

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:

www.hm-treasury.gov.uk

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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.

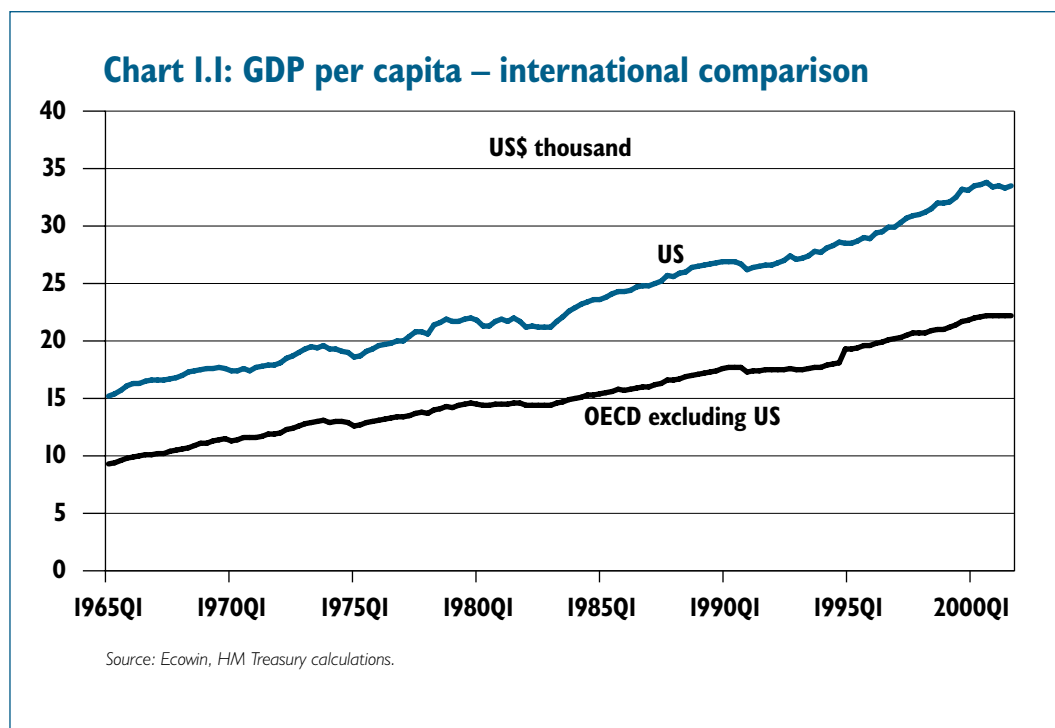
1.6 It also means that it is difficult to assign a specific start date to US monetary union. While the ratification of the US Constitution provided the initial impetus, almost any bank or company could issue currency in the early 19th century – contrary to modern concepts of a currency union in which 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:

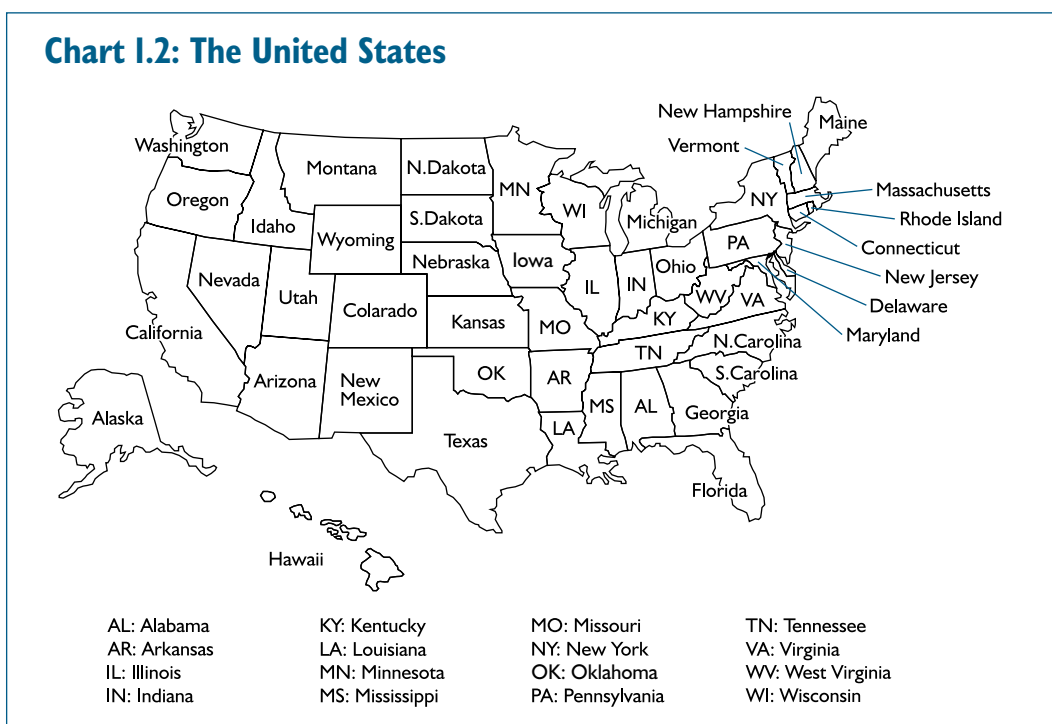
- Section 2 identifies the extent to which US regions are hit by region-specific shocks and/or have different business cycles;
- Section 3 considers the adjustment mechanisms which are present in the US to allow regions to adjust to shocks;
- Section 4 examines whether monetary union in the US has delivered 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*.

