade of currency unions over fixed exchange rate regimes were therefore estimated to be very significant indeed.

5.11 In the European context, this would suggest that adoption of the euro would have an even greater effect on trade than the removal of tariffs between EU countries. However, Rose (2000) doubts that such a figure could be applied to EMU or to the UK's potential membership of EMU. He notes that many of the countries in his sample which belong to currency unions are small, poor, or both, and so are unlike most EU countries. Equally, as Annex E shows, currency unions generally comprise a number of small countries linked to the currency of a large country. Again, this is not the case for the euro, which comprises a range of country sizes and in which the UK would be the second largest country. Therefore, Rose concludes that *“any extrapolation of my results to EMU may be inappropriate since most currency union observations are for countries unlike those inside Euroland”* (page 15).

5.12 Notwithstanding this qualification, the study has attracted a great deal of attention and scrutiny in the context of EMU. Rose (2000) argues that the measured impact of currency union may plausibly greatly exceed estimates of the impact of reduced exchange rate volatility alone on the grounds that a currency union is a much more durable commitment than a fixed exchange rate. Jacques Mélitz, in his contribution to the EMU study *Submissions on EMU from leading academics*, highlights that the results do help to resolve a piece of the larger puzzle in trade – that of home bias. In other words, Rose's results imply that separate national currencies explain, in part, why people trade much more with their compatriots.

5.13 However, the economic mechanisms underlying the result are generally not well understood. Certainly, the economic and political costs of abandoning a common currency would be much larger than simply leaving a fixed exchange rate mechanism. This should result in a more definitive elimination of nominal exchange rate risk. Aside from this explanation, Mélitz notes that the wider benefits of a single currency probably also stem from a common unit of account and more price transparency. The latter would increase trade because people can more easily compare prices across countries and seek out the most competitive supplier, domestic or foreign. The issue of price transparency is discussed further in the EMU study by HM Treasury *Prices and EMU*.

5.14 A further interesting conclusion of Rose (2000) was that there was no evidence that membership of a currency union diverts trade away from non-member countries.¹ In line with this, Jeffery Frankel, in his contribution to the EMU study *Submissions on EMU from leading academics*, states he has found little evidence, overall, of a “fortress Europe” policy. Mélitz (2001) supports this finding, noting that the creation of a common currency lowers trade barriers for all countries, and not just those participating in the union. Mélitz, therefore, suggests that the UK, Swedish and Danish economies are already benefiting from the introduction of the euro through lower transaction costs. Despite this potential benefit to non-members, the Rose study nonetheless clearly suggests that trade benefits are much more substantial for those countries which are members of a currency union.

POTENTIAL PROBLEMS AND MORE RECENT RESEARCH

5.15 A number of authors, including Rose himself, have highlighted potential problems with Rose’s initial study. They have further developed the analysis to obtain more robust estimates of the gains to trade through membership of a currency union. The results from many of these studies are summarised by Andrew Rose in his contribution to the EMU study *Submissions on EMU from leading academics*. Uncertainties concerning the original study fall into two broad categories:

- **omitted variables problems.** The model may omit other factors which are important in determining bilateral trade flows and which are correlated with membership of a currency union; and
- **simultaneity or selection problems.** Membership of a currency union may not be independent of the level of trade between countries, nor of a number of other factors that appear to systematically determine which countries form currency unions.

5.16 In both cases, these problems would cause the model to produce potentially biased and hence unreliable estimates of the trade effect of currency union membership within the Rose framework. Much of the subsequent literature on such impacts can be thought of as an attempt to solve these twin problems.

Omitted variables **5.17** There is a general concern that gravity models, despite controlling for a range of time-invariant factors such as common languages and borders, may still ignore other important determinants of trade between specific countries. If these ‘omitted variables’ are correlated with membership of a currency union, any conclusions drawn from the models would be biased. A number of studies attempt to control for this possibility through the incorporation of ‘fixed effects’ between particular country pairs within the gravity model framework.

5.18 Furthermore, more recent studies applying this methodology have also exploited variation in countries’ currency regimes over time. As Rose and Glick (2001) point out, this means that these studies address the real question of interest, namely “*What is the impact on trade of a country joining (or leaving) a currency union?*” (page 2). Rose’s original dataset precluded such an analysis in that movements in and out of unions were very few and far between. Standard cross-section studies by contrast provide an estimate of how much more countries within currency unions trade than non-members.

¹ To test the sensitivity of the results to the specification of the model, Rose added a dummy variable equal to one if the two countries were not in a currency union with each other, but at least one was in a currency union with another country. Rose found the coefficient on this variable was positive, suggesting that currency unions actually increase members’ trade with non-members, rather than diverting trade away from non-members.

5.19 Rose and Glick (2001) apply the fixed effect methodology to an expanded dataset in which there were 16 country switches into and 130 switches out of currency unions. This study suggests that trade approximately doubles in response to entering a currency union, compared to a factor of four when fixed effects are ignored. Although this shows that fixed effects are important, in itself, this does not overturn the conclusion that currency unions still have a very large impact on trade. Although a similar study by Pakko and Wall (2001) suggested that the impact of joining a currency union is not significantly positive, it was based on the inferior original dataset, which contained only eight country switches in currency regime status.

5.20 The criticism that such estimates are too heavily reliant on currency unions between smaller, poorer countries which are quite unlike EU economies still applies. A further criticism of the fixed-effect approach is that the impact of joining or leaving a currency union is assumed to be equal and opposite. Pain (2002) argues that in many cases the breaking of a currency union has coincided with other economic and political events that would have had a significant impact on trade. Citing the example of the dissolution of ties between Portugal and its former colonies in Angola and Mozambique, he argues *“it is difficult to believe that subsequent trends in bilateral trade were driven primarily by the adoption of different currencies rather than by the disruption caused by civil wars in the former colonies”* (page 76).

Relative trade barriers

5.21 Although gravity models do fit the data well, as noted in Box 5.1, Anderson and van Wincoop (2001) have argued that they do not closely correspond to the underlying theory of trade between regions. Specifically, most gravity-based studies explain bilateral trade through measures of absolute as opposed to relative trade costs. Rose’s initial study is one of those gravity-based investigations of trade that may be biased in this way.

5.22 Rose and van Wincoop (2001) therefore devise a structural model in which trade between a pair of countries depends on their bilateral trade barrier relative to average trade barriers against all other countries (multilateral resistance). Moreover, because the estimated model has a much clearer theoretical basis, the authors are able to estimate the impact on trade of currency union for any particular set of countries, including those that have never been in one. These estimates still assume that the reduction in bilateral trade barriers for new union members is the same as that for existing currency unions, but also allow other country-specific factors to be taken into account.

5.23 The main insights of the model are that:

- any reduction in barriers to trade through the elimination of separate national currencies may be expected to have more impact on larger countries because relative trade resistance falls further than for small countries. For small countries, by contrast, changes in bilateral barriers have a proportionately larger impact on multilateral resistance; and
- for countries which already trade heavily, formation of a currency union may lead to a smaller percentage increase in trade. This is because the bilateral barrier in this case has a large weight in multilateral resistance, which also falls sharply. The change in relative resistance therefore is not so great.

5.24 These theoretical predictions are discussed in greater detail in Annex D. For a large economy such as the UK already trading extensively with the euro area, these arguments cut both ways. But after taking account of the high existing degree of trade integration within Europe, the authors estimate that monetary union among the existing euro area economies could boost trade by around 60 per cent. For a full union involving all 15 EU Member States including the UK, the equivalent figure is 44 per cent. These latter figures may still be an overstatement of the case in that barriers to trade within the EU are likely to be lower than for existing currency unions, for example, because the comparative sophistication of European financial markets makes currency risk a much less serious impediment to trade.

Selection bias 5.25 The conclusions of gravity-based investigations of currency unions and trade may also be affected by selection bias. Persson (2001) explains this in medical terms. If a currency union was regarded as a ‘treatment’, then one would want to test it on two groups of patients who were similar in all respects other than that one received the treatment while the other did not. If the two groups were systematically different in some other respect, it would be impossible to tell whether the treatment was really responsible for any observed difference in the health of the two groups.

5.26 Proponents of this view in relation to trade argue that the characteristics of countries that do form currency unions appear to be systematically different from those that do not. Moreover, membership of a currency union is seen as depending on some of those factors used to explain trade within the Rose framework and also by some as a function of the level of trade itself. Again, this would lead to unreliable estimates of the impact of a currency union in the Rose framework. Two contrasting approaches in dealing with this potential problem are discussed below.

5.27 Persson (2001) contrasts the characteristics of the currency union and non-union country groups. Based on Rose’s original dataset, a comparison of the mean averages of various variables for the two groups shows that country pairs with a common currency tend to be economically smaller, poorer and geographically closer. In addition, they are more likely to share a border; have a common language; engage in a free trade arrangement; be part of the same nation; and have had the same coloniser or have a colonial relationship. Some of these conclusions are not surprising when one looks at the currency union countries contained in the dataset. Examples include:

- the Falkland Islands and Gibraltar linked with the UK;
- the Vatican and San Marino linked with Italy;
- countries of the African CFA Franc Zone such as Burkino Faso and Chad; and
- Tuvalo and Tonga linked with Australia.

A full list of the currency unions used in Rose (2000) is given in Annex E.

5.28 Furthermore, these differences between the groups are shown to be statistically significant according to standard tests (as demonstrated in Annex F). Therefore, it seems that the characteristics of currency union and non-currency union countries differ systematically. The correlation between currency union membership and a number of the variables employed to explain trade in Rose’s original study therefore is relatively strong.²

5.29 Mélitz (2001) likewise suggests there is good reason to believe countries will only form currency unions if they already enjoy particularly close economic or political ties. Of the 284 observations of bilateral trade between currency union members in Frankel and Rose (2000), who report an impact on trade similar to that of Rose (2000):

- 108 are also part of a free trade agreement or political union;
- of the remaining 176, most have a shared colonial past; and
- only 56 observations are for country-pairs with no political affiliations.

² The correlation is 0.2 or more in absolute value for six out of the nine other factors determining trade in the Rose (2000) study, which Persson suggests is strong for such a large dataset.

5.30 Mélitz adopts a fairly rough but, nonetheless, illuminating approach to correcting for this possible interaction between the various factors. This involves drawing a distinction between instances of ‘strict’ currency unions where country pairs do not share the other affiliations noted above, and ‘combined’ cases where free trade, political union and colonial ties are also present. By redefining these latter cases to exclude countries which do share a common currency, Mélitz gains ‘independent’ estimates of their impact on trade. By subtracting the sum of these effects from the estimated impact of combined currency union, Mélitz arrives at his preferred view that currency union in itself leads to a doubling of trade, against a quadrupling when the interactions are ignored.

5.31 Persson (2001) presents a much more complex matching procedure, aimed at identifying a better ‘control’ group of countries which do not belong to currency unions. Based on the various characteristics described earlier, the author first estimates the probability that each country pair in the sample would adopt a common currency, irrespective of whether they are actually in a union. This is called the propensity score. As expected, various proxies of trading costs employed in gravity models appear to be good predictors of adoption of a common currency, although there are some doubts that the propensity model is adequate for the purpose.

5.32 Persson uses the propensity score in two ways. A stratified methodology ranks the country-pairs by propensity score then divides them into five bands according to their proximity to one another on the scale. Estimation of the trade impact of actual membership of a currency union within such bands is therefore based on sets of broadly similar countries (certainly compared to the full sample). The nearest matching approach meanwhile takes each currency union country-pair and matches it to the non-currency union country-pair with the closest propensity score. The estimator is the average difference in bilateral trade across these currency union and non-currency union country-pairs. This approach also allows for possible non-linearities in the relationship between trade and the explanatory variables.

5.33 In both cases, the estimated impact of currency union membership on trade is appreciably lower. The stratified approach suggests that countries with a common currency trade 13 per cent more with each other, while the nearest matching approach gives a figure closer to 65 per cent. However, these results lack precision, so are not deemed statistically different from zero at standard significance levels. Persson’s propensity model has been criticised by Rose on the grounds that it lacks theoretical underpinnings, fits poorly and does not predict well the countries that are likely to form a currency union.³

Simultaneity bias **5.34** Possible simultaneity bias is a closely related issue. Simultaneity arises if the decision to adopt a currency union is not independent of the level of trade between a country-pair. Indeed, it seems reasonable to expect that close trade ties will be one factor motivating countries to form a currency union. Teneyro (2001) tackles these problems through explicit and simultaneous estimation both of the probability that a country-pair will form a currency union and the impact of that currency union on trade between the two countries. This approach involves the identification of factors which affect the decision to adopt a single currency, but which do not have any independent impact on trade between the countries. More detail on the methodology is given in Annex D.

³ Rose’s response to Persson is available at <<http://faculty.hass.berkeley.edu/arose/Torsten.pdf>>.

5.35 In addition, Tenreyro highlights a further source of bias in earlier studies. In datasets covering bilateral trade there are often years in which no trade is observed between economically small countries. Because the log-linear specification of the gravity model precludes zero trade entries, this was commonly overcome simply by ignoring these country-pairs. However, since currency union countries tend to be economically smaller than the average, this practice has a greater impact on the currency union group. Tenreyro addresses this problem by aggregating trade flows over five-year periods, and suggests that this issue alone is sufficient to lower the estimated impact of currency union on trade from 200 per cent to 100 per cent.

