

The United States as a monetary union

EMU study



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The United States as a monetary union

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

This study has benefited from review by Edwin M. Truman and Laurence H. Meyer, working in personal capacities as academic consultants to HM Treasury. All content, conclusions, errors and omissions in this study are, however, the responsibility of HM Treasury alone.

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

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

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EXECUTIVE SUMMARY

1 The United States (US) is a monetary union occupying a huge geographical area – significantly larger than Western Europe. As the world’s largest economy (in terms of its level of GDP) it provides a working example of how different regions – quite disparate in terms of their geography, climate, industry and heritage – develop within a monetary union.

2 The US is frequently cited as providing evidence that different regions can prosper within a monetary union and can adjust to unanticipated economic disturbances, or ‘shocks’, in the absence of an independent monetary policy or nominal exchange rate. It is often suggested that a single currency has had a significant impact on US economic performance, in terms of both macroeconomic stability and the microeconomic benefits of greater trade and competition.

3 Monetary union formally began in the US with the ratification of the Constitution in 1788. But the US only assumed many of the characteristics of a full monetary union, such as an independent central bank and a single currency, over the following 150 years. The institutions of monetary union in the US have tended to evolve in response to specific needs or difficulties, rather than according to a pre-planned framework.

4 Different aspects of the evolution and operation of the US as a monetary union have been extensively analysed in a wide range of academic studies. This study presents a comprehensive overview, drawing on the analytical framework explained in the EMU study by HM Treasury *The five tests framework*. It examines the adjustment mechanisms which have operated in the US and the likely benefits that monetary union has delivered. This study informs a number of other EMU studies and is relevant to each of the Government’s five economic tests for EMU entry, in particular the fifth test on growth, stability and jobs.

The implications of US monetary union

5 The first sections of the study consider the key implications of monetary union for regions within the US. They focus on the extent to which the regions within a monetary union are subject to region-specific shocks, and the ability of regions to adjust to such shocks without an independent monetary policy or nominal exchange rate:

- supply and demand shocks have varied widely in their incidence and impact on the regions of the US. Similarly, analysis of business cycles suggests that some regions have displayed highly idiosyncratic business cycles. It cannot be concluded that the US regions all follow a common business cycle;
- this suggests that a monetary union can survive (and prosper) with quite varied business cycles and in the presence of asymmetric shocks, i.e. shocks which affect some regions or sectors more than others;
- theories of endogenous convergence suggest reasons why a single currency might foster similarity in regional business cycles. There is limited evidence to indicate that this may have occurred in the US, but it is not clear whether this is due to the deepening of the monetary union or wider structural factors;

- various adjustment mechanisms appear to play a part in helping US regions to adjust to asymmetric shocks. Labour markets are thought to provide important adjustment mechanisms (in terms of employment flexibility and labour mobility), apparently playing a greater role than in many other countries. There is also some (though imperfect) risk sharing in financial markets – a potentially important mechanism whereby agents from one region spread investments across other regions of the economy;
- US federal fiscal policy plays a far greater role in assisting regional adjustment than does EU-level fiscal policy in Europe. But in Europe, national fiscal policy assists regional adjustment much more than state level policy does in the US. Some US states run budget deficits and surpluses, but these do not seem to be directed at cyclical stabilisation, or at offsetting regional shocks. Overall, fiscal policy appears to provide as much, if not more, assistance to regional adjustment in Europe than in the US; and
- there is no single optimal means of adjustment to shocks. Different adjustment mechanisms will be most appropriate, depending on the country or region, the specific circumstances and the nature of the shock. But the US clearly benefits from having a high degree of flexibility. In particular, labour market adjustment mechanisms facilitate a relatively rapid reallocation of resources when US regions experience region-specific shocks. High flexibility alleviates the effect of such shocks on the overall performance of the economy.

Fiscal policy institutions 6 Individual US states are not prevented by any formal institutional framework from running fiscal deficits. Nor is there any harmonisation of state income, corporate, sales or excise taxes in the US. The evidence suggests that even with highly mobile capital, states retain some flexibility to run independent fiscal policies – although in practice almost all US states choose to follow a form of balanced budget rule on an annual basis. Annex B discusses fiscal federalism – the allocation of fiscal policy authority among different levels of government.

Identifying the benefits of the US monetary union... 7 The benefits of monetary union are difficult to identify in the absence of a counterfactual illustrating the likely economic performance of the US states or regions without a single currency. Nevertheless, the evidence of the size and strength of the US economy and single market makes it difficult to believe that the monetary union has not delivered benefits.

...at the macroeconomic level 8 At a macroeconomic level, there is evidence to suggest that US monetary union has contributed to greater consumption stability. Consumption has tended to be more stable in the US than in other major industrialised economies in the last twenty years, even though output has not been noticeably more stable. The large single market, well-integrated financial markets and trade integration may have helped the US to stabilise consumption both over time and between regions.

...and at the microeconomic level 9 There are a number of channels through which monetary union in the US appears to have had a positive microeconomic impact:

- trade: an absence of comprehensive data on inter-state trade makes it difficult to compare the level of trade within the US with that between countries. Recent work suggests that trade between US states is over 40 per cent higher than trade between US states and Canadian provinces (although this may reflect factors other than the single currency). The balance of evidence suggests that the single currency in the US has helped to stimulate inter-state trade;

- investment: through the 1990s, the US experienced high rates of investment growth accompanied by high rates of productivity growth. This suggests that the US has an efficient financial market, in terms of allocating investment to high productivity areas;
- competition: a more relevant measure of the integration of the US economy may be provided by estimates of competitive pressures in the US. Evidence suggests that price competition is greater in the US than in major European countries. This is likely partly to result from the greater price transparency and integration provided by the single currency. But this cannot be separated from other factors such as a common language and culture, and the federal regulation of commerce. The evidence suggests that competitive pressure, in turn, has been the major driving force behind recent strong US productivity performance;
- specialisation: at a high level of industrial aggregation, US regions are less specialised than the EU economies. But on more disaggregated measures, the US is more specialised, which allows for agglomeration effects and for US firms to gain scale economies;
- financial markets: a large single currency area and a large, diverse single market, may have helped the development of US financial markets. This is despite the US having a relatively complex and decentralised regulatory structure; and
- US monetary union does not appear to have influenced the location of financial markets to any significant degree. Established patterns of business, often related to first-mover advantage and regional specialisms from the 19th century, appear to survive even today. In the North East, major equity investment and trading takes place in cities geographically closer than London and Frankfurt in Europe.

I0 The evidence suggests that monetary union has facilitated greater competition and integration between regions and states of the US, along with deep and liquid financial markets. It has also required the existence of an integrated single market and a high degree of confidence that, should difficulties occur, the institutional and economic structures are able to evolve and meet emerging challenges.

II This evolutionary aspect of the US monetary union is a recurring theme when examining how the US has successfully adapted to economic change and the needs of monetary union. Several examples of institutional change are identified, including:

- the creation of the Federal Reserve Bank in the early 20th century, providing an independent monetary authority for the US – a direct response to banking crises;
- evolution of the Federal Reserve structures in response to weaknesses in its original form;
- the adoption by individual states of balanced budget rules to encourage fiscal responsibility at a sub-federal level;
- the integration of the trans-continental US economy, with increasing capital mobility among regions;

- the pooling by the states of authority over tax and benefit systems at the federal level; and
- labour mobility between the North and South, which increased significantly in response to demand and supply shocks in the mid 20th century.

Conclusions 12 The study does not draw direct conclusions for EMU or the question of possible UK entry. A direct comparison between the US and euro area is difficult for several reasons, most notably that the institutions and policy frameworks of the US monetary union have evolved over a significant period of time in response to economic need, and not according to an *ex ante* design as in the euro area.

13 Moreover, the political context for the two monetary unions is very different. Ultimately the US states chose federal structures for fiscal policy to underpin political union – based on the principle of fiscal federalism. In the EU, fiscal policy is the responsibility of Member States as set out in the Stability and Growth Pact, and subject to the provisions of the EC Treaty.

14 This suggests that perhaps the most important lesson from the US experience is that a key feature of a successful monetary union is a high degree of confidence that, should difficulties occur, both the economic and institutional structures of the monetary union have the capacity to evolve and meet emerging challenges.

15 The study provides valuable evidence for the assessment of each of the Government's five economic tests for EMU entry, in particular the fifth test on growth, stability and jobs.

INTRODUCTION

The relevance of the US experience

1.1 The United States (US) is a monetary union broadly similar to Economic and Monetary Union (EMU) in Europe in terms of the overall size of its market. In 2001, the US population was around 285 million, and Gross Domestic Product (GDP) reached more than US\$10 trillion; compared to a population of around 305 million in the euro area and GDP of close to \$6 trillion.¹ The US therefore provides a working example of how a large, industrialised economy functions with a single currency, and how different regions – quite disparate in terms of geography, climate, industry and heritage – develop within a monetary union.

1.2 Given the strong performance of the US economy, it is not surprising that it is typically seen as an example of a successful monetary union. The US experience is often cited as evidence that diverse regions can prosper within a monetary union and can adjust to unanticipated economic disturbances, or ‘shocks’, without a flexible nominal exchange rate or independently set interest rate. It is often argued that a single currency has had a significant impact on US economic performance, in terms of both macroeconomic stability and the microeconomic benefits of greater trade and competition. For example, Layard *et al.* (2002, page 5) suggest that “*to improve living standards, Britain needs to belong to a unified market, such as exists in the United States. This will enable business to sell more widely and to achieve the massive economies of scale enjoyed in the US.*”

1.3 On the other hand, it is also asserted that the US success relies on adjustment mechanisms such as labour mobility and fiscal transfers between states, which are much more developed than in EMU.

1.4 The purpose of this study is to consider how monetary union has contributed to successful economic performance in the US. The study examines the costs and benefits of monetary union in the US and considers how economic structures and institutions in the US have evolved over time. The study does not draw direct conclusions from this for EMU in Europe or the question of possible UK entry. There are a number of factors that make a direct comparison difficult. However, the conclusions of this study provide valuable evidence and underpinning for some of the key issues in HM Treasury’s assessment of the five economic tests. For example, the study considers important questions such as:

- how closely correlated are the business cycles and incidence of shocks in regions within a monetary union?
- what mechanisms do regions use to adjust to asymmetric shocks within a monetary union?
- how has monetary union affected macroeconomic stability?
- what are the potential microeconomic benefits of monetary union?

The development of the US monetary union

1.5 One important message from the study is that the origins and development of the US monetary union have been very different from the introduction of the single currency in Europe (a brief history of the US monetary union is provided in Annex A to this study). While the institutions of EMU were developed within a relatively short time period, those which frame the US monetary union have evolved in stages over the period since the US dollar was introduced in 1792. This is one reason why there are clear limits to how far the experience of the US can be applied to the euro area.

¹ Source: World Development Indicators database, World Bank, August 2002.

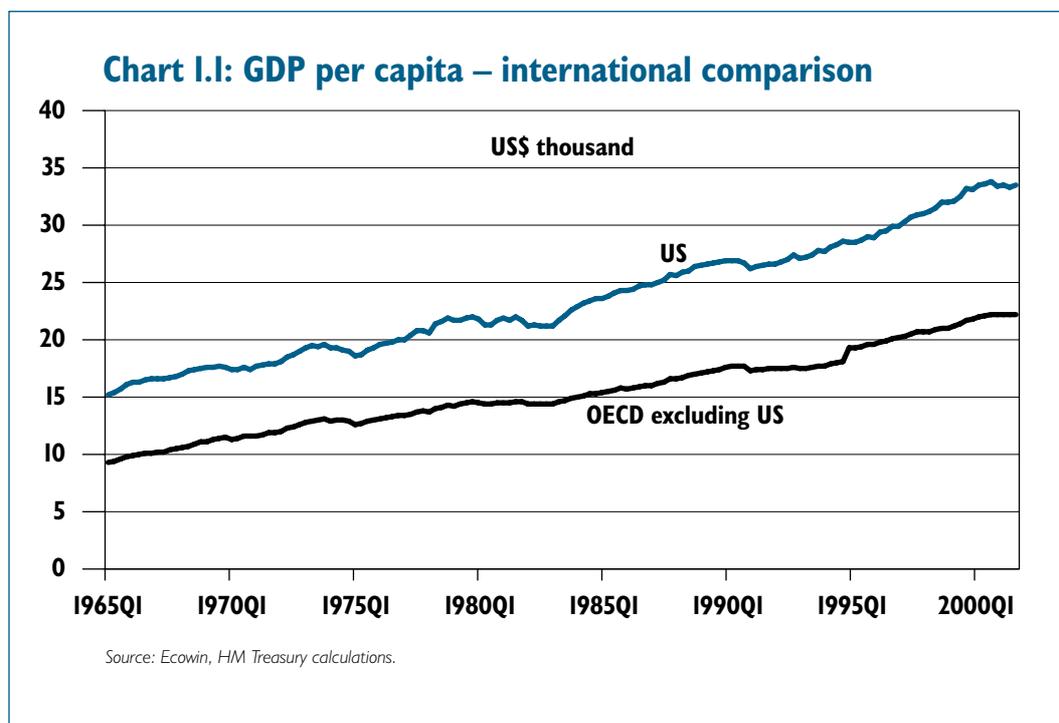
1.6 It also means that it is difficult to assign a specific start date to US monetary union. While the ratification of the US Constitution provided the initial impetus, almost any bank or company could issue currency in the early 19th century – contrary to modern concepts of a currency union in which issuance is centralised. In this regard, the US dollar’s return to the gold standard in 1879 marks a milestone, when the separate currencies of the Civil War period were reunited into a single currency due to the political will for unity. However, it was only with the 1935 changes to the structure of the Federal Reserve that the US took on most of the characteristics associated with a monetary union such as the euro area.

1.7 Many of the characteristics of the US monetary system evolved as a response to particular difficulties or inefficiencies associated with the prevailing structures. For example, the creation of a central bank was a response to recurrent banking crises.²

1.8 This suggests that the US prospered as a monetary union for a considerable period with a gradually evolving institutional structure. But it also illustrates the presence of a continuing political will to integrate and preserve the monetary union. Although the monetary union came under political and economic pressure at various times, there was substantial commitment to retain it, and a high degree of confidence in the ability of institutions to evolve in order to strengthen the working of the monetary area; not only at a federal level, but also (civil war aside) in the willingness of states to remain part of the union, and cede some powers to the federal level in response to the challenges which emerged.

The post-war performance of the US economy

1.9 Throughout the post-war period, US economic performance has been strong, particularly in the second half of the 1990s. On an output per head basis, as Chart 1.1 indicates, the gap between the US and the other OECD economies has widened in absolute terms since 1965. A number of factors help to explain this performance – strong productivity growth, political stability and high levels of employment and hours worked. A key objective of this study is to consider to what extent monetary union has contributed to this performance.



² In the words of President Woodrow Wilson: “We shall deal with our economic system as it is and as it may be modified, not as it might be if we had a clean sheet of paper to write upon, and step by step we shall make it what it should be”. (Federal Reserve Bank of Minneapolis, 1988)

A framework for considering the costs and benefits of a monetary union **I.10** The EMU study *The five tests framework* by HM Treasury sets out the economic issues which are important when considering the costs and benefits of a monetary union, and shows how they map across to the five tests assessment. An important starting point is optimal currency area (OCA) theory, first developed by Mundell (1961), and since extended. This shows that the costs of monetary union relate to the loss of an independent monetary policy and nominal exchange rate as mechanisms to adjust to region or country-specific economic shocks. The benefits of a monetary union primarily come from the microeconomic impact of sharing a common currency – lower transaction costs, an absence of exchange rate risk and a higher degree of price transparency – which potentially boost trade, investment and competition.

I.11 This suggests a number of factors that will make regions more or less suitable to be part of a monetary union. Similar economic and financial structures would reduce the likelihood of regions being hit by region-specific shocks. The presence of alternative adjustment mechanisms to an independent interest rate and flexible exchange rate will reduce the cost of any shocks that do hit. These adjustment mechanisms might be market based, such as price and wage flexibility or labour and capital mobility. Alternatively, fiscal stabilisation and redistribution at either the regional or national level may also allow regions to adjust to shocks.

I.12 More recent extensions to OCA theory have introduced new considerations relating to capital markets and to dynamic convergence within a monetary union, both largely ignored in the early OCA literature (the contribution by Peter Kenen in the EMU study *Submissions on EMU by leading academics* reviews the development of OCA theory). Developed capital markets provide another adjustment mechanism if they allow individuals to share risk and so to smooth consumption in the face of shocks to income. Another dynamic extension to OCA theory focuses on whether joining a monetary union will itself lead economic structures to converge, thereby reducing the potential for asymmetric shocks.

The structure of the study **I.13** The analytical framework for this study involves first considering the potential implications of monetary union and then identifying the likely benefits:

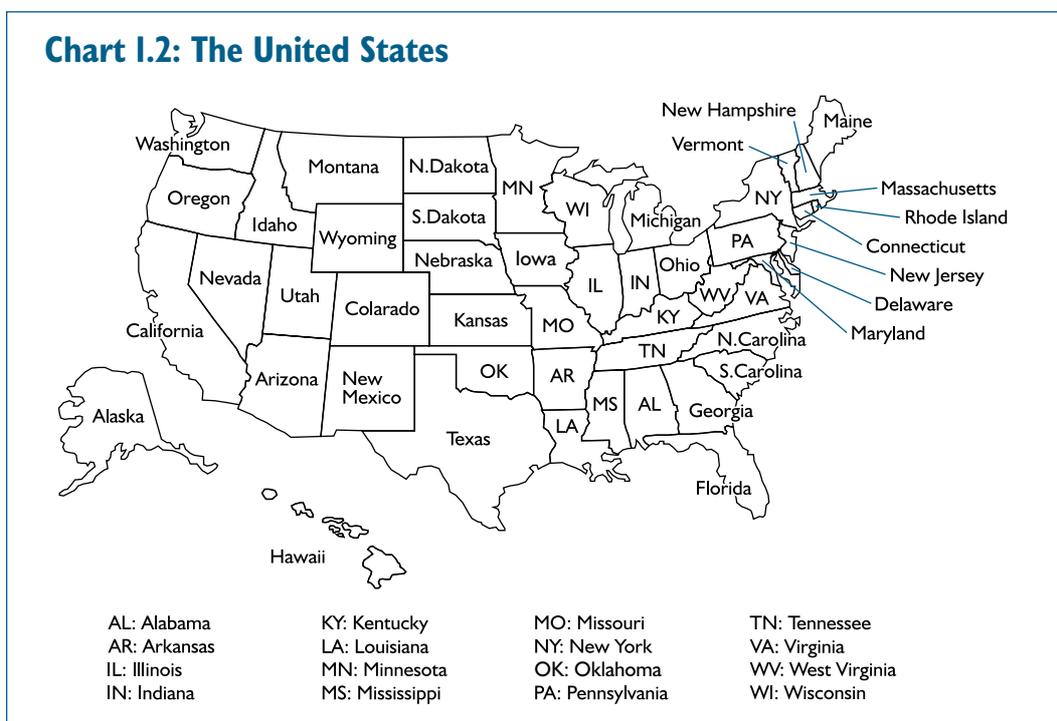
- Section 2 identifies the extent to which US regions are hit by region-specific shocks and/or have different business cycles;
- Section 3 considers the adjustment mechanisms which are present in the US to allow regions to adjust to shocks;
- Section 4 examines whether monetary union in the US has delivered the benefits of a more stable macroeconomic environment;
- Section 5 considers the potential microeconomic benefits of monetary union, such as increased trade, competition and productivity. It also discusses the impact of monetary union on US financial markets; and
- Annex A summarises the history of the US monetary union, while Annex B presents analysis and evidence of the key issues relating to fiscal federalism.

Related EMU studies **I.14** A number of other EMU studies by HM Treasury relate to this analysis. As already noted, the overall framework for analysis is set out in the EMU study *The five tests framework*. More detailed discussion of shocks and adjustment mechanisms in a monetary union can be found in the EMU studies *Analysis of European and UK business cycles and shocks*, *Modelling shocks and adjustment mechanisms in EMU* and *EMU and labour market flexibility*. Discussion of the potential benefits of EMU draws on the EMU studies on *EMU and trade*, *EMU and business sectors*, *The location of financial activity and the euro*, *Prices and EMU* and *EMU and the cost of capital*.

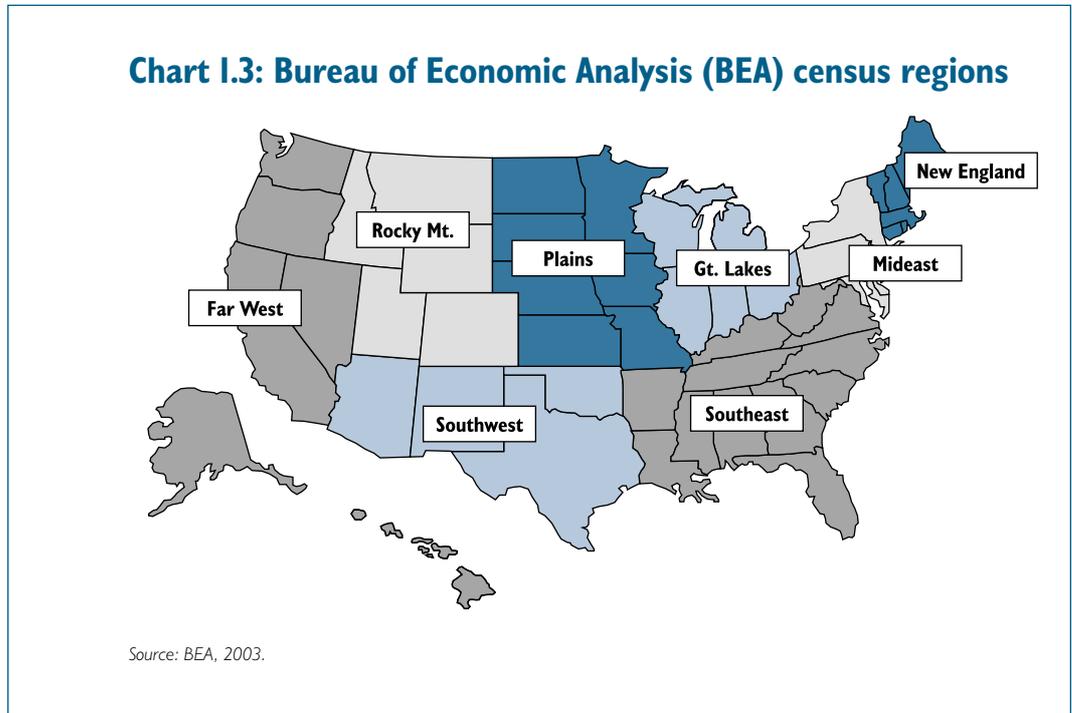
Data and geographical definitions **I.15** A common problem identified throughout much of this study is that regional data in the US are not as widely available or as reliable as international data which form the basis for the analysis of the euro area. For example, data on intra-US trade are unavailable and state/regional output data are frequently unreliable. This suggests a degree of caution must be applied when interpreting US regional data and making comparisons with euro area countries.

I.16 In addition, when looking at the US, comparisons may be highly sensitive to whether state or regional level data are used. For example, Section 5 notes that measures of industrial specialisation are affected by the size of the regional unit, making direct comparisons between regions of different sizes difficult. Since specialisation may be a factor in determining regional business cycles, this suggests difficulties when comparing the incidence of shocks between regions of varying sizes, and their respective business cycles.

I.17 There are several main sub-divisions of the US used in the analysis in this study. First, Chart 1.2 shows the 50 individual states of the US.



I.18 Chart 1.3 illustrates the eight main census regions used by the Bureau of Economic Analysis (BEA), an agency of the US Department of Commerce providing GDP and other national accounts data. This classification is used extensively in academic studies of the cyclical convergence of US regions, in Section 2.

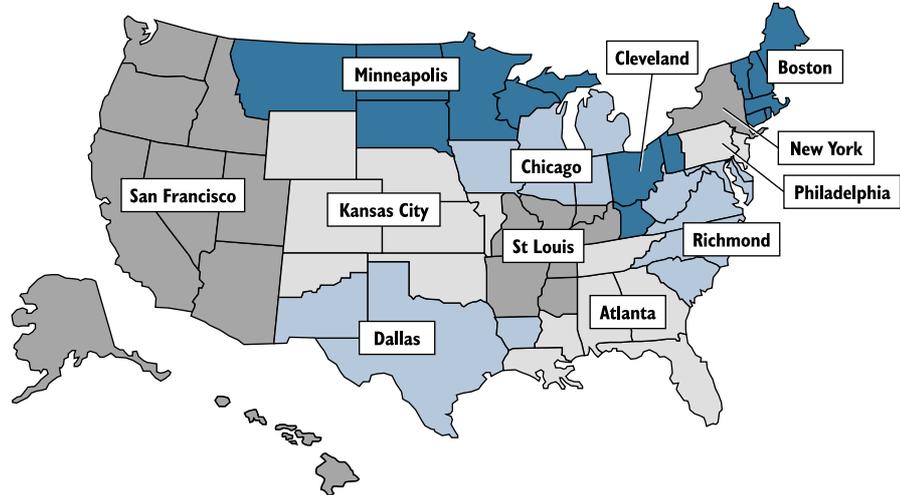


I.19 Two further sets of geographical classifications are used by the Bureau of Labor Statistics (BLS), part of the US Department of Labor and principally responsible for data and statistics on the labour market:

- the BLS census *regions*: a high-level classification dividing the US into four regions. It is drawn on in Section 5 in the context of specialisation; and
- the BLS census *divisions*: a lower-level classification that divides the four census regions into a total of nine divisions. It is drawn on in Section 2 in the context of regional business cycles.

I.20 Chart 1.4 illustrates the districts of the Federal Reserve. For the purpose of conducting monetary policy in the US, the Federal Reserve System is divided into 12 districts, each with a Bank in a major regional city. The borders of the Federal Reserve Districts do not, however, always correspond with state borders – a number of states (such as Louisiana, Pennsylvania and New Mexico) are ‘divided’ between districts.

Chart I.4: The Twelve Federal Reserve Districts



Source: Federal Reserve Bank Board of Governors.

2

US REGIONAL CONVERGENCE AND DIVERGENCE

In any country or monetary union, different regions are likely to be subject to asymmetric shocks that lead to a divergence of regional business cycles. The greater the incidence of such shocks, the more difficult it is to set a single monetary policy that is appropriate for all regions.

Evidence suggests that the regions of the US monetary union have business cycles that are not perfectly convergent. This implies that the appropriate monetary policy responses are not the same for each region.

It is difficult to identify a consistent core of US regions for which business cycles are closely aligned, although some appear good candidates. Other regions appear to have a consistently more idiosyncratic cycle.

Differences in regional business cycles may be due to a number of factors, but differences in industrial structure seem to be particularly important.

The degree of divergence between US regions is, on average, smaller than that which tends to be exhibited between countries in the EU. This may represent some degree of endogeneity; there is some, albeit limited, evidence that monetary union has increased regional convergence in the US.

Despite regional divergence, there is no significant degree of political tension created by the fact that the single US monetary policy may not always be appropriate for one or more of the regions. US regions have, the Civil War aside, displayed a strong political commitment to remain a single monetary union.¹ An important factor is that over the last century poorer regions were, in general, catching up with income levels in richer regions.

Analysing regional convergence 2.1 A key implication of sharing a single currency is that regions within the monetary union may face a national interest rate or exchange rate that is inappropriate for local conditions. This is why the costs of monetary union will be lower between regions or countries that share a similar economic structure and are affected by similar economic shocks. The more similar these factors, the more closely aligned will be the business cycles of the constituent regions, and the more likely it is that a single interest rate will be appropriate for all regions. Economic research on regional convergence has typically taken two forms:

- studies which attempt to identify the type of shocks that hit regions – on the basis that the more similar the shocks, the more closely aligned regional business cycles will tend to be; and
- studies which examine the overall similarity of business cycles – an approach that also captures how regions adjust to shocks.

2.2 Much of this research attempts to group regions according to the similarity of shocks and cycles, distinguishing between a ‘core’ of regions with similar shocks and cycles, and a ‘non-core’ or ‘periphery’ of other outlying regions. More detailed analysis of these approaches can be found in the EMU study *Analysis of European and UK business cycles and shocks* by Professor Michael Artis. For an overview of the literature in the context of the US, see Clark and Shin (1999).

¹ This does not, however, mean that disagreements between states have not occurred. The late 19th century, for example, witnessed fierce arguments over the appropriate anchor for the US dollar – the gold standard, or a newer bimetallic standard. See Annex A for a fuller discussion of the history of the US monetary union.

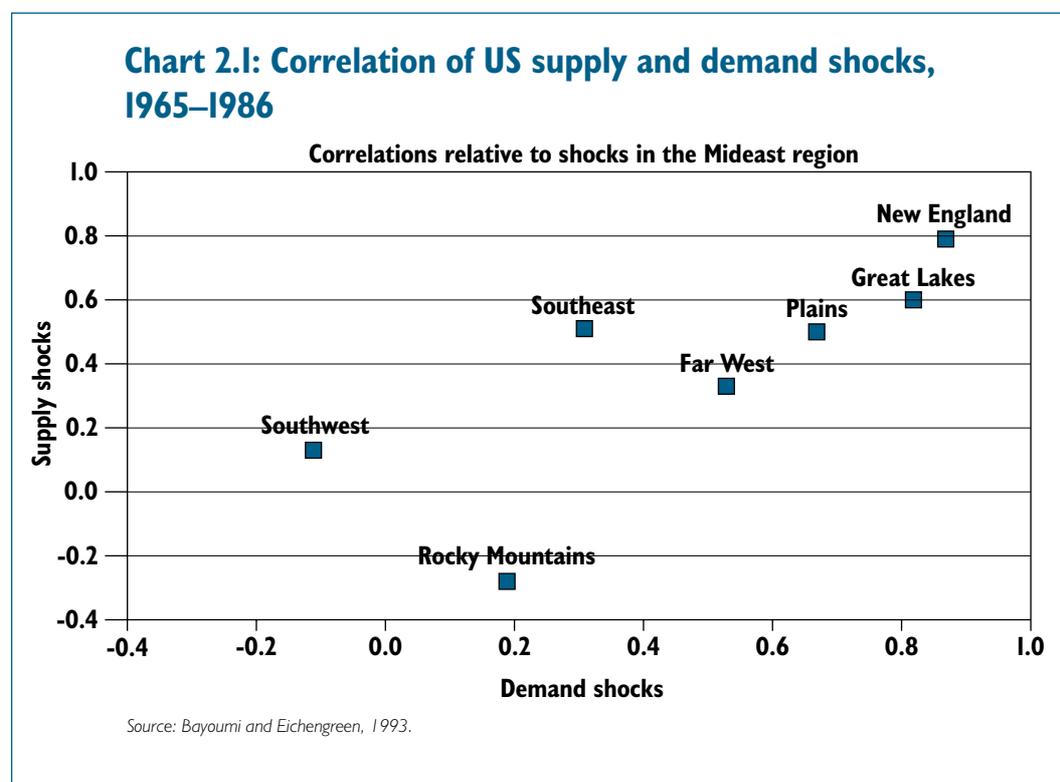
2.3 This section summarises the available evidence. From this base, the section includes HM Treasury analysis of the implications of regional differences for monetary policy. This involves constructing Taylor rule based estimates of regional interest rates in the US. The potential structural causes of regional differences in the US are then considered. The section concludes by examining whether there is evidence that regions' business cycles have become more similar as a result of being part of the US monetary union, and whether regional income levels have converged over time.

Do regions in the US experience common or asymmetric shocks?