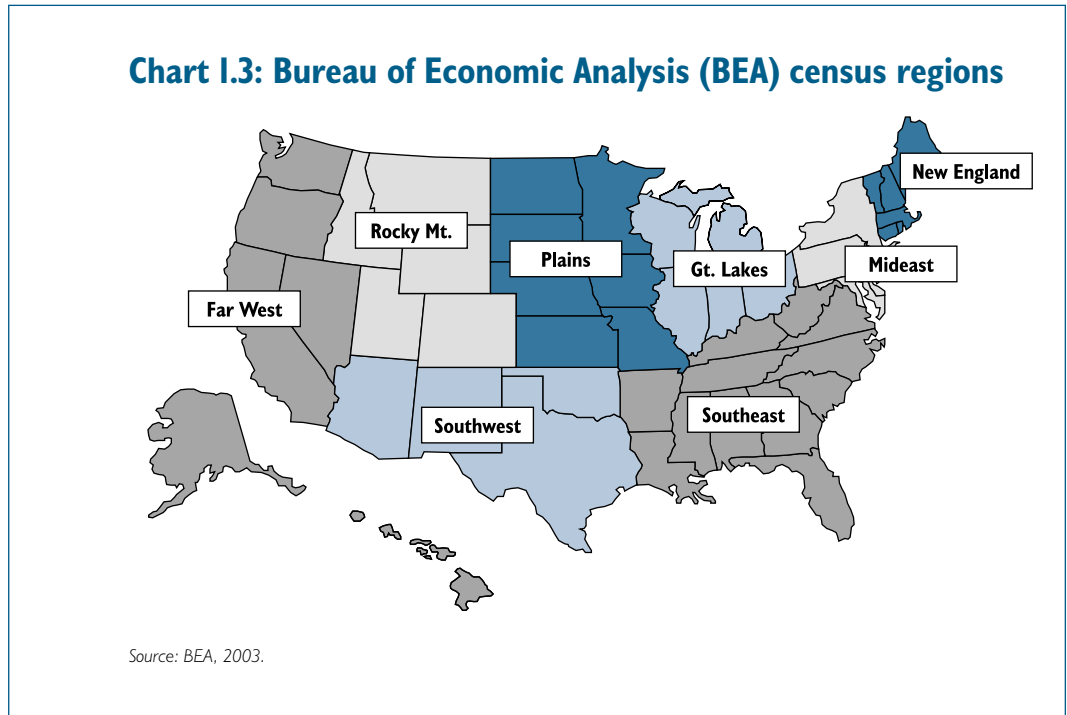
Data and geographical definitions **I.15** A common problem identified throughout much of this study is that regional data in the US are not as widely available or as reliable as international data which form the basis for the analysis of the euro area. For example, data on intra-US trade are unavailable 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.



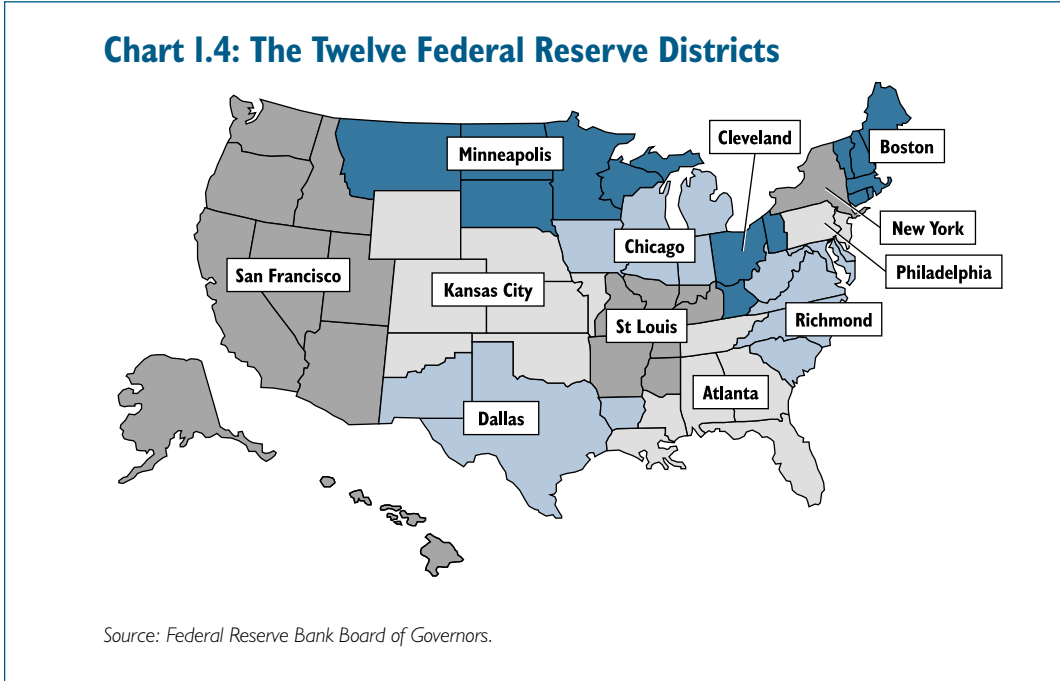
I.18 Chart 1.3 illustrates the eight main census regions used by the Bureau of Economic Analysis (BEA), an agency of the US Department of Commerce providing GDP and other national accounts data. This classification is used extensively in academic studies of the cyclical convergence of US regions, in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



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.