5.36 After correcting for zero entries and allowing for self-selection, Tenreyro estimates that the trade-enhancement effect of currency unions is approximately 60 per cent, and lower when non-linearities in the trade relationship are taken into account. Although such gains are still substantial, they are considerably lower than in earlier studies. Tenreyro's point estimate is in line with Persson's, though the two studies adopt different approaches to cater for the selection and simultaneity problems. And in both cases, the estimates are not statistically different from zero at standard significance levels, i.e. 5 per cent. However Tenreyro's estimate is statistically significant at the 10 per cent significance level.

5.37 Thus far the evidence presented has been based on cross-country or panel estimations. However, an alternative strategy is to use pure time-series analysis of changes in currency regimes in particular countries. On this basis, analysis of trends in UK-Irish trade following the dissolution of the punt's long-standing link with sterling in 1979 presents a potentially relevant test case.

CASE STUDY: BREAKING THE PUNT-STERLING LINK

Background 5.38 If membership of a currency union boosts trade with the other members of the union, then leaving one should also have a discernible negative impact. As a complement to cross-country studies, therefore, analysis of the dissolution of the Irish punt's 150 year link with sterling in 1979 provides a rare opportunity for time-series investigation of the possible impact of currency union on trade between a specific pair of countries. Thom and Walsh (2001) present a detailed empirical investigation of the effect of this dissolution.

5.39 Although typically thought of as a currency union, the Anglo-Irish currency link did not involve institutional mechanisms for formal co-operation. From 1826 to 1927 there was no separate Irish currency. In the period following the punt's introduction until 1979 the link was maintained in terms of a one-to-one no-margins peg. The link was abandoned in 1979 following Ireland's decision to join the Exchange Rate Mechanism (ERM) while the UK currency remained free-floating.

5.40 Analysis of this episode is potentially relevant for three reasons:

- this was one of very few currency unions between modern OECD economies. Most cross-country investigations, by contrast, largely concern unions between smaller economies where idiosyncratic factors might render any findings less relevant to the EMU question;
- the UK and Ireland maintained normal trading relations as members of the EU in the periods immediately before and after the breaking of the currency link; and

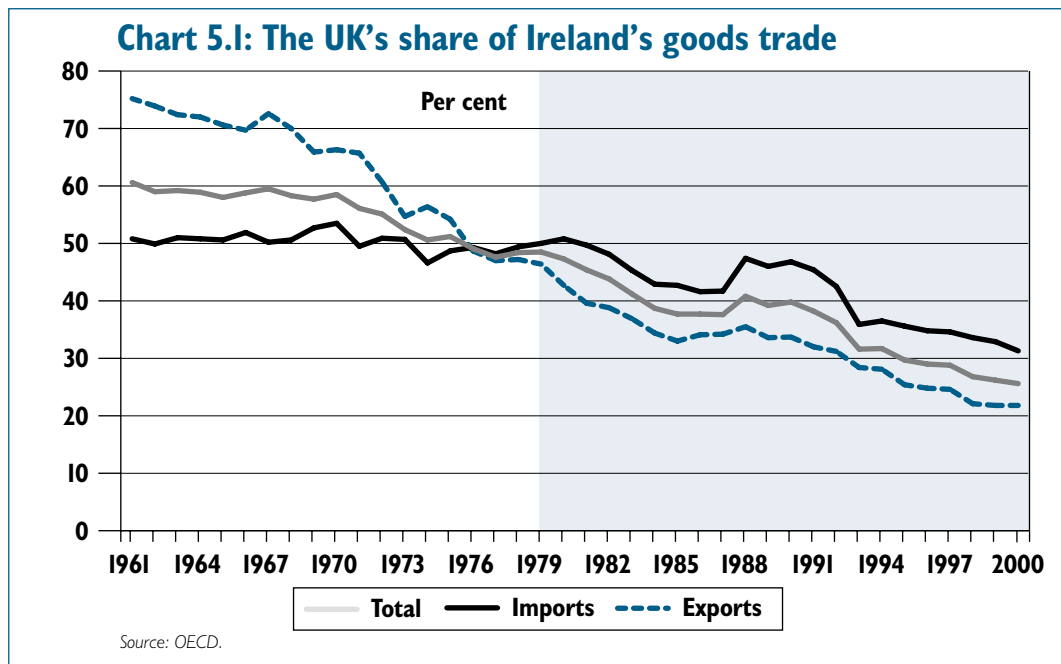
- the UK and Ireland had also signed a free trade agreement in 1965, so the change in currency arrangement in 1979 can be abstracted from changes in other trade barriers.

In this sense, identification of any structural breaks in Anglo-Irish trade post 1979 might more safely be attributed to the change in the exchange rate regime, rather than to other factors.

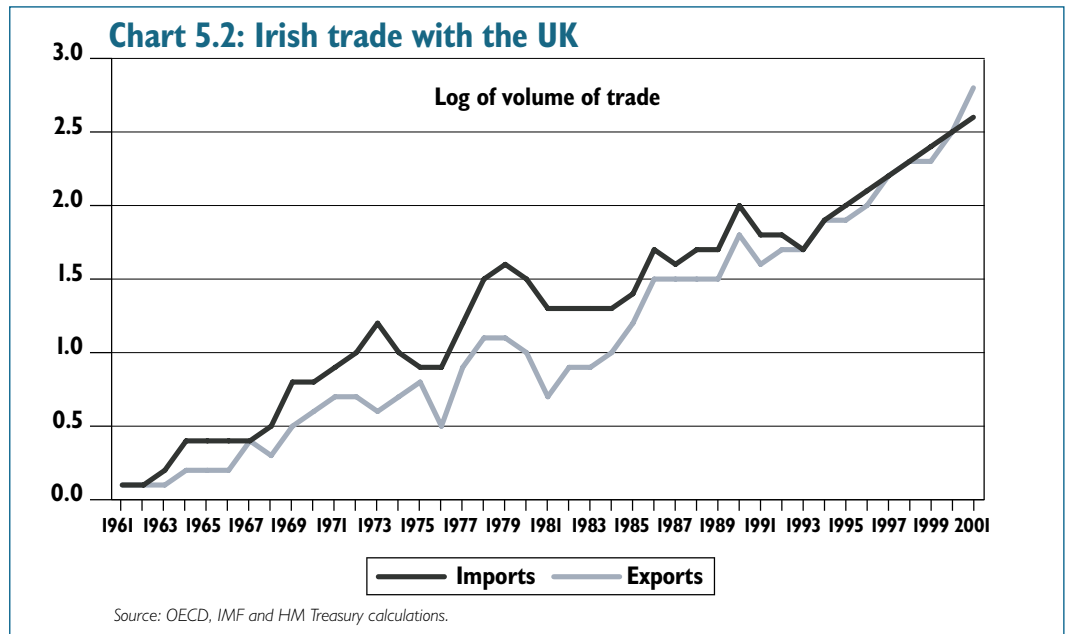
Evolution of Anglo-Irish trade

5.41 The UK's share of Ireland's merchandise trade has been in long-term decline, especially since the 1960s (Chart 5.1). Through statistical analysis of the trend⁴ in this share, Thom and Walsh identify two episodes where the rate of decline slowed for a period, the first associated with the Anglo-Irish Free Trade Area Agreement of 1965, and the second ascribed to integration within the Single Market in the late 1980s. Importantly, evidence of any faster rate of decline following dissolution of the currency link in 1979 is much less clear-cut.

5.42 Analysis of the trend in Irish trade volumes with the UK and third countries tells a similar story. Although Chart 5.2 does reveal a sharp contraction in Anglo-Irish trade volumes in the period 1979 to 1982, both exports and imports resumed their upward trend shortly afterwards. Since the downturn in trade coincided with severe recession in both Ireland and the UK and a sharp and sustained appreciation of sterling, it is not obviously the case that the short-term contraction was strongly related to the regime change. Irish trade volumes with Europe and the rest of the world also fell sharply over the same period.



⁴ Using a 20-year rolling regression of the trade share on a time trend over the period 1924 to 1998.



5.43 Looking at average real growth in Irish trade for longer periods either side of the regime change, the most striking feature is the significant increase in (already strong) Irish imports from third countries during the later period (Table 5.1). This might be consistent with diversion of import trade away from third countries during the period of the currency link, although as already established there is no strong empirical support for such effects in wider cross-country studies of trade and currency unions. Moreover, it is important to control for other factors before reaching any conclusions, most obviously differences in income growth between the countries. Ireland was relatively less developed in this period and has experienced rapid economic growth from the early 1980s onwards.

Table 5.1: Irish trade volume by area

	Percentage change on a year earlier, annual average 1979-98 ¹		
	Exports	Imports	Total trade
Anglo-Irish trade	6.9 (+1.7)	4.4 (-1.0)	5.5 (+0.2)
Irish trade with third countries	13.3 (+0.3)	8.1 (+2.2)	10.9 (+3.3)

¹Change from annual average growth in period 1950-78 shown in brackets.
Source: Thom and Walsh, 2001.

Econometric analysis of Irish bilateral trade

5.44 Thom and Walsh go on to model the time-series behaviour of Anglo-Irish trade (real exports plus real imports), testing for the effects of breaking the sterling-punt link. Analysis is conducted within the framework of a simple model allowing for a short and long-run relationship between trade flows and Irish and UK incomes, as well as possible impacts from the bilateral free trade agreement, common membership of the EU from 1973, and also bilateral exchange rate volatility in the period since 1979.

5.45 This model is shown to provide a stable basis for examination of any structural breaks in Anglo-Irish trade in 1979, with the income variables shown to be a strong determinant of the upward trend in real trade over time. Volatility in the bilateral exchange rate following the abandonment of the currency peg is shown to have only a very small negative impact on trade flows. Importantly, there is little or no evidence of any structural break in the estimated relationship in 1979. Standard tests show that the estimated model parameters are stable between the two periods and that there is no evidence of any step-change in the level of bilateral trade after the change in regime. Similarly, the model is able to make adequate predictions of Anglo-Irish trade after 1979 based on the relationship observed over the earlier period.

5.46 The authors extend the analysis by investigating possible impacts of the regime change within a general gravity model of Ireland's bilateral trade with 19 countries, treating Great Britain and Northern Ireland separately, over the period 1950 to 1992. Specification of the model involves standard 'gravity' variables, with real Irish trade to these countries explained in terms of income, size (population), distance and other variables including whether the partner country is a member of the EU or is English-speaking. As described earlier, such models may be affected by technical problems, including simultaneity bias, although the authors do not explicitly deal with this issue.

5.47 Again, subject to these technical qualifications, the model appears to provide a sound basis for examination of the effective currency union with the UK. Coefficient estimates on the core variables take their expected signs, are statistically significant, and in line with evidence from similar studies. The basic model also suggests that the sterling-punt link approximately doubled trade between the UK and Ireland in the period to 1979, in line with the Rose-type analysis presented earlier in the section. The authors explain this apparent contradiction with the time-series evidence by noting that the simple model fails to take account of other significant influences on Anglo-Irish trade.

5.48 The authors examine two specific explanations. First, that membership of the EEC from 1973 affected Irish trade with the UK differently from trade with other EU members. This is to be expected, given the Free Trade Agreement that already existed between the UK and Ireland. A revised model allowing for divergent impacts suggests that while EEC membership approximately doubled Irish trade with other Member States, there was no such impact on trade with the UK. In other words, there is evidence:

- of trade being diverted to the other members of the EU; and/or
- that Anglo-Irish trade was much less responsive to rising incomes over time than trade with other countries, particularly in continental Europe.

5.49 Again, further estimation work confirms this effect. After controlling for either possibility, the estimated impact of the Anglo-Irish currency regime on trade between the two countries appears insignificantly different from zero. Though not without its own limitations, there is no conclusive evidence to show that the impacts on Anglo-Irish trade were very substantial.

WEIGHING UP THE EVIDENCE ON CURRENCY UNIONS

5.50 Rose (2000) and subsequent studies suggest that the overall benefits to trade resulting from membership of a currency union are very substantial indeed, with estimates ranging from around 200 to 300 per cent. Taken at face value, such studies imply that EMU would create a massive impetus for increased trade among the euro area economies, on a scale exceeding that resulting from the creation of a free trade area and Single Market. In this case, the trade issue would have a much greater bearing on the overall assessment concerning the UK's possible adoption of the single currency than was previously thought likely.

5.51 But there is a very large gap between the theory and this early evidence, with all researchers accepting that the economic mechanisms underpinning these results are not well understood. This has stimulated a large body of subsequent research aimed at identifying and controlling for potential problems within the original Rose (2000) framework. These studies may provide more robust estimates of the possible gains. In general, this work has yielded lower, though still substantial, estimates of trade-enhancing benefits of currency unions. This might be viewed as the consensus, but it is still only an emerging one. This topic remains one of the most keenly contested and fluid debates in applied economics.

5.52 Most cross-country studies have been susceptible to the criticism that the results may not be applicable to the case of currency unions among larger, richer economies. The theoretical framework developed by Anderson and van Wincoop (2001), and applied by Rose and van Wincoop (2001), has allowed better country and union-specific conclusions to be derived. Controlling for ‘multilateral resistance’, that is for relative as opposed to absolute trade costs, may have removed the considerable bias present in earlier studies.

5.53 Other studies have attempted to guard against bias due to omitted variables more generally. Later ‘fixed effects’ studies on expanded datasets have been able to exploit time-series variation, identifying the impact of currency union from those countries that have actually switched regime. On this basis, Rose and Glick (2001) estimate that trade still doubles in response to entering a currency union. But this type of figuring is heavily reliant on instances of countries leaving currency unions. Entry and exit effects may not be symmetric, and some suggest that exits go hand-in-hand with disruptions to trade through other economic and political changes.