Studies of regional shocks in the US

2.4 In a seminal study, Bayoumi and Eichengreen (1993) were among the first to attempt to identify regional supply and demand shocks in the US. Using Bureau of Economic Analysis (BEA) data on gross state product (GSP) for the period 1965 to 1986, they find that regional shocks to both supply and demand are relatively well correlated across the US. That is to say, many of the shocks hitting regions of the US appear to be common shocks rather than region-specific, or asymmetric, shocks.

2.5 However, their analysis also finds that the degree of correlation between shocks varies by region (see Chart 2.1 below). Taking the Mideast region as the reference point for a common shock, the incidence of demand and supply shocks is relatively well correlated among a core set of regions: Mideast, New England, Great Lakes and Plains.² Other regions are shown to be comparative outliers, most noticeably the Southwest and Rocky Mountains. For the Southwest region, the large contribution from oil production in Texas and Oklahoma would be the most obvious explanation for some idiosyncrasy in the incidence of shocks.



² See Chart 1.3 for an illustration of the BEA census regions used in this analysis.

2.6 The main findings of a more recent study by Kouparitsas (2001) are:

- the majority of business cycle fluctuations in US regions are caused by common shocks, but the percentage of variation that can be explained in this way ranges from 96 per cent in the Southeast to only 56 per cent in New England and 63 per cent in the Southwest (with region-specific shocks accounting for the remainder);
- the impact of common shocks varies across regions. Changes in oil prices account for around 5 per cent of variation in the Far West, Rockies and Southwest, compared with 32 per cent in the Plains and 21 per cent in the Great Lakes;
- a core group of regions can be identified as having broadly similar sources of shocks and responses, comprising New England, Mideast, Great Lakes, Rockies and Far West; and
- a 'non-core' group exhibiting the least similarity in shocks and/or responses exists, comprising the Southeast, Plains and Southwest.

2.7 Other studies have further complicated this picture, by finding wide variation in the importance of different types of shock among US regions. Bayoumi and Prasad (1997) found regional disturbances to be most important in the Southwest and Rockies, where raw material production is relatively large, and in the Mideast and New England, where finance and service industries dominate. Common shocks were found to have most explanatory power for the Southeast, but very low explanatory power for cycles in the Southwest and Rockies.

Comparison of shocks internationally

2.8 To gauge the significance of these findings, the incidence of shocks in the US can be compared to that in the EU. Bayoumi and Prasad (1997) find that for the US as a whole, common shocks explain 29 per cent of the variance in US output growth, industry-specific shocks explain 25 per cent, region-specific shocks explain 19 per cent, while 27 per cent is unexplained by the model. For European nations, the comparable estimates are that 19 per cent of variation is due to common shocks, 18 per cent to industry-specific shocks, 16 per cent to country-specific factors, and 47 per cent is unexplained.

2.9 While region-specific shocks are found to be slightly more important in the US than are country-specific shocks in the EU, shocks due to common factors appear much more significant in the US than in Europe. Broadly consistent with this pattern, Decressin and Fatas (1995) find that a much higher percentage of changes in employment growth rates in the US are due to common factors than is the case for European countries.

Analysis of regional business cycles in the US

2.10 The second approach to analysing regional convergence is to examine the similarity of business cycles in different regions of the US. Rather than trying to identify the incidence of shocks, the business cycle approach focuses on the consequence of both the initial shock and its transmission in terms of how the regional economy adjusts. Although the observed cyclical outcome reveals nothing about the adjustment path, it does provide useful evidence of how different regions and states within the US have coped with a single monetary policy.

Studies on regional output and income cycles

2.11 Several studies examine patterns of output and income across the US regions. Carlino and Sill (1998) examine the relationship between cyclical responses of the eight major BEA regions,³ using per capita personal income data over the period 1953 to 1995. They find that:

- business cycle volatility varies significantly across the US. In the most volatile region, the Southeast, the cyclical *component* of income is estimated to be some seven times more volatile than in the most stable region, the Great Lakes;
- four regions – New England, Southeast, Southwest and Far West – are particularly well correlated, not only with each other, but also with the nation as a whole; and
- while a good deal of co-movement is also found between the Mideast and Plains regions, these regional economies appear only weakly correlated with the national economy.

2.12 Kouparitsas (2001) finds a high level of correlation between US regions using quarterly state personal income. The Southwest region is the least closely aligned, but its correlation coefficient is still found to be significant and high.

Cross-region output correlations

2.13 Table 2.1 presents simple correlations calculated by HM Treasury of the growth in real gross state product for the eight BEA census regions over the period 1986 to 1999. The shading highlights those correlations of less than 0.5; the paucity of shading indicating that most of the regions appear well correlated with each other. The Rocky Mountains, the Plains and Southwest are least well correlated with the US as a whole.

Table 2.1: Cross correlations – annual real GSP growth, 1986-1999

	New England	Mideast	Great Lakes	Plains	Southeast	Southwest	Rocky Mountains	Far West
US	0.94	0.92	0.85	0.71	0.90	0.57	0.38	0.79
New England		0.93	0.71	0.59	0.89	0.35	0.20	0.77
Mideast			0.68	0.50	0.80	0.30	0.10	0.82
Great Lakes				0.78	0.90	0.67	0.55	0.40
Plains					0.72	0.52	0.39	0.39
Southeast						0.52	0.36	0.51
Southwest							0.82	0.22
Rocky Mountains								0.04
Far West								

Source: BEA data, HM Treasury calculations.

2.14 A similar approach is taken by Wynne and Koo (2000), who compare correlations in output between the 12 Federal Reserve Districts. The Dallas Fed district (which overlaps closely with the BEA Southwest region – see Charts 1.3 and 1.4) is found to be significantly less correlated with others, perhaps reflecting the importance of oil extraction industries.

³ See Chart 1.3.

Comparison with the EU **2.15** Evidence suggests that the variation between US regions is less strong than across EU countries. Wynne and Koo (2000) find that the average correlation in GSP growth between US regions is 0.79, compared with an average GDP correlation of 0.38 across EU countries. Clark and van Wincoop (1999) find similar evidence, showing that the average correlation of annual output growth rates is higher in the US than the EU (0.84 compared with a European average correlation of 0.47), as is the correlation of employment growth between US regions (0.71 compared with 0.19 for EU countries).

Summarising the evidence on regional cycles **2.16** Table 2.2 summarises the core and periphery regional groupings identified in some of the studies described here. Notwithstanding the methodological issues raised by these studies,⁴ the key messages are that some divergence does exist, a core and periphery can be identified, and it cannot be concluded that the US regions follow a common business cycle.

Table 2.2: Regional divergence - shocks and cycles

	Core	Periphery or non-core
Shocks approach		
Bayoumi and Eichengreen (1993)	Mideast New England Great Lakes Plains	Southwest Rocky Mountains Southeast Far West
Kouparitsas (2001)	Mideast New England Rocky Mountains Great Lakes Far West	Southwest Southeast Plains
Bayoumi and Prasad (1997)	Not core and periphery, but three distinct regions: Northeast, Central States and the remainder.	
Cycles approach		
Carlino and Sill (1998)	New England Southeast Southwest Far West	Mideast Great Lakes Plains Rocky Mountains
HM Treasury (on basis of correlation with US, results shown in Table 2.1)	New England Mideast Great Lakes Southeast Far West	Rocky Mountains Southwest Plains

2.17 The remainder of this section identifies the key causes of regional variations and the implications of this for monetary policy. The study then examines the evidence for endogenous convergence – the convergence that may result from being part of a monetary union. The higher degree of regional convergence observable in the US could suggest that US regions are intrinsically more suited to membership of a monetary union than groups of countries. But it may also be a consequence of convergence which has occurred due to being members of a monetary union.

⁴ See the EMU study *Analysis of European and UK business cycles and shocks* by Professor Michael Artis for a discussion of these technical difficulties.

Structures: shocks and their transmission

2.18 A shock may be common to all regions, for example a change in the world oil price, or it may be region-specific, such as a regional crop failure. A region-specific shock will clearly have a greater impact on the cycle of the affected region than on the cycles of other regions. But a common shock can also affect one region more than others if different economic structures lead the shock to have asymmetric effects. For example, one region's industry may be very heavily dependent on the use of oil, so an oil price shock would have a disproportionately greater effect on that region than on others. The focus here is on three potentially important differences in economic structures: regional industrial structure, regional trade exposure and differences in the transmission of monetary policy.

Regional industrial structure

2.19 The evidence suggests that regional differences in industrial structure are likely to be an important factor behind differences in regional cycles. Browne (1978) found that industry mix was an important factor during the period 1958-76. In later work, Davis *et al.* (1997) also found evidence that shocks affect different regions of the US in different ways due to industrial differences. Michigan and Indiana, both states with a concentration of industry and employment in transport equipment and primary metals, tend to be affected more than other states by oil price shocks. Similarly, the award of military contracts is found to affect Delaware, Connecticut and Washington more than other states.

2.20 Kouparitsas (2002a) argues that the relatively large share of income in the Plains, Southeast and Great Lakes regions accounted for by cyclically-sensitive agriculture and manufacturing means that these regions are most affected by common cycles. In addition, the industrial base – the concentration of mining industries in the Rocky Mountains, agriculture in the Plains, durable goods manufacture in the Great Lakes and oil production in the Southwest – drive region-specific cycles. Carlino and Sill (1998) find oil prices and defence spending impact disproportionately on specific regions. However, they find no evidence that the relative size of manufacturing and agricultural sectors impacts on the cyclical behaviour of regional economies.

2.21 Kalemli-Ozcan *et al.* (2001) also find that states with higher industrial specialisation exhibit output disturbances that are less correlated with US output.⁵ However, they argue that specialisation does not necessarily lead to asymmetry in *income* shocks because of risk sharing (this issue is discussed further in Section 3).

2.22 An interesting case study of how industrial structure was a source of asymmetric shocks for New England is provided by Krugman (1993), as summarised in Box 2.1.

Industry matters

2.23 Overall, these studies suggest that industry mix is an important factor behind differences in regional cycles. However, it is not the whole story, since not all shocks are industry-specific. Moreover, the changing face of US industry may lessen the importance of industrial structure for regional divergence in the future. Traditional 'old economy' sectors such as mining and farming have declined in importance over time and have become less concentrated in certain areas. For example, in the period since the 1950s, the manufacturing belt has spread further to the South and faced increasing competition from overseas. This may suggest a weakening of the industrial forces generating regional asymmetry.

⁵ The survey obtains similar results for OECD economies.

Box 2.1: Regional disparities – the case of New England in the 1980s

Krugman (1993) analyses the experience of the New England region in the period 1980-1989. After 1980, this region – which had been in decline since 1950 – suddenly diverged from the rest of the country, experiencing a period of rapid increase in per capita income known as the ‘Massachusetts miracle’.

The New England region then comprised around 10 million people and was relatively highly specialised, with an industrial base concentrated in several high-technology sectors, notably high-technology military hardware. During most of the 1980s, these sectors thrived as, in parallel, computing power and the US defence budget increased rapidly. The success of these sectors filtered through to more sheltered sectors such as retailing, finance and legal services, and promoted a commercial real estate boom that led to a significant increase in construction employment. Krugman records that by late 1987, the regional unemployment rate was only 2.5 per cent, less than half the national average.

But with the end of the Cold War, defence expenditure was cut markedly, reinforced by a change in tastes away from the mini-computers that New England had specialised in towards personal microcomputers. Budgetary problems prevented the provision of a fiscal stimulus to the local economy in the face of this downturn, and within three years the unemployment rate had nearly quadrupled.

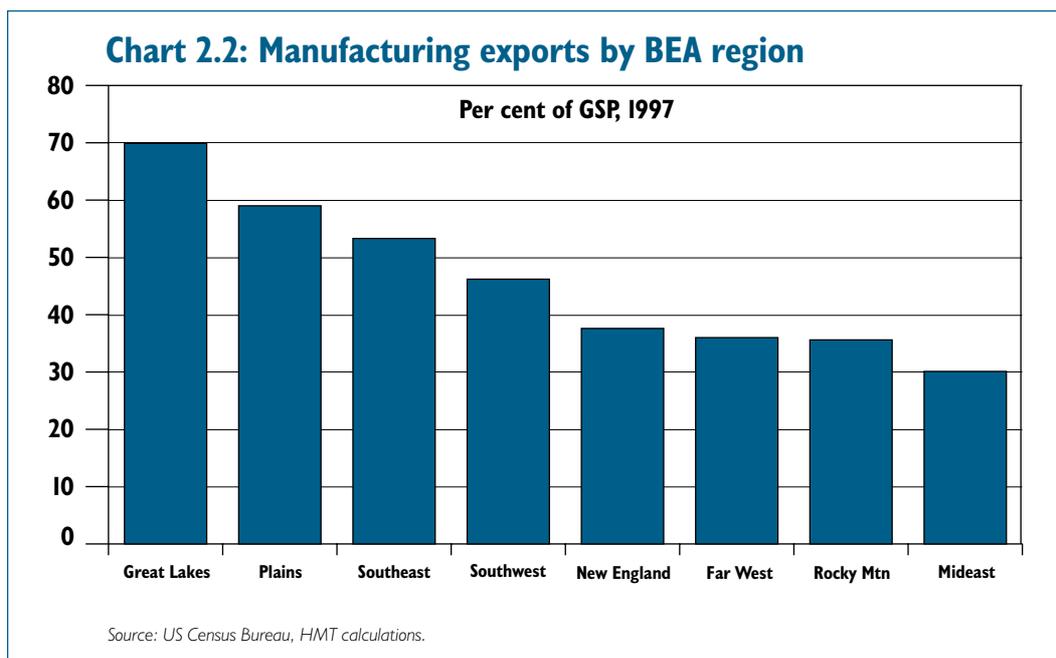
Krugman argues that based on previous regional experience in the US, there is no reason to expect the New England region to regain its pre-slump share of US employment. While the unemployment rate may gradually decline, this is because labour would move away from the region towards other, faster growing regions of the US.

Trade patterns 2.24 Regional differences in trade exposure could also drive cyclical differences. The more open a region, the more likely that shocks originating in its trading partners will be transmitted inwards through trade links.

2.25 Unfortunately (though unsurprisingly) data on US regional or state trade are sparse. There are no data which link the location of production with exports to specific regions or countries, making it difficult to identify whether certain regions are particularly vulnerable to shocks in other parts of the US, or other parts of the world. The US Census Bureau has, however, produced data on manufacturing exports⁶ by state for 1997, which have been aggregated to give the estimates of regional openness shown in Chart 2.2.

2.26 This suggests that there is a wide variation in the degree to which regions are exposed to economic conditions outside the region. Manufacturing exports vary from around 70 per cent of gross state product in the Great Lakes region, to around 30 per cent in the Mideast. While these data show only manufacturing exports, and for one year only, they do suggest that openness to trade varies significantly across regions, and so may contribute to regional cyclical variations.

⁶ Manufacturing exports data not only include data for direct exports (i.e. finished goods exported outside the US) but also intermediate goods (i.e. those manufactured goods that are used in the production of direct exports).



Monetary policy transmission

2.27 Different regional industrial structures and trade exposures may also lead to differences in the monetary transmission mechanism. Further explanation and analysis of the transmission mechanism can be found in the EMU study *EMU and the monetary transmission mechanism* by HM Treasury. The strength of the regional transmission mechanism will be in large part dependent on regional economic structures, as different industries will tend to have different sensitivity to interest rate changes. The structure of firm and household financing may also be important, as a key channel of transmission is the impact of changes in monetary policy on the cost of obtaining credit.

2.28 Carlino and DeFina (1998) find that monetary policy has differential regional impacts across the US states. The impact of a 1 percentage point rise in the Federal Funds Target Rate:

- on state real personal income ranges from -2.7 per cent in Michigan to a small positive impact on income in Oklahoma. Five states respond at least 50 per cent more than the national average, while four states respond less than half as much;
- depends on the relative size of the state's durable goods manufacturing and construction sectors; but
- is not affected by the size mix of firms (even though, in theory, small firms may be less able to smooth investment levels in the face of interest rate changes through alternative means of financing).

2.29 Kouparitsas (2001) also finds evidence of differences in the impact of monetary policy changes, accounting for between 5 per cent (in the Southwest) and 16 per cent (in the Southeast) of the total variation in regional incomes.

2.30 Overall, what evidence there is suggests that monetary policy has different regional impacts in the US due to variations in the strength of the transmission mechanism, perhaps due to differences in industrial structure. By contrast, analysis of the transmission mechanism in the EU points to the importance of cross-country differences in the structure of financing.⁷ That this is not so apparent in the US evidence is perhaps a reflection of a highly integrated financial market in the US, an issue which is covered in more detail in Section 5 of this study.

⁷ See the EMU study by HM Treasury *EMU and the monetary transmission mechanism*.

Industrial structure: the most important factor

2.31 Of the three structural factors examined, variations in industrial mix stand out as a key structural factor, particularly since the evidence suggests that industry mix is a key determinant of monetary policy transmission in the US. In particular, regions with a high concentration of manufacturing or commodity production are exposed to more asymmetric shocks than other regions. While the potential costs of monetary union would be minimised if regions had similar industrial structures, there are potential microeconomic benefits from industrial specialisation, in terms of the economies of scale and benefits of clustering which it can promote (see Section 5).

The implications of regional differences for US monetary policy

2.32 Differences between the business cycles of US regions imply that the single US interest rate is not always appropriate for all regions at all times. To illustrate this, HM Treasury has calculated regional Taylor rules to derive the nominal interest rate which might have been set if each US region had an independent monetary policy. This can be compared with the interest rate set for the US as a whole by the Federal Reserve.⁸

Box 2.2: The Taylor rule

The Taylor rule provides a simple framework for estimating the appropriate short-term nominal interest rate for the prevailing economic conditions at a given point in time. In this analysis, the rule provides an estimate of the interest rate that would be most suitable given local economic conditions – it does not mean that other rates are inappropriate, but that they may be less appropriate.

The rule states that interest rates set by the central bank are set such that the deviation of the short-term nominal interest rate from its equilibrium value responds in a linear way to the deviation of inflation around its target and the output gap – the deviation in output from its long-run potential. The basic form is given by:

$$i = r + \pi^* + \frac{1}{2} (\pi - \pi^*) + \frac{1}{2} (y - y^*)$$

where i is the nominal interest rate, r is the neutral (equilibrium) real interest rate, π^* is the inflation target, $\pi - \pi^*$ is the deviation of actual inflation from target, and $y - y^*$ is the the output gap.

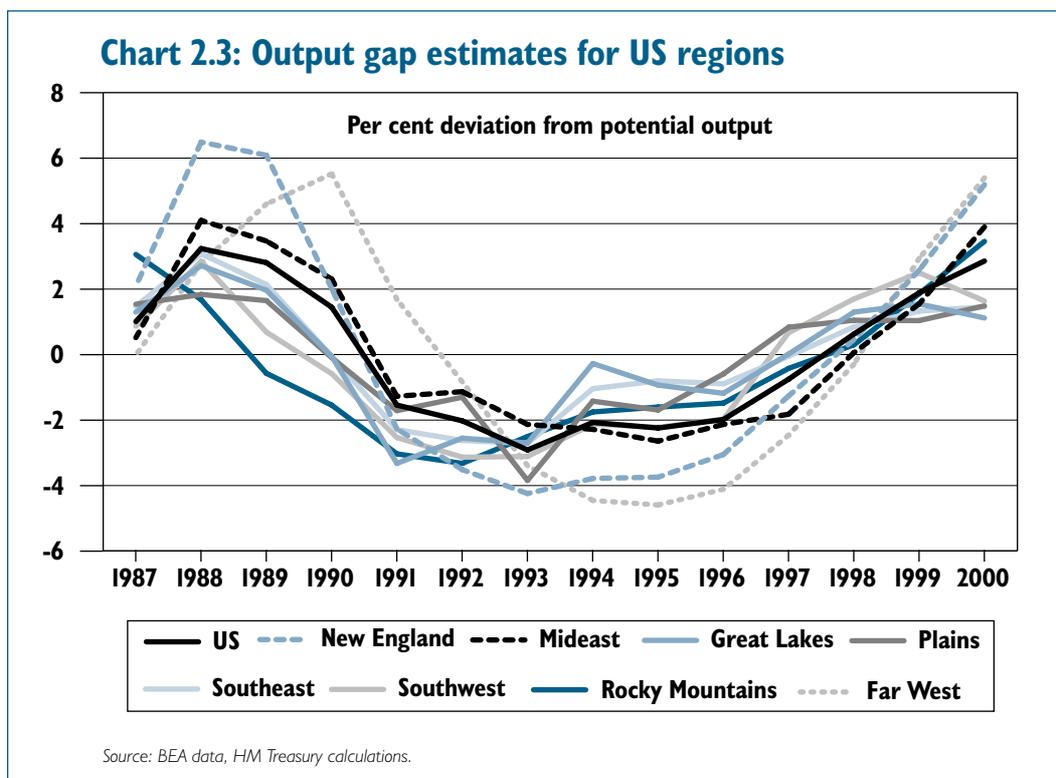
The weights on output and inflation can be altered according to the monetary authority's preferences. But most applications use the weights in the original Taylor rule, which was developed to analyse US monetary policy. These weights imply that the interest rate:

- should be reduced by half a percentage point from its equilibrium value for each one percentage point of negative output gap; and
- should be reduced by half a percentage point for each percentage point that inflation is below target. The Federal Reserve does not have a formal inflation target. But for this example, estimates have been derived by assuming that the Federal Reserve has an implicit inflation target of 2 per cent.

Taylor rules are an extensively used rule of thumb, since inflation and output are the most important factors for monetary policy to consider. But other factors may also matter in particular circumstances. Consequently, Taylor rules should be viewed as providing approximate rather than definitive estimates of appropriate interest rates at a given point of time.

⁸ Monetary policy decisions are the responsibility of the Federal Open Markets Committee, which is made up of seven members of the Board of Governors (based in Washington DC) and five presidents from the twelve regional Federal Reserve Banks. Appointments to the Committee are for one year and are rotated around regions, with only the New York district permanently represented. All regional presidents participate fully in the Committee's analysis and deliberations, but only the five that are also members of the Committee may vote on the monetary policy decision.

Calculating regional output gaps **2.33** The first stage of this analysis is to construct regional output gaps. Chart 2.3 uses BEA data on real GSP to calculate an estimate for each region's output gap over time with trend growth estimated using a common de-trending technique (the Hodrick Prescott filter).⁹

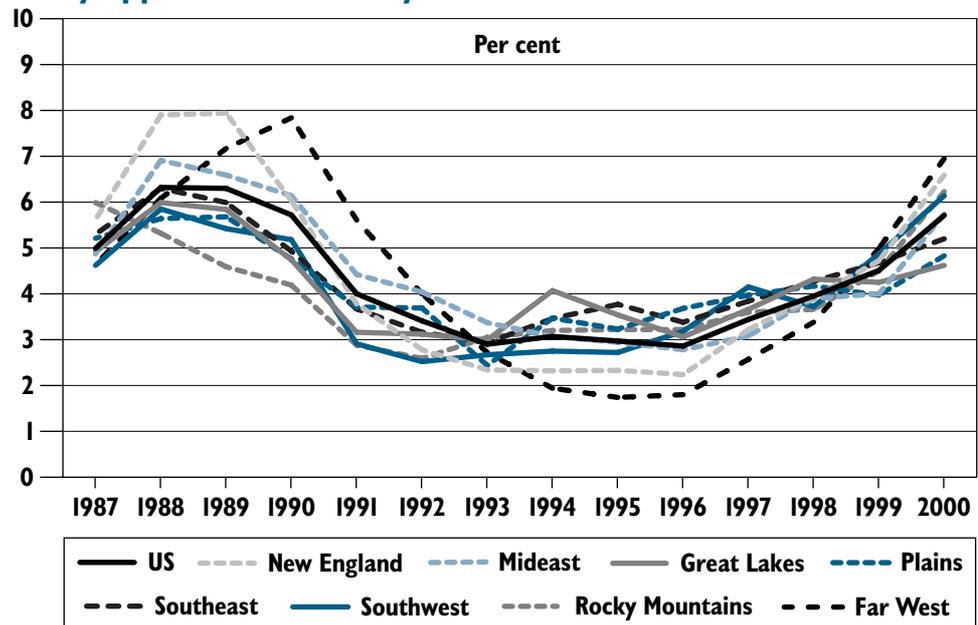


2.34 Although a high degree of cyclical co-movement is apparent, there are differences in the amplitude and synchronisation of the estimated output gaps. In 1991, for example, the Far West had a positive output gap, while output in the neighbouring Rocky Mountains region was around 3 per cent below potential. On the basis of this analysis, the Far West would have needed a tighter monetary policy than the US as a whole, while a looser monetary policy would be suggested by the Taylor rule for the Rocky Mountains. New England is an outsider at the start of the period with a significantly positive output gap peaking in 1988, becoming quickly negative and troughing in 1993. This reflects the region-specific experiences described in Box 2.1.

Implications for monetary policy using Taylor rules **2.35** To assess what these differences imply for monetary policy, Taylor rule-derived estimates of region-specific short-term interest rates are shown in Chart 2.4. As implied by the differences in the output gaps, region-specific interest rates would vary widely. In 1991, the Taylor rule rate for the Far West would have been around 6 per cent, compared to 3 per cent for the Rocky Mountain region. In 2000, the Taylor rule rate for the Far West would have been around 2.5 percentage points higher than for the Great Lakes.

⁹ See the EMU study *Analysis of European and UK business cycles and shocks* by Professor Michael Artis. Such a de-trending technique can only be as good as the data it is applied to. This is a caveat which applies particularly to regional GSP data.

Chart 2.4: Nominal short-term interest rates, as suggested by application of the Taylor rule¹



¹This example: assumes that the nominal interest rate falls 0.5 percentage points for each 1 percentage point output is below trend, and for each 1 percentage point inflation is below target; assumes an inflation target of 2 per cent; and assumes a neutral Federal Funds Target Rate of 4 per cent.
Source: BEA data, HM Treasury calculations.

2.36 Given the difficulties associated with obtaining accurate regional data in the US and constructing regional output gap estimates from them, the results should be treated cautiously and seen as providing only a rough estimate of appropriate monetary policy. Nevertheless, the key message is that if each US region had been able to set interest rates independently according to local economic conditions, they may have varied considerably. Monetary policy set by the Federal Reserve is not necessarily appropriate for all regions all of the time.

Have US regions converged over time due to being part of a monetary union?

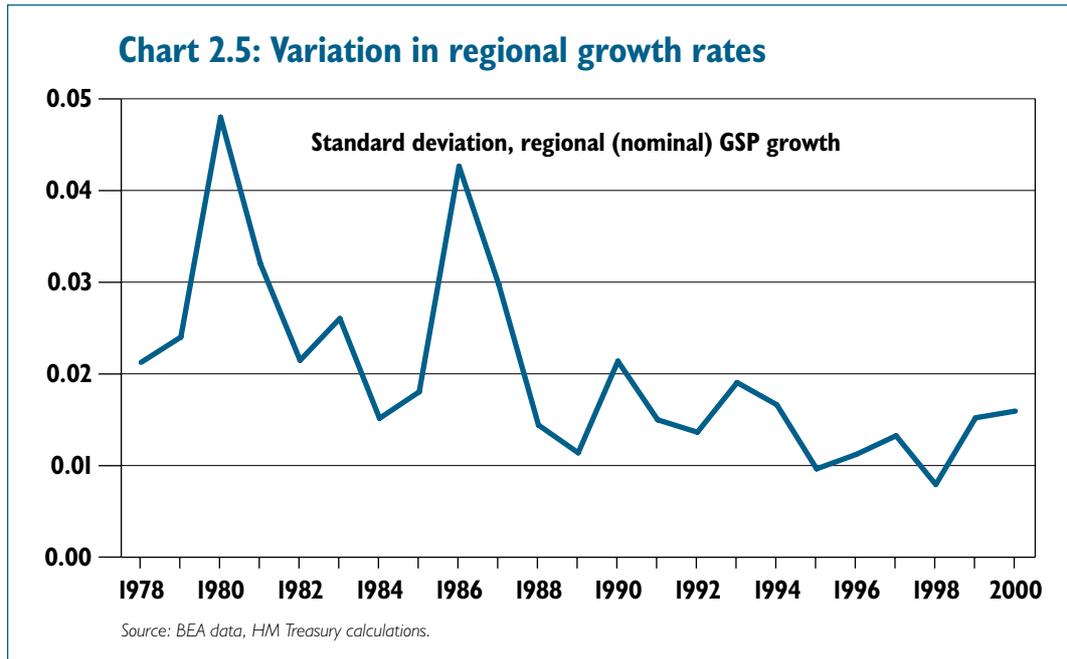
2.37 Recent extensions to optimal currency area theory have emphasised the importance of endogenous convergence.¹⁰ This is the idea that regional differences in cycles and shocks will reduce over time, because membership of a monetary union will promote convergence. For example, an independent monetary policy and flexible nominal exchange rate may be sources of shocks, removed when countries form a monetary union. In addition, a single currency may increase regional trade integration, thereby promoting business cycle convergence. In order to provide evidence for the potential strength of endogenous convergence within the US, analysis is presented over time of convergence in regional output and income levels.

Convergence in regional growth rates

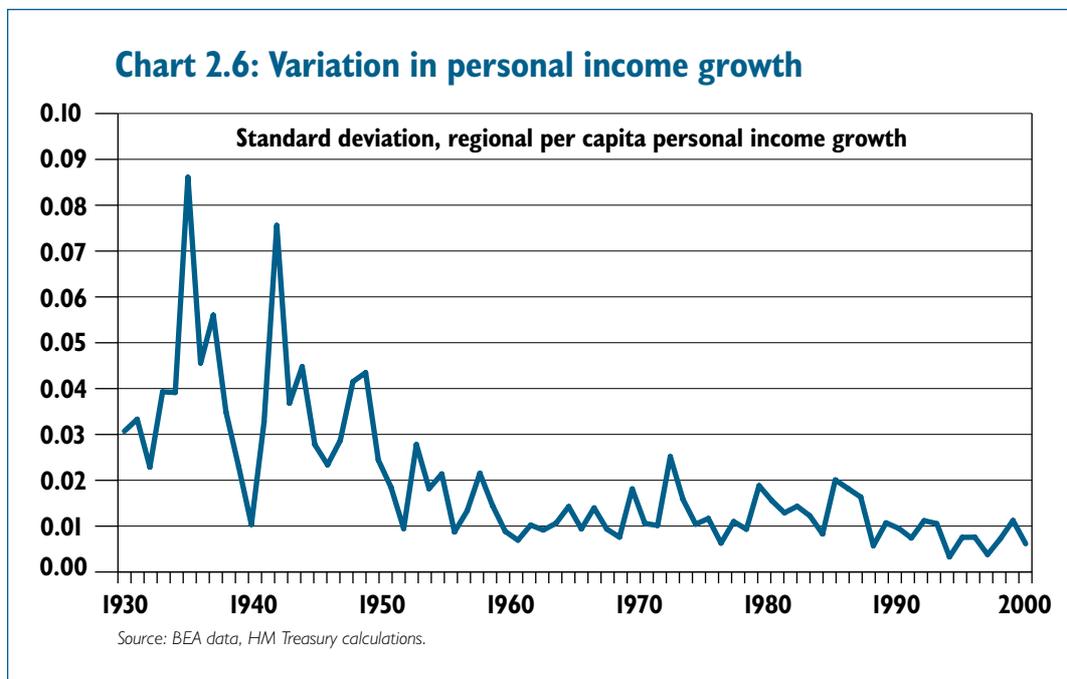
2.38 Evaluating convergence in business cycles is difficult given the lack of data on state or regional output over a sufficiently long period. However, Chart 2.5 illustrates the standard deviation of regional nominal output growth. Since 1978, the variation in growth rates across regions has declined. However, this is not necessarily a consequence of monetary union. It

¹⁰ For example, see Peter Kenen's contribution to the EMU study *Submissions on EMU from leading academics*, and the EMU study *The five tests framework* by HM Treasury.

may represent unrelated structural changes, perhaps due to the declining importance of cyclically-sensitive and concentrated industries such as manufacturing and agriculture.