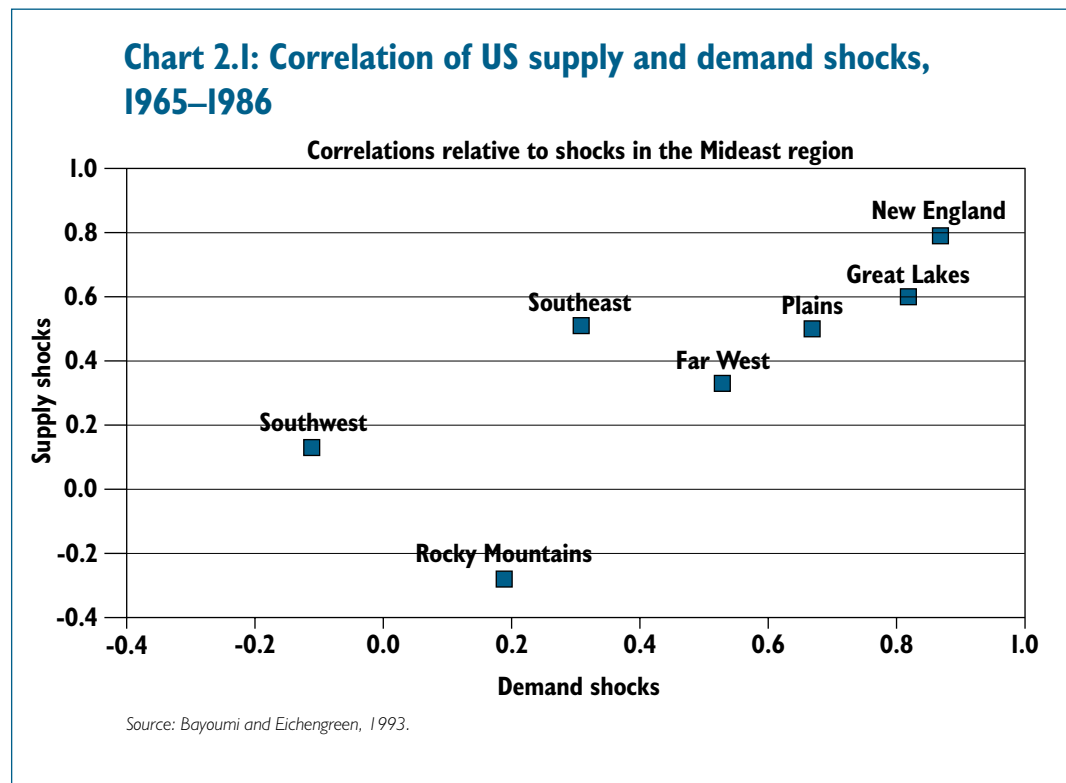
2.3 This section summarises the available evidence. From this base, the section includes HM Treasury analysis of the implications of regional differences for monetary policy. This involves constructing Taylor rule based estimates of regional interest rates in the US. The potential structural causes of 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.

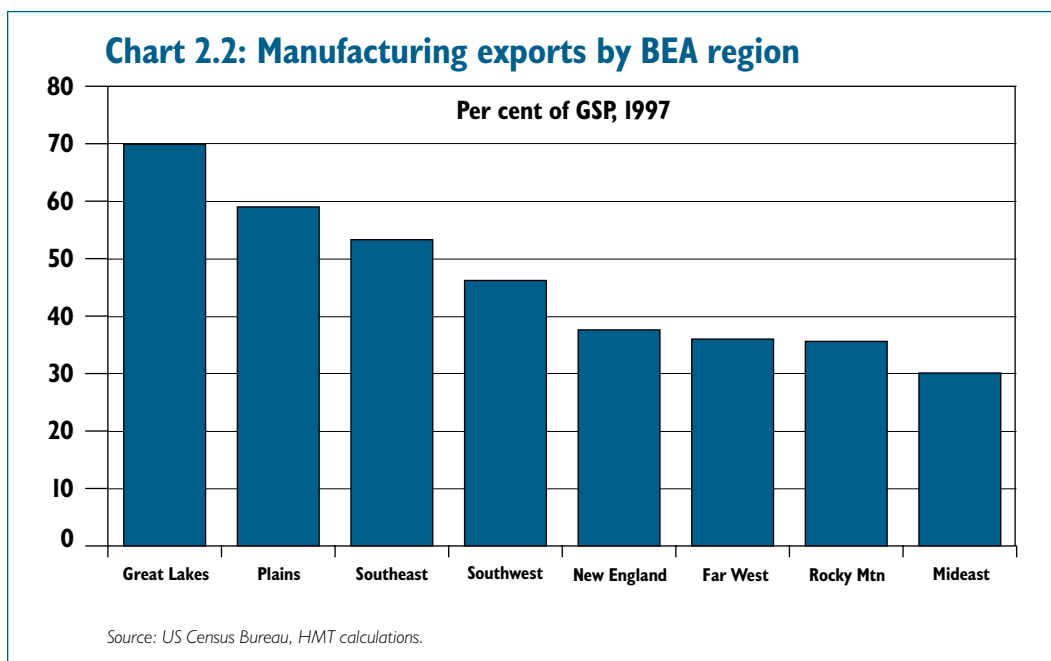
Krugman argues that based on previous regional experience in the US, there is no reason to expect the New England region to regain its pre-slump share of US employment. While the unemployment rate may gradually decline, this is because labour would move away from the region towards other, faster growing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