5.54 A second key strand to the literature concerns possible simultaneity and selection bias. This arises if the decision to form a monetary union is not independent of trade or its key determinants. The studies by Persson (2001) and Tenreyro (2001) adopt very different strategies for dealing with problem, though they arrive at fairly similar conclusions. In both cases, currency union is estimated to boost trade by up to about 60 per cent, but with lower estimates seen as plausible. However, the estimates presented in both studies are not statistically significant at standard levels, though Tenreyro’s estimate is significant at the 10 per cent level.

5.55 An alternative approach to the cross-country or panel estimates is to focus on the experience of specific countries when they changed their currency regime. This could be particularly fruitful if the countries in question are relevant to the UK example. An obvious candidate for such an approach is the breaking of the sterling-punt link in 1979.

5.56 The work of Thom and Walsh (2001) on this change in currency regime provides no strong evidence that the abandonment of the currency link had a significant negative impact on Anglo-Irish trade, either in the short or longer run, and instead they conclude that the longer-term decline in the UK’s share of Irish trade reflects a variety of long-run structural factors. Mélitz, in his contribution to the EMU study *Submissions on EMU from leading academics*, states that the most important empirical results conflicting with those of Rose stem from case studies, such as this one.

Rose’s meta-analysis **5.57** It is, of course, very difficult to arrive at a single representative estimate of the trading benefits of currency union in general. The various studies adopt different methodologies; they control for different problems; and none are above criticism on specific grounds. Nevertheless, in his contribution to the EMU study *Submissions on EMU from leading academics*, Rose synthesises the estimates of the trade effect of a currency union contained in 24 different studies. This is done using a meta-analysis, a process widely used in social research. Rose draws the conclusion from the meta-analysis that a currency union increases trade by approximately 100 per cent.

5.58 There are significant limitations with meta-analysis and with the results from it. For example, a number of studies rely on the same dataset which, other things being equal, would tend to standardise the results. Therefore, although each of these studies is given an equal weight in the conclusion, it is probably fair to note that the number of truly independent observations is much lower. Equal weighting also implies no discrimination. Later research on more relevant databases and using more sophisticated methodologies has typically yielded lower estimates. Furthermore, in the case directly relevant to the UK, that of dissolving the sterling-punt link, trade does not appear to have been affected by the change in currency regime. This points towards focusing on estimates below Rose’s average.

There are clear limits to the applicability of most cross-country studies of currency unions to the question of the potential trade impact of the euro on EMU members. The conclusions largely reflect currency unions among smaller, poorer countries. Moreover, few directly address the key policy question – what is the impact on trade of joining a currency union?

An alternative strategy therefore is direct analysis of the impact of EMU on trade within the euro area itself since 1999, though this is obviously problematic in that there are limited data to work with. It is, therefore, too soon to identify any euro effects with certainty, and any conclusions must necessarily be tentative.

Simple analysis of recent trends provides some evidence of increased trade as a percentage of GDP within the euro area. This may be a short-term phenomenon and cannot firmly be ascribed to the euro. Alternative explanations, however, are not obvious.

Intra-euro area trade as a proportion of total trade has in fact fallen for all euro area countries, except Luxembourg, since 1999. But the sharper increase in extra-euro area trade is perhaps easier to rationalise: US demand has been buoyant until recently; the oil price rose sharply between 1998 and 2001, which increased the value of euro area imports from outside the euro area; and there has been ongoing EU integration with the CEE economies.

Controlling for key determinants of trade, and comparing against a group of similar industrialised economies, empirical research by Micco *et al.* (2002) suggests that trade among the EMU countries has risen appreciably since 1999. The impact of the euro thus far is estimated to be within the range of 10 to 25 per cent increase in trade.

The result that EMU has already had an appreciable positive effect on euro area trade is replicated by Piscitelli (2003) in work for HM Treasury, though the effect is smaller. On the basis of her preferred data, the increase in euro area trade to date ranges from 3 to 13 per cent. These figures, and those from Micco *et al.*, can be interpreted as the shorter-term effect of EMU.

6.1 As discussed in Section 5, there are clear doubts concerning the relevance of general cross-country analysis of the impact of currency unions on trade to the specific case of EMU:

- all the studies are based on samples in which the currency union observations are relatively small in number, and predominantly concern unions between smaller, poorer countries or territories. Corrections for omitted variable or selection bias cannot overcome this shortcoming;
- Rose and van Wincoop's structural approach comes closest in allowing a more tailored estimate of the benefits of currency union for the euro area. Although still conditional upon a number of key assumptions, this suggests an increase in trade of between 40 per cent and 60 per cent; and
- many of the studies indicate only that countries which share a common currency trade more than those which do not. Those studies that exploit time-series variation in currency arrangements come closer to estimating what the actual impact of adopting a common currency may be. But they still concern unions among smaller, poorer countries, and largely reflect exit and not entry effects.

6.2 The obvious alternative is a direct examination of the impact of EMU on trade within the euro area itself since 1999. This clearly circumvents all of the problems noted above. The major difficulty of course lies in the fact that there are relatively few years of trade observations under EMU to work with. This means it may be too early to discern any euro effect and also, where any effect is identified, it is difficult to be sure that the conclusions are robust.

6.3 Notwithstanding the problem of the limited timescale since the euro was introduced, this section examines the evidence, starting with a basic examination of recent developments in EU trade. This is followed by a review of some more detailed empirical investigations of early euro effects.

RECENT DEVELOPMENTS IN TRADE INTENSITY

6.4 Some researchers have focused on trade between individual EU countries and the rest of the EU, but then drawn conclusions about the impact of the euro on EMU members' trade. For example, Legrain (2002) contrasts the rise in EU trade as a percentage of GDP in Germany, France and Italy since 1999 with a fall in the UK's trade with the EU over the same period. Clearly, it is preferable to use data detailing trade with the euro area, rather than with the EU, to assess whether EMU has affected euro area trade. This is done below for goods trade only because of limitations with services data.

Intra-euro area trade in goods

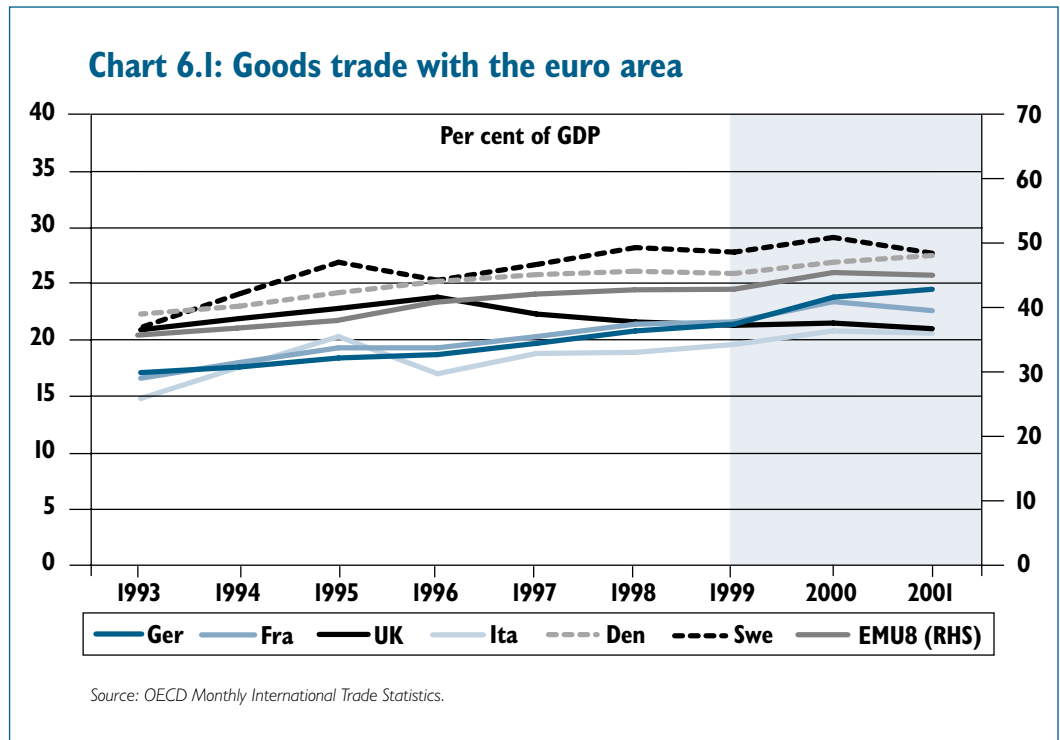
6.5 Table 6.1 and Chart 6.1 show trade in goods with the euro area as a percentage of GDP for the larger EU countries, including the UK and the EMU non-members. The other euro area economies are shown in aggregate.¹

Table 6.1: Goods trade with the euro area as a per cent of GDP

	UK	Ger	Fra	Ita	Den	Swe	EMU8
1993	20.9	17.1	16.6	14.8	22.3	21.1	34.4
1994	21.9	17.6	18.0	17.6	23.0	24.1	35.7
1995	22.8	18.4	19.3	20.3	24.2	26.9	37.1
1996	23.8	18.7	19.3	17.0	25.2	25.3	40.5
1997	22.3	19.7	20.3	18.8	25.8	26.7	42.0
1998	21.6	20.8	21.4	18.9	26.1	28.2	42.8
1999	21.3	21.4	21.6	19.6	25.9	27.8	42.9
2000	21.5	23.8	23.4	20.8	26.9	29.1	46.0
2001	21.0	24.5	22.6	20.6	27.5	27.7	45.5

Source: OECD Monthly International Trade Statistics.

¹ EMU8 refers to Austria, Belgium, Spain, Finland, Ireland, Luxembourg, the Netherlands and Portugal. Greece is excluded as data for 2001 were not available at the time of publication.



6.6 Table 6.1 and Chart 6.1 provide some evidence of increased intra-euro area trade intensity for most of the larger euro area countries. Any movement for the smaller euro area bloc is less striking although, within the total, the Netherlands and Austria have seen clearer gains. The UK, by contrast, has seen no such increase, with trade with EMU members remaining flat as a percentage of GDP following some decline in earlier years.

6.7 These observations are generally confirmed through simple statistical analysis by HM Treasury. This involves basic regressions relating each country's trade with the euro area as a per cent of GDP to a time trend, reflecting longer-term integration with the EU, and an intercept shift for the period since 1999. The sample consists of annual OECD trade data for the period 1980 to 2001, except for Germany where the sample begins in 1993.

6.8 The results are summarised in Table 6.2. The shift term is positive for seven of the nine euro area countries in the sample,² and significantly different from zero at the 10 per cent level for France, Italy, Austria, the Netherlands and Finland. The shift term, by contrast, is negative for the UK and statistically significantly different from zero at the 5 per cent level. These results would seem to confirm an EMU effect, but the regressions for a number of countries exhibit serial correlation. Hence, the test of significance may well be biased.

Table 6.2: Change in intra-euro area trade since 1999¹

	Positive impact	Negative impact
Euro area countries	France(**), Italy(**), Austria(**), Netherlands(*), Finland(*), Germany, Spain	Portugal, Ireland
Other EU countries	Denmark(**), Sweden	UK(**)

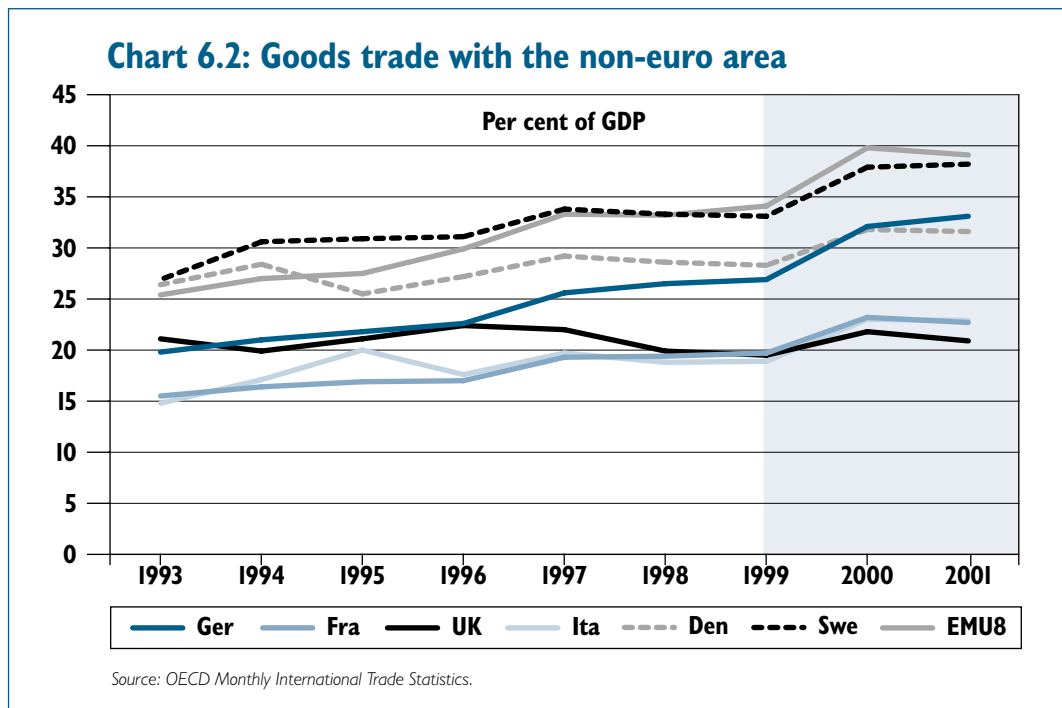
¹Based on regression of trade with euro area as a per cent of GDP on a constant, time-trend and intercept dummy taking value of 1 from 1999. Results tabulated according to sign of coefficient on intercept dummy. (**) and (*) indicate coefficient significantly different from zero at 5 and 10 per cent levels respectively.