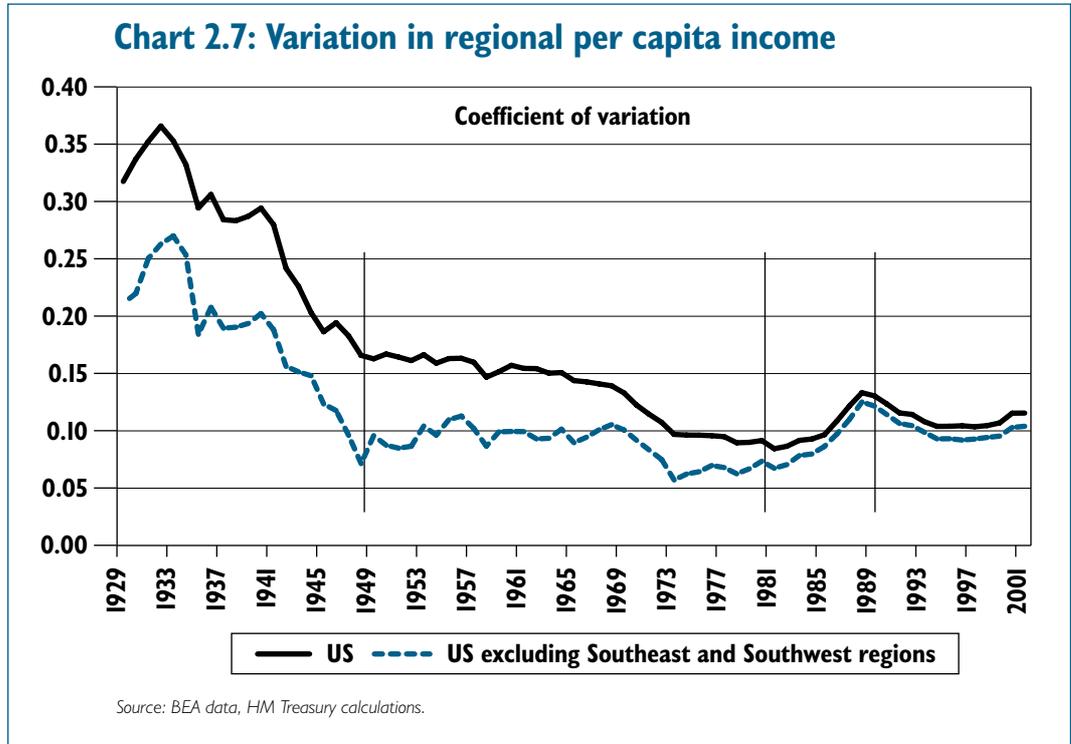


2.39 Data on regional income growth are available over longer periods. However, it is important to note that convergence in income levels may be a consequence of greater inter-regional risk sharing as much as of convergence in regional output (see Section 3).



2.40 Chart 2.6 shows a significantly higher degree of variation in regional per capita personal income growth in the 1930s and 1940s, before settling to a broadly stable level of variation from around the mid 1950s onwards. Despite significant income shocks in the 1970s and 1980s, personal income growth has exhibited less regional variation over the past 50 years.

Convergence in regional income 2.41 A related issue is whether regional income levels have converged over time. Chart 2.7 indicates the coefficient of variation between regional per capita income levels in each year from 1929 to 2002. This illustrates that over the past 70 years, dispersion in per capita income has generally declined, though periods of relatively slower and faster catch-up are evident.



2.42 The whole period can be split into four sub-periods:

- from 1929 to around 1949 convergence is particularly marked. In part this may reflect a recovery from an abnormally high degree of divergence in incomes during the Great Depression period;
- from 1950 until around 1980 regional income convergence continues, albeit at a slower pace than previously. Within this sub-period, per capita incomes in the southern regions converge most clearly to the national average (illustrated by a closing of the differential between the two lines in Chart 2.7);
- during the 1980s, per capita income divergence rose across the US – perhaps explained by a severe recession in the early 1980s, exchange rate volatility, significant oil price changes and a major restructuring of American industry; and
- since then, there has been a small degree of further convergence, before stabilising once again.

2.43 The general trend in these charts is one of increasing regional convergence, though variations in regional income clearly persist.

2.44 A study by the Bureau of Economic Analysis (BEA, 2001) shows that in the period from 1950 to 1979, the poorest quintile of US states grew, on average, more than 1 percentage point a year faster than the richest. However, the BEA study finds that this pattern is less clear in the period from 1979 to 1999, when the poorest quintile grew only around 0.3 percentage points a year faster than the richest quintile. Barro and Sala-i-Martin (1990) also find evidence that poorer states tended to grow faster than richer ones over various periods between 1840 and 1988.

2.45 Overall, the evidence presented here suggests that US regions experienced convergence in output and income growth, and in income levels, over the course of the past century. However, it is clear that the regions are still far from fully converged and continue to experience quite significant variations in output and income.

2.46 It is difficult to disentangle a monetary union effect from other structural changes. A single policy framework or trade integration promoted by monetary union may facilitate regional convergence. But convergence may also reflect the increasing importance of the service sector across all US regions or increased risk sharing between regions. Thus, the trend may have been dictated primarily by increasing income levels and technological advance rather than monetary union.

Conclusions on regional convergence and divergence

Regional divergence exists

2.47 The key message from this analysis of the US is that regional cyclical differences are a feature of a functioning monetary union. The analysis in this section establishes four stylised facts about regional shocks and business cycles in the US:

- the most important point to note is that there is divergence between US regions;
- this divergence is much less than is seen between EU countries;
- different approaches give different groupings – but New England, the Mideast, Great Lakes and Far West can arguably be seen as core regions; and
- the Rocky Mountains and Southern regions are arguably ‘non-core’ regions, exhibiting the most idiosyncratic business cycles.

2.48 The evidence on the causes of these divergences suggests that several factors may be important, but that differences in industrial structure appear to be one of the most significant. There also appears to be wide variation in openness to trade across regions in the US.

2.49 The implication of regional divergence is that US-wide monetary policy will not be appropriate for all regions at all times. While it is difficult to estimate the scale of the divergence, the Taylor rule based estimates calculated by HM Treasury suggest that appropriate regional interest rates can vary quite widely.

2.50 There is limited evidence that regional business cycles have become more convergent over time. But it is difficult to prove whether regions have converged as part of an endogenous process associated with the deepening of the monetary union, or on account of wider structural factors.

In the presence of asymmetric shocks, regions in a monetary union need to be able to adjust to varied and changing economic circumstances without the aid of an independent monetary policy or nominal exchange rate. In the US:

- labour mobility is found to be an important mechanism for adjusting to longer-term structural change, and more so than in other countries. But labour mobility may be less important for adjusting to fluctuations in the business cycle.
- financial markets allow significant risk sharing between states, apparently more so than between other groups of nations. This provides some income insurance in the event of region-specific shocks. However, the opportunities are not fully exploited; and
- fiscal policy plays a limited role in regional adjustment, less than in most European countries. In the US, regional assistance is mainly provided by the federal government, whereas in Europe it is funded at the national rather than EU level.

The evidence is not conclusive on the relative importance of each adjustment channel, reflecting measurement difficulties and, more than likely, a degree of endogeneity in their operation. For example, sub-national fiscal policy is likely to be more constrained when factor mobility is high because capital and labour may move away from states if local taxes get too high relative to other states. But, at the same time, it should also be less necessary if factor mobility provides an alternative adjustment channel.

There are costs and benefits to each form of adjustment, and each is relatively more efficient than others at dealing with certain kinds of shock. A large monetary union such as the US may be subject to a diverse range of shocks – to demand and supply, affecting specific sectors and geographic regions, as well as common shocks hitting the economy as a whole. No adjustment channel is best for all countries, in all circumstances, and in the face of all kinds of shock.

3.1 Section 2 shows that regions within the US are subject to region-specific shocks that can lead their business cycles to diverge. This section considers how regions adjust to such shocks and disturbances in the absence of an independent monetary policy or flexible nominal exchange rate. This question is important because if regions have the flexibility to adjust quickly and smoothly to shocks through alternative adjustment mechanisms, then the costs of monetary union may be small. But if the lack of independent monetary policy means that regions experience volatile cycles and long periods away from trend output, then the costs may be high. This is why the flexibility to adjust to shocks is a key element of the framework for analysing the costs and benefits of monetary union, as set out in the EMU study by HM Treasury *The five tests framework*.

3.2 In the absence of an independent monetary policy and flexible nominal exchange rate, the adjustment mechanisms examined in these sections are:

- **price adjustment** – the prices of goods may change to reflect economic conditions;
- **labour market adjustment** – wages or employment may change to reflect economic conditions, or adjustment may occur through employees and employers adapting working practices or skills;

- **risk-sharing through financial markets** – when agents spread their investments across regions or countries, or can obtain credit from other regions, shocks in the home region can be smoothed; and
- **fiscal policy** – government spending and taxation can be used to smooth the business cycle or to redistribute income from richer to poorer regions.

The role of prices in adjustment

Prices can help adjustment...

3.3 Prices can provide adjustment to shocks by responding flexibly to changing economic conditions. For example, in a region that suffers a fall in demand for its output, adjustment can take place through prices falling to reflect the lower demand for the region's output.

3.4 A change in regional price levels implies a change in a region's real exchange rate. The real exchange rate is a measure of a region's price level relative to other regions expressed in a common currency. Other things being equal, an increase in a region's real exchange rate will lead to a fall in the competitiveness of a region's goods and a fall in demand. Within a monetary union, in the absence of nominal exchange rates, relative inflation rates drive the real exchange rate. This means that regional price level changes can be an important adjustment mechanism in a monetary union.

3.5 The impact of price level changes on regional real interest rates¹ will run counter to the effect on real exchange rates. With a given nominal interest rate, higher inflation lowers real interest rates, which would tend to lead to higher output. However, as explained above, inflation also raises a region's real exchange rate which tends to dampen demand. If prices are to act as an adjustment mechanism, the effect on real exchange rates has to be stronger than the real interest rate effect. This issue is considered in the EMU study *Modelling shocks and adjustment mechanisms in EMU*.

...but the evidence on their impact in the US is limited

3.6 There is little evidence on prices as an adjustment mechanism in the US as few regional price data are collected. What data are available suggest that regional relative price movements play a supporting role in adjusting to demand shocks in the US. Blanchard and Katz (1992) find that consumer prices respond slowly to shocks to employment. In response to a 1 per cent regional decrease in employment, consumer prices are found to fall by 0.38 per cent after six years, with the effects disappearing almost entirely after 15 years.

3.7 One noticeable effect of declining economic health in a region may be a fall in the price of land. Blanchard and Katz (1992) find evidence for such an effect. They find that house prices decline steadily after a negative shock to employment by around 2 per cent after 4 to 5 years. As the supply of housing responds to the change in population, prices then return to their previous level over time. This, in turn, suggests that labour migration may be a factor in adjustment. This is discussed later in this section.

Inflation rates in different US cities

3.8 City data show persistent variations in inflation. In a study of consumer price indices (CPIs) for 19 major US cities, Cecchetti *et al.* (2000), found persistent price level divergences, with an average convergence rate of nearly nine years.² Inflation measured over 10-year intervals varied by as much as 1.6 percentage points (see Table 3.1). In the post-war period, the maximum observed differential was 1.29 percentage points, with an average of around 1 percentage point.

¹ Real interest rates reflect the cost of holding money over and above inflation. At any given nominal interest rate set by a central bank, the greater the rate of inflation, the lower the real cost of borrowing.

² Moreover, there was no indication that the convergence rate of price differentials has changed over time.

Table 3.1: Selected annual inflation rates – US cities

Sample	Maximum	City	Minimum	City	Differential
1926-1935	-1.70	Washington DC	-3.25	Los Angeles	1.55
1936-1945	3.44	Portland	2.25	Boston	1.20
1946-1955	4.52	Chicago	3.60	New York City	0.92
1956-1965	2.13	San Francisco	1.19	Detroit	0.94
1966-1975	5.69	New York City	4.98	Los Angeles	0.71
1976-1985	7.64	Cleveland	6.35	New York City	1.29
1986-1995	4.00	New York City	2.87	Houston	1.13

Source: Cecchetti et al., 2000.

3.9 These differential inflation rates may mean that prices are playing a part in the adjustment process, though the differentials may also reflect transport costs and the presence of non-traded goods (see Section 5, and also the EMU study by HM Treasury *Prices and EMU*).

The role of labour markets in adjustment

3.10 Labour markets are a potentially important adjustment mechanism. The EMU study by HM Treasury *EMU and labour market flexibility* identifies a number of ways in which labour markets can promote adjustment:

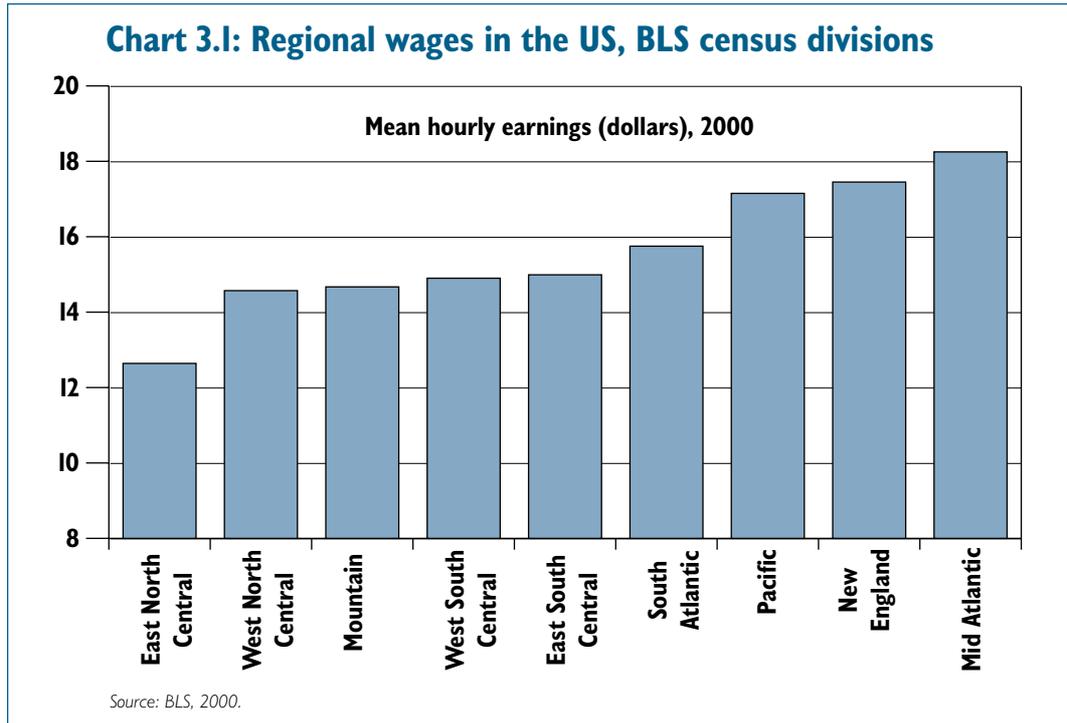
- relative wage flexibility – where relative regional wages adjust in the face of changing economic conditions;
- employment and functional flexibility – where employers and employees adapt working patterns or adjust skills in response to changing economic conditions; and
- labour mobility – where labour physically moves between regions in response to economic conditions.

Relative wage flexibility

3.11 Relative wage flexibility describes the extent to which wages adjust across particular segments of the labour market, such as different regions or occupations, in response to changes in the composition of demand or supply. If wages are flexible across regions then wage growth should be slower in high unemployment regions, such that firms are able to sustain competitiveness, thereby encouraging investment and the creation of more jobs.

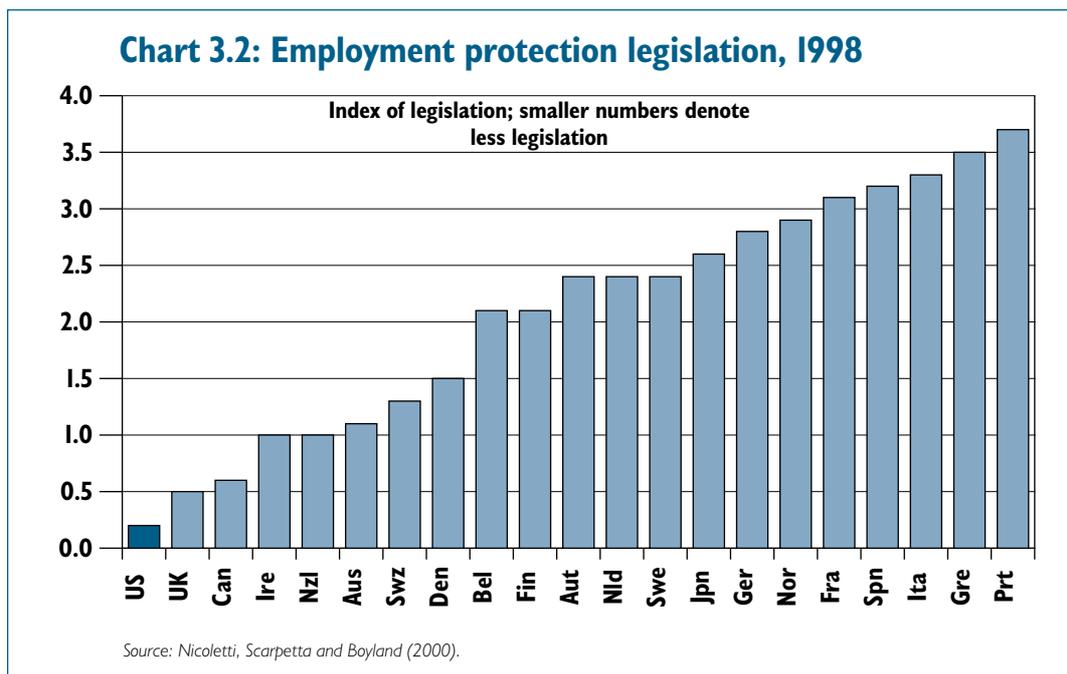
3.12 Evidence for the US suggests that relative wages do play a role in adjustment, more so than in some European countries. McMorro (1996), for example, finds that higher regional unemployment in the US encourages wage reductions in the region concerned, relative to other regions. He shows that between 1980 and 1987, the ratio of unemployment rates between high and low unemployment regions grew from 1.23 to 2.15 – but that over the same period, wages declined in the worst performing regions to facilitate adjustment. This contrasts with observations for Germany, and Italy, where wages did not respond to a growing differential in unemployment rates.

3.13 Chart 3.1 shows that wages vary widely across the US regions – such differences may indicate a role for relative wages as an adjustment mechanism, though they may also reflect differences in regional productivity.

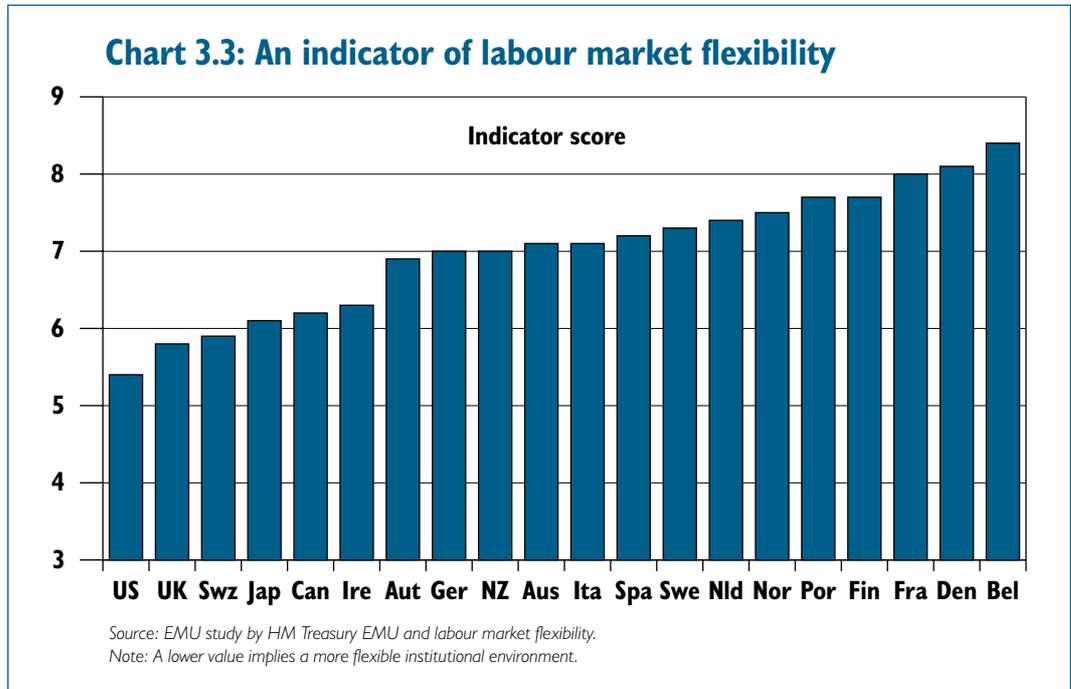


Institutional environment 3.14 The EMU study *EMU and labour market flexibility* by HM Treasury describes how labour market institutions can slow labour market adjustment following an economic shock. The evidence suggests that the institutional environment in the US is conducive to labour market flexibility. In particular, the US has (by international standards):

- a low benefit replacement rate, maintaining the incentive for displaced labour to find new employment;
- a relatively low tax wedge, implying that tax rates on income provide less of an incentive to remain outside the labour force; and
- relatively light employment protection legislation (the rules governing hiring and firing in the workplace), as shown in Chart 3.2 – though there are limits to the measure illustrated.



3.15 The EMU study by HM Treasury *EMU and labour market flexibility* draws these and other institutional factors³ together to estimate an indicator of labour market flexibility in the US and a range of other countries – shown in Chart 3.3. While the indicator is only a rough guide, it does illustrate that the US labour market compares extremely well with other countries in terms of flexibility. Together, these factors imply that US labour markets are relatively quick to react to changes in economic conditions.



Labour mobility **3.16** But it is often argued that the final labour market adjustment channel, labour mobility, is particularly important in the US. For example, the influential study by Blanchard and Katz (1992) argues that labour migration is the dominant mechanism for adjusting to regional shocks in the US. As Boxes 3.1 and 3.2 illustrate, the US has a history of inter-regional migration and high levels of immigration.

3.17 By contrast, labour migration in the EU is typically believed to be much lower than in the US due to language and cultural barriers. Data are not strictly comparable, but movements across US state boundaries indicate considerably greater mobility than between EU countries. About 6.7 million people a year crossed US state borders in the 1990s, equivalent to 2.5 per cent of the total population. By comparison, only around 0.1 per cent of the total EU population changed official residence between two countries in 2000 (HM Treasury, 2002c).

Evidence of labour migration in the US **3.18** The assumption underlying the work of Blanchard and Katz (1992) is that temporary shocks to output permanently affect the state *level of employment*, while *relative unemployment rates* tend to return to trend. Permanent changes in employment levels suggest an outflow or inflow of labour through migration. For example, after a negative shock regional unemployment rates may rise. If labour migrates out of the region to better performing regions, the unemployment rate will fall back, since the overall labour force available is declining. But the level of employment will be permanently affected by workers moving out of the region: labour follows capital (though see Box 3.1).

³ The index combines measures of the replacement rate; benefit duration; spending on active labour market policies; employment protection legislation; the tax wedge; union coverage; and union density.

Box 3.1: US labour mobility past and present

Internal labour mobility has played an important role in the economic development of the US. East-West migration was common in the 19th century, while North-South migration was less common until more recently.

Eichengreen (1991b) discusses how in the 19th and early 20th centuries, the US North and South were widely different in terms of social, cultural and political institutions. Wages in the South were lower than in the North, but Southern workers were largely prevented from moving to the North both by the legacy of segmentation and by the widespread immigration of workers from Europe, many of whom already had relatives and friends in the North ready to help them settle. But this was not the only constraint: Southern capital owners were quick to discourage capital investment from the North, and worked to prevent education of a low-skilled Southern workforce.

Demand and supply shocks in the 1940s broke these barriers. Demand for labour picked up in the North at the same time as the supply of labour from Europe was disturbed by war, and mechanisation reduced agricultural opportunities in the South. Large-scale migration began to take place.

Ultimately, labour mobility increased not because legal barriers were removed, but because factors affecting both the supply of and demand for labour necessitated it; another example of how the US monetary union has tended to evolve, in response to prevailing conditions.

The general perception of what drives labour migration is that labour follows capital: workers move to where the jobs are. However, Atkeson and Bayoumi (1993) note that throughout the 1970s and 1980s, labour and capital have tended to flow to the same regions of the US. So is it possible that capital follows labour, attracted by lower wages?

Blanchard and Katz (1992) find little evidence to support this reverse causality – job creation is found to respond only weakly to changes in wages.

Similarly, Partridge and Rickman (2002) find that shocks to labour demand are more important, on average, than changes in migration – suggesting that workers follow jobs more often than the reverse. But the results vary over time, and by region – labour demand shocks are found to dominate in the industrial Midwest (the ‘rustbelt’), the agricultural Midwest (the ‘farm belt’) and the energy-producing states. Perhaps not surprisingly, they find some evidence which suggests that jobs following workers drives job creation in the ‘Sunbelt’ states, which in turn may be more a reflection of the effects of international immigration, rather than migration. See Box 3.2 for more discussion of immigration as an adjustment channel.

3.19 If real wages are quick to adjust to a shock, labour will face less incentive to relocate. However, Blanchard and Katz find that the predominant adjustment mechanism is through migration rather than real wages. Their analysis suggests that real wages are generally slow to adjust. In response to a decrease in employment of 1 per cent, real wages fall by only around 0.2 per cent. Supporting evidence comes from Bayoumi and Prasad (1997), who find that regional employment growth patterns in the US can primarily be explained by industrial factors, suggesting that labour moves to regions with growing industries.

3.20 Davis *et al.* (1997) also find evidence that migration is the major adjustment mechanism bringing US regional unemployment rates back to long-term rates and that the speed of migration varies according to the type of shock. Oil price shocks in particular are shown to have been the major influence on regional unemployment fluctuations in the 1970s.

Labour mobility in the US compared to Europe **3.21** US labour mobility is generally thought to be high when compared with European countries. Obstfeld and Peri (1998) show that regional differences in unemployment rates are less persistent within US states than within European countries, consistent with the thesis that migration within US states contributes more to adjustment than it does elsewhere.

3.22 Decressin and Fatás (1995), however, find that responses in US employment rates are not noticeably less persistent than in Europe, although the adjustment mechanisms do differ: the US demonstrates greater migration, while Europe adjusts more through changes in activity and participation, with people moving in and out of the labour force rather than between regions.

Recent evidence on US labour mobility **3.23** The studies referred to above suggest that labour mobility in the US is higher than in other countries. However, estimates of labour mobility are vulnerable to criticism. The EMU study by HM Treasury *EMU and labour market flexibility* points out that estimates of migration are sensitive to the size of the regional unit, noting that for both the US and UK, estimates of migratory flows appear larger if smaller regional units are considered.

Box 3.2: Immigration and labour market adjustment

In recent years, the US has attracted a huge inflow of labour. As well as increasing the labour force and thereby boosting potential growth, the immigration of new labour may substitute for internal migration, and aid adjustment by locating in faster-growing regions. Passel and Fix (2001) report that the share of immigrants in the total US population rose from less than 5 per cent in 1970 to almost 11 per cent in 2000.

The majority of new immigrants appear to be influenced in their choice of destination by the presence of previous immigrants, rather than by economic conditions. For example, Borjas *et al.* (1997) find that in 1990, 75 per cent of immigrants lived in one of six 'gateway' states (California, New York, Texas, Florida, New Jersey and Illinois). Passel and Fix note, however, that since the mid 1990s, many of those immigrants that previously would have been expected to locate in California, instead located in a number of different states. The link between new and previous waves of immigrants may be weakening, but remains comparatively strong. Card (1997) too finds evidence that immigration is linked to regional economic factors and thus assists regional adjustment, although links with previous waves of immigrants are also apparent.

Another issue is whether outflows of existing residents offset inflows of immigrants, particularly if the arrival of cheaper labour causes relative wages in the region to decline. Card (1997) finds no significant evidence of this. Other evidence suggests immigration actually stimulates job creation in a region. Hanson and Slaughter (1999) show that in regions which receive an influx of low-skill labour the proportion of labour-intensive industry increases (in line with theory) to absorb the available workers, so holding relative wages constant.

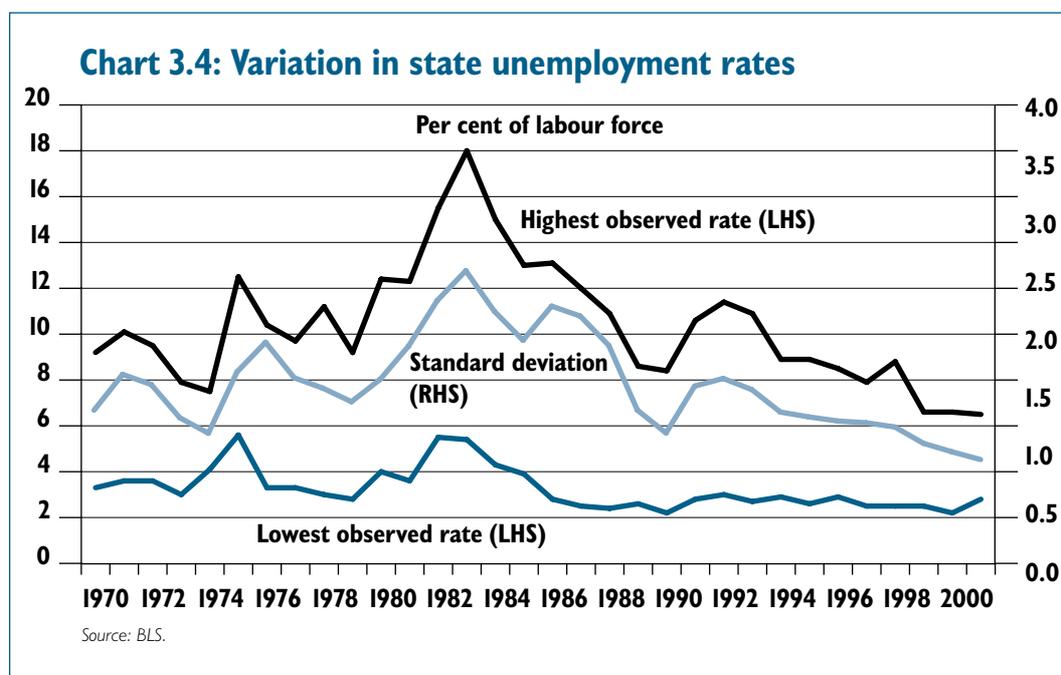
Overall, immigration does seem to play a role in helping regions to adjust to changing circumstances, but local economic conditions are clearly not the only factor determining where a newly arrived immigrant chooses to locate. Moreover, by concentrating in a small number of areas, immigrants may actually embed regional specialisation in labour-intensive industries.

3.24 Some standardisation of underlying shocks is also necessary for an international comparison of labour mobility, argue Obstfeld and Peri (1998), since shocks provide the ‘push’ to migrate. Thus, it is possible that labour mobility is related to the opportunity for specialisation provided by monetary union in the US. Indeed, labour mobility may facilitate a higher level of specialisation, which in turn may lead to a higher incidence of asymmetric shocks, to which greater mobility helps US regions adjust.