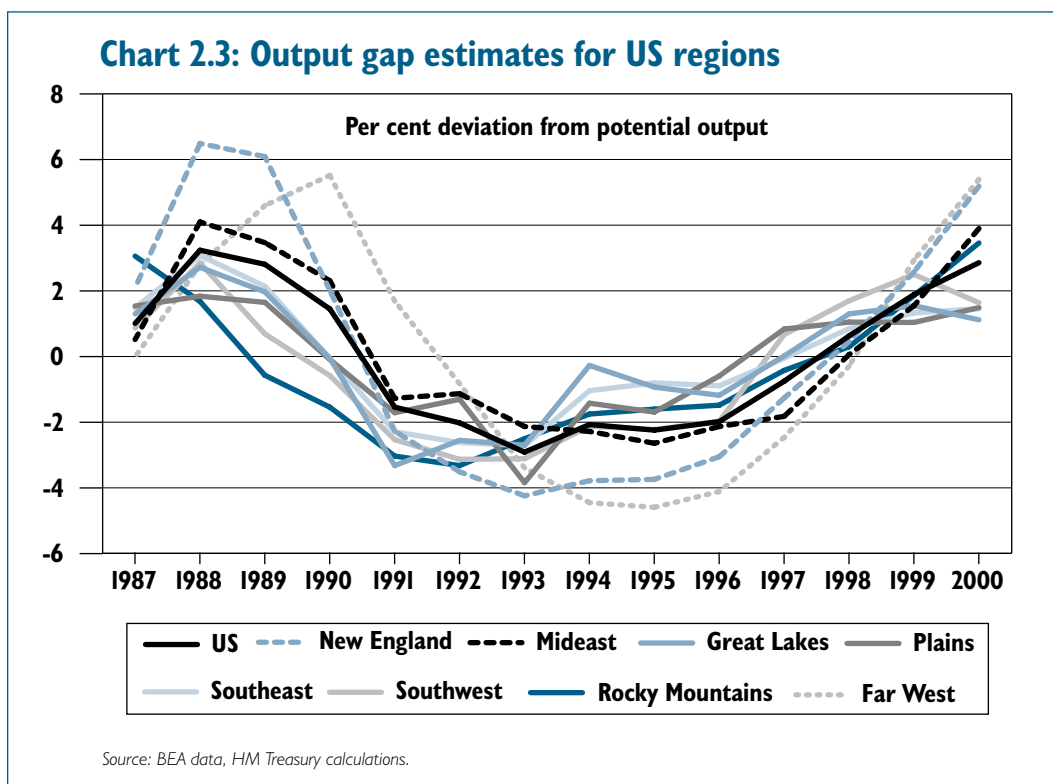
The weights on output and inflation can be altered according to the monetary authority's preferences. But most applications use the weights in the original Taylor rule, which was developed to analyse US monetary policy. These weights imply that the interest rate:

- 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

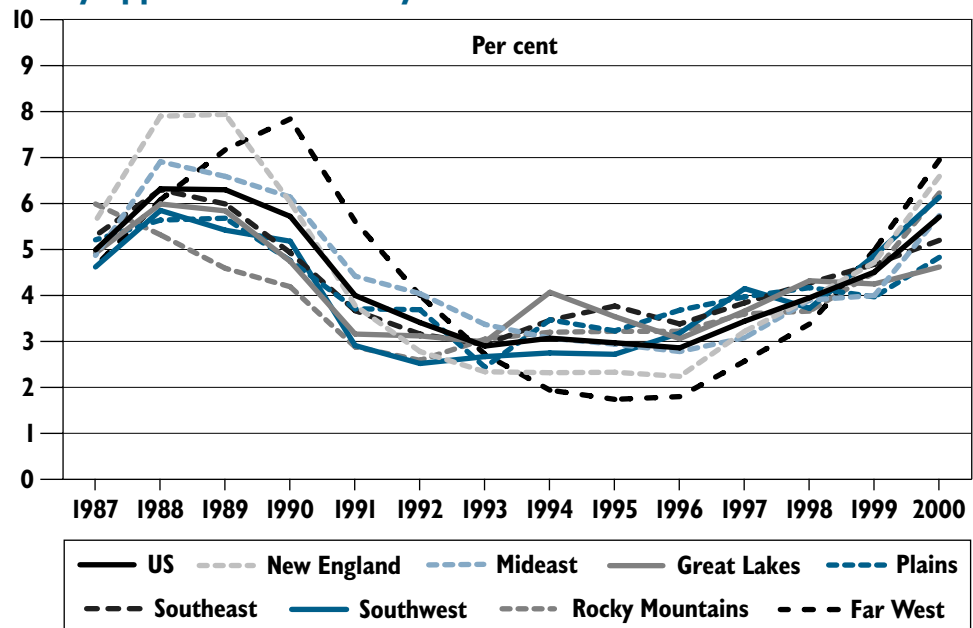


2.34 Although a high degree of cyclical co-movement is apparent, there are differences in the amplitude and synchronisation of the estimated output gaps. In 1991, for example, the Far West had a positive output gap, while output in the neighbouring Rocky Mountains region was around 3 per cent below potential. 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?

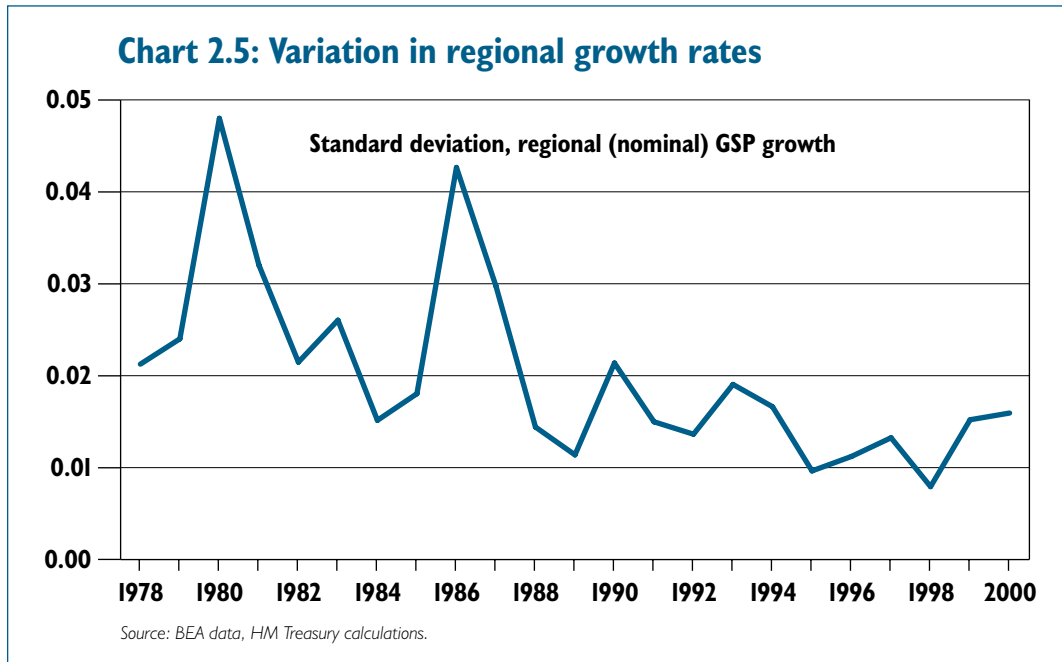
2.37 Recent extensions to optimal currency area theory have emphasised the importance of endogenous convergence.¹⁰ This is the idea that regional differences in cycles and shocks will reduce over time, because membership of a monetary union will promote convergence. For example, an independent monetary 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