Source: HM Treasury estimates based on OECD data.

²Belgium, Luxembourg and Greece are not covered.

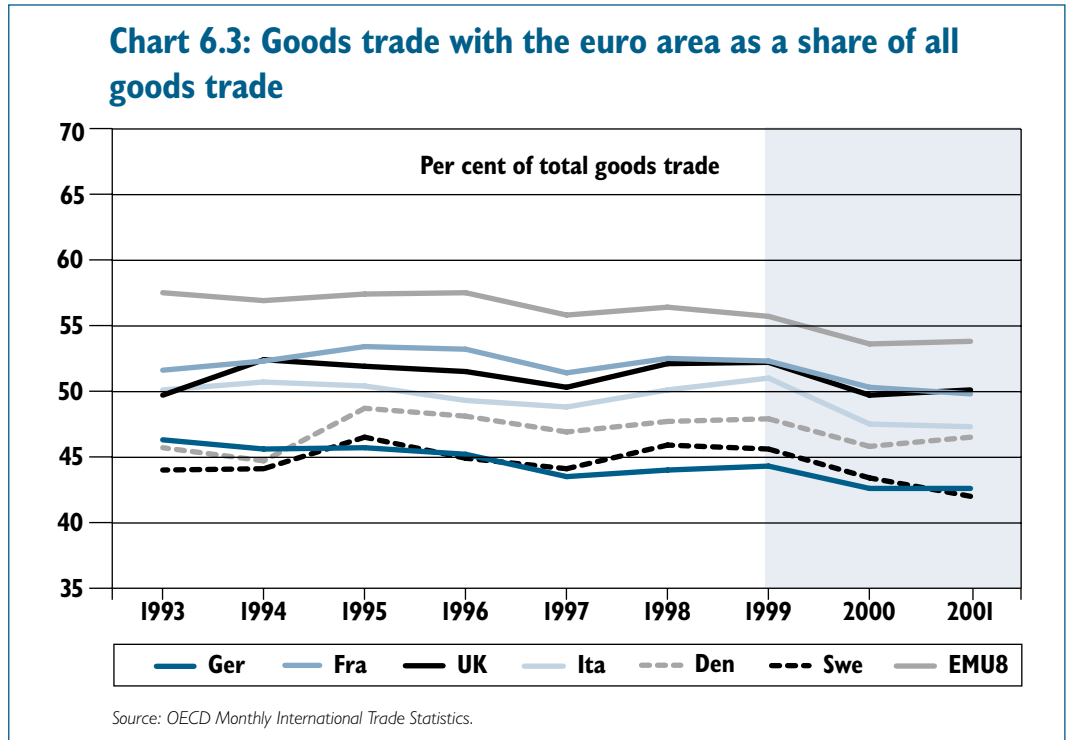
6.9 Thus far the results are at best indicative. Although a number of euro area countries have experienced increased trade intensity with other members of the euro area, this cannot be taken as clear cut evidence of a euro effect:

- not all euro area countries were affected in the same way. Intra-euro area trade as a per cent of GDP has actually fallen relative to its previous trend for a number of smaller euro area economies, including Ireland, Portugal and Greece;
- at the same time, both Chart 6.1 and the statistical analysis indicate rising euro area trade for Sweden and Denmark, which have not adopted the single currency. But both are small and do a lot of trade with the euro area, so the findings are consistent with the evidence in Section 5 that a currency union should not be trade diversionary; and
- more recently, euro area trade intensity has fallen back for a number of euro area economies, including France and the EMU8. This is likely to reflect the slowdown in EU growth over the past two years, and more generally cautions against reading too much into shorter-term developments.



Extra-euro area trade in goods

6.10 Chart 6.2 shows extra-euro area trade as a per cent of GDP for the larger EU economies, and again an aggregate for the smaller euro area countries. In fact, extra-euro area trade intensity has risen for all EU Member States apart from Luxembourg. In many cases, this movement has been very sharp, particularly in Germany and Italy among the larger EU countries. The result of this sharp increase in trade with non-euro area countries is that the share of trade with the euro area in total trade has actually fallen for every EU country except Luxembourg (Chart 6.3).



6.11 While a falling share of euro area trade in total trade might appear to undermine the thesis that the euro has had a meaningful impact, there are plausible explanations for this increase in extra-euro area trade:

- buoyant growth in the US in the second half of the 1990s has meant that EU trade intensity with the US has trended up markedly until quite recently (Chart 6.4). But, arithmetically, this only partly explains rising extra-euro area trade intensity overall;
- the increase in oil prices between 1998 and 2001, increased the value of euro area oil imports from the non-euro area. Table 6.3 shows that when this factor is accounted for, the decline in the share of euro area imports that originate from within the euro area is less marked; and
- ongoing integration and economic co-operation between the EU and the Central and Eastern European (CEE) economies is also likely to help to explain rising extra-euro area trade intensity.

6.12 Overall, the above provides tentative evidence that, in line with the work presented in Section 5 and the experience of Sweden and Denmark, EMU has not been trade diversionary.

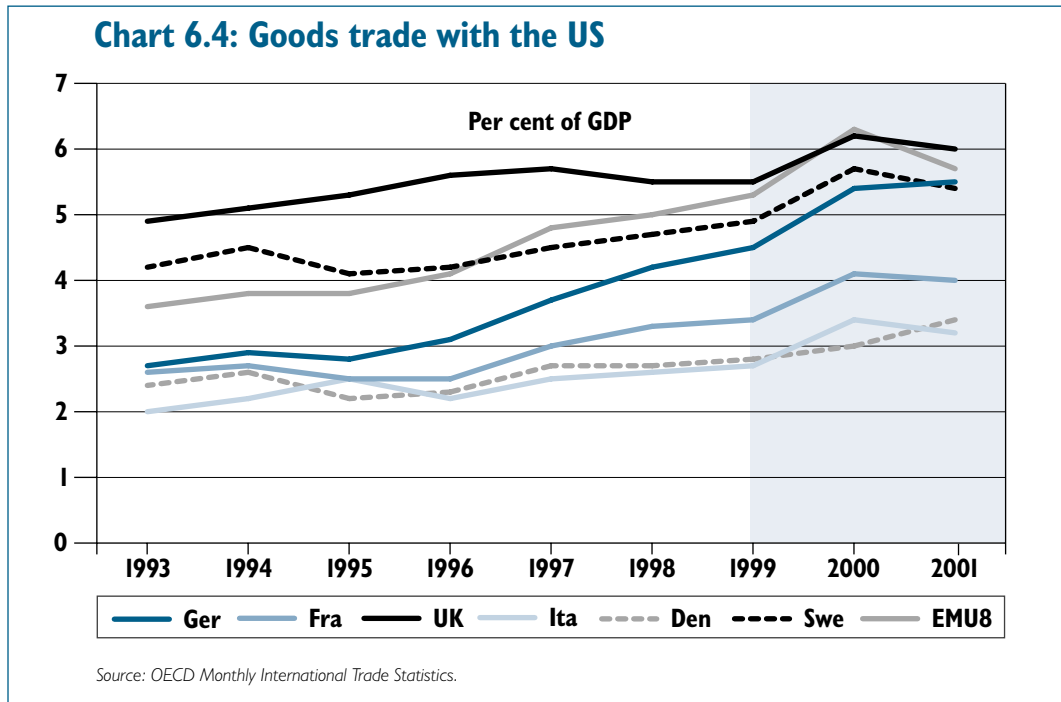


Table 6.3: Share of euro area imports by origin

	Euro area	Non-euro area West Europe	Central and Eastern Europe	Other
With oil				
1998	52.4	14.9	4.1	28.6
2001	49.1	13.9	5.2	31.8
Change	-3.3	-1.0	1.1	3.2
Without oil				
1998	54.0	14.6	4.2	27.2
2001	51.9	13.6	5.5	29.0
Change	-2.1	-1.0	1.3	1.8

Source: Eurostat.

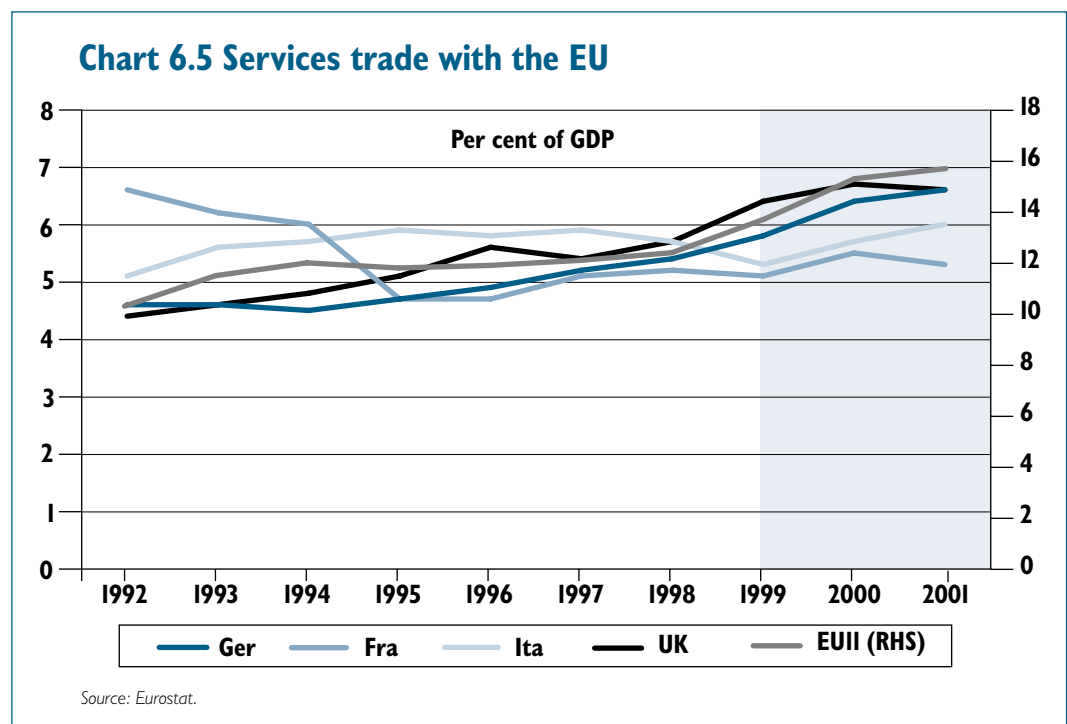
6.13 The increase in trade with the non-euro area also highlights that euro area countries' trade integration with all partners has increased since 1999. In their contribution to the EMU study *Submissions on EMU from leading academics*, Willem H. Buiter and Clemens Grafe attribute much of this increase to the depreciation of the euro since 1999. This is because this nominal depreciation of the euro was also a real depreciation, so the price of traded goods increased relative to non-traded goods in the euro area. Even with the volume of trade remaining constant, this would raise the share of trade in GDP for euro area countries.

6.14 This may well be the case for euro area countries' trade with the non-euro area, but it does not apply directly to intra-euro area trade because internal exchange rates were fixed from 1999 onwards. However, the depreciation of the euro could well have put up prices of goods, measured in euros, imported from outside the euro area. This could have increased the incentive for euro area consumers to buy from euro area producers, so increasing intra-euro area trade. On the other hand, it may also have made it more profitable for euro area producers to supply foreign rather than domestic markets, possibly reducing intra-euro area trade. Therefore, it is not possible to say for certain whether the depreciation of the euro would have increased or decreased intra-euro area goods trade. Furthermore, it is perhaps unlikely that such an effect would be seen so rapidly.

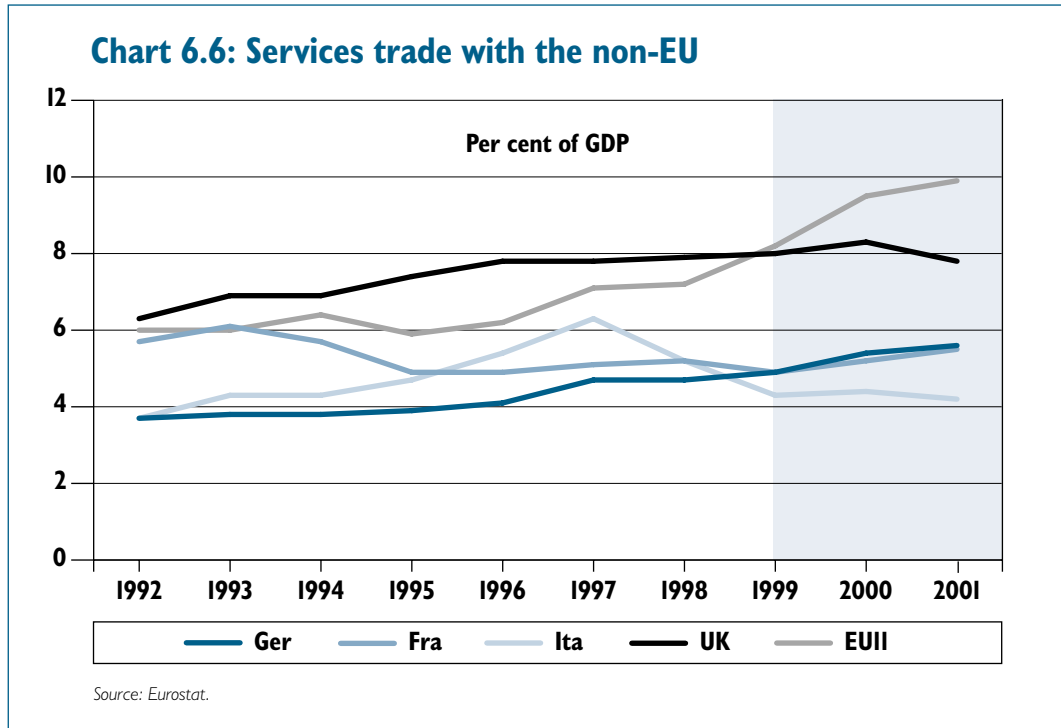
6.15 This is as far as any simple analysis of trends can be taken. A more detailed analysis of intra and extra-euro area trade is required, controlling for the key determinants such as relative demand in the two regions. This is carried out later in the section.