3.25 In addition, empirical estimates of mobility are potentially sensitive to measurement error. Rowthorn and Glyn (2002) argue that measurement errors in empirical analysis can greatly exaggerate the stability of regional unemployment rates. In fact, their empirical analysis shows that employment rates in the US have been slow to recover in response to state-specific shocks, suggesting limited adjustment through labour mobility. This may be because of the rise of two-earner families less able (and with less incentive) to move in response to shocks, or the declining share of the working population accounted for by a mobile reserve of agricultural workers.

3.26 The work of Blanchard and Katz is also commented on in Daniel Gros’ contribution to the EMU study *Submissions on EMU from leading academics* which notes that they do not use direct data on migration flows. He suggests that Blanchard and Katz’s findings imply “*that if General Motors fires 100 workers, 65 of those who do not find a job the same year will have left the region within the same period. This is difficult to believe even for the US.*”

3.27 Chart 3.4, which shows unemployment rates across US states, provides a further source of evidence. The wide variation in regional unemployment rates suggests that labour mobility responds only with a lag. The range between the highest unemployment rate in 2001 (6.5 per cent in the District of Columbia) and lowest (2.8 per cent in North Dakota) was 3.7 percentage points.



How effective is adjustment through labour mobility? **3.28** On balance, the evidence suggests that US labour mobility is an important adjustment mechanism, and may be higher than in other countries. However, regional unemployment differences clearly persist in the US, suggesting labour mobility operates with a lag. As is discussed in the EMU study by HM Treasury *EMU and labour market flexibility*, given the personal economic and social cost involved in migration, it is likely to function more effectively in longer-run structural adjustment. Other forms of labour market adjustment, such as wage flexibility or flexible working patterns, may be more appropriate for adjusting to temporary shocks of the sort which a region-specific monetary policy would otherwise respond to. Even in the long run, for a region affected by an adverse shock, outward labour migration may not bring about the necessary adjustment in wages. If this is the case, then excess unemployment will remain in the region. Labour mobility may also reduce the effectiveness of other adjustment channels such as wage flexibility and physical capital mobility.

3.29 In addition, its usefulness as a regional adjustment mechanism may be sensitive to US economic conditions. Partridge and Rickman (2002) find that between 1970 and 1992, net migration flows observable across regions are correlated with the economic cycle, with differences in migration rates highest when some states grow faster than others in an expansionary phase. For example, state migration rates diverged sharply in the mid 1980s. Yet, since 1994, net migration rates have converged as the US labour market has tightened, perhaps because jobs were relatively abundant in the local area of most workers.

The role of market risk sharing in adjustment

3.30 A relatively recent and important extension to the economic literature on monetary unions is the focus placed on the role of capital markets in the adjustment process. Professor Kenen's contribution to the EMU study *Submissions on EMU from leading academics* describes how the unification of financial markets in a monetary union can play an important role in smoothing the income effects of asymmetric shocks. Much of the development of this theory has originated in studies of risk sharing in the US monetary union. There are two main types of market risk sharing:

- **portfolio or capital market risk sharing:** risk can be shared through holding claims on other regions' output, for example through the ownership of equity. This can be viewed as *ex-ante* insurance from region-specific shocks; if a region experiences a negative shock, income from assets in other regions will provide relief. This channel of risk sharing can insure against both temporary and permanent shocks; and
- **credit risk sharing:** risk can also be shared through borrowing or lending with other regions. This channel can be used as an *ex-post* adjustment to shocks. For example, if a region is hit by a negative demand shock, then firms and households borrow from another region to smooth the impact. This mechanism can only be used to smooth over temporary shocks or provide short-term relief from permanent shocks.

3.31 This is analysed by first considering the integration of US capital markets, an important prerequisite for market risk sharing, and then reviewing some of the studies which have directly estimated the extent of risk sharing in the US.

The development of capital market integration in the US **3.32** Effective financial market risk sharing relies on integrated capital markets. Section 5 and Annex A discuss in more detail the development of US financial markets. The evidence suggests that capital markets have become increasingly important as a channel for smoothing shocks in the US, reflecting financial innovation, geographical deregulation and better access to securities markets. But there is evidence of a high degree of capital mobility in the US even in the immediate post-War period – for example, in Sinn (1992) and Romans (1965).

3.33 Reflecting the continuing integration of US capital markets, Atkeson and Bayoumi (1993) find significant differences in patterns of income and regional production across the major US regions over the period 1963-86, with most of the differences the result of net flows of income from capital, rather than from labour income (i.e. by workers living in one region and working in another) or from government transfers. In New England, for example, income exceeded production by around 10 per cent more than for the US as a whole, while the Southwest exhibited a shortfall of a similar size.

3.34 However, US capital market integration has not been perfect. Financial service markets in the US have been subject to restrictions on the degree to which banks have been able to offer services across state borders. Up until 1999, the Glass Steagall Act enforced separation between commercial and investment banking. In addition, interstate branching of commercial banks was largely impossible until 1995, with the implementation of the Riegle-Neal Interstate Branching and Efficiency Act in 1995 (Buch, 2000).

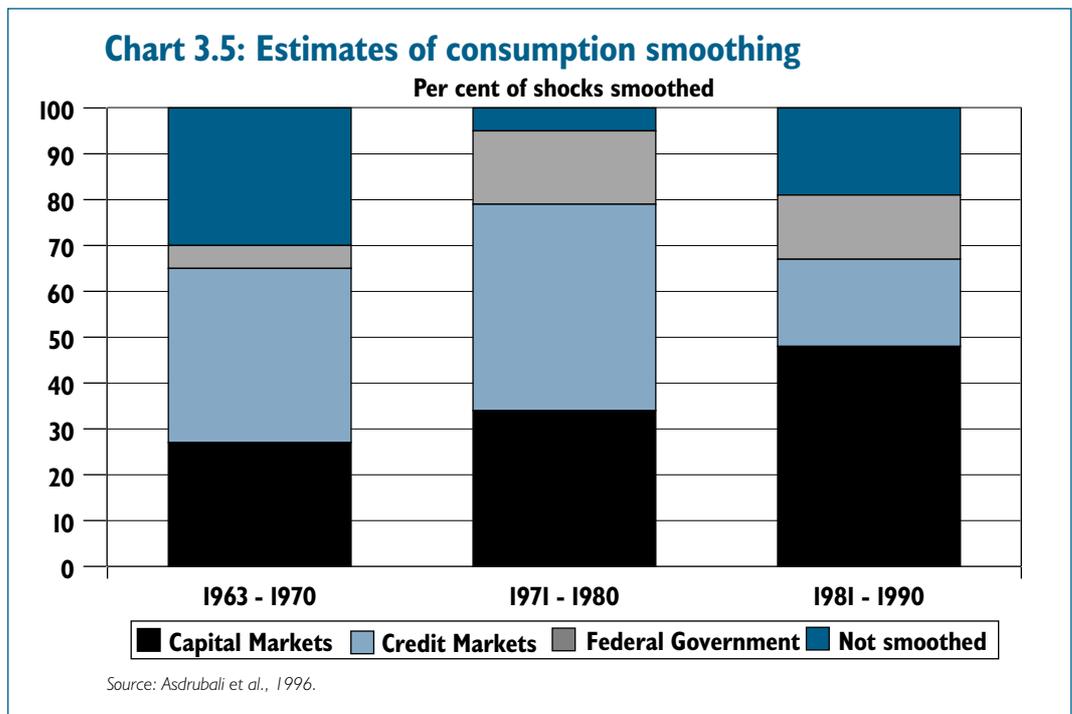
3.35 Berger *et al.* (1995) report that the proportion of banking assets legally accessible from a typical US state had increased from under 7 per cent in 1979 to almost 70 per cent in 1994. Over the same period, they note that actual ownership of a typical state's assets controlled by out-of-state banks (via holding companies) had risen by a similar proportion, from 2.1 per cent to almost 28 per cent. However, the actual use of the opportunities offered by interstate banking lagged what was legally possible, and there remained substantial opportunities for consolidation in this market. That said, the effect of market segmentation can easily be overstated, since banks have been able to circumnavigate restrictions, for example by using holding-company structures.

Estimates of risk sharing in the US **3.36** There are a range of estimates of the degree of market risk sharing in the US. Crucini (1999) argues that once it is accepted that risk sharing may be imperfect, it is likely that empirical results will be sensitive to the survey methods chosen, and to whether observed shocks in any given sample period are fully or partially insured against, or uninsured altogether.

3.37 Some of the literature also finds it difficult to distinguish between risk sharing between regions and within the same region. This is an important distinction – intra-regional risk sharing is of limited use after a permanent region-specific shock. Even in a world of perfect risk sharing, some differences in consumption may still be observed. As well as differences arising from different tax rates, Stockman and Tesar (1995) point out that taste shocks might give rise to some differences in patterns of consumption, even in a world of perfect risk sharing.

3.38 A number of studies find that risk sharing is important in the US (and perhaps more important than fiscal transfers):

- Athanasoulis and van Wincoop (2001) estimate that risk reduction through financial markets is around 35 per cent. This compares with a potential reduction of at least 54 per cent if agents used existing financial markets to diversify risk more fully;⁴
- Asdrubali *et al.* (1996) show that over the period 1963-1990, financial markets smoothed more than 60 per cent of regional fluctuations: capital markets smoothed 39 per cent of shocks to output, while credit markets smoothed a further 23 per cent (Chart 3.5). In addition, the effectiveness of the various channels of smoothing is found to change over time with capital market smoothing increasing in the 1980s at the expense of credit smoothing, reflecting perhaps the nature of shocks, tighter monetary policy (manifested in higher borrowing rates) and financial innovations allowing better access to capital markets.



- Melitz and Zumer (2000) use a similar analysis to Asdrubali *et al.*, but adapt the model to account for taste and preference shocks to output. Their estimates suggest that around 48 per cent of US regional shocks are smoothed through risk sharing, although some of this risk is shared within the same region (intra-regionally); and
- Sørensen and Yosha (1998) also find evidence for significant market risk sharing between US states. For the period 1981 to 1990, they estimate that 48 per cent of shocks were smoothed through capital market insurance and 19 per cent through credit markets.

⁴Athanasoulis and van Wincoop note that investors in the US tend to bias their investments locally, while individuals seem to believe that the company for which they work is less risky than diversified funds, according to a survey of 803 individuals in 1995, conducted by John Hancock-Gallup.

3.39 Other studies are less conclusive. Atkeson and Bayoumi (1993) argue that the bulk of consumers in the US do not share risk through capital markets. Capital markets are primarily used to generate an income stream rather than to insure against shocks. Their estimates show that the insurance provided by capital markets is relatively small; that for each US\$1 fall in labour income, capital income rises by less than 1½ cents.

3.40 Hess and Shin (2000) find that the correlation of labour income to total income is very high,⁵ suggesting that the degree of income hedging provided by asset ownership is limited: only around 10 per cent of each household's risk is shared nationally.⁶ Of the remainder, 30 per cent of risk is shared within a particular industry (i.e. individuals spread risk by investing in other companies within the same sector), 20 per cent is shared within a particular region of the US (i.e. by investing across sectors, but within the local region), while 40 per cent of household risk is unshared with other households.

3.41 If risk sharing were perfect, regional consumption would be perfectly correlated across regions, since output shocks in one region would affect the consumption decisions of individuals in other regions equally. Hess and Shin (1998) use retail sales data from 1978-1992 to show that consumption is less correlated across US states than output⁷ – implying that US regions do not fully share risk. Louisiana and Texas appear to exhibit greater cross-correlation of consumption than of output with respect to other states. Since Louisiana and Texas are the main oil-producing states, this may suggest that risk sharing is highest in those states where shocks are most region-specific, and the need for risk sharing is greatest.

3.42 The apparently low degree of intra-national risk sharing leads Hess and Shin to suggest that national borders may not be the main obstacles to intra-national risk sharing. Instead, they argue that US households may simply prefer to invest in what is familiar to them: regional bias analogous to home bias at the national level. Information barriers, rather than national barriers, may be the primary obstacles to risk sharing in financial markets.

Comparing risk sharing in the US and between countries

3.43 Nonetheless, regional risk sharing in the US is much greater than between countries, according to both Melitz and Zumer (2000) and Sørensen and Yosha (1998) – consistent with home bias at the national level leading to less international diversification than would be predicted by models of optimal portfolio allocation.

Conclusion on risk sharing

3.44 The balance of evidence suggests that market risk sharing is an important adjustment mechanism in the US, and certainly seems to be higher than between national economies.

Adjustment through fiscal policy

3.45 In a monetary union, fiscal policy may also play an important role in adjusting to shocks. As well as the normal public policy functions of government, such as the provision of public services, fiscal policy can be used to provide forms of insurance against shocks to output – in some cases through a targeted policy of stabilisation, in others through the way that tax and benefit systems affect incomes when output and employment levels change. In some countries, these functions are largely the responsibility of central government. In others, fiscal autonomy is more decentralised and stabilisation is provided by regional or sub-federal levels of government.

⁵The approach taken by Hess and Shin implies that insurance provided by fiscal policy is also included in these estimates.

⁶Although they acknowledge that the results may be biased downwards by statistical effects; measuring non-labour earnings is difficult because capital gains and losses will tend only to be reported when realised.

⁷Backus *et al.* (1992) describe this observation as the “consumption/output anomaly”.

3.46 There are, therefore, two important issues: the degree of stabilisation provided, in aggregate, by fiscal policy in a given country; and the level of government through which it is provided. Annex B provides a detailed analysis of fiscal stabilisation in the US. Chart B.1 summarises the different forms of fiscal insurance provided by government and defines the terminology used in this section and Annex B. The annex examines whether and how federal and state governments provide insurance against shocks in the US, finding that fiscal policy autonomy is more centralised in the US than it is in the euro area.

3.47 The annex also examines the degree of stabilisation provided in the US compared with other monetary unions such as the euro area and Canada. Broadly speaking, the evidence suggests that the degree of stabilisation provided in the US is, if anything, less than is provided at the Member State level in the euro area.

**Federal level
fiscal policy**

3.48 Automatic stabilisation provided to the US economy by the federal government through the tax and benefit system is smaller than in many other industrialised economies, in part because of the smaller share of the economy accounted for by the public sector. In 1999, for example, structural primary expenditure in the US was around 26 per cent of GDP, compared with around 35 per cent in the UK and around 45 per cent in France (OECD). The OECD (2000) find that the US fiscal position was least responsive to changes in the economic cycle among OECD members. This is despite a general increase in the importance of the automatic stabilisers in the US during the 20th century, as federal spending (as a percentage of GDP) increased significantly (see Annex A on the history of the US monetary union for more detail).

3.49 The evidence (Cohen and Follette, 2000; Auerbach and Feenberg, 2000) suggests that the US automatic stabilisers offset around 8 to 10 per cent of a shock to US output.

3.50 The federal tax and benefit system in the US provides some inter-regional insurance against asymmetric shocks – though no more than is already provided, on average, at a Member State level in the EU. Some redistribution from richer to poorer regions is also provided, though less than in Canada and within some European countries.

**Inter-regional
insurance**

3.51 A number of studies have examined the overall degree of adjustment provided by the US federal tax and transfer system. Table 3.2 summarises the results, distinguishing between redistribution and stabilisation where possible.⁸

- stabilisation is of more relevance to the functioning of a monetary union, because it can replace the short-term adjustment mechanism that might otherwise be provided by an independent currency or monetary policy; and
- fiscal redistribution may be better suited to allowing a region to adjust to a permanent shock. However, fiscal redistribution may reduce incentives for the region to adjust to shocks. Bayoumi and Masson (1995) state that: “*we see little reason to argue that redistribution must necessarily accompany monetary union*” (page 255).

⁸ The term ‘insurance’ is used in different ways by different authors. For the purposes of this study, insurance describes all fiscal policy designed to offset the impact of shocks, including inter-temporal smoothing, inter-regional stabilisation and inter-regional redistribution. See Annex B and Chart B.1 for a more detailed summary of these different forms of insurance.

Table 3.2: Fiscal stabilisation and redistribution in the US

	Redistribution	Stabilisation
von Hagen (1992)	47	10
Bayoumi and Masson (1995)	22	30
Fatás (1998)		11
Asdrubali <i>et al.</i> (1996)		13
Sørensen and Yosha (1997)		15
Athanasoulis and van Wincoop (2001)	20	10
Obstfeld and Peri (1998)	19	10
Melitz and Zumer (1998)	16	12 to 20
European Commission (1977)		28
Sala-i-Martin and Sachs (1991)		33 to 50

Note: Each result represents the percentage offset through the US federal fiscal system for a state suffering a shock to income/output.

3.52 In summary, the aggregate amount of fiscal insurance provided is found, if anything, to be less than is provided at a national level in the euro area:

- the US Federal Government provides less inter-temporal automatic stabilisation to shocks than other OECD economies (including EU Member States);
- the federal tax and benefit system in the US provides some stabilisation against asymmetric shocks, perhaps offsetting around 15 per cent of shocks (as shown in Table 3.2) – though this is no more, and probably less, than is already provided, on average, at a Member State level in the EU; and
- the federal tax and benefit system in the US provides some redistribution from richer to poorer regions, though less than in Canada and within some European countries.

Discretionary policy 3.53 Although this evidence suggests that the US system provides less automatic stabilisation to shocks than found in other OECD economies, the fiscal authorities may be able to compensate for this by greater use of discretionary changes.

State-specific policies have a limited role 3.54 But there is little evidence to suggest that state-specific fiscal policies in the US play an important part in smoothing shocks. The US did operate a system of Revenue Sharing between 1972 and 1986, in which state and local government received money from the federal government to spend. For further discussion, see Annex B on fiscal federalism. But there is no similar arrangement in place today – although there remain occasional calls for its reintroduction. At present, however, states are only likely to receive federal assistance in the event of specific difficulties or disasters.

State level fiscal policy 3.55 A striking feature of the US – and difference from the euro area – is that regional or sub-federal (in this case state) governments make little or no effort to use their budgets as a stabilisation tool. Every state but Vermont has the requirement that the state budget should be balanced, although the precise definition of this varies. In some cases, it means that the Governor merely has to submit a balanced budget to the legislature; in others, that it must be balanced upon approval. Certain states allow the self-imposed fiscal rule to be relaxed if it is to finance certain, exceptional items; other rules vary by the type of funds to which they apply.

Box 3.3: The impact of US unemployment insurance

Unemployment benefits in the US are paid through programmes operated at the state level, which determine eligibility for benefits within an overall federal framework.

There would appear to be only limited interstate transfers or redistribution through this channel alone. As argued by von Hagen (1992) unemployment insurance in the US “involves only a minimal extent of income redistribution among states suffering high and low unemployment” (page 349). Rather, the system works on the basis of self-insurance at the state level, though with the solvency of each system preserved by a federal lender of last resort. Therefore the US unemployment system does not require either large-scale federal resources, or cross-funding of insurance programmes by different states. He argues that this shows “...there is no compelling need to allocate unemployment insurance functions at the center of a monetary union” (page 349).

This may be, but Sørensen and Yosha (1997) find that, although direct transfers from federal government to states are the largest means of income insurance in the US, unemployment benefits are the most efficient of US fiscal instruments for insuring income, i.e. they achieve the greatest degree of insurance for a given budget. This leads them to argue that a monetary union can achieve considerable risk sharing with a much smaller overall budget than currently exists in the US.

However, US unemployment insurance does not appear to provide a large degree of offset against a temporary shock. Auerbach and Feenberg (2000) estimate that between 1989 and 1990, unemployment benefits were equal to around 4 per cent of the shortfall in output relative to potential over the period. Assuming that around half of this benefit was consumed rather than saved would suggest that unemployment benefits provide an additional 2 per cent offset against the original shock – a much smaller impact than that provided by income and payroll taxes. Nonetheless, the existence of unemployment benefits may help to sustain consumer confidence in the face of mounting concerns over job security.

3.56 The US unemployed insurance system provides some counter-cyclical impact at a state level (see Box 3.3). However, commitment to balanced budget policies means that state level fiscal policy can move in a pro-cyclical direction, magnifying booms and slumps.

Rainy-day funds 3.57 During the 1990s, many states began to set aside ‘rainy-day funds’ – a reserve account aimed at building up a defence against a future downturn analogous to ‘buffer funds’ operated in Finland in the euro area. At the end of fiscal year 2001, the National Association of State Budget Officers estimated that states had built up reserve balances totalling 7.7 per cent of annual expenditures, although the size of the funds varied widely; from 10.2 per cent of expenditure in New Mexico to zero in California and Colorado (CBPP, 2002).

3.58 States such as Maine, Missouri, Ohio and Kentucky made use of these funds to balance a shortfall in budgets for the fiscal year 2002. But other states have not used their funds.⁹ There is anecdotal evidence that political pressure to maintain budget discipline, and concerns that state finances could worsen further, may have restricted the ability or desire of some state legislatures to use the accumulated surpluses. In general therefore, these funds are not used as adjustment mechanisms over the economic cycle, but as a fund that can be turned to in the event of a very serious downturn in state finances.

⁹The Center for Budget and Public Policy Priorities (CBPP) reports that in December 2001, the state of Florida enacted around \$1 billion worth of budget cuts without drawing down any of the \$941 million in the rainy-day fund (CBPP, 2002).

Fiscal policy restrictions

Are regional fiscal policy restrictions necessary? **3.59** An important question is whether regions within a monetary union need to be constrained by fiscal rules designed to limit the risk of one region running up excessively high levels of debt. This might occur if a region believes that, if it goes bankrupt, other regions in the monetary union will bail it out.

3.60 The US experience suggests such rules are not necessary. Although many states operate ‘balanced budget’ rules, these are self-enforced. They are not imposed by the federal government or by multilateral agreement between the states, and could be altered or revoked by the states. Despite this, states have still tended to try and maintain sound public finances. But this may be specific to the political circumstances of the US, and the clear and long standing relationship and commitment between the federal and state level. As noted in Annex B, the institutional model of fiscal federalism is very different in the euro area, with virtually all fiscal autonomy resting with Member States.

3.61 Von Hagen (1992) argues that the real restraining influence comes from the fact that the Federal Government is free from obligations to respond to economic conditions within any one state. State governments are aware of this, and must act accordingly. A practical example is provided by Currie (1997), who draws attention to the experience of New York City. The city ran into severe financial problems but was not bailed out by either the Federal Government or other states. As Currie notes:

“When New York City ran into debt problems in the early 1980s, neither federal nor state government came to its aid. If a bail-out were motivated by concern over the social and political consequences of a debt crisis, this applies as much within today’s EU. In practice, when governments face debt problems they do not go bankrupt – they adopt tough fiscal measures to resolve the crisis.” (page 8)

3.62 What does this imply for fiscal stabilisation at the state level? A traditional view of regional public finances in a federal system argues that, since factors of production can migrate easily across regions, it is unwise for regional governments to use fiscal policy to stabilise demand, since the benefits of any fiscal expansion are ‘exported’ to other states. In other words, if a state were to increase borrowing, firms and labour may leave, anticipating that the borrowing must eventually be paid for in higher taxes. Though as already established, labour mobility, for example, is relatively limited in the short term.

3.63 This highlights the close link between fiscal policy and other adjustment mechanisms. Where factors of production are less mobile, there is a correspondingly greater freedom for fiscal authorities in a given region to stabilise demand through fiscal policy. Alternatively, in regions with a high degree of inter-regional factor mobility, an independent fiscal policy is less useful, but should also be less necessary. Box 3.4 examines whether US economic integration places *de facto* limits on the tax policies of individual states.

3.64 Another reason why states may be reluctant to run deficits is that capital markets may not have confidence in a state’s commitment to a long-run balanced budget, so increasing their borrowing costs. Inman and Rubinfeld (1991) argue that the US capital market “*has appeared reluctant to accept a state’s promise of a balanced budget over a business cycle*”. (page 3). In addition, von Hagen (1998) argues that smaller states may face higher borrowing rates than the prevailing market rate.

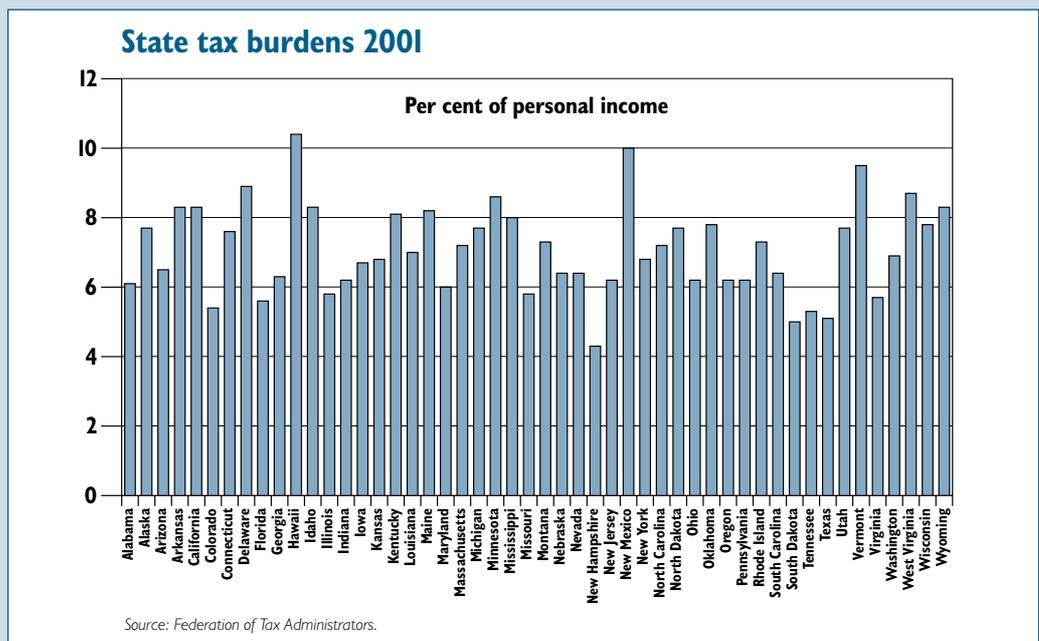
Box 3.4: Regional tax and spending policies in the US monetary union

Related to the discussion of state fiscal policy is the question of how much *de facto* freedom states have to pursue independent fiscal policies within the US monetary union. For example, it is often suggested that in a monetary union with a high degree of factor mobility, tax rates will need to be harmonised. The US provides a useful example in this respect.

Despite the US being a highly integrated economy, there is no harmonisation of income taxes, corporation taxes, sales or excise taxes between the different states. The Federation of Tax Administrators provides comprehensive data on tax rates, which show the following:

- income tax rates vary widely across the US. The low rate varies from 0.36 per cent in Iowa to 6.0 per cent in North Carolina; higher rates vary from 4.5 per cent in Connecticut to 11 per cent in Montana. Several states, including Florida, Texas, Nevada and Washington do not operate a state income tax at all, while other states limit income tax to dividend and interest income. The income brackets to which these rates apply, and personal exemptions allowable, also vary widely;
- corporate tax rates vary from 3–5 per cent in Mississippi to a flat rate of 9.8 per cent in Minnesota. Some states operate a progressive tax system, with several tax brackets (ten in Alaska, six in North Dakota), while many others operate a single flat rate;
- sales tax rates vary from 2.9 per cent in Colorado to 7 per cent in Rhode Island and Mississippi. Food items are exempt in some states but taxable in many others;
- excise taxes also vary widely. As of January 2002, excise taxes on gasoline, for example, varied from 8.0 per cent in New York to 28 per cent in Rhode Island.

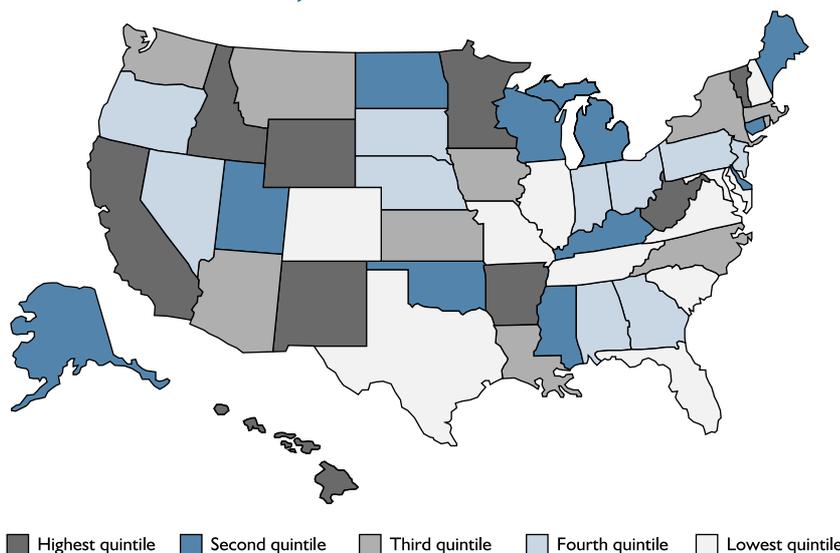
Neither is there any evidence to suggest that variations in the different tax rates help to offset each other. The following chart shows tax revenues in each state, on a per capita basis, as a percentage of personal income. The effective tax burden varies quite considerably. It is lowest in the New England state of New Hampshire, and highest in New Mexico, Hawaii and Vermont.



According to the Tax Foundation (2002), the total effective tax burden in 2002 (including federal, state and local taxes) varies from a high of 36.7 per cent in Connecticut to 27 per cent in Alaska, with an average for the US of 32.1 per cent.

The following map classifies each state according to the level of state tax as a percentage of personal income; the darker colours representing those with the highest state tax burden.

Tax burden across the US, 2001



Source: Federation of Tax Administrators.

The map shows little pattern in tax burdens between states. One of the most notable features is those states in the highest tax quintile that border states in the lowest quintile — Texas and New Mexico in the Southwest, Colorado and Wyoming in the Rockies, and Virginia and West Virginia in the Southeast. Perhaps most notably, two relatively small neighbour states, Vermont and New Hampshire, are in the highest and lowest quintiles respectively. This suggests that even with a high degree of factor mobility, there is still some freedom for states to vary tax rates relative to their neighbours.

Eichengreen (1990) points out that autonomy over tax can be estimated by examining the spill-over in revenues between states. There are two ways in which tax rate changes can impact on the revenues of an adjoining state. First, there may be a ‘substitution’ effect, whereby individuals cross the border to consume goods and services from the lower tax jurisdiction. Second, there may be an ‘income’ effect, where higher tax rates mean lower disposable income and lower spending on both sides of the state line. Eichengreen refers to work suggesting that for the area around Iowa in the period 1950-79, the income effect dominated for most taxes.

What does this mean for state tax rates? Eichengreen points out that variation in state tax rates in the US is somewhat less than between EU Member States (around 40 per cent less), suggesting that factor mobility may exert some pressure for equalisation in tax rates. But it is clear from the US experience that this equalisation is far from complete – few factors of production are perfectly mobile, and there appear to be sufficient costs associated with moving to allow a good deal of variation in tax.

Neither are tax rates necessarily pressured towards the lowest rate. The Tax Foundation reports that the number of days of work taken to pay off state tax liabilities has remained broadly constant over the last 15 years. Over the same period, there has been a general trend upwards in the level of federal taxes. Thus, the overall tax burden has not been pushed down through tax competition, perhaps reflecting the fact that some people/states will prefer public provision of some services, and are willing to pay for them.

This evidence suggests that a monetary union can exist without harmonisation of tax rates, tax bases or tax burdens at the state or regional level. This may reflect the fact that those states with higher levels of tax and spending are able to provide services and public goods that individuals and companies find attractive and which compensate for the higher tax burden.