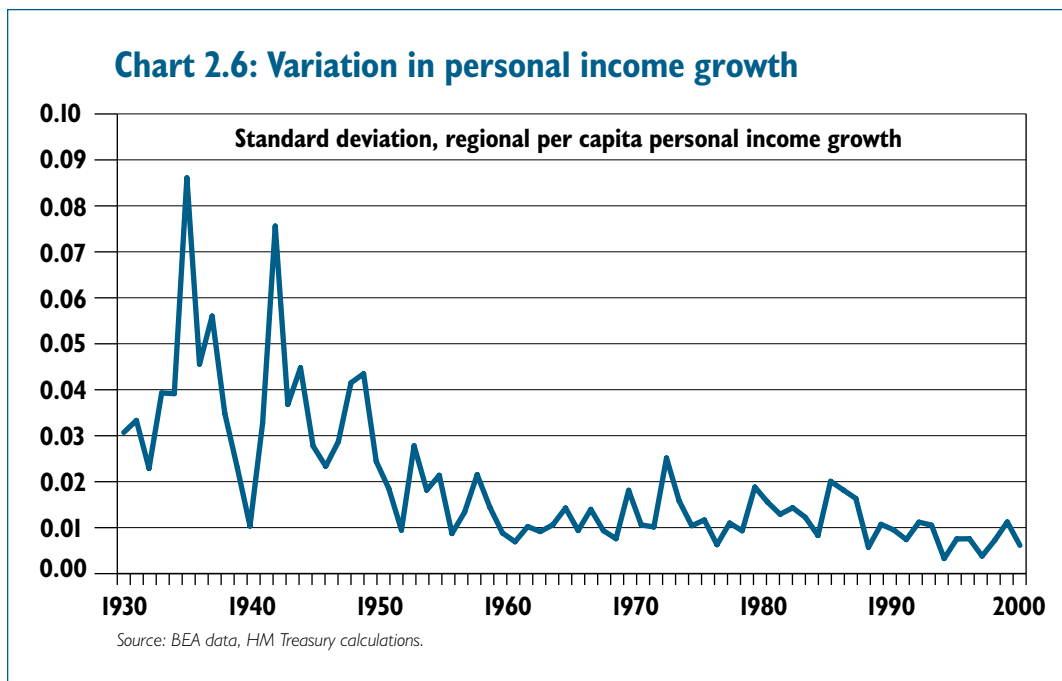
2.38 Evaluating convergence in business cycles is difficult given the lack of data on state or regional output over a sufficiently long period. However, Chart 2.5 illustrates the standard deviation of regional nominal output growth. Since 1978, the variation in growth rates across regions has declined. 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.

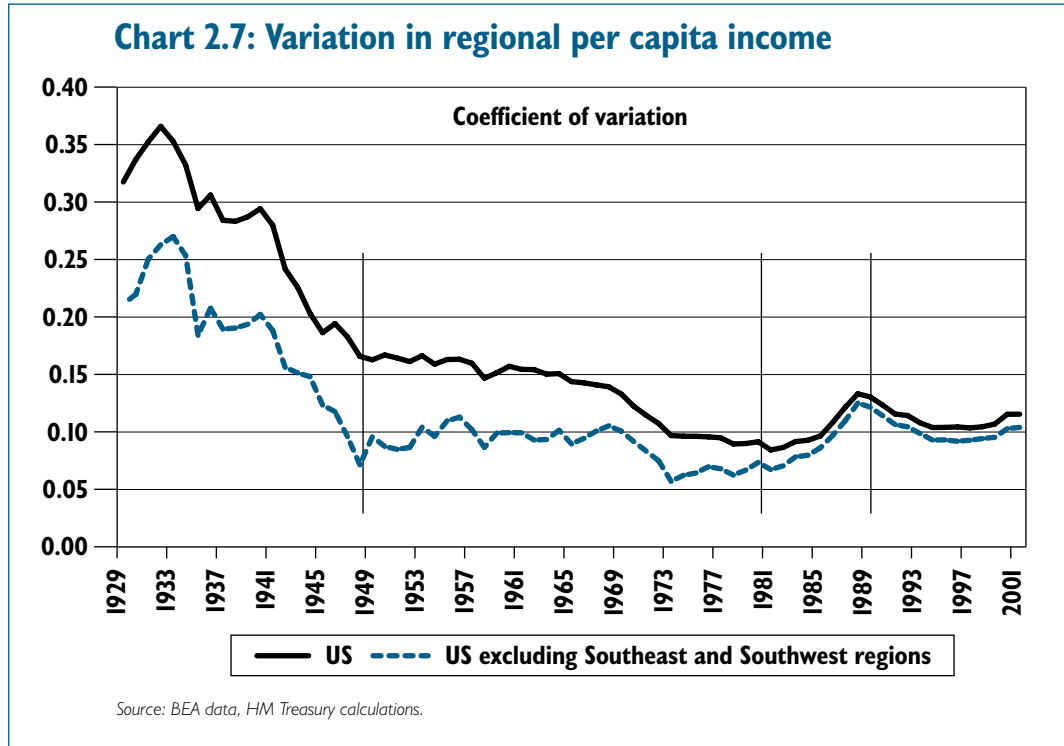


2.39 Data on regional income growth are available over longer periods. However, it is important to note that convergence in income levels may be a consequence of greater inter-regional risk sharing as much as of convergence in regional output (see Section 3).