Trade in services 6.16 Charts 6.5 and 6.6 show trade in services with the EU and non-EU respectively. Trade in services is generally of much lower significance to EU economies than trade in goods. That said, for the UK at least, the share of services in total trade has increased from about 20 per cent in 1989 to about 25 per cent in 2001. So services are gradually becoming a more important part of total trade. More generally, for the larger EU countries, intra-EU services trade typically accounts for around 5 per cent of GDP, compared to a figure of 25 per cent for goods. The most striking feature in Chart 6.5 is the upward trend in intra-EU services trade, except in France and Italy, throughout the 1990s. This has only been mirrored in extra-EU trade in services among the smaller EU11 countries.³ While this longer-term upward trend in intra-EU services trade might reasonably be ascribed to the Single Market Programme, the figures do not provide any evidence of enhanced integration in the most recent period, with the possible exception of those for France and Italy.

6.17 The impact of the euro on intra-euro area trade in services may remain limited until other barriers to trade in services within the EU are reduced. A single market for services is one of the 'top ten' economic reform priorities identified by the Government for making the transition to a more competitive, dynamic and knowledge-based EU economy (HM Treasury, 2003).



³EU11 figure is the figure for the EU15 minus the figures for Germany, France, Italy and the UK. A breakdown for the euro area is not available.



EMPIRICAL STUDIES

Cross-country studies

6.18 There are two strands to research into the early impact of EMU on euro area trade. The first is cross-country analysis within the Rose-type framework, but based on a more representative sample of European and other developed economies, pioneered by Micco *et al.* (2002). The alternative is time-series analysis of the trade developments in particular EMU countries, as in a study by Stephan (2002). But overall, there are very few studies to date.

6.19 Research by Micco *et al.* (2002) of the Inter-American Development Bank, represents one of the few comprehensive, empirical investigations of the impact of EMU on euro area trade since 1999. The study is aimed directly at the relevant policy question: what has been the impact of the single currency to date on trade among the euro area economies? The study allows for the possibility that the EMU countries already traded more as a group, even before the single currency was adopted. Such impacts are identified after controlling for other key determinants of trade flows. The non-EMU comparator sample of countries meanwhile is a group of similar EU and other industrialised economies.

6.20 The Micco *et al.* study's methodology is described in Box 6.1. Identification of the impact of EMU on trade is conducted within the gravity model framework, and this is shown to be a stable basis for the investigation. The models fit the data well. Coefficients on key explanatory variables are correctly signed, well determined and relatively stable across the various estimations presented by the authors. Robustness of the conclusions to precise model specification is addressed through the adoption of various estimation techniques. These include the presentation of results under specific controls and also more generalised fixed effects which guard against bias due to omitted variables.

Box 6.1: Explaining the Micco et al. (2002) methodology

The authors work with annual trade data from the IMF Direction of Trade Statistics dataset covering the period 1980 to 2001, which is deflated using the US consumer price index. Two datasets are derived, the first containing all 22 industrialised countries in the IMF database and the other containing only the EU15 countries (actually only 14 separate countries as figures for Belgium and Luxembourg are combined). Around half of the 90 country pairs in the EU dataset involve two countries participating in EMU.

As with most other studies, investigation of common currency effects is grounded within the gravity model framework, with bilateral trade explained by joint GDP, joint GDP per capita and distance between the two countries. A variety of other controls are sometimes included depending on the precise estimation method. As a check on the robustness of the results, the authors estimate the 'euro effect' through three different (though related) routes.

Cross section analysis involves estimating the gravity equation year-by-year using conventional regression techniques. Beyond the standard gravity variables, the equation includes a full set of controls including the existence of a common border, common language and joint membership of a free-trade area. The impact of the euro is derived from an EMU dummy variable that takes a value of one for each EMU country-pair in all years, even before the launch of the single currency. The 'euro effect' therefore is expected to show up as an increased coefficient on this dummy for regressions in the EMU years compared to estimates for years prior to 1999.

For fixed effects analysis, the model is estimated once using observations for all years in the sample. Time-invariant controls such as distance or common language are dropped and replaced by a single fixed effect for each country-pair, which simply shifts the intercept. This variable picks up all time-invariant influences on bilateral trade between each country pair, including those that may have been overlooked in the previous model. The EMU dummy variable is as defined previously, but is combined with a series of year dummies, permitting identification of any 'excess' trade between EMU pairs in each year, and hence changes in this estimate over time.

The difference-in-difference approach is similar to the second approach except that the EMU dummy variable ($FEMU_{ijt}$ below) is now set equal to one only when both countries in the pair are formally participating in EMU, i.e. from 1999 onwards for euro area pairs only. Following the Persson (2001) terminology, this method compares the difference in bilateral trade between 'treated' country-pairs (the countries that originally formed EMU) and the remaining country-pairs, which are controls in the experiment.

The equation used is:

$$\ln T_{ijt} = \beta_{ij} + \beta_1 \ln Y_{it} Y_{jt} + \beta_2 \ln y_{it} y_{jt} + \beta_3 FTA_{ijt} + \beta_4 EU + \beta_5 FEMU_{ijt} + \varepsilon_{ij}$$

where,

T_{ijt} = bilateral trade (average of imports and exports) between countries i and j in year t (in constant US\$)

Y_{it} = GDP of country i in year t (in constant US\$)

y_{jt} = GDP per capita of country j in year t

FTA_{ijt} = 1 if countries i and j are in a common free trade area at time t , but 0 otherwise

EU = 1 if the country-pair are both members of the EU

6.21 The study concludes that EMU has already had an appreciable impact on trade among the euro area economies. The results do, of course, vary somewhat according to each methodology:

- cross section analysis suggests that the euro area economies already traded more as a group prior to EMU (controlling for EU membership). Since 1999, EMU is estimated to have boosted trade among the group by a further 15 per cent;
- this is confirmed by the fixed effects analysis which points to gains of a similar order of magnitude; and
- for estimation over the full sample period, the difference-in-difference analysis shows gains of just under 25 per cent in trade between euro area members. If the sample is restricted to the period 1992 to 2001, the gains are estimated at between 12 per cent (European sample) and 19 per cent (wider industrialised countries sample).

6.22 Piscitelli (2003) in work undertaken for HM Treasury attempts to replicate the findings of Micco *et al.* and to test the robustness of the results to the use of different datasets. Her overall finding is that the result that euro area membership increases trade appears to be robust to replication. However, the size of the effect to date may be somewhat smaller than they report, ranging from 3 to 13 per cent when using Piscitelli's preferred GDP series. This work is discussed further in Box 6.2.

6.23 Piscitelli also looks at the question of whether the movement in the euro-dollar exchange rate could explain some of the increase in intra-euro area trade since 1999. This is not controlled for in Micco *et al.* Preliminary analysis suggests that allowing for this movement does not reduce the effect of EMU on intra-euro area trade.

6.24 Another recent study by Bun and Klassen (2002) adopts a similar approach. But there are two key differences. First, Bun and Klassen separately identify the impact of real exchange rate volatility on bilateral trade, permitting the total impact of the euro to be split between that arising from the elimination of nominal exchange rate volatility and wider effects. Second, and more important, theirs is a dynamic model of exports that allows for persistence in trade flows (e.g. reflecting exporters' sunk costs or habit formation among importers). This explicit treatment of the dynamics of trade behaviour is rare in gravity models. The advantage is that this allows the authors to say something about the speed at which EMU appears to be impacting on trade, and therefore to estimate the likely longer-term impact and also over what sort of timescale the bulk of benefits may be appropriated.

6.25 In line with some of the studies reviewed in Section 4, the authors find that reduction of real exchange rate volatility has a statistically insignificant and economically minor effect on trade. They note that this is partly because exchange rate volatility prior to EMU was low anyway, due to the prospective members' participation in the ERM. The wider impact of the euro, however, is estimated as a cumulative expansion in euro area trade of just under 10 per cent by 2001. This is at the lower end of the range identified by Micco *et al.*, although any reasonable confidence bands around the two sets of results would certainly be overlapping. The longer-term impact of the euro is estimated at a little under 40 per cent, though this estimate is highly dependent on the precise dynamics identified in the model (which in turn are data driven).⁴ The same dynamics imply that the bulk of the long-run euro impact feeds through after about 20 years.

⁴The shorter-term impact of income on trade, for example, appears implausibly strong in this study, though this does not necessarily mean that the dynamics of the euro effect have been wrongly identified.

Box 6.2: A closer look at the results of Micco et al. (2002)

Using the dataset provided by Micco et al., Piscitelli (2003) in work for HM Treasury broadly replicates their results, with an estimated boost to euro area trade after the formation of EMU ranging from 7 to 23 per cent, depending on the sample of countries and the sample period used in the analysis.

However, Piscitelli finds that the results are sensitive to the GDP series used in the regressions. Using her preferred GDP series, she finds that the EMU effect is somewhat lower than Micco et al., although still positive. These alternative estimates suggest the increase to date may be between 3 and 13 per cent.

As in Micco et al., the size of the estimated boost to trade varies depending on the sample period used for the regressions. Regressions using data from 1980 to 2001 yield higher estimates than those using data from 1992 to 2001 (11 to 13 per cent increase for the longer period compared to estimates of 3 to 5 per cent for the shorter period, when using Piscitelli's preferred GDP series).

It may be that in the regressions over the longer time period, some of the boost to trade provided by the Single Market Programme in the late 1980s and early 1990s is counted as an EMU effect. The shorter sample period attaches less weight to observations that pre-date the Single Market programme and hence may be less affected by this effect.

As an additional cross check, the regression was also estimated using OECD trade data. The results appear broadly similar to those based on IMF data, with the estimated increase in trade ranging from 6 to 22 per cent.

This work is preliminary, and further work is required to ascertain why the results differ and how they fit into the wider body of work. Such work could also look at the impact of any serial correlation that may be present on the standard errors of the estimated coefficients. Recent work by Bertrand et al. (2001) and Kézdi (2002) suggests this might be a problem in both fixed effects panel estimation and the difference-in-difference approach, which may impact on the statistical significance of the euro and other effects.

These caveats aside, the results to date suggest that the Micco et al. finding of an increase in trade from the euro is robust, although the effect may be somewhat smaller than they report.

Single country studies **6.26** An alternative approach is to focus on the trade of one country. Stephan (2002) for the DIW Institute in Germany analyses the time-series behaviour of German exports to the euro area. The paper estimates a conventional error correction⁵ equation for the export demand from the EMU member countries, based on competitiveness, a scale variable representing income in the euro area, and trend specialisation in trade. This study is aimed more generally at developing an export equation for forecasting and simulation purposes.

6.27 While the model is robust over the full sample, forecasting tests show that it is unable to account for the strength of growth in German exports to the euro area since 1999. Stephan concludes that this is a sign that actual German export growth has been buoyed by EMU, an effect not captured in the model. But the results can only be at best indicative of a euro effect. The scale of the errors in predicting export growth in recent years is not very large in the context of the model's fit over the full sample.

⁵ This technique involves estimating the long-run determinants of export demand in level terms, and embedding this relationship within a short-term model explaining dynamic movements (i.e. growth) in exports.

Conclusion 6.28 The fact that there are only three years' data since the euro was launched make it difficult to come to very firm conclusions regarding a euro effect on trade. The evidence in favour of a euro effect comes in the form of:

- a simple analysis of recent developments, which highlights an increase in euro area trade intensity;
- recent studies by Micco *et al.* (2002) and Bun and Klassen (2002) identifying an appreciable early euro impact of at least 10 per cent by 2001, after controlling for various determinants of trade and against a reasonable comparator sample of countries outside EMU; and
- work for HM Treasury by Piscitelli (2003) which replicates Micco *et al.* and finds the positive effects of EMU on euro area trade to date could be less than implied by the Micco *et al.* study, though still positive and significant.

6.29 The scale of the euro effect to date, not surprisingly, is estimated to be significantly smaller than that identified over the longer term in studies applying methodologies comparable to that of Micco *et al.* to datasets where currency unions largely concern smaller, poorer economies. For example, Glick and Rose's (2001) exit/entry analysis suggested a doubling of trade. It is also lower than Rose and van Wincoop's (2001) EMU-specific calculations based on a structural model incorporating multilateral resistance (40 to 60 per cent). Interestingly, Bun and Klassen suggest that the euro effect will build over time, leading to a near 40 per cent expansion in intra-euro area trade over the longer term.