Conclusions on US regional adjustment

3.65 This section has built up as complete a picture as possible of how the various adjustment mechanisms in the US respond to shocks. The balance of evidence suggests that:

- labour markets provide important adjustment mechanisms, apparently playing a greater role than in many other countries. Eichengreen (1990) estimates that the speed of adjustment to shocks, via labour markets, is some 25 per cent higher in the US than in several countries of the EU – although lower than within the UK and France. In particular, labour mobility is found to be important as a mechanism for adjusting to long-term structural change in the US;
- financial markets allow significant risk sharing between states, apparently more than between other groups of nations. However, they are not fully exploited. To some extent, this may reflect the fact that many people invest in order to gain a steady income stream, rather than offset their own labour income;
- US federal fiscal policy plays a far greater role in assisting regional adjustment than EU level fiscal policy does in Europe;
- but in Europe, national fiscal policy assists regional adjustment much more than state level policy does in the US. Some states do run budget deficits and surpluses, but these do not seem to be directed at cyclical stabilisation or at offsetting regional shocks; and
- overall, fiscal policy appears to provide as much, if not more, assistance in Europe than in the US.

Endogeneity of adjustment **3.66** There may be a degree of endogeneity in the relative importance of the different adjustment mechanisms. If factors of production become more mobile, it may become harder for individual regions and states to run independent fiscal policies. Similarly, Blanchard and Katz (1992) suggest that because labour migration is high, price and wage movements in the US play only a limited role in adjusting to shocks. A higher level of price and wage flexibility might offset the need for some labour mobility.

Different adjustments suit different responses **3.67** Adjustment through one mechanism is not an exact substitute for adjustment via others. A distinction can be drawn between permanent and non-permanent shocks. Fiscal policy may provide insurance against transitory shocks, by allowing regions of a monetary union to mutually insure each other. By contrast, a permanent shock requires a reallocation of resources, and fiscal stabilisation may actually create incentives which delays that structural adjustment.

3.68 Ghosh and Wolf (1997) also note that the value of different adjustment mechanisms is determined by the type of shock. They point out that broad-based fiscal policy stabilisation is of limited value for shocks to individual sectors; rather, cross-sectional labour mobility would act as a more effective adjustment mechanism. In contrast, fiscal stabilisation is of most use when large output movements occur regionally, affecting the majority of sectors within that area.

3.69 This illustrates the fact that no one system of adjustment to shocks is best for all countries, in all circumstances, and in the face of all kinds of shock. There may also be costs to the economy from the particular adjustments that do take place. As noted by Blanchard and Katz, labour mobility may not always be efficient; it also involves significant social costs to any region from which workers choose to migrate.

The impact of monetary union on stability in the US is difficult to identify in the absence of a counterfactual which would show how stable US regions would have been if monetary union had never existed.

The evidence suggests that US output volatility has declined through the second half of the 20th century, particularly over the last 20 years.

US consumption has been more stable than in other major industrialised countries over the past twenty years, and more stable than output. The large and integrated financial market in the US may have helped firms and households to smooth consumption in the face of shocks to output.

4.1 Having analysed adjustment and the costs associated with it, the remainder of this study considers the potential benefits to the US economy of monetary union, in terms of both macroeconomic and microeconomic factors.

4.2 Recent research on monetary unions considers whether they promote macroeconomic stability. There are three principal ways in which this might occur:

- first, it has been argued that an independent exchange rate is primarily a source of shocks to the economy, rather than a stabilisation mechanism (as is assumed in traditional optimal currency area theory). Extending this argument to the US, if each US state had an independent exchange rate there might be a significant increase in economic volatility within the US. With a single currency this potential source of instability is removed, and the large size of the US internal market means that most of the domestic economy is shielded from US dollar instability;¹
- second, a large and integrated financial market may allow firms and households to smooth consumption more effectively in the face of shocks to income. Section 3 considered the evidence on inter-regional and longer-term risk sharing in the US; and
- third, monetary union could lead to gains in monetary policy credibility. However, as Escolano (2000) points out, these gains are not necessarily associated with joining a monetary union, but are related to the good conduct of policy.

4.3 This section first examines US macroeconomic performance over the past 70 years; and then considers whether monetary union has influenced US macroeconomic performance, focusing on the impact on stability.

¹ For example, Layard et al. (2002, page 9) argue that "... the US, with only about 10 per cent of its output traded outside its borders, is able to follow a policy of close to benign neglect towards the external value of its currency, the dollar, without major effects on its own economy. But for a trading nation like Britain, exporting about 28 per cent of GDP these [exchange rate] shocks matter".

Developments in US macroeconomic performance

4.4 The evidence from studies examining the evolution of macroeconomic stability in the US over the last 70 years is that increasing stability in the US business cycle is a long-term phenomenon.

20th century developments **4.5** In a seminal paper, Burns (1960) highlights five main factors contributing to the US business cycle becoming more stable in the years following the Great Depression:

- first, prior to the 1920s, the industrialisation of the US economy meant that a greater share of employment was subject to fluctuations in the business cycle. From 1920, this trend appeared to halt, and indeed reverse, as the number of ‘white-collar’ occupations increased as a proportion of total employment. Burns notes the US recession of 1957-1958, when ‘blue-collar’ employment declined by around 12 per cent, compared with a decline of only 3 per cent in ‘white-collar’ posts;
- second, the relative expansion of corporate, rather than individual, enterprise helped to act as a buffer between variations in production and the flows of income to individuals – because dividends tended to be less volatile than corporate profits. And as business improved inventory management techniques, another source of instability was reduced – by holding lower inventory-sales ratios there was less scope for firms to scale back production in the event of a downturn and rely on inventories to satisfy an already dwindling demand;
- third, the strengthening of financial systems throughout the early part of the 20th century helped to limit fear of contagion and propagation of crises. In so far as monetary union promoted integration of financial markets (for more details see Section 5 on financial markets) this suggests a role for the monetary union in helping to improve stability. However, institutional reform and developments largely unconnected to monetary union were also important for strengthening the financial sector;
- fourth, running alongside these developments was an emerging political consensus in the 1930s that mass unemployment was unacceptable, and that the business cycle should not be left to run a free course. Improvements in the conduct of monetary policy were complementary, with long-term interest rates becoming more responsive to downturns in activity and the Federal Reserve making use of open-market operations to influence credit conditions counter-cyclically; and
- fifth, the expanding role of the public sector may have helped to reduce macroeconomic volatility. Personal and corporate income taxes gradually became the most significant portion of federal revenues, and tended to be more responsive to changes in the overall level of economic activity than revenues that had previously been dominated by taxes on estates, gifts, employment and sales. Together with the development of unemployment insurance benefits (established on a national basis in 1935), this has allowed the role of the automatic stabilisers in the economy to develop (further detail on fiscal stabilisation is provided in Section 3).

4.6 DeLong and Summers (1984) also find evidence that the US economy has become progressively more stable. They emphasise:

- the role of the larger and more progressive tax system in dampening fluctuations in income, and note that growth in the availability of consumer credit reduced the number of consumers who would otherwise have had to cut consumption in response to income changes; and
- the increasing institutionalisation of the economy might have contributed to stability. In the pre-War period, there were few long-term labour market contracts and relatively little unionisation. The period immediately before and after the War saw dramatic increases in union membership and a fall in the share of the working population who were self-employed. Longer-term contracts and attachments between workers and firms might have slowed the response of employment (and therefore personal income) to changes in demand.

Recent developments in US macroeconomic stability

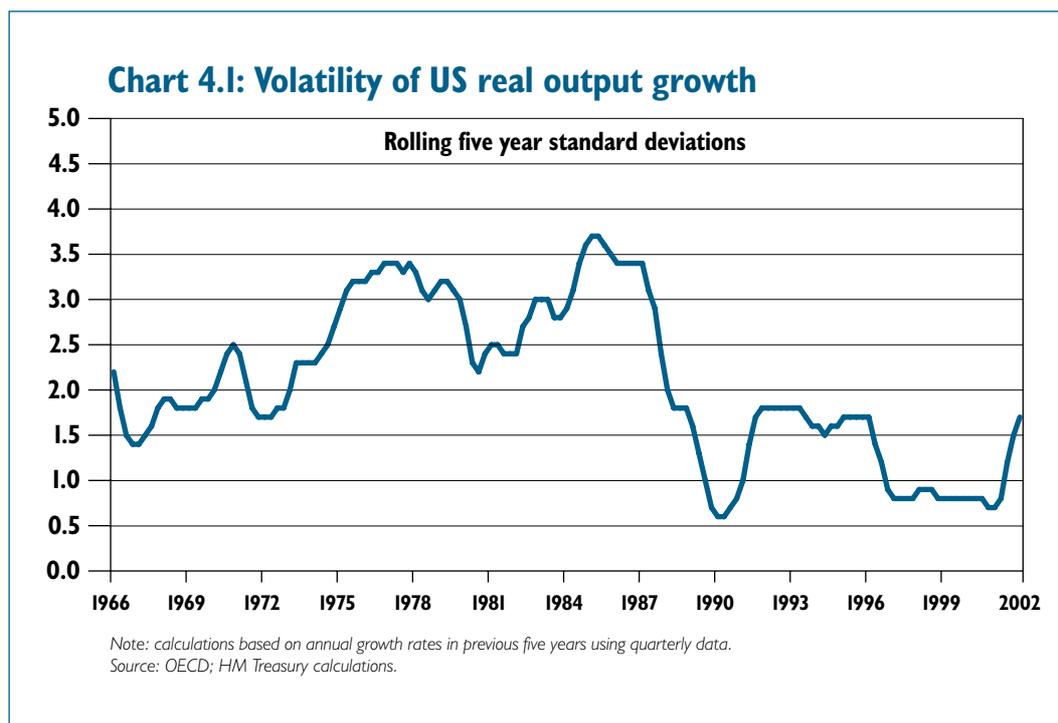
4.7 Recent debate has centred on whether the volatility of the US economy has fallen further in the last 20 years. Two sustained periods of strong economic growth since the early 1980s have focused attention on the resilience and stability of the US economy. In February 2002, for example, Federal Reserve Chairman Alan Greenspan used his testimony to Congress² to discuss a range of developments in the US economy and their potential impact on economic stability. Chairman Greenspan saw potentially positive influences on stability from improved information, greater flexibility, financial regulation and the increased role of conceptual value. But he emphasised that these developments also posed risks to stability.

4.8 Chart 4.1 indicates that output volatility in the 1990s has been consistently lower than in the previous three decades. Blanchard and Simon (2000) argue that the two long expansions in US output since the early 1980s are the result of a decline in output volatility that has been evident to a greater or lesser degree since the 1950s. Their analysis suggests that the decline in volatility has several causes – including decreased volatility of government spending from the 1950s onwards, lower volatility in consumption and, to a lesser extent, investment.

4.9 In contrast, McConnell and Perez-Quiros (1998) and others³ argue that, rather than there having been a gradual decline in volatility over the period since the 1950s, there was a rapid decrease in volatility in the first half of the 1980s.

² Alan Greenspan: The Semi-annual Monetary Policy Report to Congress, 27 February 2002.

³ Chauvet and Potter (2001), Romer (1999) and Taylor (2000).



Causes of the recent decline in volatility

4.10 There is less agreement over the causes of this decline in volatility, though two factors stand out – an improvement in the conduct of monetary policy and changes to inventory management.

Inventory management?

4.11 Since the mid 1990s, newer inventory management techniques, such as ‘just in time’ and a shift towards less inventory-intensive industries, may have led to inventory investment becoming counter-cyclical, reducing the volatility of output relative to sales.

Monetary policy improvements?

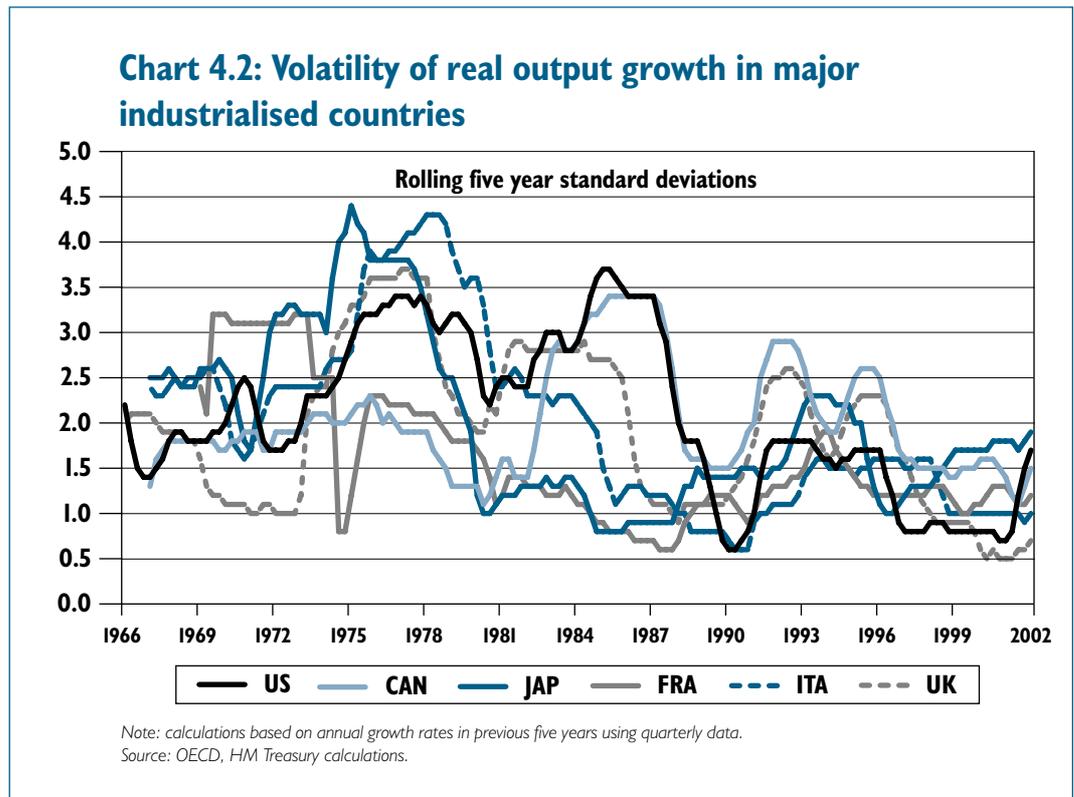
4.12 Taylor (2000) argues that the reduction in volatility is a result of less volatile consumption patterns, due to improvements in the conduct of monetary policy. He points out that the Federal Reserve has become more reactive to inflation and to changes in real output. Clarida *et al.* (1998) argue that in the Volcker/Greenspan⁴ period, the Federal Reserve has adopted a more proactive stance in seeking to control inflation.

4.13 The methodological problems with identifying shocks and their impact on the economy make it difficult to settle the argument between those who find evidence that the decline in volatility reflects an improvement in the conduct of policy and those who believe that it reflects the fact that the period has been relatively shock-less. In addition, it must also be borne in mind that, even if the economy is currently more stable, volatility may increase once again. Romer (1999) points out that Burns’ finding of a more stable US macroeconomy in the 1950s ultimately turned out to be fleeting.

⁴ Chairmen of the Federal Reserve Board of Governors: Paul Volcker 1979-1987; Alan Greenspan 1987 to date.

The impact of monetary union on macroeconomic stability in the US

Relative output stability 4.14 It is difficult to gauge the impact of monetary union on macroeconomic stability in the US as there is no appropriate counterfactual. However, one approach is to compare the performance of the US economy against that of other major industrialised economies. Chart 4.2 shows the volatility of output growth in the US and selected other G7 economies on a rolling five-year basis. There was a high degree of output instability in the US during much of the 1970s and 1980s followed by an improvement from the mid 1980s. The second half of the 1990s has seen low output volatility in the US, but this is also true of most other countries in Chart 4.2.

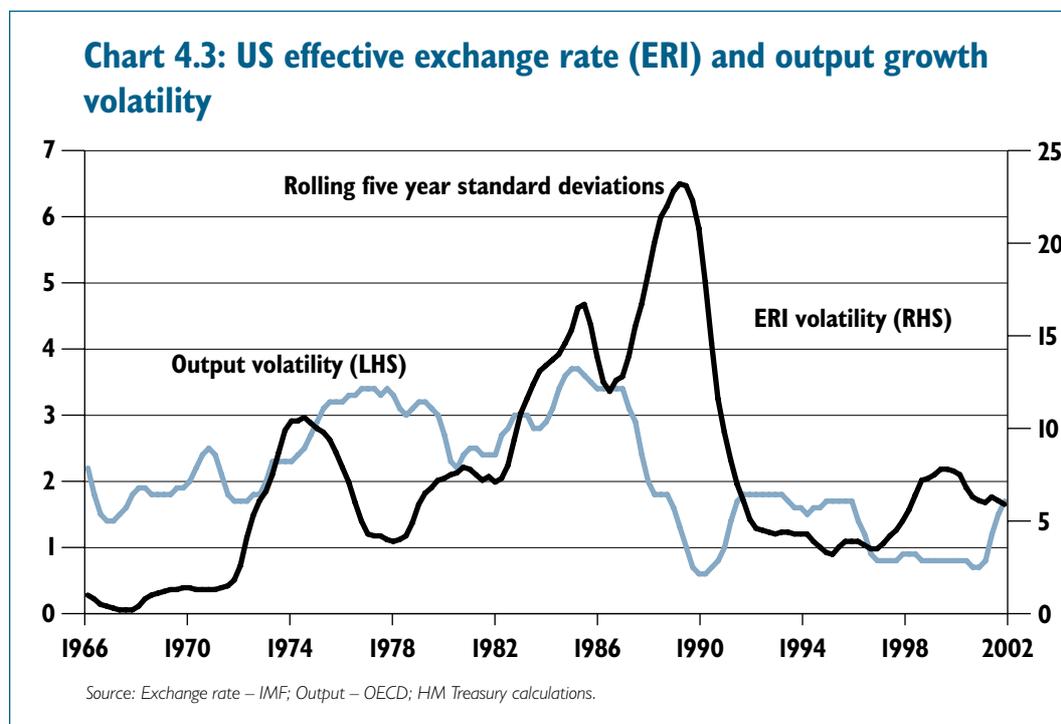


The impact of monetary policy on stability 4.15 One explanation for increasing output stability in the US is an improvement in the operation of monetary policy. However, there is no direct causality between the existence of monetary union and effective monetary policy. That is not to say that the two cannot be linked but, as already noted, improvements in the conduct of policy can arise without joining a monetary union. In the US example, the evidence suggests that institutional factors have largely been responsible for the improvement in stability, as they have for other countries.

Impact of the dollar exchange rate on stability 4.16 Large monetary unions might also gain macroeconomic stability because the economy is less exposed to external developments and to exchange rate volatility. International exports account for around 12 per cent of US GDP, compared to around 32 per cent for the UK.⁵

⁵ OECD data, ratio of exports of goods and services to GDP at market prices, 2000.

4.17 Chart 4.3 compares the volatility of the effective dollar exchange rate (ERI) against output. In the early 1970s, there was an increase both in output and exchange rate volatility; despite its relatively low external exposure, US output volatility may have been affected by the exchange rate. However, it is not possible to attribute causality on the basis of this chart – it may be that output volatility is driving exchange rate volatility. And by contrast, the late 1980s saw a sharp increase in exchange rate volatility corresponding with a decline in output volatility.

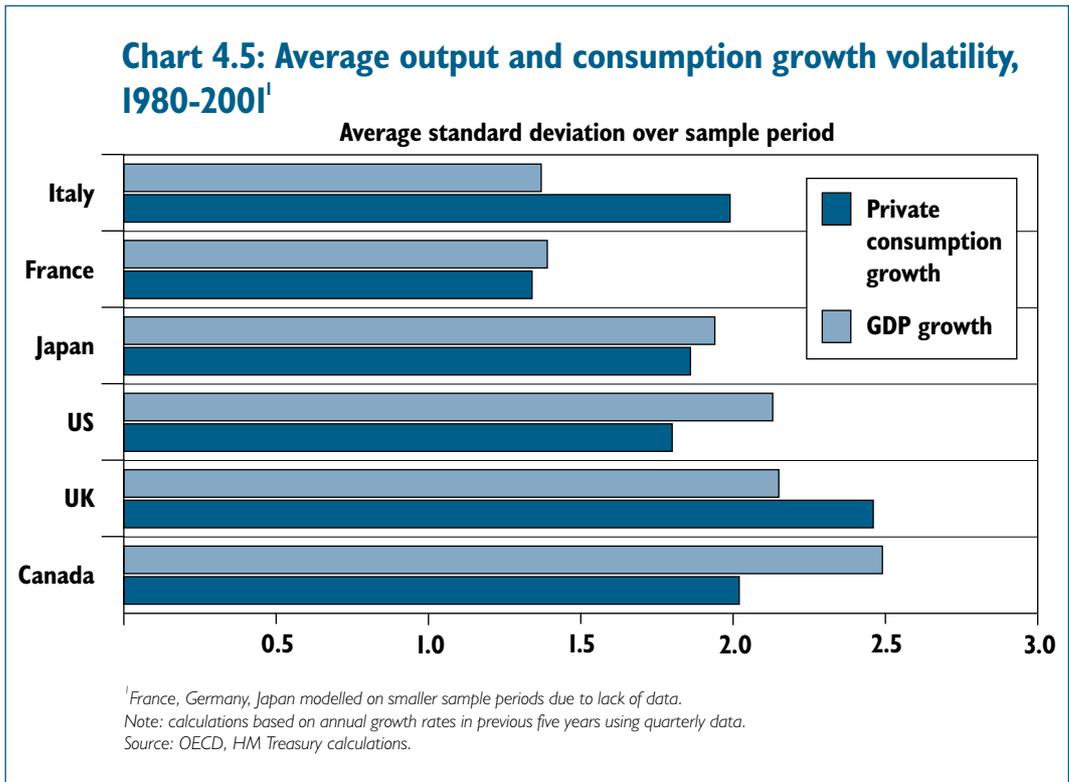
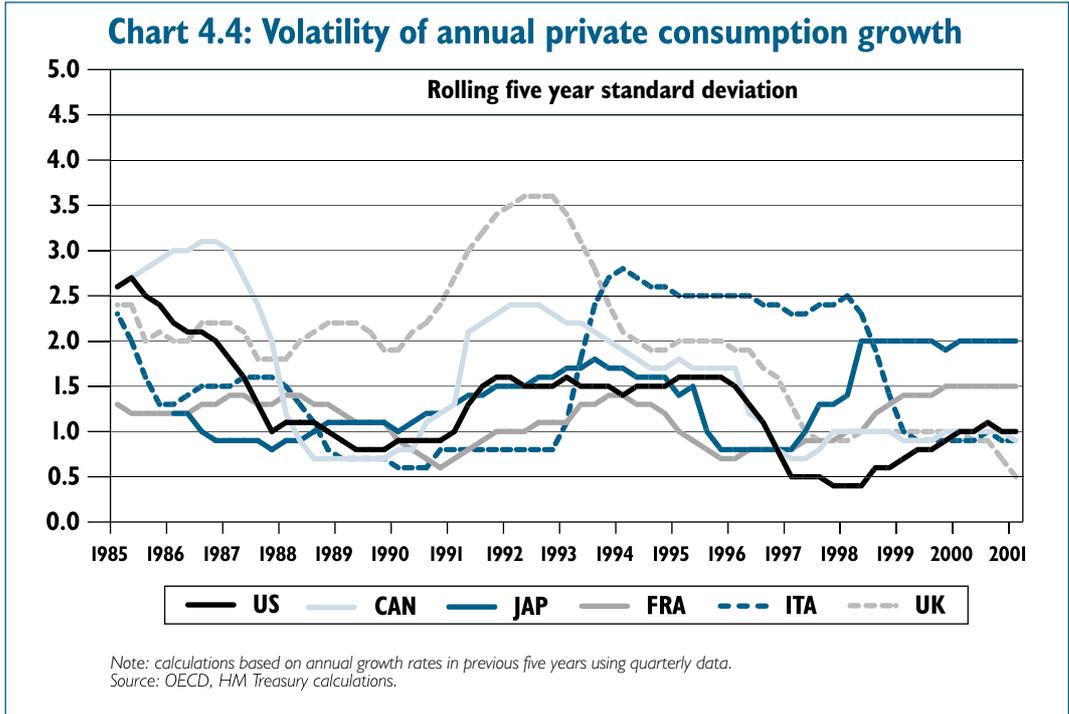


The stability of consumption

4.18 A final explanation for why monetary union may have benefited US macroeconomic stability is that its large integrated financial market allows firms and households to smooth consumption in the face of output shocks.

4.19 Chart 4.4 shows that US consumption has been among the most stable of major industrialised countries since the mid 1980s. This is confirmed in Chart 4.5, which indicates the average standard deviation of output and consumption over the period 1980-2001. It also shows that US consumption has been less volatile than output.

4.20 As outlined in Section 3, one reason why consumption may be less volatile than output is that firm and households smooth over shocks to output through financial markets. The large integrated financial market in the US may have helped to promote this process.



Conclusions on macroeconomic stability in the US

4.21 The impact of monetary union on stability in the US is difficult to identify in the absence of a counterfactual. It is not possible to know how stable the US regions would be if monetary union had never existed.

4.22 Evidence suggests that US output volatility has declined through the second half of the 20th century, particularly over the last 20 years, although this has largely been a consequence of structural factors; it is hard to identify an impact from monetary union.

4.23 Since the mid 1980s, US consumption has been among the most stable of major industrialised economies. The large and integrated financial market in the US may have helped firms and households to smooth consumption in the face of shocks to output.

Monetary union may encourage cross-border trade and investment, and promote the development of a larger, more integrated and more competitive market. US microeconomic performance is impressive: productivity and employment are both high relative to international benchmarks. However, it is difficult to quantify how much of this performance can be attributed to monetary union:

- evidence suggests that trade is higher within the US monetary union than it would be if the states or regions adopted individual currencies;
- competition is found to be greater, and prices consistently lower, in the US than in other major economies;
- at a disaggregated industry level, US regions are more specialised than EU regions, which may increase industrial efficiency; and
- US financial markets are highly integrated, which may promote efficient capital allocation and reduce the cost of finance for firms.

5.1 A monetary union offers important potential microeconomic benefits.¹ Alan Greenspan has highlighted² that if the US economy had had 50 currencies – one for each state – for the last 200 years, the US would be a less integrated and less productive economy today. If each US state had a single currency there would be an exchange rate transaction cost on all inter-state transactions. Firms and consumers would also be exposed to exchange rate volatility, which could add a further cost to inter-state transactions. Finally, with 50 separate currencies, there would be much lower price transparency across the US, making it difficult to compare prices across states.

5.2 These factors (which would also apply if there were regional currencies) would add up to a significant potential barrier to inter-state trade and investment flows, and as a result such activity might be considerably lower than it is now. The US market would be more fragmented along state or regional lines, and this might reduce competition considerably. Rather than competing with firms from across the US, competition would to some extent be limited to much smaller borders. US firms would be less able to exploit the significant economies of scale they currently enjoy. This might further affect the pattern of industrial specialisation and concentration in the US. If firms traded less extensively across the US market, then they might be less likely to locate in geographical clusters of similar activity, reducing the potential clustering benefits of technology and knowledge spillovers.

5.3 A single currency may also promote the development of an integrated financial market, which could promote more efficient capital allocation and may make it easier and cheaper for firms to raise capital for investment. A more integrated financial market also has the potential to promote macroeconomic adjustment, at both the regional and aggregate level, as has been discussed in earlier sections.

¹ In addition, a number of EMU studies by HM Treasury consider in detail the theory and evidence on the potential microeconomic benefits of EMU. For example, see the EMU studies *EMU and business sectors*, *EMU and the cost of capital*, *The location of financial activity and the euro*, *EMU and trade*, and *Prices and EMU*.

² Quoted by Ed Balls, Chief Economic Adviser to HM Treasury in the 2002 Cairncross Lecture. Available at www.hm-treasury.gov.uk.

5.4 This section considers the evidence that the US has enjoyed microeconomic benefits from monetary union. Like the analysis of the potential macroeconomic benefits of monetary union, this is a difficult question to answer in the absence of a counterfactual in the form of the US with a number of separate currencies. To deal with this, the approach taken reviews the key elements of microeconomic performance in the US in recent years, and then considers whether monetary union may have influenced these.

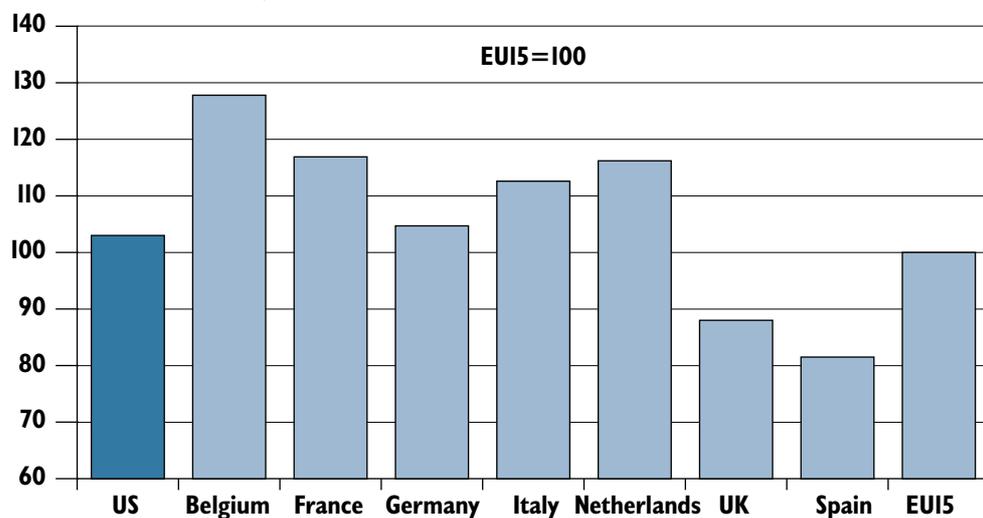
US microeconomic performance

5.5 A key theme of this study has been the strong post-War growth in the US economy. The second half of the 1990s was a period of particularly impressive economic growth, with GDP growing by 4 per cent a year on average. Key drivers of this growth were strong productivity gains and rising employment, in part, from an increasing labour force.

US productivity performance

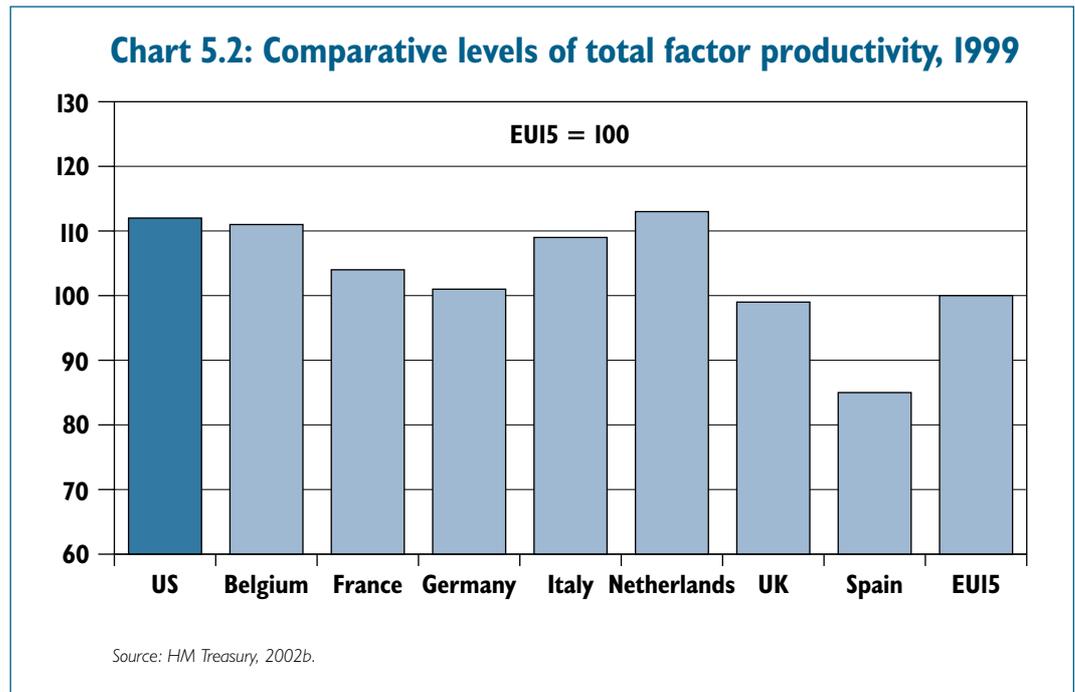
5.6 Between 1995 and 1999, US productivity increased at an annual rate of over 2½ per cent, compared with a growth rate of around 1½ per cent a year in the two decades prior to 1995. By 2001, US productivity was, on Eurostat estimates, some 17 per cent higher than the EU total on a GDP per worker basis, but only 3 per cent higher on the basis of GDP per hour worked (see Chart 5.1). Although the aggregate EU performance lagged the US, some countries within the EU had productivity levels which were similar or higher.