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:

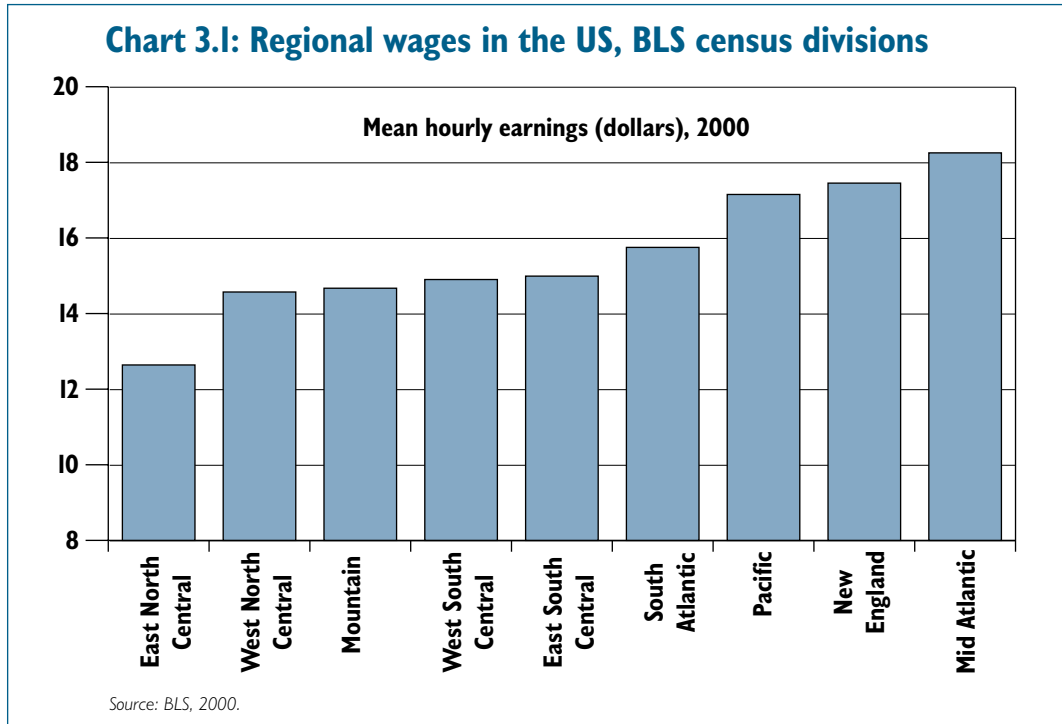
- relative wage flexibility – where relative regional wages adjust in the face of changing economic conditions;
- employment and functional flexibility – where employers and employees adapt working patterns or adjust skills in response to changing economic conditions; and
- labour mobility – where labour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

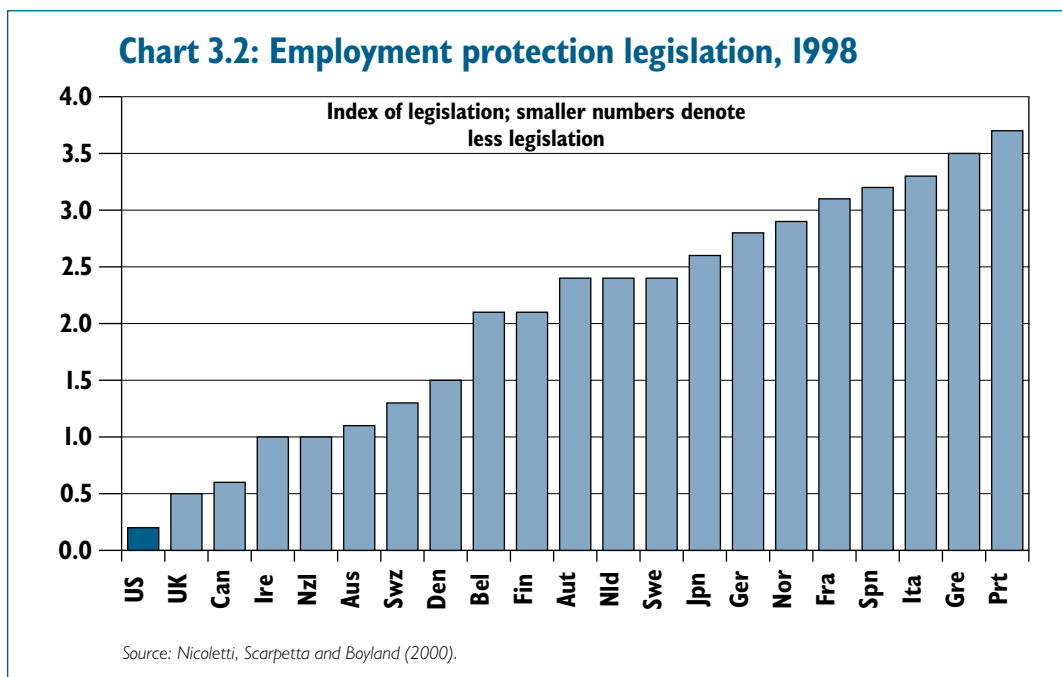
3.13 Chart 3.1 shows that wages vary widely across the US regions – such differences may indicate a role for relative wages as an adjustment mechanism, though they may also reflect differences in regional productivity.