6.30 While data limitations are important, it can be concluded at this stage that there is reasonably robust evidence that EMU has boosted intra-euro area trade since 1999.

Summary 7.1 The first part of this study (Sections 2 and 3) considers the potential benefits to trade from membership of a currency union from a largely theoretical perspective. It also includes an examination of UK trading patterns, which provides pointers to the likely scale of such benefits in the case of possible UK membership of EMU. The key conclusions are as follows:

- in principle, theory shows that participation in EMU would boost UK (or any other country's) trade with the euro area, raising efficiency and productivity overall. The key mechanisms underpinning these benefits are reduced exchange rate uncertainty, lower transaction costs, and enhanced competition through greater price transparency;
- but there has been some presumption among economists that these benefits would probably be relatively modest in scale. Shorter-term currency uncertainty can be hedged in financial markets. Direct estimates of financial savings through lower transaction costs are relatively modest;
- the euro area, and the EU more generally, is the UK's dominant trading partner accounting for around half of UK trade (equivalent to about 30 per cent of UK GDP), compared to shares of less than one fifth for the US and Asia. This existing high degree of integration might limit the expansion of the UK's share of trade with the euro area under EMU, but does imply greater welfare gains overall; and
- the simple geographical distribution of UK trade underestimates the importance of the dollar. This matters because the adoption of the euro could lead to increased external currency volatility against the dollar, partly offsetting the benefits of perfect nominal exchange rate stability with the euro area. But on plausible assumptions concerning the dollar's share of UK trade, it is still expected that adopting the euro would improve exchange rate stability overall.

7.2 The greater part of the study (Sections 4 to 6) provides a detailed analysis of the available empirical evidence concerning these effects. It concludes that:

- empirical evidence linking exchange rate volatility with lower trade is very mixed. Even for those studies that do establish a clear link, any increase in trade arising from the complete elimination of exchange rate volatility within a given area is not likely to exceed 10 per cent at most;
- the breaking of the sterling-punt link had no discernable impact on Anglo-Irish trade, which adds further evidence to the view that euro membership would not increase UK-euro area trade by much;
- looking more widely, though, a large body of empirical work shows that the impact on trade of membership of a currency union could be much more substantial. Early studies suggest that countries sharing a common currency may trade up to three times more than those who do not;
- but the emerging consensus is that the impact is smaller than this, though still potentially important. Based on the key strands in the literature, Table 7.1 provides an illustrative summary of views. Later estimates of increased trade within currency unions still range up to around 100 per cent, but vary widely according to their focus and methodology; and

- the results of nearly all the cross-country studies reflect the fact that most currency unions are between smaller, poorer countries. It is recognised that they cannot safely be extrapolated to the question of the UK adopting the euro. Initial analysis comparing trade in the euro area with that between otherwise comparable industrialised or European economies suggests the short-term euro impact ranges from 3 per cent up to around 25 per cent since 1999.

Table 7.1: Summary of currency union trade effects from academic studies

Study and focus	Currency union effect (per cent)	Statistically significant
Rose (2000). Cross-country regression. After controlling for other key determinants of trade, do countries with a common currency trade more? Contains some widely recognised statistical deficiencies.	200	5%
Rose and Glick (2001). Guards against omitted variable bias. What is the impact of entering/exiting a currency union?	100	5%
Pakko and Wall (2001). Guards against omitted variable bias. What is the impact of entering/exiting a currency union?	Negligible	–
Rose and van Wincoop (2001). Incorporates country/union specific ‘multilateral resistance’ effects.	Existing euro area gains: +60 UK in EMU: +44	5%
Persson (2001). Matching procedure: compares trade in currency union countries with trade between otherwise ‘similar’ countries.	+13 to +65	–
Tenreyro (2002). Allows for the possibility that membership of a currency union is not independent of the level of trade or its determinants.	+25 to +60	10%

Estimate of long-run impact on UK trade

7.3 It is difficult to arrive at a single estimate representative of the long-run gains to UK trade through possible adoption of the single currency. Nevertheless, on the basis of a careful review of the evidence, this study concludes that a reasonable range for the potential increase in UK trade with the euro area resulting from UK membership of EMU is between 5 and 50 per cent, without any trade diversion from the non-euro area. The lower end of this range equates with the lower estimates of the increase in intra-euro area trade that has already occurred between member countries. The upper estimate pays much greater attention to the wider benefits signalled by the evidence in Section 5, and seems closer to the more likely outcome.

EMU and UK income

7.4 This EMU study also concludes that increased trade integration with the euro area would be beneficial for UK long-term growth. Section 2 sets out the conceptual links between international openness and potential output or growth. Based on cross-country empirical evidence reviewed in this study, it seems reasonable to assume that each 1 percentage point increase in the trade to GDP ratio increases real GDP per head by at least $\frac{1}{3}$ per cent in the long run. For example, Frankel and Rose (2000) suggest a figure of $\frac{1}{3}$ per cent, while Frankel and Romer (1996) produce estimates of 0.4 per cent and 1.0 per cent.

7.5 Table 7.2 draws together the above analysis to arrive at a plausible range of estimates of the potential long-run increase in UK output and income through increased trade as a result of successful UK membership of EMU.

Table 7.2: Illustrative long-run impact of EMU membership on UK output and growth through increased trade within the euro area

Long-run increase in level of GDP per head, per cent		
Assuming a long-run impact of a 1pp increase in the trade to GDP ratio on the level of output per head of:	Increase in trade with euro area	
	5 per cent	50 per cent
$\frac{1}{3}$ per cent ¹	$\frac{1}{2}$	$4\frac{1}{2}$
$\frac{2}{3}$ per cent ²	1	$9\frac{1}{4}$

Increase in long-run annual growth rate of GDP per head (spread over 30 years), percentage points		
Assuming a long-run impact of a 1pp increase in the trade to GDP ratio on the level of output per head of:	Increase in trade with euro area	
	5 per cent	50 per cent
$\frac{1}{3}$ per cent ¹	0.02 pp	0.15 pp
$\frac{2}{3}$ per cent ²	0.03 pp	0.30 pp

¹ Frankel and Rose (2000) estimate.

² Broadly mid-way between Frankel and Rose (2000) and Frankel and Romer (1996) estimates.

Source: HM Treasury calculations.

7.6 For example, the top panel of Table 7.2 shows that under the assumption that each 1 percentage point increase in the trade to GDP ratio increases real GDP per head by $\frac{1}{3}$ per cent in the long run (Frankel and Rose, 2000), then an increase in trade with the euro area at the top end of the 5 to 50 per cent range would increase the long-run level of GDP per head by $4\frac{1}{2}$ per cent. Under the assumption that each 1 percentage point increase in the trade to GDP ratio increases real GDP per head by $\frac{2}{3}$ per cent in the long run (broadly mid-way between the estimates of Frankel and Rose, 2000 and Frankel and Romer, 1996), then a 50 per cent increase in trade with the euro area as a result of EMU membership would increase the level of GDP per head by $9\frac{1}{4}$ per cent. However, in the case of an increase in trade with the euro area at the bottom of the 5 to 50 per cent range, the increase in the long-run level of GDP per head is somewhat smaller at between $\frac{1}{2}$ and 1 per cent.

7.7 It is very difficult to know how long it would take for such benefits to feed through. Rose's original work, which looked at the long-run effect of a currency union on trade, used data covering the period 1970 to 1990. Therefore, the increase in trade might be assumed to occur over a period of around 20 years. This is in line with Bun and Klassen (2002), who find the bulk of their estimated long-run effect feeds through after about 20 years.

7.8 Increased openness is also likely to affect output with a longer lag. The higher end estimates for the increase in trade with the euro area imply the potential for significant effects – an increase in the growth rate of output per head of between 0.15 and 0.30 percentage points a year if spread over a period of, say, 30 years (as shown in the lower panel of Table 7.2). Equally though, the lower estimates for the increase in trade with the euro area imply little effect on the growth rate of GDP per head over a 30 year period (between 0.02 and 0.03 percentage points a year). To provide a basis for comparison, the European Commission (2002) estimates that, over the ten years since its launch in 1992, the Single Market has added just under 0.2 percentage points to annual GDP growth.

7.9 There are substantial uncertainties and risks surrounding these estimates. It is vital that these are kept in mind when potential trade impacts are considered in any overall assessment of the likely costs and benefits of UK participation in EMU. Moreover, smooth appropriation of such benefits would be critically dependent on sustained convergence of the UK economy with the euro area, as well as the absence of any short to medium-term misalignments in the sterling-euro entry exchange rate.

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A1 Not all the literature subscribes to the view that exchange rate volatility reduces trade. As McKenzie (1999) puts it “*in true economic style, other models have been derived which support the positive hypothesis that exchange rate volatility may lead to greater levels of trade*” (page 72). The argument relies on firms being able to export disproportionately when the exchange rate is in their favour, but cut back production when it moves against them. This gives the potential for high profits in the good times but without losses in the bad times, so expected profit under an uncertain, variable exchange rate is higher than with a fixed, certain, exchange rate. In other words the profit function of the firm is convex. This convexity has the potential to offset the concavity of a risk averse firm’s utility function. Therefore, the firm’s expected utility from trade under uncertainty may actually be higher than for trade under certainty.

A2 The European Commission (1990) also comments on the possibility that exchange rate volatility may not affect trade and investment adversely.

“This argument starts from the idea that trade always represents an option: and it is a well-known principle that the value of an option increases with its variability. The basic argument in less technical terms simply means that changes in the exchange rate represent not only a risk, but also an opportunity to make profits. A firm involved in trade can export, it does not have to, and will only do if it is profitable. If the exchange rate becomes more variable the probability of very favourable exchange rates and therefore high profits increases. The probability of very unfavourable exchange rates also increases, of course, but this does not lead to offsetting losses since the firm can always stop exporting. A higher variability of the exchange rate leads therefore to a higher probability of making high profits, which is not matched by an equivalent probability of high losses, only somewhat lower profits. This implies that higher exchange rate variability offers on average the opportunity to make higher profits” (page 82).

A3 This proposition is heavily dependent on firms being able to vary their output quickly and at a relatively low cost. If, on average, firms run below full capacity they may actually be able to increase output above its average level without too much trouble. However, reducing output below its average level when the exchange rate moves against them may be more problematic. For example, businesses have fixed costs, which will not fall with lower output. Equally, reducing staff levels is not costless and neither is rehiring staff when the situation reverses. More generally, firms are often bound by contracts with suppliers and buyers, so possibly preventing them from varying supply quickly.

A4 Furthermore, if a large proportion of a firm’s output is accounted for by exports, the decision to stop exporting when the exchange rate is unfavourable may mean the firm goes out of business. This is especially true because its domestic demand base will also be threatened by imports, which the unfavourable exchange rate has made more competitive. The firm would find it difficult to expand its domestic market to make up some of the lost business abroad. Overall, the arguments that there may be a positive relationship between exchange rate volatility and trade do not seem intuitively appealing.

CLASSICAL AND NEOCLASSICAL TRADE THEORY

B1 Classical trade theory is normally associated with the insights of David Ricardo in the nineteenth century and Eli Heckscher, Bertil Ohlin and Paul Samuelson in the early to mid-twentieth century.

B2 Prior to Ricardo, trade between countries was explained by the existence of **absolute advantage**. As the name implies, this argued that each country exports the products which they could produce more cheaply than their competitors and, in exchange, import products in which other countries held cost advantages. While Ricardo's theory has something in common with this, it went further and illustrated a much wider set of benefits to free trade than absolute advantage implied. Specifically, Ricardo showed that a country does not need to have an absolute advantage in anything in order to benefit from international trade. Rather, all it needs is a **comparative advantage**.

B3 Comparative advantage is best illustrated using a simple example. Take two countries, A and B, which produce two products, cloth and wine, using just one factor of production, labour. Using one unit of labour, country A can produce two units of cloth or one unit of wine. Country B meanwhile can produce three units of cloth or three units of wine for the same labour input.

B4 In this example, country A does not have an absolute advantage in the production of either good; country B can produce both wine and cloth more efficiently, i.e. using less labour. But the crucial insight of Ricardo's theory was that it is still in the interests of both countries to specialise and then trade. This conclusion arises because what matters for a country in international trade are opportunity costs of production, rather than absolute costs. In this case, the example has been constructed such that the opportunity costs of production of wine or cloth vary between the two countries. This is sufficient to make specialisation and trade beneficial to both parties.

B5 If country A produces one unit of wine, then it gives up production of two units of cloth. For country B, the production of one unit of wine means it has to give up just one unit of cloth. The opportunity cost of producing wine therefore is lower in country B. Similarly, it can be seen that the opportunity cost of producing one unit of cloth is lower in country A, at half a unit of wine compared to one unit of wine in country B. It is therefore beneficial for country A to specialise in cloth and country B in wine and for the two to trade with each other.

B6 This simple example rests on a number of assumptions:

- there are only two countries and only two final goods;
- the production of each good uses only one unit of labour, and each unit of labour is of identical quality;
- the supply of labour is fixed with respect to the wage in each country, i.e. perfectly inelastic;
- labour is perfectly mobile between the two sectors within the economy, but is internationally immobile;
- there are constant returns to scale, i.e. each unit of additional labour produces the same amount of output as all the previous units of labour;

- there are no trade barriers or transport costs;
- both the factor and goods markets are perfectly competitive; and
- the technologies used in production differ between the two countries.