Chart 5.1: Comparative levels of labour productivity, GDP per hour worked, 2001



Source: Eurostat.

5.7 US performance exceeds the EU on a Total Factor Productivity (TFP) basis (Chart 5.2). This adjusts productivity for the effect of capital deepening, and is arguably a more relevant measure of productivity performance. On this measure, the US is more productive than the UK, Germany and France. A recent paper by HM Treasury concludes that there has been “*a lack of ‘dynamism’ in productivity performance in the EU, relative to recent experience in the US*”. (HM Treasury 2002b, page 13.)



5.8 Box 5.1 summarises recent research focused on the role that advances in and utilisation of information technology have played in recent US productivity growth.

US employment performance **5.9** The US stands out for combining productivity performance with an impressive employment record. HM Treasury (2002a) argues that this combination is arguably “*the most impressive aspect of the US achievement. . .*” (page 14).

5.10 Chart 5.3 shows that while productivity levels are higher (on a GDP per person employed basis) in the US than in the other economies surveyed, employment rates in the US are also higher. US employment is, on average, 10 percentage points higher than in the EU. This strong overall employment performance is likely to be a feature of the relatively flexible labour market in the US, as discussed in Section 3.

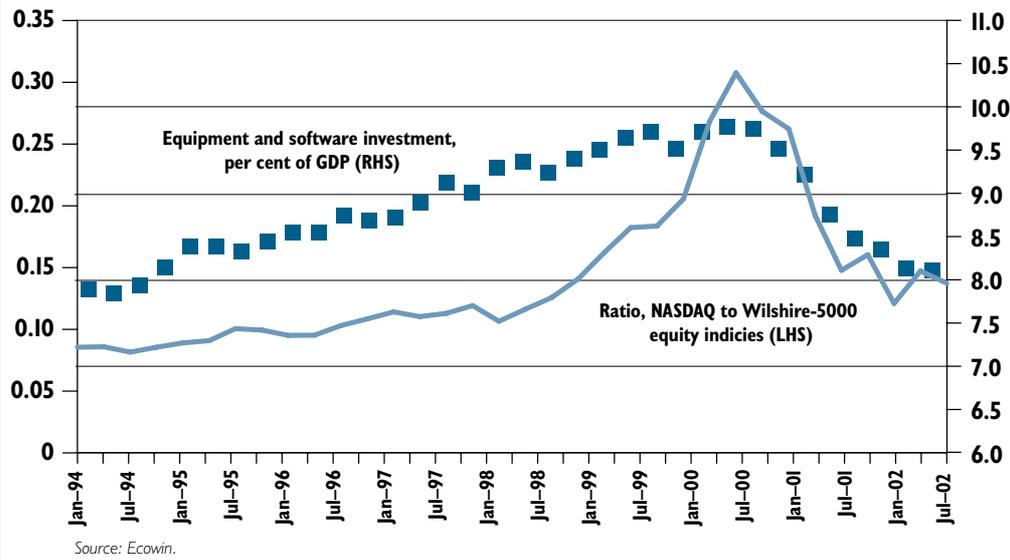
Box 5.1: Productivity and the role of IT

There is evidence of a strong contribution to recent US productivity growth from the production and use of information technology (IT). Oliner and Sichel (2000), for example, find that the use of information technology and the production of computer equipment accounts for around two thirds of the increase in productivity growth between the first and second halves of the 1990s. There are three particularly relevant features of IT investment:

- it depreciates and is replaced quickly, so technological progress is embodied quickly into the capital stock;
- network effects allow the benefits of IT investment to spill over to other parts of the economy; and
- demand for IT investment is relatively more sensitive to changes in the cost of capital than in demand for other capital goods.

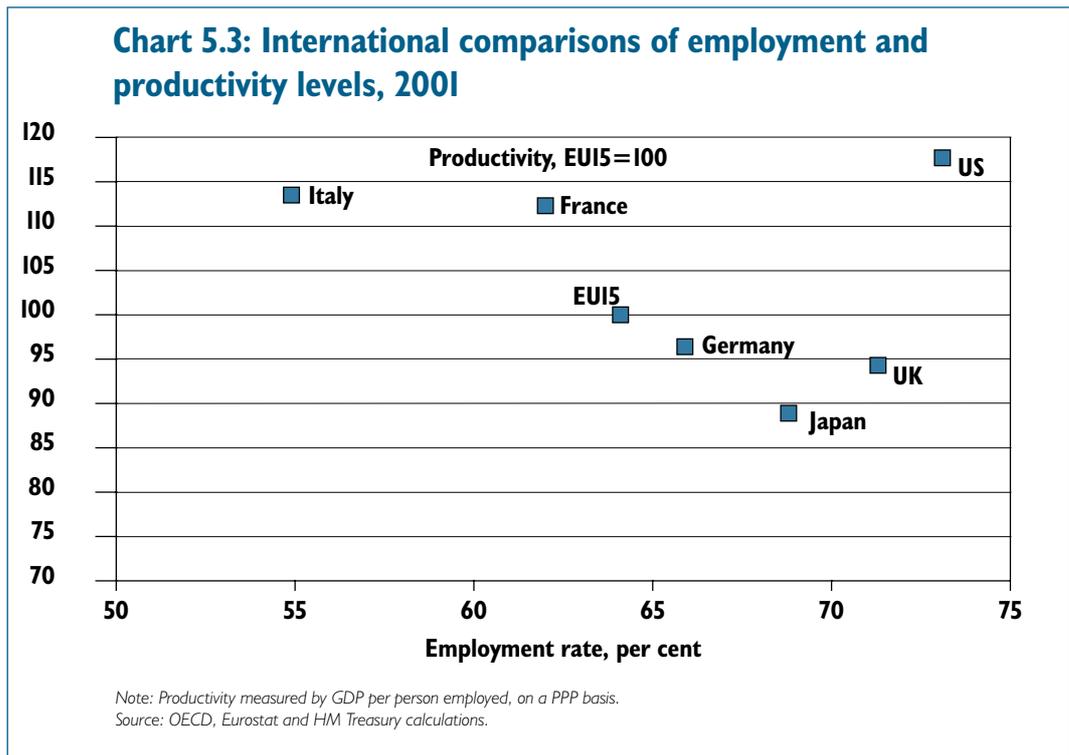
US macroeconomic stability and access to large, liquid financial markets, may have played a role in facilitating the significant US investment in ICT equipment. The chart below suggests a correlation between the pick-up in technology equity prices and ICT investment, suggesting that high-tech firms took advantage of relatively cheap capital in order to build up their capital stock.

Equipment and software investment, and technology equity prices



But the application of IT may itself be a function of other factors. Baily (2002) highlights how Wal-Mart, and other retailers, adopted IT in order to develop a highly efficient supply chain, allowing them to compete vigorously in retail markets. But retail banks invested in high technology equipment that “were not really needed for the tasks that most bank employees were performing”. (Baily 2002, page 11.)

Overall, investment in IT is unlikely to have an impact on productivity unless it creates enough competition to trigger firms to reorganise and generate wider efficiency gains.



The link from monetary union to economic performance in the US

5.11 The question is whether monetary union in the US has contributed to this impressive economic performance. The potential feed through from monetary union to growth and productivity can be examined through four mechanisms:

- whether inter-state trade in the US is higher than across national borders;
- the development and implications of an integrated financial market in the US, in particular for the amount and quality of investment;
- whether there is evidence of higher levels of competition in the US; and
- the pattern of industrial specialisation in the US compared to other countries.

US monetary union and trade

5.12 An increase in trade stemming from the existence of a common currency is often advanced as one of the major benefits of a currency union. It is assumed that a single currency reduces the transactions costs of trade, eliminates the need for hedging of exchange rate risk and improves the transparency of costs and prices across the currency area. The EMU study by HM Treasury *EMU and trade* provides an overview of the theory and evidence on the impact of monetary unions on trade.

5.13 This section considers whether there is evidence to suggest that trade within the US is greater than it would have been if US regions or states had separate currencies. To do this rigorously requires a comparison of intra-US trade with external trade. However, as noted in Section 2, trade data are not compiled fully for the US states. The empirical estimates in the literature tend to be based only on commodity flows data, which are of limited value because they:

- include goods for export that are simply transported from one state to another for shipment;
- include all flows, rather than simply from source to end-user; and
- are based on a limited coverage of trade in goods, without any coverage of services.

5.14 Given that trade data are not available, it is necessary to turn to other sources of evidence. McCallum (1995), in an influential examination of Canadian provinces, found that Canadian provinces traded around twenty times more with each other than with US states of a similar size and proximity. But a later study, by Anderson and van Wincoop (2001), analysed trade from the perspective of US states rather than the Canadian provinces, and showed that borders reduced trade between the US and Canada by around 44 per cent – a lower, but still significant, figure.³

5.15 The implication would appear to be that US regions trade with each other more than they trade with neighbouring Canadian provinces. However, there are factors aside from the single currency which may explain this:

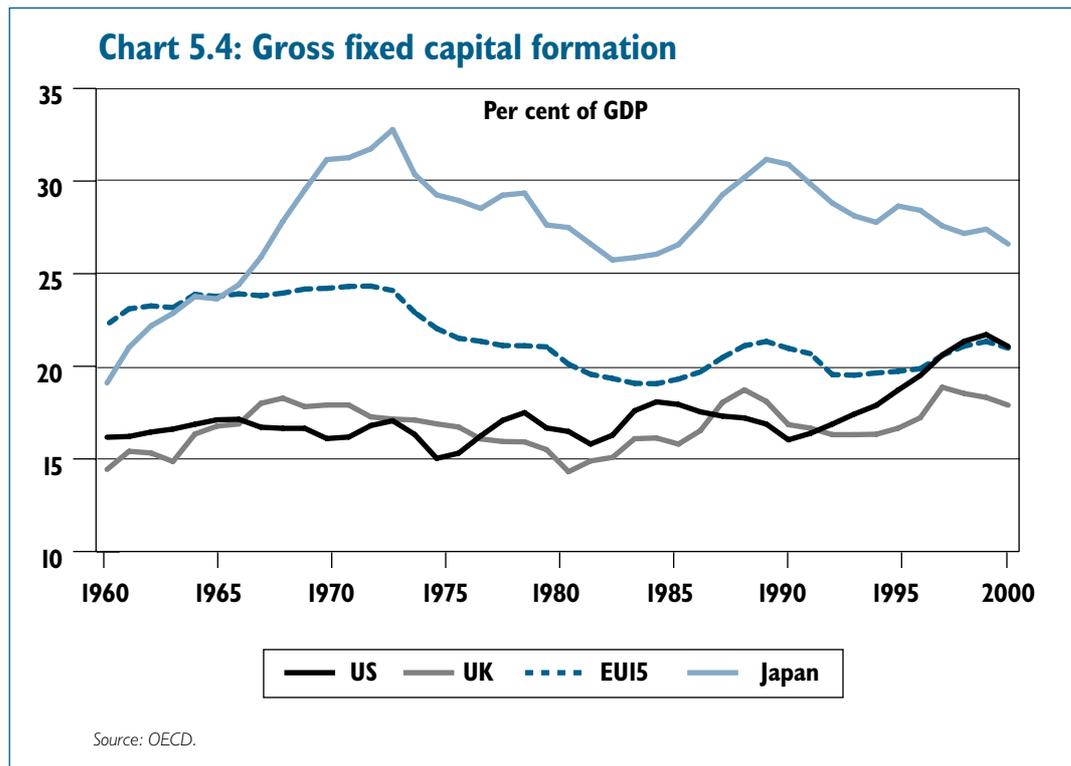
- US states are politically integrated, and have a greater degree of cultural similarity;
- there are likely to be fewer non-tariff barriers to trade between states than between regions in separate countries; and
- in addition, there is no counterfactual example to assess the degree of trade if the US states had maintained individual currencies.

Trade and output 5.16 The EMU study by HM Treasury *EMU and trade* assesses the analysis and evidence linking increased trade to gains in output. This approach could, in principle, be applied to analyse the output gains to the US from increased inter-regional trade but, in practice, the absence of reliable state or regional trade data undermines the worth of such an exercise.

US monetary union and investment

5.17 Increased investment is potentially a key driver of productivity. As Chart 5.4 indicates, investment levels in the US, as measured by gross fixed capital formation, were lower than in the EU until the 1990s. But they have risen sharply in the last ten years, coinciding with a period of faster US productivity growth.

³ Anderson and van Wincoop argue that the smaller size of the Canadian economy biases McCallum's work, since any trade barrier would affect Canada more than it would a given US state.



5.18 Firms will only invest if expected returns from the investment exceed the cost of the investment. A volatile economic environment may also discourage firms from investing by reducing expected returns; the issue of macroeconomic stability in the US was considered in Section 4 of this study. The cost of capital is also an important driver of investment levels. The EMU study by HM Treasury *EMU and the cost of capital* considers the potential impact of monetary union on the cost of capital in detail, and some of the issues raised are relevant to the US experience.

5.19 Large, integrated capital markets may potentially lower the cost of capital. Markets which have a large number of participants may reduce liquidity risk – the risk of being unable to find a buyer or seller for an asset at a reasonable price. Broad markets, where a range of different assets are traded, allow investors to diversify their holdings widely, which means they require a lower credit risk premium.

5.20 This suggests that that the large size of US financial markets may have contributed to a lower cost of capital. London Economics (2002) note several features of US financial markets that point to its relative size and efficiency:

- **venture capital funds** in the US are some five times the size of those in the EU;
- compared internationally, **trading costs on equities** have a lower effective spread on the New York Stock Exchange (NYSE);
- total **market capitalisation** of the NYSE was some €11.2 trillion in 2001, compared to €2.2 trillion in the largest EU exchange (London);
- NASDAQ (based in New York) is the exchange with the highest **trading turnover** in the world; and

- **corporate bond markets** remain significantly larger in the US than in the EU – debt securities, as a percentage of total liabilities of non-financial companies, were 10.6 per cent in the US compared to 2.4 per cent in the euro area.

5.21 However, there is little direct evidence of a lower cost of capital in the US. Comparisons of indicators such as the equity risk premium and the cost of bonds and bank lending do not consistently suggest that the cost of capital is lower in the US than in other industrialised countries. To a large degree this probably reflects the difficulty in accurately measuring the cost of capital faced by firms – these issues are discussed in more detail in the EMU study by HM Treasury *EMU and the cost of capital*.

5.22 The integrated US financial market may benefit investment through another avenue. The US has achieved high productivity with, what were until recently, relatively low overall investment levels. This suggests that the US economy is successful at allocating investment to high productivity projects. One factor behind this may be that the large, integrated and flexible financial market in the US can efficiently bring together firms and potential investors from across the country. The noticeable upturn in US investment levels in the 1990s primarily reflects the sharp rise in IT investment and is an illustration of how the US capital market can quickly allocate resources to new, productive sectors.

US monetary union and competition

5.23 Increased inter-regional trade and investment should boost competition. McKinsey Global Institute (2001) find that competitive pressure was the key driver behind the recent productivity acceleration in the US, largely because it forced businesses to improve operational efficiency (as set out in Box 5.1). Greater competition may also raise productivity by eliminating slack within individual firms, and at the industry level by driving out the least productive firms.

5.24 Importantly, the principle of open competition between firms across the US single market is enshrined in the Commerce clause of the Constitution, which reserves the power to regulate inter-state trade at the federal government level. Individual states are prevented from creating barriers to trade within the US – a critical institutional element of the US monetary union. Although banking has, at least to some extent, been subject to state restrictions (as discussed later in this section), even this sector has been opened up to greater competition in recent years.

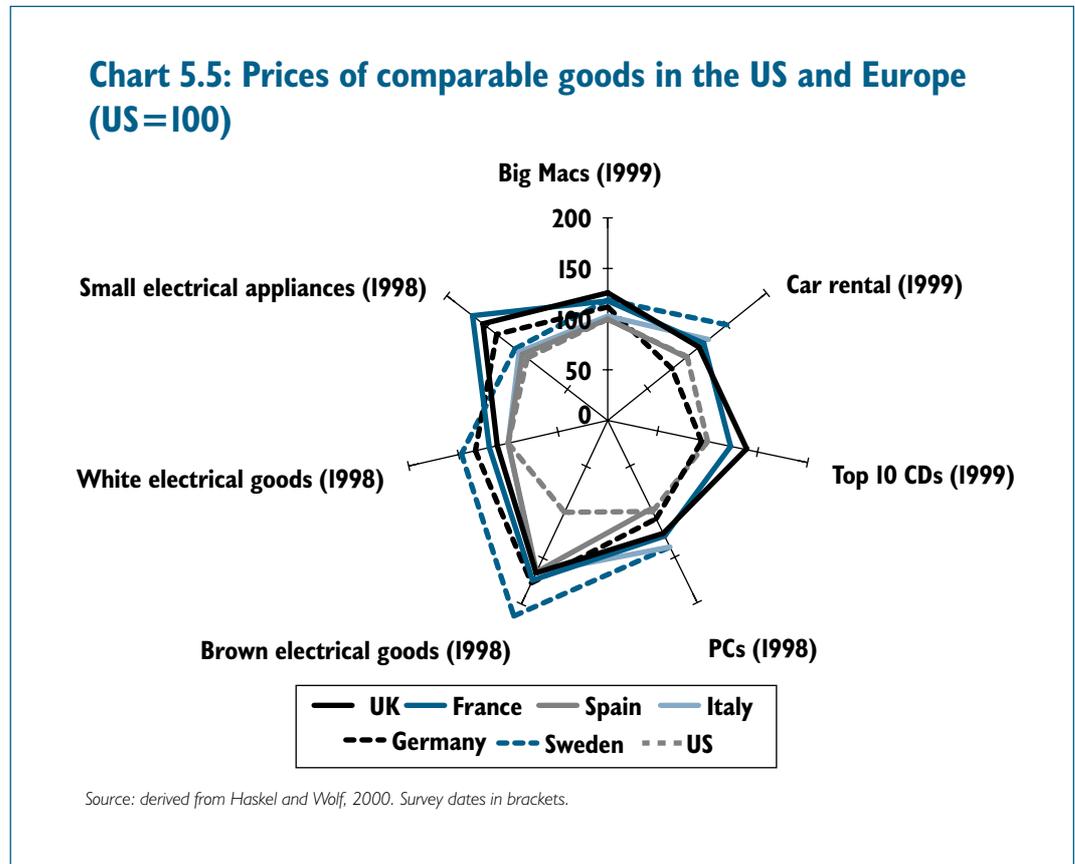
5.25 Over the long run, competitive forces should eliminate large price differentials between regions.⁴ So a key indicator of the level of competition in an economy is the degree of price convergence between regions. Prices are more easily measured and observable than trade data in the US, and so are a useful source of evidence on the degree of US market integration. (See the EMU study by HM Treasury *Prices and EMU*.)

Prices as an indicator of competition

5.26 Evidence quoted by Baily (2002) suggests that prices in the US are lower than in other major industrialised countries; on average US prices are 15 per cent higher than the lowest prices available among a set of countries, compared to 42 per cent higher in the UK, 62 per cent higher in Germany and 85 per cent higher in Japan.

⁴ Even in a perfectly competitive market there will be some variation in prices across regions, because of factors such as transport costs and differences in the prices of non-traded goods such as land.

5.27 Chart 5.5 below, derived from Haskel and Wolf (2000), summarises evidence on prices for a number of goods in the US, compared with major European countries. Although not the cheapest for all goods, the US stands out for consistently having among the lowest prices for all of the goods in the sample, which suggests higher levels of price competition.



Competition and monetary union **5.28** There may also be non-price competition not represented by these data. But accepting the premise that competitive pressures are stronger in the US, how much can be attributed to monetary union?

5.29 Parsley and Wei (2002) assess the relationship between exchange rate regimes and market integration, based on deviations in prices within economic regions and countries. Using data on prices for 95 goods in 69 countries worldwide over the period from 1990-2000, they compare the degree of goods market integration under different exchange rate regimes and find that:

- there is a much stronger integration effect in economies that adopt a more institutionalised exchange regime, such as a currency board or currency union; and
- goods markets are more highly integrated in the US than in other currency arrangements. Of course, this may reflect factors such as the US's common language and institutions as well as the currency union effect. Broadly supportive results are obtained by Rose and Engel (2001), who find that real exchange rates have much lower short-term volatility within currency unions.

5.30 Overall, this evidence supports the thesis that if the US regions or states had separate currencies, they would not be as highly integrated and competitive as they are now. Baily (2002) provides a neat summary of this effect, which also notes that to encourage an improvement in productivity, competition should not just be within the internal market, but also in the global marketplace:

“The 1990s economy experienced heightened competition in an increasingly deregulated economy with strong international competition. In particular, US service industries, which often compete on a global scale, sought out new technologies to improve their productivity. If the new economy were the result of a random surge in innovation, then all countries should have had similar changes together. After all, the new technologies are available globally. In practice, the US economy has been well ahead of most of the industrialised countries and a reason for this is that the United States has highly competitive markets in the industries that are using information technology.” (page 16)

5.31 But these competition effects must not be seen in isolation. The real exchange rate, working through prices, is a key adjustment mechanism in monetary union in the short to medium term.

5.32 Competition, brought on by rapidly changing technology and the loss of older, traditional industries, may also give rise to unemployment. The fact that US employment performance is so good serves to illustrate the value of flexible markets in reallocating resources from older to newer, emerging industries. This type of flexibility is important whatever the monetary arrangement, but membership of a monetary union puts an even greater premium on it (see the EMU study by HM Treasury *Modelling shocks and adjustment mechanisms in EMU*).

US monetary union and specialisation

5.33 Increased trade and investment within a monetary union, and higher levels of competition, may act to promote industrial specialisation, where regions specialise in certain types of economic activity. A survey of the evidence on specialisation is contained in the EMU study by HM Treasury *EMU and business sectors*.

5.34 Specialisation offers potential productivity gains because technology and knowledge spill overs may be higher if similar firms are located in geographical clusters. Clusters may build up considerable economies of scale which allow them to compete in both national and international markets. Krugman and Venables (1993) describe the case of Detroit's specialisation in motor vehicle production:

“Barriers to trade between national economies . . . are often enough to block the expansion of a successful industrial district beyond its national market. Detroit's initial advantage allowed it to crowd out its competitors [in motor vehicle production] in New York, Connecticut and Pennsylvania before World War I; no European automotive centre could do the same in the far less integrated European auto market.” (Krugman and Venables 1993, page 2.)

5.35 However, there is also the prospect, examined already in Section 2, that higher specialisation increases the risk of more pronounced asymmetric shocks. This depends critically on the type of specialisation that occurs. If different regions specialise in production common to the same industries (for example, if one specialises in car tyres while another specialises in engine production), the degree of similarity in shocks is likely to be greater than if they specialise in totally unrelated goods or services.

Specialisation in the US compared to the EU

5.36 A good deal of the research in this area compares specialisation in the US with the EU. It is difficult to provide precise comparisons because the data are affected by the size of regions sampled – smaller regions are more easily affected by the location of specific industries, and tend to distort the data. However, the US appears to be more specialised on most measures. For example, Table 5.1, reproduced from Krugman and Venables (1993), shows that employment in three specific sectors is more concentrated in individual regions of the US than in the EU countries. For example, 51.8 per cent of US steel industry employment is in the Midwest region. By comparison, Germany has the largest share of steel industry employment in the EU, but it accounts for only 20.2 per cent of this total.

Table 5.1: Shares of industry employment

Per cent	Steel	Cars	Textiles
US (1990)¹			
Northeast	13.4	7.9	14.2
Midwest	51.8	65.6	3.2
South	24.5	23.4	79.6
West	10.4	7.0	3.9
EU (1989)			
France	18.9	25.3	15.8
Germany	20.2	34.7	13.2
Italy	18.7	9.5	17.4
UK	15.8	13.0	18.6

¹ BLS census regions.

Source: Krugman and Venables, 1993.

5.37 Midelfart-Knarvik *et al.* (2000) also find that the US is more specialised than the EU on the basis of a measure of specialisation known as the Gini coefficient⁵ (see Table 5.2). They also show that US specialisation has been declining since the 1970s; the US Gini coefficient has fallen from 0.45 in 1970-1973 to 0.37 in 1994-1997. However, as noted by the authors, it is difficult to determine the forces driving these patterns, particularly since the majority of industries observed share the trend towards dispersion.

Table 5.2: Specialisation in the US and EU

	Gini coefficient			
	1970-73	1980-83	1988-91	1994-97
US average	0.45	0.41	0.39	0.37
EU average	0.25	0.23	0.25	0.26

Source: Midelfart-Knarvik *et al.*, 2000.

5.38 However, other studies have found that specialisation in the US is not necessarily higher than in the EU. Peri (1998) found that in 1986 the degree of specialisation in the US was about the same as that in Europe. Clark and van Wincoop (1999) use data on ten broad categories of manufacturing and services and conclude that US regions are, on most measures, less specialised than the EU and that between 1981 and 1995 the US became less specialised.

⁵ The Gini coefficient is a measure of specialisation that summarises the distribution of production across industries in a given country. A higher coefficient indicates a higher degree of specialisation.

Interpreting the evidence on specialisation **5.39** One explanation of these different results relates to the level of industrial aggregation used. The US seems to be more specialised at a high level of industrial disaggregation, while at more aggregate levels it is less specialised than the EU.

5.40 It is specialisation at more aggregate levels that tends to influence the degree of business cycle convergence – hence while US regions appear to have specialised at disaggregate levels of industry, this does not necessarily imply more business cycle divergence than would otherwise be the case. Indeed, Clark and van Wincoop (1999) find that as specialisation decreases across the US, business cycle correlations also fall.⁶

5.41 Thus, while Section 2 of this paper notes that industrial structure in the US is a factor in regional economic divergence, the results do not support the conclusion that monetary union, by facilitating specialisation, has contributed to greater divergence in regional business cycles.

5.42 Indeed, given the strong economic performance of the US economy over the past fifty years, it seem likely that the microeconomic benefits of specialisation have outweighed any potential macroeconomic costs. The fact that the US economy is able to adjust to regional industry shocks, through financial market risk sharing and labour mobility, will also have helped to reduce the potential macroeconomic costs.

US monetary union and financial markets

5.43 US financial markets are frequently thought of as a key contributory factor to strong US economic performance in recent years – promoting the availability of relatively low cost and easily accessible capital to finance new investment. The depth and liquidity of financial markets may in part be a function of the single currency, with finance available without exchange rate risk or transaction costs from across the US.

The impact of monetary union on the development of US financial markets **5.44** The development of US financial markets started with the formal creation of monetary union in the late 18th century and the ratification of the Constitution in 1788. After US independence, the first Treasury Secretary, Alexander Hamilton, proposed a series of reforms to the US financial system, many of which tended to favour the creation of federal structures and institutions at the expense of each state's authority. State debts were to be restructured into newly created Treasury securities, and the Federal Government was given the authority to raise revenues from customs duties and excise taxes, thus allowing it to pay interest on debts. In addition, Hamilton proposed the creation of the First Bank of the United States to assist in federal financial operations, and to lead the development of a nationwide banking system (Sylla, 1995).

5.45 The impact on financial markets was that active, regulated trading markets emerged for the exchange of federal securities, notably in the three cities where banks had first opened – New York, Philadelphia and Boston. The emergence of trading markets made the issue of equity securities more attractive to investors because they could be easily bought and sold.

The location of financial markets in the US **5.46** An important issue for the UK is how monetary union impacts on the location of financial activity. The EMU study by HM Treasury *The location of financial activity and the euro* considers the key drivers of financial market location. The US example is particularly useful because the existence of financial markets pre-dates both the creation of the political centre of gravity in the US around Washington DC and the huge territorial expansion of the 19th century, which integrated vast new areas into the economy. By examining this evolution,

⁶This result appears intuitively odd, but may reflect the fact that specialisation, depending on how it is measured, need not be correlated with divergence in business cycles.

BOX 5.2: US financial services history and location

The first three banks in the US were founded in three cities – New York, Boston and Philadelphia – in the 1780s. These were local banks, isolated from each other in the absence of any banking system. It was also in these three cities that the first securities markets developed, to be followed by Baltimore soon afterwards. Significantly, the establishment of US securities markets precedes the establishment of the nation's capital in Washington DC.

In today's terms, the three markets appear relatively close geographically. New York and Boston are around 200 miles apart, while only 100 miles separates New York from Philadelphia. However, communication delays existed between the cities in the early days which helped each to establish and grow independently — it took a couple of days to travel between Philadelphia and New York, and a further week to Boston. Despite this, Sylla (1998) finds evidence of integration and efficient pricing between these three major markets from the beginning. Sylla also notes that New York was the most active of the markets, even though Philadelphia was widely regarded as the leading financial centre.

New York's role as the pre-eminent US port appears to have helped its financial development. Merchants from elsewhere in the US needed exchanges in New York to pay for their goods. The connections between the banking and securities markets were also critical. Indeed, Banner (1998) argues that by 1840, New York had established itself at the centre of securities trading in the US. The development of the telegraph helped cement this position because, by the 1850s, New York was effectively setting stock prices for other large US cities.

As the country expanded, it was the Northeast US that witnessed the most rapid development of financial markets and banking. By 1830, Sylla (1998) records that the New England and Mid Atlantic regions of the US were home to roughly 86 per cent of US banks and 72 per cent of banking capital. In part, this may reflect inter-state banking restrictions; East coast banks were forced to issue securities because they were unable to loan directly to the West, where investment capital was in strong demand.

The early strength of the Northeast stock markets probably also helped to stymie the development of some financial markets in the South and West. Atlanta and Dallas emerged as regional banking centres in the South, yet many banks in these cities chose to insure against large credit demands by linking with banks elsewhere in the country. Odell and Weiman (1998) report that in 1880, 90 per cent of Georgia banks had turned to banks in New York for their primary correspondent^a while the figure was 97 per cent for Texas. In this way, New York's early-mover advantage was reinforced. The rapid spread of banking post-1880 stimulated demand for regional banks, which tended to concentrate around the railroad hubs – Atlanta and the twin cities of Dallas-Forth Worth in particular.

By the time the Federal Reserve was founded in 1935, Atlanta and Dallas were the dominant regional financial centres in the Southern US. Both were chosen as homes for regional Federal Reserve banks, which arguably helped their positions as regional financial centres (see Odell and Weiman, 1998).

The importance of Chicago as a financial centre owes much to its location. The Chicago Board of Trade was formed in 1848 for the trading of agricultural commodities, and it was this specialism that led to the development of futures contracts. To get round problems of storing corn throughout the cold winters, merchants bought from producers, and used the Chicago markets to sell to processors at an agreed price, for delivery in the following spring. The first recorded futures contract took place only three years after the exchange's birth and laid the foundations for Chicago to become the world's largest derivatives exchange.

^a A bank that accepts deposits and performs banking services for other depository institutions.

and the pattern of financial location today, it is possible to identify whether economic integration has influenced the location of markets. A summary of some of the main historical influences on US financial market location is contained in Box 5.2.