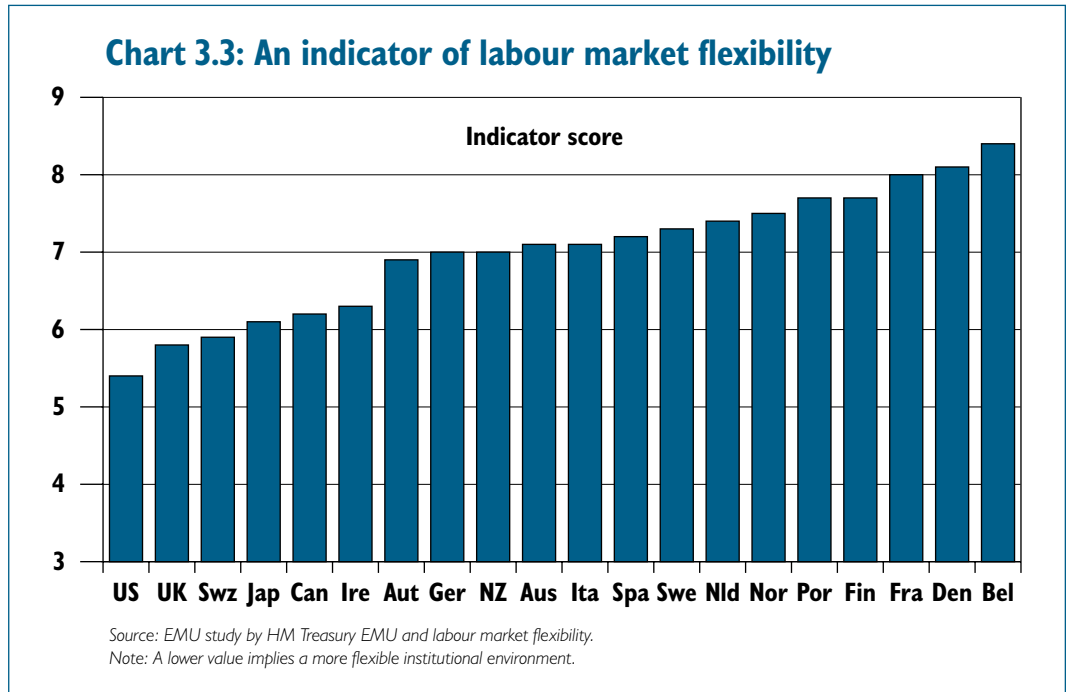
Institutional environment

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.

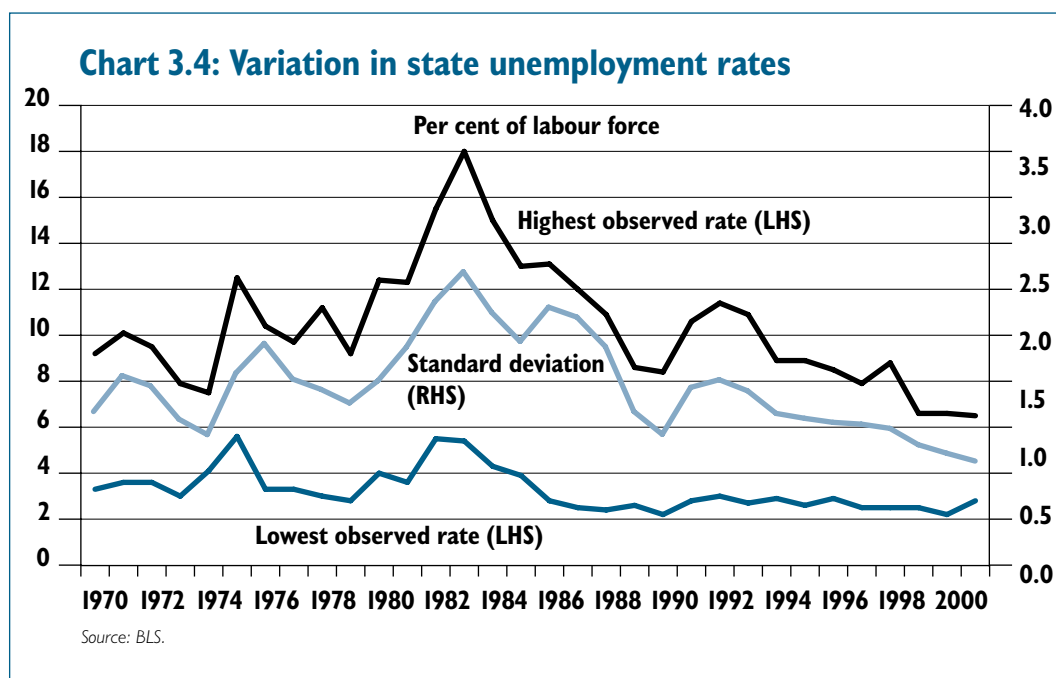
Overall, immigration does seem to play a role in helping regions to adjust to changing circumstances, but local economic conditions are clearly not the only factor determining where a newly arrived immigrant chooses to locate. Moreover, by concentrating in a small number of areas, immigrants may actually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