B7 The last assumption in particular is crucial. Without it the two countries would not have an incentive to trade as each unit of labour in both countries would produce the same amount of output and so there would be no gain to trade. However, Ricardo's model was problematic because it used only one factor of production, labour, and offered no explanation of why its productivity should vary between countries. In reality products will use different factors of production with differing intensities. For example, textile production relies mainly on a supply of labour whereas computers require capital and know-how.

B8 Heckscher, Ohlin and Samuelson (H-O-S) subsequently extended the basic theory of comparative advantage to deal with the reality of countries having different amounts of the factors of production (land, labour and capital). The factor abundance model as it became known suggested comparative advantage was the result of differing factor endowments between countries. The corollary is that the model predicts countries should export goods that require relatively intensive use of factors of production in which the country has a relatively abundant supply.

B9 So H-O-S theory also predicts gains from specialisation and trade, but along the lines of relative factor endowments. The comparison with the Ricardo model is that if two countries have identical factor proportions, there would be no reason for the two to trade.

NEW TRADE THEORY

B10 Classical trade theory, embodied in the models of Ricardo and H-O-S, emphasised the differences between countries in explaining why goods and services cross borders. We might therefore expect trade to be predominantly between countries that differ in terms of resource endowments and income levels. In particular, technologically-advanced industrialised nations would be expected to trade with labour-rich developing economies producing basic commodities.

B11 However, as the twentieth century wore on, comparative advantage theory grew increasingly inconsistent with a number of stylised facts of international trade. In particular:

- world trade is predominantly accounted for by trade between nations which are very similar in terms of resource endowments (and income levels); and
- trade is heavily concentrated in cross-border transactions involving ostensibly similar goods and services between industrialised countries rather than the simple 'wine in exchange for cloth' type of trade comparative advantage theory predicts. That is, trade is mostly intra-industry rather than inter-industry.

B12 To explain intra-industry trade, it is important to note that it comes in two forms. The first is where trade between countries is based on different stages in the production process of a good. The second is trade in finished products in niche markets. For example a country exports luxury cars, but imports standard family cars. In many European countries and North America intra-industry manufacturing trade accounts for more than 60 per cent of all manufacturing trade, as shown in Table B1. More generally, there is a view that trade between developed countries is predominantly intra-industry trade, while trade between developed and developing countries is based on inter-industry trade.

Table B1: Manufacturing intra-industry trade as a per cent of total manufacturing trade

	1996–2000 average
UK	73.7
Germany	72
France	77.5
Italy	64.7
Spain	71.2
Netherlands	68.9
Sweden	66.6
Denmark	64.8
Austria	74.2
Belgium/Luxembourg	71.4
US	68.5

Source: OECD Economic Outlook Volume 2002/1 No.71.

B13 New Trade Theory emerged in the 1970s and 1980s to deal with this apparent anomaly between theory and reality. While there are many strands to this literature, the core view is that “*much trade represents arbitrary specialisation based on increasing returns [to scale], rather than an effort to take advantage of exogenous differences in resources or productivity*”, Krugman (1991, page 7). Increasing returns to scale means that each additional unit of output is produced more cheaply than the previous units. Hence, there is an advantage to large-scale production. These returns to scale in production can be both internal and external to the firm:

- **internal economies of scale.** Many products are subject to economies of scale in production so that unit costs decline with higher volumes of output. Examples of such goods are cars, aeroplanes and steel. Thus, in a world of product differentiation, it makes sense for different countries to specialise in the production of specific models or brands such that scale economies can be exploited. For consumers, the benefits from this process are potentially two-fold; greater choice and lower prices; and
- **external economies of scale.** External economies refer to productivity gains or cost reductions that an individual firm reaps from the expansion of other firms in the same industry. For example, in knowledge-intensive industries, new knowledge spills over from firm to firm either through contacts or as knowledge transferred by skilled workers. The more contact any one firm has with others in the same industry, the greater the transmission of knowledge among them, as they hear about each other’s techniques and as skilled labour migrates from firm to firm. An often-cited example is California’s Silicon Valley where semiconductor and computer producers swap ideas and workers.

B14 Industries with significant external economies of scale are thus subject to declining average cost curves (at least up to a maximum efficient scale at a relatively high level of output) although firm level cost curves may still slope upwards. In relation to trade, the newer theories tell us that exporting increases the size of the potential market facing a national industry and enables external economies to be captured as production for export increases. In turn, this can increase competitiveness against the same industries in other countries by lowering costs and give the country a significant advantage in the global market.

B15 But this does not necessarily explain intra-industry trade, because a country can still specialise in the production of a complete product, for example cars. To explain intra-

industry trade requires the realisation that international trade allows countries to specialise in one stage of the production process, for example, engine production for cars. The economies of scale become international, rather than national. Clearly this becomes a more viable option as the costs involved in international trade fall.

B16 The second form of intra-industry trade – trade in finished products within the same category – meanwhile rests on demand factors. In the supply-side models of trade each class of product is assumed to be identical, for example wine is wine regardless of its origin. In reality consumers often view French wine as being a different product from Italian wine or Australian wine. Equally, they view German-made cars as being different from French or Italian-made cars. In other words, consumers value product diversity.

B17 A further point is that these different types of intra-industry trade can co-exist within the same industry. The component parts of a final product can be produced in separate countries and transported to another country to be assembled into the final product. This final product could be a niche market product within an industry and could be in turn exported.

B18 Overall, increasing returns to scale, meaning that by increasing output average costs can be reduced, encourage specialisation in production. Specialisation can be in different stages of the production process or in niche markets. With countries specialising it then becomes practical to produce at an optimal scale in a range of goods and services, so aggregate productivity rises. Countries can then trade with one another and offer consumers wider choice, and at lower prices than if national economies attempted to make all products themselves.

RECENT DEVELOPMENTS

B19 New trade theory is a very neat way of explaining the phenomenon of intra-industry trade based on increasing returns to scale. However, more recently some researchers have revived the classical theories in an attempt to explain trade between countries in ostensibly similar goods. Essentially this approach involves integrating the technical differences underlying Ricardian theory with differences in factor abundances used in a Heckscher-Ohlin framework. For an example of this see Davis (1995).

B20 Other work by Davis and Weinstein (2001) explores the possibility that the mismeasurement of the factor content of intra-industry trade led to the loss of faith in old trade theory. The authors suggest empirical work often assumes countries use the same technology to produce a good. Therefore, to produce one unit of a good, every country has to use the same amount of factor inputs. Hence a zero trade balance for a good implies no net trade in factor services has occurred.

B21 Romalis (2002) notes that previous examinations of input-output matrices show that countries do in fact use different production techniques and that these techniques reflect factor endowment differences. It is more reasonable, therefore, to allow production technology to differ across countries. This means 'identical' goods can be produced with differing factor intensities. Intra-industry trade can then actually result in a net trade in factor services – as predicted by old trade theory.

SUMMARY

B22 The two key messages from old and new theories of trade, and the recent developments, are that trade facilitates specialisation and specialisation results in higher productivity. The theories are distinguished simply by their basis for specialisation, be it technical differences, factor abundances or economies of scale.

B23 Overall, it does not seem unlikely that a combination of old and new theories of trade would explain trade flows more fully than either model taken individually. Given the recent advances in the area of trade theory, there may also be benefits from further research into the factor content of intra-industry trade, particularly as it accounts for a majority of world trade.

C1 The data used in this study come from three sources:

- the Office for National Statistics (ONS);
- the OECD; and
- Eurostat.

Trade systems C2 Trade data are commonly based on one of two systems: the general trade system or the special trade system. The general trade system records all merchandise trade (excluding merchandise in transit through the UK) crossing the national boundary of a country, including goods imported into and exported from Customs warehouses and free zones. The special trade system records goods that cross the Customs frontier and goods that are imported into and exported from Custom bounded areas. Again, goods that are only in transit and do not enter Custom bounded areas are not included.

The data used C3 The ONS data presented in this study are from the UK balance of payments and are used only when looking at the UK in isolation. They are based on the general trade system data provided by HM Customs and Excise. But, in order to conform to the IMF Balance of Payments Manual (BPM5) definitions, the ONS has to make various adjustments, such as including certain transactions which are not reported to HM Customs and Excise and excluding certain transactions which are reported to HM Customs and Excise but have not involved a change of ownership. In addition, the value required for balance of payments purposes is the value of goods at the point of export, i.e. the Customs border of the exporting country, rather than the value of goods as they arrive in the UK. Therefore, the freight and insurance costs of transporting the goods to the UK needs to be deducted from the import values recorded by HM Customs and Excise.

C4 Monthly trade data from the OECD, which are based on the special trade system, are used when making international comparisons over time. The data used by the OECD are actually provided by Eurostat, which collects data from each EU Member State. In principle, the two sources should be consistent. However, the OECD presents the data in US dollars, while Eurostat uses euros. Therefore, the exact exchange rate used to convert either dataset for comparison may lead to differences. The data from the OECD were used because the series go back to 1960, whereas the Eurostat data start in 1989.

C5 The current account data for the EU countries are used when a more detailed breakdown of the current situation is required. The data are taken from Eurostat and are based on data from national sources. As with the ONS data, they should be based on the general trade system and adjusted in line with the IMF Balance of Payments Manual.

D1 Gravity models have been used in empirical studies looking at the impact of currency unions on trade. They have also been employed in assessing the impact of exchange rate volatility on trade. Standard gravity models explain bilateral trade flows using the economic mass of two countries, the distance between them and a selection of other factors thought plausibly to affect trade. These can take the form of dummy (binary) and/or continuous variables, such as a measure of exchange rate volatility. Economic mass is usually measured by: the product of the two countries' GDP; the product of their GDP per capita; and/or, the product of their populations.

Basic gravity models

D2 Examples of the basic gravity models are found in McCallum (1995), Dell'Araccia (1999) and Rose (2000). McCallum uses a particularly simple model to deduce that Canadian provinces trade 22 times more with each other than with US states of a comparable size and distance away. The model had the log of bilateral trade on the left hand side, while on the right hand side it included only log GDP of the trading regions, the log of the distance between them and a dummy variable indicating whether the trade flows were inter-provincial or between a US state and a Canadian province.

D3 Such a model can be expanded to include a far greater variety of controlling factors, as in Dell'Araccia (1999) and Rose (2000). In one of his estimates of the effect of exchange rate volatility on trade in Western Europe, Dell'Araccia added a shared border variable, an EU membership variable, as well as a measure of exchange rate volatility.

Rose (2000) model **D4** However, Rose went a step further than previous work, which had looked at either the impact of a national border or exchange rate volatility on trade. His model included far more controlling factors, among which was a currency union dummy variable. This took the value one for a country-pair with a shared currency and zero otherwise. Rose's core result is based on a pooled cross-section estimation. This means the observations over time (from 1970, 1975, 1980, 1985 and 1990) are merged into a single cross-section, rather than using them as a panel. The model is given below.

$$\ln X_{ij} = \beta_0 + \beta_1 \ln(Y_i Y_j) + \beta_2 \ln(Y_i Y_j / Pop_i Pop_j) + \beta_3 \ln D_{ij} + \beta_4 Cont_{ij} + \beta_5 Comlang_{ij} \\ + \beta_6 FTA_{ij} + \beta_7 ComNat_{ij} + \beta_8 ComCol_{ij} + \beta_9 Colony_{ij} + \gamma CU_{ij} + \delta V(e_{ij}) + \epsilon_{ij}$$

where i and j denote countries, \ln denotes natural logarithm, and the variables are defined as:

X_{ij} = Value of bilateral trade between i and j

Y = Real GDP

Pop = Population

D_{ij} = Distance between i and j

$Cont_{ij}$ = 1 if i and j are contiguous, 0 if not

$Comlang_{ij}$ = 1 if i and j have a common language, 0 if not

FTA_{ij} = 1 if there is a free trade agreement between i and j , 0 if not

$ComNat_{ij}$ = 1 if i and j are part of the same nation, 0 if not

$ComCol_{ij}$ = 1 if i and j were colonies after 1945 with the same coloniser, 0 if not

$Colony_{ij}$ = 1 if i colonised j or vice-versa, 0 if not

CU_{ij} = 1 if i and j use the same currency, 0 if not

$V(e_{ij})$ = Volatility of the exchange rate between i and j

\mathcal{E}_{ij} = error term

D5 These basic models used ordinary least squares (OLS) to estimate the pooled cross-section. In the case of Rose (2000), the estimated coefficient on the currency union dummy implied currency union members traded over three times more with each other than did non-member countries. However, subsequent literature, and some previous literature, casts a great deal of doubt on the validity of this methodology. Section 5 noted the potential shortcomings, two of which were:

- the model invariably omits factors that are important in determining trade links between countries, meaning estimates may be biased; and
- the relationship between trade and membership of a currency union may be two-way. Early work does not allow for this, so again the resulting estimates may be biased.

Omitted variable bias

Biased estimates imply ... D6 It is well known in econometrics that the omission of important factors from an estimated relationship gives rise to the potential of biased estimates. This has been presented as a potential problem afflicting the early work on the impact of currency unions on trade. While a great deal of effort is made in the work of Rose (2000) to control for the factors determining bilateral trade, it is unlikely that this approach can capture the unique set of factors that determine the trading relationship between any two countries.