5.47 The involvement of different sectors and different geographical areas provides anecdotal support to the suggestion that monetary union between the different US states contributed to the early development of US capital markets. However, it is difficult to disentangle the effects of monetary union from political union – the creation of federal level Treasury securities was also an important factor in the development of US capital markets.⁷

**Financial market
regulation in the
US**

5.48 US capital markets do not have a single regulator (see Box 5.3). Regulation has tended to take an evolutionary approach, developing in response to need, rather than following an *ex-ante* model of regulatory organisation. In part, this is a function of a reluctance to centralise, particularly the banking system, and shift power from the state to the federal level. The degree of regulatory overlap between different bodies is limited by statutes and agreements between institutions. For example, an agreement between the Federal Reserve, the Office of the Comptroller of Currency and the Federal Deposit and Insurance Corporation (FDIC) assigns primary supervision among them, and a degree of co-ordination is achieved through the Federal Financial Institutions Examination Council (FFIEC).

5.49 Far from hindering development, this decentralised approach to regulation may well have benefited the development of US financial markets. The ‘dual’ system of banking (state versus national banks) was often seen as a means of preventing one bank or a cartel from gaining excess market power. It was to preserve this status that, until recently, banks which were members of the Federal Reserve were prohibited from branching outside of their home state.

5.50 US regulatory decentralisation has possibly also helped market innovation, allowing individual states to innovate with different regulatory practices and quickly respond to the development of new banking practices. Greenspan (1998) argues that “*the dual banking system also offers protection against over zealousness in regulation by permitting banks to have a choice of more than one federal regulator by the act of selecting a state or federal charter*”. By not sticking rigidly to a specific, *ex-ante* institutional design, the US system is arguably good at reacting to new products, and corporate developments such as the blurring in recent years of boundaries between banks, investment banking services and insurance. Regulators, at both the state and federal level, are forced to compete and respond effectively to the changing demands of the industry.

⁷The development of securities markets also helped the US to expand territorially. The US was able to borrow from European investors to finance the purchase of the Louisiana territory from France in 1803 (Sylla, 1995).

Box 5.3: US financial services regulation

The US operates without a single financial services regulator, in contrast to the current UK model. Patterns of regulation vary according to the type of business carried out:

- **insurance business** is regulated at a state level, though the National Association of Insurance Commissioners (NAIC) aims to help co-ordinate the regulation of multi-state insurers;
- **banking regulation** varies according to the particular type of bank and the business being conducted. A key distinction is between State Banks, chartered by state governments, and National Banks chartered at the federal level by the Office of the Comptroller of the Currency:
 - for National Banks, the Office of the Comptroller is the main regulator, and all are required to be members of the Federal Reserve System. The Federal Reserve System also has supervisory power over bank holding companies, through which the majority of banks are organised;
 - State Banks are subject to sub-federal regulators at the state level, such as the New York State Banking Regulator (NYSBR);^a
 - deposits of both state and national banks are insured by the Federal Deposit Insurance Corp. (FDIC), which has supervisory power over any institution that it insures. All banks that are members of the Federal Reserve System must insure their deposits with the FDIC; state banks do not have to, but most choose to do so; and
 - savings and loans and credit unions each have their own state or federal supervisor (or both).
- **securities trading** is largely regulated by the Securities Exchange Commission (SEC) at the federal level, with derivatives trading regulated by the Commodities and Futures Trading Commission (CFTC). State-level regulators also exist, but the SEC and CFTC retain primacy.

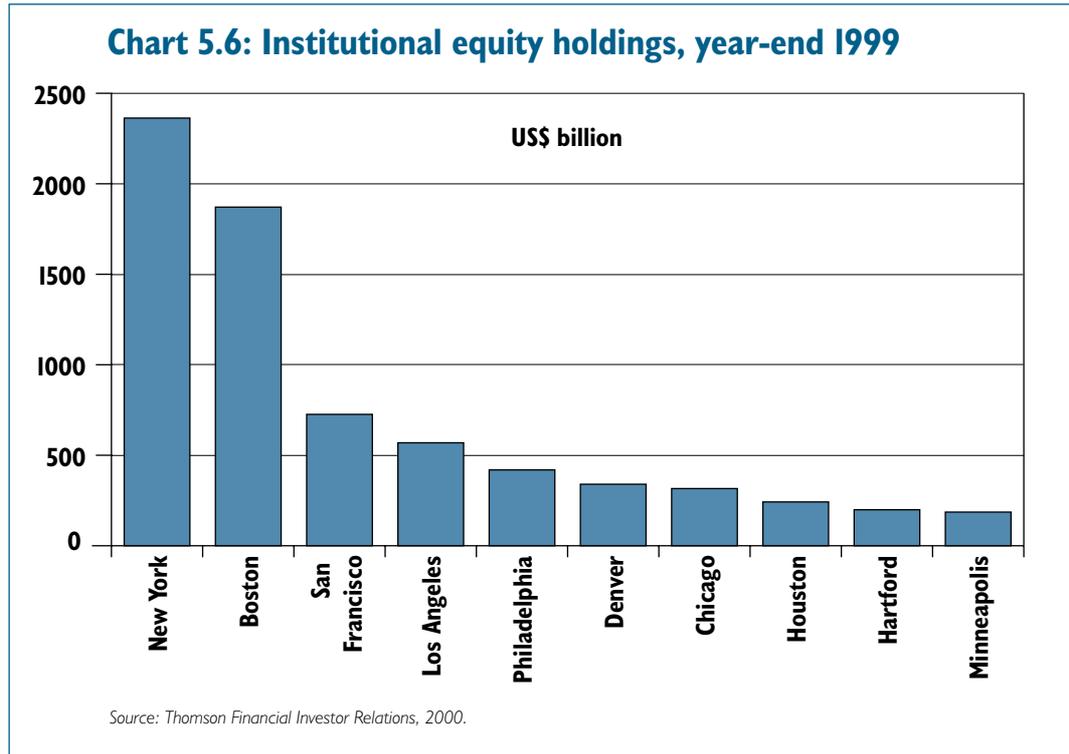
^aThere are two kinds of State Banks: Members (of the Federal Reserve System) and Non-Members. Members are supervised by the Federal Reserve in cooperation with the state supervisor; Non-Members (mostly small banks) are supervised at the federal level by the FDIC, also in cooperation with state supervisors.

5.51 This does not offer a guarantee that there could not, in the future, be disturbances to the financial system. Historically, the US regulatory system has shown itself capable of adjusting to meet specific challenges – *ex-ante* it is difficult to identify an area in which the current system is lacking. Moreover, concerns that regulatory competition would lead to a ‘race-to-the-bottom’ in regulatory standards do not appear to have had foundation.

The current position: equity holdings

5.52 Having established the historical evolution of US financial markets, this section considers the current position of the sector. Chart 5.6 illustrates the relative importance of major US cities in terms of institutional equity holdings:

- the US fund management industry is dispersed over several different centres, although New York and Boston are dominant; and
- the three original centres of finance in the US remain important today. New York and Boston are still the two largest centres for equity management despite 200 years of integration and the two cities being a relatively short distance apart. Philadelphia also remains an important centre.

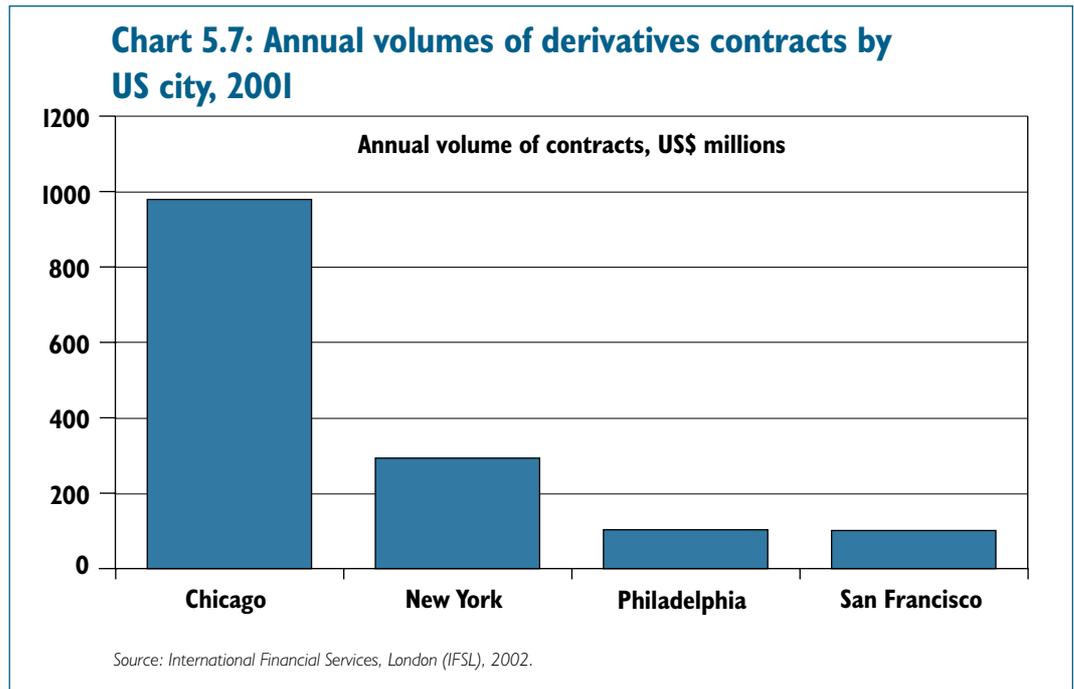


5.53 Although New York is the largest base for US equity management, its share has declined in recent years. The passage of the Gramm-Leach-Bliley Act in 1999 accelerated consolidation within the securities industry, and the cost of doing business in New York has drawn increasing attention. New York's share of securities industry employment declined from 39 per cent to 26 per cent between 1980 and 2001 according to the Securities Industry Association (SIA), who also note that a number of major financial institutions have reacted to rising rents by relocating at least some of their operations to nearby New Jersey (SIA, 2001).

Derivatives trading

5.54 Chart 5.7 indicates that Chicago, the city in which derivatives were first developed, maintains its advantage in this market. This is despite New York being a more important financial centre overall. Chicago maintains a greater degree of dominance in the derivatives market than does any city in the fund management industry, partly a result of having merged with a number of other Mid-West exchanges in the 1940s and 1950s.

5.55 These patterns suggest that there is a degree of first-mover advantage in financial market business. Those cities where markets develop first (whether by historical accident or technical expertise) have retained a significant part of their business even in the face of competition from other cities. This suggests that agglomeration effects may be quite long-standing, as financial networks and expertise develop in particular areas. This also appears to sustain itself in the face of at least some innovation in the industry. Chicago developed as a derivatives market because it was the pre-eminent commodities trading city in the US. More recently, it has been derivatives on exchange and interest rates that have grown significantly – yet Chicago has gained a dominant position in this market too.



5.56 The data also suggest that different financial centres can co-exist in a monetary union, even within a relatively small geographical area. Four of the top ten US fund management centres are located in the North East US (New York, Boston, Philadelphia and Hartford), while a further two are located in California (Los Angeles and San Francisco). While other more regional markets such as Minneapolis, Denver and Houston have developed, there does not appear to be any strong evidence of either dispersion of business across the country or strong regional consolidation. In addition, the data show it is possible for cities to specialise in different markets within a single currency area, and for a city to be a leader in one market but a minor player in others.

Conclusions: microeconomic benefits of monetary union in the US

5.57 In the absence of a counterfactual, and because the US economy has been subject to many technological, taste and output shocks, it is difficult to identify the benefits of even an established, successfully functioning, monetary union. The US is a wealthy nation, with high levels of productivity and employment. Is any of this due to the existence of monetary union?

5.58 Although impossible to quantify, the answer is almost certainly yes. The size and integration of the US economy has contributed to a high degree of competitive pressure, trade between its various regions and opportunities for factors of production to move efficiently across a large economic area in order to exploit efficiencies. Of these, the competitive effects derived from the existence of a single, trans-continental market with a single currency, are arguably most easily identified.

5.59 The US also benefits from having a high degree of flexibility. Section 3 shows that labour market adjustment mechanisms, particularly employment flexibility and labour mobility, facilitate a relatively rapid reallocation of resources when US regions experience region-specific shocks. High flexibility alleviates the effects of such shocks on the overall performance of the economy.

5.60 Similarly, there has been a beneficial impact from the development of the financial markets in the US. The creation of monetary union probably helped the initial development of US financial markets – and features of the early US economy helped cities such as New York and Boston to establish an early advantage in financial services. Since then, long-standing patterns of location in financial markets appear to have been sustained, despite innovation in financial markets.

5.61 The US capital market is important for two reasons. On the one hand, the availability of deep, liquid financial markets has almost certainly contributed to US economic performance, providing capital efficiently to firms across the country. On the other hand, they have also probably contributed to the successful functioning of the monetary union – in terms of providing a means for US investors to share risk across the country (discussed in Section 3), helping disperse the effects of asymmetric shocks.

5.62 Other factors have also helped – for example, an entrepreneurial spirit, and the regulation of inter-state commerce at the federal level, which has helped to preserve the single market and prevent barriers to trade being erected at the state level. But the size of the US single market has almost certainly been an important factor in achieving a high level of productivity, and the single currency has almost certainly facilitated this.

6

CONCLUSIONS: THE US AS A MONETARY UNION

6.1 This study has considered how the US functions as a large economy with a single currency, and how this has contributed to economic performance. To do this, the study has examined the costs and benefits of monetary union in the US; assessing the degree of divergence in regional business cycles; how regions adjust to a single monetary policy; and how the existence of a single currency has benefited the US in terms of both macroeconomic and microeconomic performance.

6.2 The conclusions of the study provide valuable evidence for some of the key issues considered in HM Treasury's assessment of the five economic tests:

- a monetary union can survive (and prosper) with quite varied business cycles, and in the presence of asymmetric shocks;
- various adjustment mechanisms exist to help regions adjust to asymmetric shocks, but tend to be appropriate for different kinds of shock. For example, labour mobility is higher in the US than in Europe, but its effectiveness in adjusting to temporary shocks may be limited;
- US federal fiscal policy plays a far greater role in assisting regional adjustment than EU fiscal policy does in Europe. But in Europe, national fiscal policy assists regional adjustment much more than state level policy does in the US. Overall, fiscal policy appears to provide as much, if not more, assistance to regional adjustment in Europe than in the US;
- consumption has been more stable, on average, in the US than in other G7 economies since 1980, indicating that deep, well-integrated financial markets have helped US households and business to spread risk;
- the single currency has almost certainly helped stimulate inter-state trade and investment, and provided a spur to competition, which appears to be significantly more intense in the US than in Europe; and
- the single currency in the US appears to have aided the development of US financial markets, but does not appear to have influenced changes in the location of financial market activity to any significant degree.

6.3 The study does not draw direct conclusions from this evidence for EMU or the question of possible UK entry. A direct comparison between the US and euro area is difficult for a number of reasons, most notably that the institutions and policy frameworks of the US monetary union have evolved over a significant period of time in response to economic need, and not according to an *ex ante* design as in the euro area.

6.4 Moreover, the political context for the two monetary unions is very different. Ultimately the US states chose federal structures for fiscal policy to underpin political union. In the EU, fiscal policy is the responsibility of Member States – as set out in the Stability and Growth Pact, and subject to the provisions of the EC Treaty.

6.5 This suggests that perhaps the most important lesson from the US experience is that a key feature of a successful monetary union is a high degree of confidence that, should difficulties occur, both the economic and institutional structures of the union have the capacity to evolve and meet emerging challenges.

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Wynne, M. A. and Koo, J. (2000) 'Business Cycles Under Monetary Union: A Comparison of the EU and US', *Economica* (67), pp. 347-74.

A1 When the Articles of Confederation were ratified in 1781, the US comprised 13 states and occupied only a small part of the area that it now does. But the formative country was expanded in several steps, including: the Louisiana purchase of 1803 from France that, in bringing Western and Southern regions into US hands, almost doubled the size of the country; and, victory in the Mexican War, which brought the land of 7 future states, including Texas and California, into the Union (1846-48). The country covers a diverse range of physical topography – from the desert regions of the West (e.g. Nevada, Arizona), mountainous regions (e.g. Colorado, Western Montana) to the rich agricultural plains of the Midwest (e.g. Kansas, Nebraska, Indiana).

A2 Monetary union in the US arguably began with the ratification of the Constitution in 1788. Prior to that time, currency had varied across the formative country, in part reflecting different colonial heritages – sterling and the Spanish peso were accepted across the states, and individual colonies attempted to introduce paper currencies of their own. Generally speaking, these monies could not be exchanged for gold or silver, and were known as ‘bills of credit’ – the best known of which was the ‘continental’, issued by the Federal Government during the Revolutionary War. Even after the War, each of the colonies was able to issue their own bills.

A3 The Constitution changed this, making the first real steps toward a monetary union. Kim (1997) argues that the Constitution laid the political foundations for economic integration “...by prohibiting taxes and duties on interstate commerce and by ensuring interstate mobility of people and capital” (page 5). It also gave Congress the exclusive right to coin money, and prevented individual states from issuing their own paper money. By creating a monetary union in this way, the Constitution aimed, in part, to defuse tension between states that had disagreed widely on how monetary policy should help the agricultural sector recover from a period of rapid deflation (Rockoff 2000).

A4 An alternative option would have been for the states to pursue greater integration through fixing the value of the states’ currencies with respect to one another (i.e. without the adoption of a single currency). Rolnick *et al.* (1993) argue that the states viewed such a system as undesirable, because it would have allowed individual states to increase their own rate of money supply at the expense of others, earning seigniorage revenue in the process, and potentially driving up the rate of inflation. Experience of high inflation due to the over-issue of the continental was also fresh in many minds – indeed, the continental depreciated so much during the course of the war that it gave rise to the saying ‘not worth a continental’. Thus, the institutional arrangement of giving up, to the Federal Government, the power to issue money, was seen as an essential step toward economic integration.

A5 The United States dollar was introduced in early 1792. From this point, individual states were unable to issue their own currency, although both the Federal Government and private banks retained the right to issue their own banknotes. Just prior to this, the first US Treasury Secretary, Alexander Hamilton, suggested the establishment of a first central bank – the First Bank of the United States, established by Congress in 1791. Based in Philadelphia, the Bank was the largest corporation in the US, and was responsible for issuing a paper

money across the country of uniform value. But due to worries over the size and power of the central bank, it was wound up when its 20-year charter expired in 1811,¹ as the bank was often seen as representing the wants of the privileged over what remained a largely agrarian population. Similarly, the Second Bank of the United States, established in 1816, was also dismantled after its 20-year charter expired, and a further 77 years would pass before the US would again have a central bank, with the creation of the Federal Reserve System. Thus, despite the move towards a single currency, moves toward creating a central bank in the US took longer.

A6 Following the demise of the Second Bank, the ‘Free Banking Era’ reigned, during which a huge number of state-chartered banks operated without federal regulation. Almost anyone was able to issue currency, so a variety of paper monies circulated at any given time. Rolnick *et al.* (2000) argue that since no bank regulation provided for costless par redemption, this initial attempt to introduce a common currency was a failure. It is estimated that by 1860, roughly 8000 different banks were circulating ‘broken’ currency,² so called because the banks frequently failed, making the notes worthless. The National Bank Act, passed in 1863 ended this period, and established a national banking system for the first time. Newly created National Banks became responsible for issuing a uniform paper currency, backed by the purchase of government securities, and in 1865, a 10 per cent tax on state bank notes was introduced, effectively pushing them out of existence.

A7 The US Civil War lasted from 1861 to 1865. Eleven states seceded from the Union to form the Confederate States of America in the period between December 1860 and May 1861, as arguments over slavery, tariffs, and the integration of new territories in the West caused friction between states. To finance the war, the government broke the link between the dollar and gold, and issued its first paper money since the continental, the greenback – so called because it was printed in green ink – between 1861 and 1862. But this change did not reach across the entire country, as the Civil War had the effect of dividing the nation into three monetary areas. The southern states used a money standard based on the Confederate dollar (backed by cotton), while the East and Mid West used a standard based on the greenback. The Pacific states, meanwhile, continued to use gold as the standard for their currency.

A8 With the fall of the Confederacy in 1865, the southern states moved to the same greenback system as the Northeast. From 1863, the National Banks had begun issuing currency. Yet the Pacific states remained on the gold standard for some time; so despite the achievement of political union, two currencies circulated at a floating exchange rate. Interest rates tended to be higher in the Pacific states. The two were reunited in 1879 when the US returned to the gold standard at the pre-Civil War parity level. Kim (1997) argues that in the aftermath of the Civil War, both political and economic forces worked in tandem to bring the states together more closely together.

A9 Despite this, opposition to the gold standard was widespread, particularly from farmers faced with declining real prices as deflation persisted – William Jennings Bryan³ pleaded that the US should not “*crucify mankind on a cross of gold*”. The 1890s saw strong pressures to move to a bimetallic system, but the arguments were weakened as new gold discoveries were made, and mining techniques improved. As a result inflation began to pickup, easing the pressure on farmers, and the US was able to reinforce its commitment to the gold standard with the Gold Standard Act of 1900.

¹ Opposition to the creation of the bank, led by Thomas Jefferson, arguably provided one of the key policies around which political parties crystallised.

² Source: Federal Reserve Bank of San Francisco, online exhibit of American currency.

³ US Congressman, three-time Presidential nominee, and later, US Secretary of State.

A10 Recurrent banking crises throughout the second half of the 19th century raised dissatisfaction with the banking structure. The discipline of the Gold Standard meant that, in the event of a domestic banking crisis or stock market crash, the money supply could not respond quickly enough to avert panics – the system was not flexible enough to inject liquidity into markets. Broaddus (1993) comments that the era was characterised by significant volatility in short-term interest rates, with short-term spikes of more than 10 percentage points not uncommon. Following a severe banking panic, the Aldrich-Vreeland Act of 1908 recommended the creation of a central banking authority, and established a commission to examine long-term solutions to banking and financial problems. This was ultimately to lead, in 1913, to the signing of the Federal Reserve Act into law by President Woodrow Wilson, which gave birth to the new central bank – the Federal Reserve (the Fed). Romer (1999) argues, “... *it is reasonable to say that monetary policy as we mean it today did not exist before World War I*” (page 17).

A11 Yet even then, the Fed continued to evolve. Romer suggests “...*monetary policy first arose as an important cyclical force – for good or ill – in the 1920s and 1930s.*” (page 18). The early history of the Fed was marked by disputes between those who wished to centralise power with the Board of Governors of the Fed, based in Washington DC, and those who wished to see more power rest with the 12 regional banks making up the Federal Reserve System. There were accusations that monetary policy was being set for New York financiers, without consideration to the problems that caused for land-owners in the Plains. Eichengreen (1991a) argues that the evolution of the Fed in the 22 years to 1935 (and the signing of the Banking Act of that year) was a direct response to an inadequate framing of the Fed’s operations and available instruments in the 1913 Act. See Box A1 for more detail.

A12 The responsibilities and functions of the Fed have changed over time through a number of legislative acts. The Fed began to use open-market operations widely in the 1920s, and a separate legal entity, the Federal Open Market Committee (FOMC) was established in 1935 to conduct such operations and control the money supply. Up to 1951, the Fed largely supported the fiscal policy goals of the US Treasury, as a means of financing the War effort. The Treasury-Federal Reserve Accord of 1951 formally ended this obligation, and emphasised the independence of the Fed to pursue discretionary policy. The Fed has subsequently remained strongly independent in its pursuit of its monetary policy objectives.

A13 As an indication of the kind of economic pressures facing the early monetary union, Rockoff (2000) draws on optimal currency area theory (after Mundell 1961) to argue that, from an economic point of view, separate currencies might have been preferable for some regions during much of the 19th century:

- by world standards, the major census divisions of the US were large economies in their own right;
- they each specialised in certain goods, which made them susceptible to asymmetric shocks – the geographical diversity of the US no doubt contributed, since the early US economy relied greatly on agricultural produce that tended to specialise according to regional climates and soils etc; and

Box A1: The early years of the Federal Reserve System^a

Eichengreen (1991a) notes that the Fed evolved considerably in its first 22 years, in response to weaknesses in its original form. The 1913 Act set up a structure around 12 district reserve banks and a central board – the Federal Reserve Board.

Initially, the individual reserve banks issued their own bank notes, which traded at fixed exchange rates against one another – and each had to be backed with gold. But the districts were left to control their own policy on discount rates by the 1913 Act, which was largely ambiguous on the relative power and roles of the district banks versus the central board. Eichengreen states that as early as 1915, two years after the inception of the Federal Reserve System, the Governors of the reserve banks complained that the Board was “*exceeding its authority in the specificity and scope of its instructions regarding discount policy*”.

The Act did not make any provisions for the co-ordination of open-market operations either (the buying and selling of securities by the central bank, generally used to control the money supply) – thus raising the possibility that reserve banks might end up bidding against one another when entering the market. Such operations were widely used by the districts, although only for the conduct of monetary policy after 1922. And it was in 1923 that the Open Market Investment Committee (OMIC) was created, under the supervision of the Board, to centralise securities purchases and sales. Even then, however, the individual reserve banks retained the right to opt out of centrally recommended operations.

Criticism of the OMIC was widespread amongst the Southern and Western banks that were not represented, particularly given the overall supervision of the central Board. In response, a 12-member committee, the Open Market Policy Committee (OMPC), representing each of the 12 reserve banks was formed. But even this still left unclear exactly who was responsible for the final say over open-market operations, and still allowed reserve banks to opt-out of OMPC operations.

But with the creation of the Federal Open Market Committee (FOMC), a body given legal standing under the 1933 Banking Act, final authority of operations was clarified and centralised in Washington with the Board. In 1935, the Board was renamed the Board of Governors of the Federal Reserve System, and was given formal responsibility for relations with foreign central banks. At the same time, the FOMC was legislated to comprise the seven members of the Board of Governors, plus 5 representatives of the reserve banks – chosen to represent the whole US, rather than simply the Northeast and Mid-West as had happened in the 1920s. And for the first time, the decisions taken by the FOMC were binding on the reserve banks, which could no longer choose which recommendations they followed.

^a This summary account draws heavily on the much fuller account in Eichengreen (1991a).

- the adjustment mechanisms available to offset these shocks were limited. There was limited labour mobility between regions (particularly between the North and the South, both before and after the Civil War), while the fragmented banking system contributed to capital immobility. The Federal Government, which accounted for a relatively small share of GDP, was unable to offset regional shocks through fiscal transfers. Indeed, throughout most of the period described above, there was no clear notion of fiscal policy as a tool of economic management. Fiscal policy was decentralised first at the state level, and then at the local government level, and its role was to promote economic development through infrastructure investment and legal innovation to promote corporations and banks.

A14 As such, there is evidence that regional shocks were severe in the early stages of the monetary union. A regional shock would often induce concerns over the solvency of the regional banking system (which was highly fragmented, it was not until the late 20th century that prohibitions on interstate banking were lifted). Balance of payments problems ensued, and bank reserves would be run down due to an inability to devalue the regional currency. These problems were frequently exacerbated, and transmitted to other regions of the monetary union, by pressure for fundamental reform of the monetary system – increasing uncertainty about the existing frameworks. Yet even in these early years, when the regions were relatively isolated from one another, Kim (1997) points out that regional incomes were quite similar – although this data excludes the slave population in the South, that would show regional per capita income significantly lower than other regions.

A15 So despite having monetary union from the late 18th century, Kim (1997) argues that the United States only progressed from being a set of regional economies to an integrated national economy between the 19th and 20th centuries. As integration proceeded, it allowed for greater specialisation in manufacturing and agriculture, leading to stronger regional patterns of production. In addition, regional factor endowments, particularly for manufacturing resources such as energy and minerals, varied widely, contributing to regional variation in industrial structures. In turn, regional per capita income also began to diverge as a result.

A16 This process of integration was driven by a combination of economic factors and policy by the Federal Government:

- a national transportation system began to emerge. The greatest spur to better infrastructure was provided by the states themselves, who competed to facilitate business in their locales by improving transport systems. As the federal government assumed greater prominence in the post-Civil War period, it subsidised the building of transcontinental rail. Between 1860 and 1890, national railroad mileage increased from 30,626 to 166,703;
- labour mobility began to increase. In the early 19th century, the population was largely concentrated among the eastern states. As the population grew, people began to migrate west to utilise good quality agricultural land in the plains. The greater mobility of labour continued into the 20th century; Fishback *et al.* (2001) note US census statistics which record that 11 per cent of the US population moved in the years between 1935 and 1940, and that 40 per cent of these moves crossed state lines; and
- finally, changes to institutions cemented the union. The Gold Standard Act of 1900 removed much uncertainty about monetary institutions in the US, ending controversy over the monetary standard used to underpin the currency. The Treasury began to carry out central-banking activities. At the beginning of the 20th century, it started to intervene frequently and regularly in the money market, converting what had up until that time been emergency measures into a more regular and predictable operating function. As noted previously, the formalisation of central banking was strengthened by the establishment of the Federal Reserve in 1914, giving central control over most of the banking system and providing an agency that could deliberately intervene to alter domestic money supply.

AI7 The US faced probably its most severe economic problems in the 1930s. The stock market crashed in 1929 and a severe monetary contraction began in the nation's heartland. Several large bank failures led to a series of liquidity crises and further panic led to probably the worst banking crisis in American economic history. One third of banks disappeared within two years. The problems were, it is sometimes argued, exacerbated by the Federal Reserve policy that tightened monetary conditions, contributing to a sharp recession that prolonged the Great Depression.

Box A2: The Great Depression

The Great Depression of the late 1920s and early 1930s was the most significant 20th century event in US economic history. Driven by strong growth through the 1920s, stock market speculation had fuelled a boom in security prices, arguably creating a speculative bubble. In tandem, household debt rose, as did business liabilities. A near crash in March 1929 demonstrated the vulnerability of the markets, but monetary policy remained contractionary, even as industrial output began to slow that year. In October, the bubble began to deflate – and stock prices fell rapidly.

As they did, finance became harder to come by for business, and production began to fall. As the money supply contracted, the Federal Reserve acted to increase liquidity. But as investors shied away from equity, there was a more general move towards cash. Savings were withdrawn from banks, and the number of bank failures began to increase – slowly at first, but the numbers began to pick up significantly in the summer of 1931. As prices fell, debt-holders saw their burdens rise in real terms, and there was a growing number of defaults on domestic bank loans.

The US was not the only country that suffered. Commodity price falls spread the pain to many developing countries, while the desire to maintain fixed exchange rates caused problems for many Western economies. These commitments were to prove unsustainable. The Bank of England suspended the gold standard in September 1931 which appeared to raise the prospect of the dollar being devalued, which the Federal Reserve resisted by raising US interest rates sharply.

Expansionary policy was resumed in 1932 through open market operations, though only temporarily – some of the Federal Reserve banks began to run short of gold reserves. Meanwhile, the wave of bank failures gathered pace, reaching a peak in March 1933. Following an appeal from the New York Fed, the newly inaugurated President Roosevelt declared a 'bank holiday', shutting the banking system down, and imposing controls on foreign exchange trading as a means of giving time to devalue the dollar. Once free from the fixed exchange rate, the dollar depreciated by more than 30 per cent against sterling.

The US recovery began soon afterwards, but the impact of the slump was difficult to shake-off. Temin (1994) points out that unemployment remained in excess of 15 per cent until 1940, leading him to conclude that the Depression lasted throughout the 1930s.