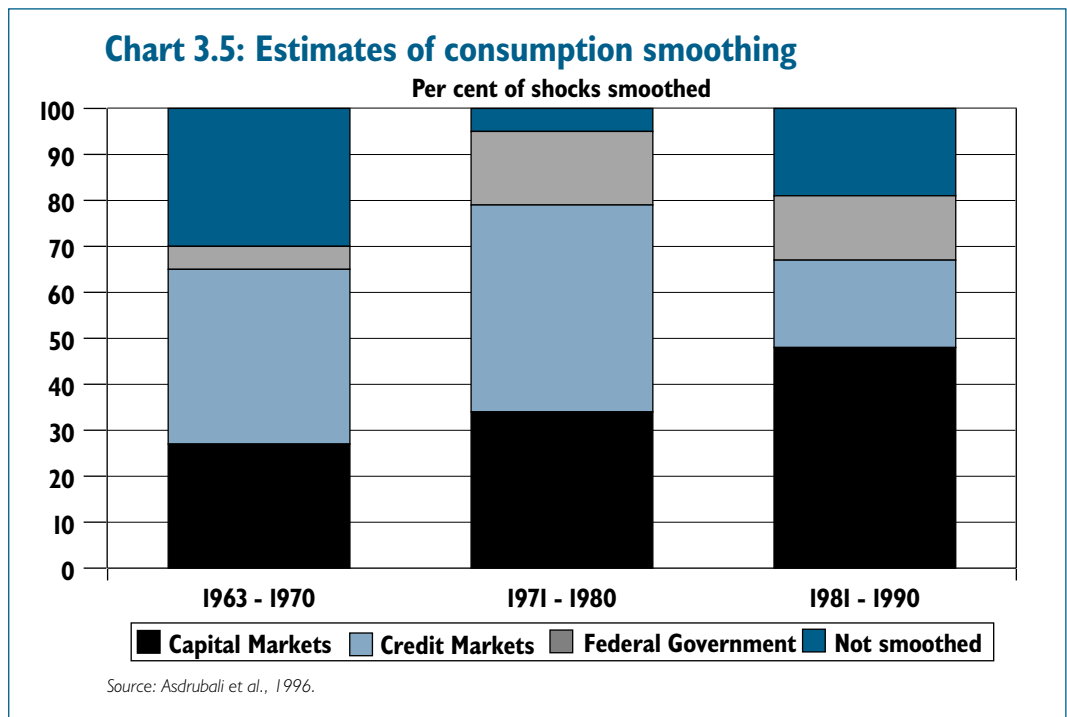
3.35 Berger *et al.* (1995) report that the proportion of banking assets legally accessible from a typical US state had increased from under 7 per cent in 1979 to almost 70 per cent in 1994. Over the same period, they note that actual ownership of a typical state's assets controlled by out-of-state banks (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.

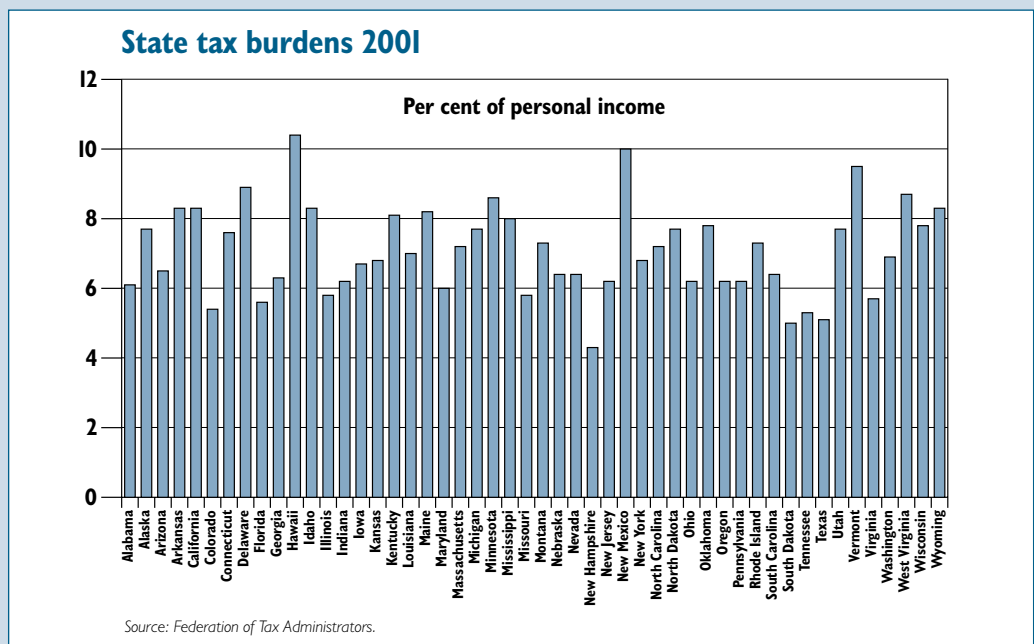
Box 3.4: Regional tax and spending policies in the US monetary union

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.

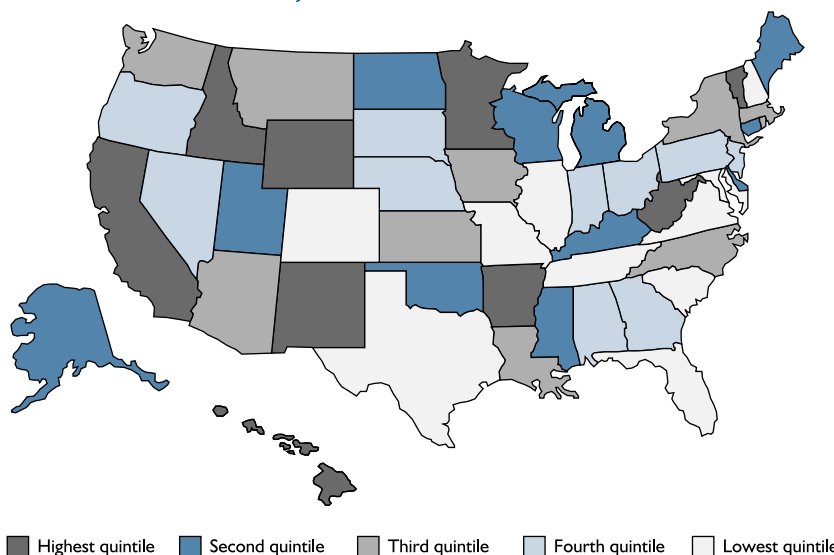
Neither is there any evidence to suggest that variations in the different tax rates help to offset each other. The following chart shows tax revenues in each state, on a per capita basis, as a percentage of personal income. The effective tax burden varies quite considerably. It is lowest in the New England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