D7 In an attempt to overcome this problem other studies have used fixed effects. The idea behind fixed effects is that they represent all ‘fixed’ factors that could impact on trade between a country pair, but which are not explicitly included in the model. Essentially, this says for each country pair there is quite probably a distinct set of factors, aside from those explicitly controlled for, which determine how much the two countries trade with each other. This set of factors is captured by the fixed effect.

D8 Pakko and Wall (2001) apply the country-pair fixed effect methodology to the dataset used in Rose (2000). The gravity model also contains the standard GDP variables, a free trade area variable and an exchange rate volatility term, as shown below:

$$\ln X_{ijt} = \beta_0 + \beta_1 \ln(Y_i Y_j)_t + \beta_2 \ln(Y_i Y_j / Pop_i Pop_j)_t + \beta_3 FTA_{ijt} + \gamma CU_{ijt} + \delta V(e_{ij}) + FE_{ij} + \tau T'_{ijt} + \mathcal{E}_{ijt}$$

where i and j denote countries, t denotes time, \ln denotes natural logarithm, and the variables are defined as:

X_{ij} = Value of bilateral trade between i and j

Y = Real GDP

Pop = Population

FTA_{ijt} = 1 if there is a free trade agreement between i and j at time t , 0 if not

$CU_{ijt} = 1$ if i and j use the same currency at time t , 0 if not

$V(e_{ijt})$ = Volatility of the exchange rate between i and j in the period before t

FE_{ij} = Country-pair fixed effect

T'_{ijt} = Vector of time dummies.

\mathcal{E}_{ijt} = error term

D9 Although Pakko and Wall used the same trade data as Rose (2000), the selection criteria was tighter because they required at least two observations for each country-pair, compared to only one in Rose's work. In theory this should have allowed the question 'what is the impact on trade of joining a currency union?' to be answered. Earlier work could only ask 'how much more do currency union members trade with each other than do non-members?'

D10 The point estimates suggest membership of a currency union actually reduces trade. In fact, the effect of a currency union on trade is statistically indistinguishable from zero – *there is no measurable effect*. However, this finding has to be treated with caution on econometric grounds because, despite the large overall sample size, there were only eight recorded switches into or out of currency unions. This is considerably less than necessary to produce a reliable estimated coefficient of the effect of joining a currency union.

... fixed effects preferable **D11** Pakko and Wall also estimate the Rose (2000) model using exactly the same data as in their fixed effect estimation. This is useful because the coefficients on the product of GDP and the product of GDP per capita, which are used in both approaches, can be compared. The coefficient on the GDP control in the fixed effect model is close to double that in the pooled cross-section model, while the coefficients on GDP per capita have opposite signs. Although the Pakko and Wall fixed effect model has its shortcomings, the large difference in the coefficients of controls common to both models implies the pooled cross-section results may be biased. Therefore, to improve the reliability of Rose's original results it becomes necessary to collect data that contains more country switches into, or out of, a currency union. This would allow a meaningful analysis using the fixed effect methodology.

Trade still doubles **D12** Rose and Glick (2001) do precisely this and manage to find a significant positive impact on trade from a common currency. According to this study membership of a currency union doubles trade with other members. However, there are still problems with this approach, such as systematic differences between currency union and non-currency union pairs and simultaneity bias. These are discussed in more detail below.

Relative trade barriers

D13 Although some papers, such as Rose and Glick (2001), address the problem of omitted variables generally, Rose and van Wincoop (2001) focus on the specific omission of relative trade barriers. They suggest that theory implies trade between two countries depends on the bilateral trade barriers present relative to the multilateral, or average, trade barrier with all their trading partners, including internal trade barriers. Prior to this work, gravity models made no allowance for a country's internal trade costs and its trade costs with all its other international trade partners.

D14 The intuition for using relative trade costs is simple. It is more attractive to trade with a country that has low trade costs relative to the average trade cost across all countries and internally. The inclusion of this term gives three important results:

- trade barriers reduce size-adjusted trade between large countries more than between small countries;

- countries that already trade a lot with each other will experience a smaller percentage increase in trade from forming a currency union; and
- although countries that already trade a lot will experience a smaller increase in trade, their welfare benefit from entering a currency union will be greater.

D15 The result that trade barriers reduce trade between large countries more than between small countries is seen by looking at the equation for bilateral trade derived by Anderson and van Wincoop (2001).

$$x_{ij} = \frac{y_i y_j}{y^w} \left(\frac{t_{ij}}{P_i P_j} \right)^{1-\sigma}$$

D16 This gives exports from country i to j (x_{ij}) as a function of: the combined income (y) of the two countries relative to world income; bilateral trade barriers (t_{ij}) relative to the multilateral trade barrier (P) for each country; and the elasticity of substitution between all goods ($\sigma > 1$). In other words bilateral exports depend on the bilateral trade barrier relative to the average trade barrier with all trading partners. Each country produces a fixed quantity of goods, which is in some sense like assuming that each country has a fixed level of factors of production.

D17 The intuition behind trade barriers reducing size-adjusted trade between large countries more than between small countries, is that for a large country P contains a greater proportion of internal trade barriers. These are unaffected by changes in international trade tariffs. When t_{ij} falls, P_i and P_j also fall, as t_{ij} is present in both P_i and P_j . But for a large country t_{ij} accounts for a smaller proportion of P_i and P_j so the ratio in brackets falls further than it does for a small country. As the elasticity of substitution between goods is greater than one, bilateral trade increases in response to the fall in the relative trade barrier between the two countries.

D18 Rose and van Wincoop (2001) explain the logic underlying why countries that already trade a lot will experience a smaller increase in bilateral trade from a currency union. It is because if bilateral trade barriers are reduced between countries which already trade a lot with each other (relative to their total trade), multilateral resistance will also fall. The result is that relative trade barriers between these countries do not fall by a great deal, so trade does not rise by a large amount.

D19 Rose and van Wincoop (2001) also claim that welfare is inversely related to multilateral trade resistance, P . If bilateral trade barriers with a country (or group of countries) with which the domestic country trades extensively are reduced, multilateral resistance will fall substantially, for reasons outlined above. Hence, welfare will increase by a greater amount in countries that trade extensively, because welfare is inversely proportional to multilateral trade resistance. This is easy to see in terms of a common currency. Using separate currencies imposes a cost on firms that trade internationally. Therefore, the more firms there are trading internationally, the greater the gain from reducing transaction costs.

D20 In an attempt to estimate a gravity model that takes account of multilateral as well as bilateral trade resistance, Rose and van Wincoop (2001) add country-specific fixed effects to a regression similar to that of Rose (2000). The fixed effects are assumed to represent a country's multilateral trade resistance, while the existing factors such as a common language or membership of a free trade area represent bilateral trade resistance.

D21 It is worth noting that this raises a potential problem in the interpretation of the Rose and van Wincoop results. Fixed effects are supposed to take on board all factors important in determining trade between two countries, but not explicitly included in the regression. This raises the question of how closely the fixed effects relate to multilateral resistance.

D22 Nevertheless, the results, which are outlined in Section 5, suggest that the inclusion of a multilateral resistance term reduces the size of the currency union effect. The implication is that previous estimates were biased as a result of omitting this important variable.

Simultaneity bias

D23 A further form of bias that needs to be addressed is simultaneity bias. This is where the estimation fails to take account of a two-way relationship between the variable of interest and one or more of its regressors. In this case the potential for simultaneity bias exists because countries that trade heavily with each other may opt to form a currency union, so membership of a currency union is not a truly exogenous variable. We have already seen that theory suggests countries which already trade a lot with each other would gain the most in terms of welfare, so giving them the incentive to form a currency union. Such a two-way relationship was not explicitly modelled in either the earlier pooled cross-country work or the developments using fixed effects.

D24 Some literature covering the impact of exchange rate volatility on trade, prior to the work on currency unions, found it was important to account for simultaneity. In this case it arose when central banks pursued a policy of exchange rate stabilisation against major trading partners.

D25 Tenreyro (2001) adapts the basic gravity model, containing GDP terms, a vector of other determinants of trade and a currency union variable. The currency union term is **not** assumed to be independent of the bilateral trade variable or the other right hand side variables. Instead the gravity model is jointly estimated as part of a system of two equations. The other equation determines the probability that a currency union is formed between the two countries. This probability is based on a number of factors that also determine trade flows, such as a common language, having a common former coloniser, distance and being a member of a free trade area.

D26 This approach also reduces the estimated impact of a currency union on trade. After correcting for simultaneity, and data problems (discussed in Section 5), Tenreyro suggests the effect on trade falls from 200 per cent to about 60 per cent, which is significant at the 10 per cent level.

Conclusion

D27 Overall, a number of adaptations have been made to the basic gravity models used by McCallum (1995) and Rose (2000). Essentially, these involve using some form of fixed effect to overcome omitted variable bias, or estimating the model as part of a system of equations to prevent simultaneity bias. Both these methods should produce more reliable estimates of the impact of a currency union than earlier gravity models, which were estimated as pooled cross-section ordinary least squares regressions. The results from these adaptations suggest that the impact of a common currency is substantially lower than the 200 per cent increase in trade presented by Rose (2000). That said, Section 5 still concludes that the impact could feasibly be as large as 60 per cent.

E

ANNEX E: CURRENCY UNION EXAMPLES TAKEN FROM ROSE (2000)¹

AUSTRALIA

Christmas Island (territory)
Cocos (Keeling) Islands (territory)
Norfolk Island (territory)
Kiribati
Nauru
Tuvalu
Tonga (pre 1975)

DENMARK

Faroe Islands (part of Denmark)
Greenland (part of Denmark)

ECCA

Anguilla (territory of UK)
Antigua and Barbuda
Dominica
Grenada
Montserrat (territory of UK)
St Kitts and Nevis
St Lucia
St Vincent and the Grenadin

FRANCE

French Guiana (overseas department)
French Polynesia (overseas territory)
Guadeloupe (OD)
Martinique (OD)
Mayotte (territorial collectivity)
New Caledonia (OT)
Reunion (OD)
Saint Pierre and Miquelon (TC)
Wallis and Futuna Islands (OT)
Monaco

FRANCE AND SPAIN

Andorra

BELGIUM

Luxembourg

CFA

Benin
Burkina Faso
Cameroon
Central African Republic
Chad
Comoros
(Republic of) Congo
Cote d'Ivoire
Equatorial Guinea (post 1984)
Gabon
Guinea-Bissau
Mali (post 1984)
Niger
Senegal
Togo

ITALY

San Marino
Vatican

MOROCCO

Western Sahara

NORWAY

Svalbard (territory)

SOUTH AFRICA

Lesotha
Namibia
Swaziland

SWITZERLAND

Liechtenstein

NEW ZEALAND

Cook Islands (self-governing, associated with NZ)
Niue (self-governing, associated with NZ)
Pitcairn Islands (territory of UK)
Tokelau (territory of NZ)

¹Note: This table is copied directly from Rose (2000), including notation in brackets.

TURKEY

Northern Cyprus

UK

Falkland Islands (territory)

Gibraltar (territory)

Guernsey (dependency)

Jersey (dependency)

Man, Isle of (dependency)

Saint Helena (territory)

Scotland (?)

Ireland (pre 1979)

USA

American Samoa (territory)

Guam (territory)

US Virgin Islands (territory)

Puerto Rico (commonwealth associated with US)

Northern Mariana Islands (commonwealth in political union with US)

British Virgin Islands (territory of UK)

Turks and Caicos Islands (territory of UK)

Bahamas

Bermuda (colony of UK)

Liberia

Marshall Islands

Micronesia

Palau

Panama

Barbados (? 2:1)

Belize (? 2:1)

SINGAPORE

Brunei

F

ANNEX F: DIFFERENCES BETWEEN VARIABLE AVERAGES FOR CURRENCY UNION MEMBERS AND NON-MEMBERS

F1 Using a t-test, it is possible to test whether the variable averages, measured by the means, of two groups can be regarded as the same. In this case the test is whether the means for currency union members can be regarded as the same as the means for non-currency union members. To do this it is necessary to assume that the variables for each group are normally distributed around their means. The test statistic used is:

$$t = \frac{\sqrt{n}(x_{cu} - x_{ncu})}{S}$$

where, n = sample size

x_{cu} = mean for currency union countries

x_{ncu} = mean for non-currency union countries

S = standard deviation for currency union countries.

Table F1 presents the results of the t-test.

Table F1: t-test of variable means for currency union members and non-members.

Variable	CU Members Mean	Mean	CU Non-Members Standard Deviation	Sample Size	t-statistic
Output	34.428	28.866	3.964	252	-22.274
Output per capita	16.238	15.248	1.641	252	-9.577
Distance	8.201	6.469	1.387	252	-19.823
Contiguity	0.025	0.111	0.315	252	4.334
Language	0.136	0.806	0.397	252	26.791
Free Trade Area	0.017	0.298	0.458	252	9.740
Same country	0.001	0.143	0.351	252	6.422
Same coloniser	0.081	0.710	0.455	252	21.945
Colonial relation	0.013	0.028	0.165	252	1.443
Trade	9.413	8.609	0.996	252	-12.814

Source: The data for the tests are means of variables from Rose's original data set and presented in Persson (2001).

F2 Using a two-sided t-test with a significance level of 5 per cent (the probability of rejecting the hypothesis that the averages of the two groups are the same when it is actually true) **the critical value for the tests is +/- 1.96**. If the t-statistic in the right hand column is greater than 1.96 or less than -1.96, the averages of the two groups cannot be regarded as the same in relation to the variable on the left hand side.