AI8 The Depression can be seen as part of a wider process of evolution in US institutions and policy, leading to policy changes that ultimately strengthened the functioning of the monetary union. Over the course of the following decades, the institutions of the US evolved in a number of ways, strengthening the monetary union. These included:

- the development of federally funded transfer programs, such as unemployment insurance, social security etc. – which, as discussed in Section 3, help regions adjust to asymmetric shocks;

- the Federal Government increased spending significantly. The New Deal⁴ and major public works projects (the 1930s witnessed unprecedented spending on roads, dams etc) contributed to a significant rise in federal government spending. Federal government outlays grew from 3.4 per cent of GDP in 1930 to 12 per cent in 1941, immediately prior to the US becoming involved in World War 2. The later addition of Medicare⁵ and other ‘Great Society’⁶ programs in the 1960s cemented this shift, offsetting a decline in defence spending in the early 1970s; Federal Government outlays in 2002 were estimated to be just under 20 per cent of GDP⁷;
- spending under many of the New Deal programs varied state by state – spending per capita was some three to four times higher in the West than in many Southern States. Fishback *et al.* (2001) suggest that variation in program spending had a significant effect on migration in some cases, public works spending being one program that they find contributed significantly to migration into the county in which the money was spent. Migration is also likely to reflect the fact that widespread job losses due to the Depression will have reduced economic ties to their original home county/state for many people;
- the introduction of a federal deposit insurance system in 1934, that appears to have stopped the recurrent problem of regional banking crises. Prior to this, weak banking systems often caused asymmetric real shocks to develop into a nation-wide banking panic. Following the ‘bank holiday’ of 1933, the Federal Deposit Insurance Corporation (FDIC) was set up as an independent government corporation, insuring deposits against bank failure and regulating some aspects of the banking system. As a means of restoring public confidence in the system the FDIC has been largely successful – bank failures in the US have, except in the late 1980s and early 1990s, become a rarity;
- the enabling of the Federal Reserve System to function as the lender of last resort, allowing monetary policy to react more quickly to economic downturns and contain regional banking problems;

⁴ Domestic policy programme of President Franklin D. Roosevelt, so-called because of Roosevelt’s promise of a “a new deal for the American people” when accepting the 1932 Presidential nomination. Under the New Deal, various employment programmes were legislated for, including the Civilian Conservation Corps (providing national conservation work) and the Public Works Administration (providing employment in construction of highways and other infrastructure, and public buildings).

⁵ Scheme providing medical benefits and insurance to those over 65 or with long-term disabilities.

⁶ Slogan used in 1965 by President Lyndon Johnson to describe his legislative program of national reform. In his first State of the Union address, Johnson described his vision of a “Great Society” that would include a “war on poverty” and federal support for education, medical care for the elderly, and legal protection for blacks deprived of voting rights by state regulations. He also proposed a new department of housing and urban development to co-ordinate federal housing projects. The programme represented the largest number of legislative programs since Roosevelt’s New Deal.

⁷ Data from “The Budget for Fiscal Year 2003 – Historical Tables” Budget of the United States Government, available from <http://www.whitehouse.gov/omb/budget/fy2003/>

- the introduction of a mortgage insurance programme, whereby private lender's decisions could be insured by the Federal Housing Agency (FHA) – a federal government-backed organisation which began underwriting loans for repair and modernisation in 1934, and for new homes in 1935. The aim of the scheme was to stimulate recovery in the building/construction sector, but had the longer-term impact of fundamentally changing elements of mortgage financing – by allowing smaller down payments on property, and promoting the use of long-term loans. Fishback *et al.* (2001) suggest that the FHA program helped encourage a nation-wide housing market, from a relatively illiquid state in the early 1930s, by subsidising interest rates (the government implicitly assumed some of the default risk) and reducing some of the liquidity constraints on mortgage financing. Moreover, because the construction sector witnessed some of the highest levels of unemployment during the Depression, the boost to mortgage and housing markets provided by the FHA had significant effects, according to Fishback *et al.*, on inter-state migration and labour mobility;⁸ and
- federal labour legislation was implemented, in the form of minimum wages, regulation of hours and conditions of work.

AI9 The economic consequences of the Depression were severe. Despite the developments described above, the pressures on the US monetary union were immense, particularly since the impact of the Depression was far from even across the country. Nonetheless, the developments enacted by the Federal Government serve as an example of how the US monetary union evolved to face specific problems and difficulties.

⁸ Fannie Mae, a corporation that packages individual mortgages into securities before selling on to investors, was formed as part of the FHA in 1938. Congress set up the Federal Home Loan Mortgage Corporation, Freddie Mac, for similar purposes in 1970 – to stabilise national mortgage markets in the face of interest rates that varied widely across the country. Both organisations now exist as publicly traded corporations.

B1 This annex addresses fiscal stabilisation in the US, with reference to fiscal federalism – the allocation of fiscal policy authority among different levels of government. The aims of fiscal policy can essentially be broken down into three objectives:

- public policy objectives, such as the provision of public services;
- income stabilisation, in the face of temporary shocks to output; and
- income redistribution, from richer to poorer regions of a country.

B2 Both stabilisation and redistribution are ways in which fiscal policy *insures* regions against shocks. This annex considers the ways in which fiscal policy provides insurance, examining evidence for the scale of such insurance in the US compared with other countries.

Fiscal federalism in theory

B3 From time to time, particular industrial sectors or regions of countries will be hit by shocks. Some will be temporary, manifested in a sudden, temporary drop in demand for that region's production; others will have a more permanent impact, such as supply shocks due to rapid changes in technology, that cause a permanent fall in output in the region.

B4 Temporary shocks to income can be stabilised by borrowing during a downturn. Permanent shocks necessitate a structural adjustment; for a region whose production is no longer demanded because it is outdated, borrowing and insurance cannot solve the underlying problem that the region needs to find new areas of production and specialisms. That said, insurance may still provide temporary support, helping smooth the adjustment to a new equilibrium.

B5 Within a currency area, monetary policy is available as one tool to respond to shocks whose impact are felt broadly symmetrically by all regions. Fiscal policy may also carry out this function. For instance, the national or federal government can borrow money to stabilise income in the face of a temporary, negative shock. Governments can borrow to finance spending even as tax revenues fall, with debts repaid when growth returns to potential as the effect of the shock dissipates. In effect, the government is borrowing against future tax revenues.

Different levels of government **B6** When comparing fiscal policy among a group of countries, it is important to note that the existence of different levels of government affects the range of possibilities for fiscal stabilisation:

B7 With a single tier of government, **the national or federal** government can provide:

- inter-temporal insurance, by varying its borrowing over the economic cycle; and
- inter-regional insurance, by net taxes/transfers flowing between component regions, either through the automatic stabilisers¹ or discretionary policy.

B8 With some fiscal autonomy at a **regional** level, a regional government may be able to provide insurance independently of the national or federal government through regional inter-temporal insurance.

B9 This implies that a range of possibilities exist through which multi-level governments can combine to provide fiscal stabilisation:

- at one extreme, fiscal policy may be highly centralised, working almost entirely through national or federal government;
- at the other extreme, fiscal policy is undertaken at a regional level, with little or no fiscal insurance provided at the national or federal level (as in the EU, where fiscal policy remains the responsibility of Member States); and
- in between, there is a range of intermediate models of fiscal federalism, where power is shared more equally between regional and national/federal levels of government (for example, as in Germany and Canada).

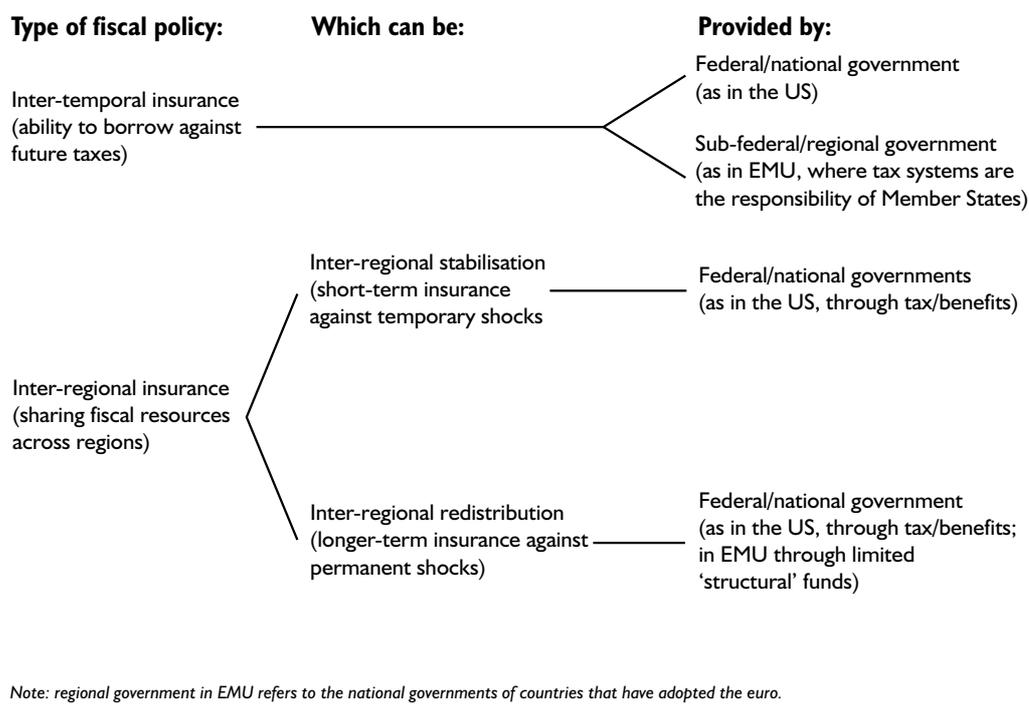
B10 The choice of which level of government is most appropriate for the conduct of fiscal policy is a political economy issue, closely tied to preferences over the provision of public goods and services. Discussion of this point is beyond the scope of this study. But it is important here insofar as it suggests that institutional factors must be considered when comparing the impact of fiscal policies across countries. This study shows that the US is arguably closest to the first, centralised form of fiscal federation.

B11 This annex begins by describing in more detail the way in which fiscal policy can act to offset the impact of shocks. Drawing on this analysis, the study then examines the evidence comparing the degree of fiscal stabilisation in the US with international examples. In particular, it focuses on the differences in institutional frameworks between the US and other monetary unions, such as Canada and the euro area, where fiscal policy is more decentralised.

B12 Chart B.1 provides a summary of the different ways in which fiscal policy can provide insurance against shocks, illustrating how insurance can be provided at different levels of government. The chart also draws on the empirical evidence summarised later in this annex to provide a stylised comparison of the difference between models of fiscal federalism in the US and the euro area.

¹ Automatic stabilisers are a by-product of the tax and benefit system. They describe the tendency for private sector payments to the Government to fall and receipts from Government to rise when private sector income falls.

Chart B.I: Modelling fiscal federalism



Fiscal stabilisation – policy options

Inter-temporal insurance B13 Inter-temporal insurance is a form of insurance frequently carried out by individual households who borrow against future income. But it is also a function available to the national or federal government, and may be available to individual regions if local or sub-federal governments have a degree of fiscal autonomy. Thus, in the face of an asymmetric shock affecting only one state or region, local government may be able to stabilise the local economy in this way.

Inter-regional insurance B14 Fiscal policy also provides a policy tool against shocks that affect individual regions, by sharing the burden with other regions within a country or monetary union. This transfer of resources occurs naturally through a tax and benefit system set at the federal level of government, and may be quite limited depending on how the system is financed by different levels of government. In response to fall in demand for output in a given region, less tax is paid to the federal or national government because of the lower level of economic activity, while a higher level of benefits are paid to the region if unemployment increases. A transfer of resources thus occurs between the regions of the country, helping to cushion the initial impact of the shock. Automatic effects can be supplemented by discretionary action. In the event of a permanent shock, resources may continue to be reallocated from richer to poorer regions of the country for sustained periods.

B15 Thus, inter-regional insurance can be classified according to the type of shock it responds to and its budgetary implications. These types of insurance are discussed in greater detail below:

- **inter-regional stabilisation:** constituent regions are insured against *temporary* asymmetric shocks, thereby helping to stabilise consumption across the union. Since the shock is temporary, the insurance is also only temporary;

- **inter-regional redistribution:** in the face of *permanent* shocks, the country commits to reallocate resources to regions of the union that are judged, for example on an output per capita basis, to be relatively poor. The aim is to compensate for longer-term structural differences in productivity levels or invest to address these differences. Since large variations in relative output and income levels will be determined by structural, rather than cyclical factors, redistribution may be a long-term commitment.

Inter-regional stabilisation B16 Inter-regional stabilisation acts as a system of insurance in which regions within a monetary union are protected against temporary shocks. In the event that one region suffers a downturn in economic activity, it continues to call on spending from the supra-national, or federal, level of government, even while tax revenues in that region may have fallen. Thus, the region effectively borrows from other members of the union, rather than having the entire burden of the borrowing fall upon its own taxpayers. Since there is no *a priori* reason to expect one region to suffer a greater number of asymmetric shocks than its neighbours in the long run, inter-regional stabilisation need not involve any long-term reallocation of resources from relatively rich to relatively poor areas.

Inter-regional redistribution B17 An alternative form of insurance is redistribution – essentially, the transfer of resources from richer to poorer areas of a monetary union, which may, in the presence of deep-rooted structural problems, continue for some period of time. Redistribution may be justified insofar as it seeks to address a lack of development, perhaps because market failure means that structural adjustment is made more difficult – for example the public financing of infrastructure in a deprived area that would otherwise not be provided by the market. There may also be a desire to prevent rapid out-migration from a relatively poor region, because of large social costs that this might incur, an argument that may be particularly pertinent in areas where geographic or climatic factors make long-term convergence in productivity levels difficult.

B18 However, even well-intentioned redistribution may act against regional economic performance. Redistribution may reduce the incentives for poorer regions to reform structurally (e.g. through greater variation in regional wage differentials), effectively postponing what may be essential changes to the regional economy if real convergence in productivity levels and incomes is to take place.

Macroeconomic policy and stabilisation in the US

B19 The paper has identified several ways in which fiscal policy might provide adjustment to shocks in a monetary union:

- inter-temporal insurance by the federal/national government;
- inter-temporal insurance by sub-federal or regional governments;
- inter-regional stabilisation through the federal/national government tax and benefits system; and
- inter-regional redistribution between states by the federal/national government.

B20 The focus of this section is to consider how fiscal policy operates in the US; specifically, the degree to which fiscal policy provides stabilisation against shocks through each of the channels described above. As with other countries, fiscal policy in the US only partially stabilises against the impact of a shock. Despite this, the impact varies across countries both in terms of the aggregate level of stabilisation, and (as noted previously) the level of government at which it is provided.

Inter-temporal insurance by the federal government

B21 The US Federal Government, like almost all governments, borrows in financial markets. It is difficult to identify a specific counter-cyclical impact because as well as changes in the fiscal stance through the normal functioning of the automatic stabilisers, the government can undertake discretionary stabilisation and, of course, its normal public policy functions.

B22 Automatic stabilisation provided to the US economy by the federal government through the tax and benefit system is smaller than in many other industrialised economies, in part because of the smaller share of the economy accounted for by the public sector – in 1999, for example, structural primary expenditure in the US was around 26 per cent of GDP, compared with around 35 per cent in the UK and around 45 per cent in France. So it is not surprising that the OECD (2000) find that among member economies, the US fiscal position was least responsive to changes in the economic cycle. Nonetheless, the 20th century saw an increase in the importance of the automatic stabilisers in the US as federal spending as a percentage of GDP increased (see Annex A on the history of the US monetary union for more detail).

B23 Evidence from Cohen and Follette (2000) and Auerbach and Feenberg (2000) suggests that the US automatic stabilisers offset only around 8-10 per cent of a shock to aggregate output.

B24 The government may also undertake discretionary stabilisation. The OECD (2000) notes that in the early 1990s recession, fiscal policy supported and reinforced the automatic stabilisers; while the automatic stabilisers caused the fiscal balance to deteriorate by 1.1 per cent of GDP, discretionary loosening caused a further deterioration, also of 1.1 per cent of GDP.

Inter-temporal insurance by sub-federal/regional governments

B25 As with the federal government, the size of the public sector in each US state is likely to affect the degree of stabilisation provided by automatic changes in tax revenues. Fatás and Mihov (1999) find that states with larger tax to GDP ratios exhibit less volatile business cycles; a high level of personal taxes, in particular, is associated with lower volatility in output.

B26 As noted in the main body of this study, individual state governments in the US make almost no effort to engage in inter-temporal insurance of income by using their budgets as a stabilisation tool. In fact, almost without exception, the states limit the operation and impact of the automatic stabilisers through balanced budget requirements.

B27 Every state but Vermont has the requirement that the budget should be balanced, although the precise definition of the 'balanced budget' requirement varies from state to state. In some cases, it may mean that the Governor merely has to submit a balanced budget to the legislature; in others, that it must be balanced upon approval. Certain states allow the self-imposed fiscal rule to be relaxed if it is to finance certain exceptional items; other rules vary by the type of funds to which they apply. There is, therefore, little harmonisation of fiscal rules at the state level, and where restrictive budget rules are implemented, states may still be able to borrow by devolving debt issuance to the local (municipal) level of government.

B28 In recent years, many states began to set aside 'rainy-day funds' – a form of reserve account built up during the expansion of the 1990s, with the aim of building up a defence against a downturn in revenues and increasing liabilities associated with a cyclical downturn. By the end of the fiscal year 2001 (end September 2001), the National Association of State Budget Officers estimated that states had built up reserve balances totalling 7.7 per cent of annual expenditures, just under 3 percentage points higher than in the period preceding the recession of the early 1990s (Centre on Budget and Policy Priorities, CBPP, 2002).

B29 However, the size of the funds varies widely – from 10.2 per cent of expenditure in New Mexico to zero in other states, such as California and Colorado. States such as Maine, Missouri, Ohio and Kentucky have used their funds to balance a shortfall in their budgets for the fiscal year 2002. But other states with funds available have not always used them. The Center on Budget and Public Policy Priorities (CBPP 2002) reports that in December 2001, the state of Florida enacted around \$1 billion worth of budget cuts without drawing down any of the \$941 million available in the rainy-day fund. Section 3 notes anecdotal evidence that political pressure to maintain budget discipline and concerns that state finances could worsen further, may have restricted the ability or desire of some state legislatures to use the accumulated surpluses. This latter point refers to the fact that this kind of intertemporal smoothing is only effective against non-persistent shocks.

B30 Thus, US states generally choose not to undertake counter-cyclical stabilisation. This contrasts with Canada, a more devolved federation than the US, where federal taxes comprise around half the share of income that they do in the US (Bayoumi and Masson, 1995). Provinces have correspondingly greater autonomy over fiscal policy than their US counterparts, which is available to use for counter-cyclical stabilisation.

B31 It also contrasts sharply with the euro area, where tax and spending decisions remain the responsibility of individual Member States, subject to the avoidance of excessive deficits. Each Member State retains the ability to use counter-cyclical fiscal policy in the event of a temporary shock to output, illustrative of a more decentralised fiscal system than in the US.

Inter-regional stabilisation

B32 Inter-regional stabilisation to offset temporary shocks can arise through two main channels:

- an explicit system of mutual insurance between regions or states to pool revenues, perhaps paying into a fund in good times and withdrawing when the region is hit by a negative asymmetric shock, such as a fall in demand for that region's output. Such a system could be administered at a federal level, or by states independent of the federal government (although in practice this seems less likely and so for simplicity is excluded from Chart B.1), and may result in significantly larger transfers of income than those provided simply through the tax/benefit system; and
- the automatic stabilisation property of the tax and benefit system. Asymmetric shocks cause a drop in the taxes paid by one region, at the same time as benefits (or transfer payments) to the region increase. Since the overall system is funded by the federal US Government, an asymmetric shock necessarily implies that resources are diverted from faster to slower growing regions.

B33 The US operates no explicit system of revenue sharing between states – though it has done so in the past, and there are occasional calls for its reintroduction. The 1972 State and Local Fiscal Assistance Act authorised the creation of the Office of Revenue Sharing as a bureau of the US Treasury Department, and the foundation of a revenue sharing programme between states that existed until 1986. The revenues under this system were paid to states on the basis of complex formulae relating to (among other factors) population, urbanised population, 'tax effort'² and per capita income. Thus, while some elements of revenue may have been affected by cyclical factors, not all were – and the system functioned more generally as a means of disbursing federal funds to states.

B34 In contrast, the evidence suggests that the US federal tax and benefit system does work to provide temporary inter-regional stabilisation against shocks. It is this automatic stabiliser property of the tax and benefit system that appears to be captured by most of the large number of studies examining the degree of fiscal insurance in the US and other countries, dating from the MacDougall Report (European Commission, 1977). There are a number of limitations with the majority of these studies,³ not least that it is often difficult to distinguish the automatic inter-regional stabilisation caused by the federal tax and benefit system from:

- the inter-temporal insurance provided by federal government borrowing; and
- the redistributive elements of fiscal policy – a key distinction since, as noted above, redistribution is not necessary for the successful functioning of a monetary union.

B35 Table B.1 summarises the results of the key studies on the US, distinguishing between stabilisation and redistribution where possible. The key points are:

- most studies find that fiscal insurance plays at best a small role in offsetting the effect of asymmetric shocks. Von Hagen (1992) and Obstfeld and Peri (1998) calculate that 10 per cent of a change in state income is offset by fiscal insurance. Fatás (1998) also finds that the effect of insurance is 11 per cent, similar to the majority of other studies;

² The net amount of tax collections divided by aggregate personal income.

³ von Hagen (1992) and Fatás (1998) provide a more thorough discussion of the limits to methodologies employed in many of these studies.

- other approaches, such as those taken by Melitz and Zumer (1998) and Sørensen and Yosha (1997) find slightly higher results. Sørensen and Yosha also find that the share of state income insured federally increased between the 1960s and 1970s, before stabilising;
- the analysis in the MacDougall Report (European Commission, 1977) found overall that the US system reduced income differences by 28 per cent, broadly similar to Germany, but significantly less than in other European countries (36 per cent within the UK, 47 per cent within Italy and 54 per cent within France); and
- Sala-i-Martin and Sachs (1991) offer a higher estimate of between 33 per cent and 50 per cent, despite specifically excluding large one-off transfers from their estimates. But von Hagen (1998) argues that this, and the MacDougall Report, fail to distinguish adequately between stabilisation and redistribution.

B36 The evidence suggests that the stabilisation effect provided by the federal tax and benefit system acts to offset perhaps around 15 per cent of shocks to output. But Fatas (1998) finds that the degree of insurance varies widely by state – from a high of 28 per cent in North Dakota to just over 3 per cent in Virginia – with an average for the US as a whole of some 11 per cent.

Table B.1: Fiscal stabilisation and redistribution in the US

	Redistribution	Stabilisation
von Hagen (1992)	47	10
Bayoumi and Masson (1995)	22	30
Fatás (1998)		11
Asdrubali <i>et al.</i> (1996)		13
Sørensen and Yosha (1997)		15
Athanasoulis and van Wincoop (2001)	20	10
Obstfeld and Peri (1998)	19	10
Melitz and Zumer (1998)	16	12 to 20
European Commission (1977)		28
Sala-i-Martin and Sachs (1991)		33 to 50

Note: Each result represents the percentage offset through the US federal fiscal system for a state suffering a shock to income/output.

B37 International comparisons are provided in a number of papers. Pisani-Ferry *et al.* (1993), for example, find that insurance offsets around 17 per cent of a shock in the US, compared to 37 per cent in France and over 34 per cent in Germany. Goodhart and Smith (1993) estimate a 21 per cent offset in the UK (as do Melitz and Zumer (1998)). For Canada, studies such as Bayoumi and Masson (1995), Melitz and Zumer (1998) and Obstfeld and Peri (1998) agree that roughly 15 per cent of shocks are offset through insurance.

B38 In contrast, the current EU-level system provides very little insurance against shocks – Sala-i-Martin and Sachs (1991), for example, found that the system for raising EU budget revenues (“own resources”) offset only 0.5 per cent of shocks to output, compared with 34 per cent in the US. But this is at an EU level only, and ignores the impact of national fiscal policy at the Member State level.

B39 The broad conclusion of this evidence, despite the empirical difficulties noted above, is that the degree of stabilisation provided in the US is not large and is no greater, and probably less, than that which is already provided by individual nation states in Europe.

Inter-regional redistribution between states

B40 Redistribution, as noted above, may be used as a means of transferring resources from relatively rich to relatively poor regions of a country or monetary union. Rather than aiming to stabilise output against temporary shocks, redistribution is usually motivated by one of two factors:

- an objective to equalise incomes, in the face of large productivity differences; or
- investing in order to address long-standing structural problems.

B41 In the US, redistribution is provided through the tax and benefit system in a similar way to stabilisation. The distinction between stabilisation and redistribution arises, as noted previously, because of differences in the underlying shocks. Insofar as the shocks are temporary, no long-term redistribution takes place. But where shocks have a permanent impact on individual regions, the system can result in prolonged, long-term redistribution from richer to poorer regions.

B42 This distinction underpins the empirical difficulties discussed earlier, associated with estimating the insurance and redistribution impact of US federal fiscal policy. Nonetheless, studies that identify a specific redistributive impact in the US suggest that it may, if anything, be larger than the insurance channel. Estimates of between 13 and 22 per cent of a shock offset in this way are given by Melitz and Zumer (1998), Obstfeld and Peri (1998), Athanasoulis and Van Wincoop (2001), Bayoumi and Masson (1995) and Goodhart and Smith (1993).

B43 The US Federal Government is also able to provide specific targeted assistance to regions suffering particular hardship. For example, the Appalachian Regional Development Act of 1965 was a direct response to a lengthy depression in West Virginia and eleven other states. Of over \$1 billion approved under the Act, funding was provided for infrastructure improvements, education, timber production and the closure of old mines.

B44 The Canadian Government, in contrast, is constitutionally mandated to engage in regional redistribution in this way, as a means of ensuring that each province is able to provide a broadly similar level of public services to its population as other regions, for a comparable level of tax.⁴ The current system of redistribution at the EU-level in Europe is extremely limited in comparison to both the US and Canada, occurring through structural fund programmes.⁵ The EU budget is small in comparison with national spending in Member States – at around 1 per cent of EU GDP, compared with an average of around 50 per cent of GDP in the Member States.

B45 This is reflected in the evidence, provided by both Bayoumi and Masson (1995) and Obstfeld and Peri (1998), that redistribution in Canada is greater than in the US. Melitz and Zumer (1998) also find that redistribution from richer to poorer regions is greater in the UK (26 per cent) and France (38 per cent).

⁴ According to Section 36(2) of the Constitution Act (1982): “Parliament and the government of Canada are committed to the principle of making equalization payments to ensure that provincial governments have sufficient revenues to provide reasonably comparable levels of public services at reasonably comparable levels of taxation.”

⁵ At present, there are four Structural Funds through which the European Union grants financial assistance to resolve structural economic and social problems, including the European Regional Development Funds (ERDF), which promote economic and social cohesion within the Union through the reduction of imbalances between regions or social groups. In addition, the EU supports Member States whose GDP is less than 90 per cent of the European average through the Cohesion Fund, which finances projects linked to the environment and trans-European transport systems.

B46 Thus, even though the redistribution channel is found to dominate fiscal insurance in the US, the evidence suggests it is lower than in Canada and some European countries.

Other evidence

B47 The degree of stabilisation and regional assistance provided by different channels of fiscal policy is often difficult to identify in the face of different kinds of shocks and cross-country differences in institutions and fiscal systems.

B48 In the preceding analysis, this annex has identified the individual channels through which fiscal insurance is provided in the US. As noted above, the empirical evidence frequently finds it difficult to separate the different forms of insurance – for example, inter-regional stabilisation from inter-regional redistribution. Those papers which, according to von Hagen (1992) and Fatás (1998), fail to distinguish between two or more of the channels, are worth noting here. In some senses, at least, this may facilitate more direct comparisons with the stabilisation provided by other nations, such as European countries, where the mix of unemployment benefits and discretionary stabilisation may vary widely from country to country:

- the MacDougall Report (European Commission, 1977) is criticised by von Hagen for failing to distinguish between redistribution and stabilisation – they estimate that insurance provided by the US Federal Government offset some 28 per cent of an asymmetric shock. But this is lower than their estimates for Canada (32 per cent), France (54 per cent), Germany (29 per cent) or Italy (47 per cent);
- Bayoumi and Masson (1995) are criticised by Fatás (1998) for failing to separate inter-temporal insurance by the federal government from inter-regional stabilisation. As set out in Antonio Fatás' contribution to the EMU study *Submissions on EMU from leading academics*: “When a state suffers a recession, and the fall in its tax revenues is not compensated by revenue increases coming from other states, then the federal budget will run a deficit that will need to be paid in the future by all states. As a result, the state in recession does not benefit as much as indicated by the smoothing of disposable income and, moreover, the other states suffer because of the future tax payments;”
- but for the purposes of this analysis, this may help in a comparison with other countries, for the reason given above. Bayoumi and Masson estimate that the degree of insurance is higher in the US than in Canada (30 per cent and 17 per cent respectively). Moreover, using data from 5 EU countries including the UK, they find that the fiscal system reduces fluctuations by an average of 31 per cent in these countries, comparable with that in the US. Thus, they argue that the stabilisation provided by the US Federal Government, through the combined effect of tax and benefits and inter-temporal borrowing, is broadly equivalent to that which is provided already by national governments within the EU.

Conclusions

B49 Despite the empirical difficulties associated with this analysis, a number of conclusions can be drawn about the system of fiscal federalism in the US and how it compares internationally.

B50 In this context, institutional differences between the US and other countries and monetary unions must be borne in mind. Fiscal policy in the EU is significantly more decentralised (to a Member State level) than in the US, where most fiscal authority remains at the federal level. This means that when comparing the degree of insurance provided by fiscal policy under each system, comparators vary – inter-temporal and inter-regional insurance, for example, are provided at a Member State level within the EU and euro area, and at a federal level in the US. Barry Eichengreen’s contribution to the EMU study *Submissions on EMU from leading academics* argues that many early studies of EMU and fiscal federalism “...underplayed the importance of national ... fiscal policies, which have more capacity [than in other monetary unions such as the US] to do good ... in Europe because fiscal policy is so much more decentralised there.”

B51 With this in mind, the following conclusions can be drawn from the evidence. In terms of inter-temporal insurance:

- the US Federal Government provides less inter-temporal automatic stabilisation to shocks than other OECD economies (including within EU Member States), though it can compensate for this through discretionary policy changes; and
- state governments in the US do not conduct counter-cyclical policy (inter-temporal stabilisation) to stabilise against shocks.

B52 In terms of inter-regional stabilisation:

- the federal tax and benefit system in the US provides some inter-regional insurance against asymmetric shocks – though no more than is already provided, on average, at a Member State level in the EU; and
- there is no system of explicit counter-cyclical revenue-sharing in the US.

B53 Finally, in terms of inter-regional redistribution:

- the federal tax and benefit system in the US provides some redistribution from richer to poorer regions, though less than in Canada and within some European countries.

B54 Overall, the empirical evidence suggests that the degree of insurance provided by national fiscal systems within the euro area already at least matches that provided by the federal government in the US. While the US provides a greater degree of stabilisation through fiscal policy than is provided (at the Community level) by the European Union, this tends to ignore the fact that the Member States of the EU have correspondingly greater freedom to run independent fiscal policies than US states. Since asymmetric shocks tend to occur at a regional or sectoral level, the difference, on stabilisation grounds, between providing fiscal insurance at a federal level or (as in the euro area) the Member State level should be limited.⁶ Indeed, in his contribution to the EMU study *Submissions on EMU by leading academics* Antonio Fatás argues that “the implementation costs [of a European fiscal federation] are too large to compensate for the small potential benefits”.

B55 That said, it does imply a difference in distributional terms, i.e. who pays for the insurance. When inter-regional insurance is provided at a federal level, the burden of paying may fall on taxpayers in all regions of the monetary union; on the other hand, if it is provided at a regional level, the burden falls only on the taxpayers in that region. In this way, taxpayers in euro area countries are (structural funds apart) only bearing the burden of insurance in their own country.

⁶ Although the difference in institutional design may be important in relation to questions of political economy and/or efficiency. Both are beyond the scope of this study.

