

# University of Cambridge Department of Geography

FINAL REPORT

by

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and Chris Thompson

Centrality,  
Peripherality,  
and  
EEC Regional  
Development  
Study

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The Influence of Peripheral and Central Locations on  
the Relative Development of Regions

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Finally, any observations, inferences, conclusions, or errors, in this Report are solely the responsibility of the authors, and should not be taken as representing official views or policies of either of the sponsoring agencies.

## SUMMARY

This is the Final Report of a research project which has investigated relationships between centrality, peripherality and regional economic structure, evolution and performance within the European Community.

The primary aim of the project, as set out in its Terms of Reference, was "to establish, analyse and attempt to explain recent trends in the levels of economic activity and population within the different regions of the countries of the European Community, in the context of assessing whether there exists a significant tendency towards increasing concentration of people and industry in the more central areas of the Community". Specifically, the project was therefore required to investigate "three related questions, namely: do significant economic differences exist between the central and peripheral regions of the Community: are these different categories of regions evolving differently over time: and how far may observable differences be explained by, or related to, relative location within the Community?"

The research thus began by measuring objectively each region's relative accessibility, or nearness in geographic space, to economic activity as that is actually located in different areas of the EEC, using an index of accessibility known as "economic potential". Values of the latter, expressed in millions of European Units of Account per kilometre, were calculated by a standard formula for each of the 108 level-II regions of the Community of the Nine for various years. Comparison of these 'potential' values provides both a measure of changes in relative regional accessibility over time, allowing for Community enlargement and the removal of tariff barriers to trade, and a basis for objectively classifying regions into such categories as 'central' and 'peripheral'.

The actual pattern of regional economic potentials for the first year of full economic integration of the Nine (1977) reveals a wide disparity between the most inaccessible, or peripheral region, Calabria (1134.3 mio EUAs per km), and the most accessible or central region, Rheinhessen-Pfalz (9664.1). Calabria's potential index is thus only 11.7 percent of the latter's. A further ten regions, seven of them in Italy, are below 20% of the maximum while thirteen regions, seven of them in West Germany, record values over 60% of the maximum. When mapped, the 50% potential contour describes a triangular plateau of high accessibility to Community-wide economic activity with corners on Stuttgart, Hamburg, and Lille. West Berlin, South-East England, and Ile-de-France form outlying peaks of relatively high accessibility around this 'golden triangle'.

Comparison of potential values for regions of the Nine in 1965, 1970, and 1973 reveals a clear trend of widening disparities in regional accessibility, not only between regions in the then member and non-member countries, but also between regions within the Six. The trend increased appreciably over the 1970-73 period, compared to 1965-70. A simulation of tariff removal between the Six and the Three over one year in 1973, shows a marked increase in potential for regions in the Three relative to central regions of the Six. Peripheral regions of the Six also

benefit relatively more than central regions. In absolute terms however the gains in potential to central regions of the Six are greater than gains to the periphery, so that the overall absolute disparity between centre and periphery widens still further as a result of simulated tariff removal.

The final period, 1973-77 shows further widening, especially vis-a-vis the Italian and UK periphery, but at a slower rate than in the early 1970's. However simulation of a second enlargement, including Greece together with Spain and Portugal (EUR 12), shows yet further widening of relative accessibility differences: the new lowest potential region is the Aegean (679.7 mio EUAs per km), whose value is only 7.0% of the maximum. The region with the highest potential in the new Three is Cataluna (2127.9), equal to only 22.0% of the maximum but still higher than 16 other regions in the original Nine. The overall impact of enlargement to Twelve on regions within the Nine is relatively small and mostly confined to French peripheral regions bordering Spain.

The 1977 EEC-wide potentials are used to classify the 108 level-II regions as either "central" (35 regions with values above 4,400 mio EUAs per km), "intermediate" (40 regions with values of 2,800-4,400 mio EUAs per km), or "peripheral" (33 regions with less than 2,800 mio EUAs per km). Central regions are found in five different countries, with the largest concentration in West Germany (17), and lesser ones in the Netherlands and Belgium (7 each). Peripheral regions are also found in five countries, with the largest numbers in Italy (16) and France (10). The overall pattern of central and peripheral regions thus objectively defined is remarkably consistent with previous and widely-held perceptions of centrality and peripherality within the EEC.

This central-intermediate-peripheral classification and a classification of regions according to levels of urbanisation are then used as bases for further wide-ranging analysis of recent trends in regional economic development within the Community of the Nine. The main conclusions of this analysis are as follows.

Demographic trends in the EEC's peripheral regions over the period 1973-79 were, in aggregate, markedly different from those in central regions, with substantial population growth in the former, but virtually no increase in the latter. Trends in Gross Domestic Product, the most basic measure of the volume and output of economic activity in a particular region, evidenced a substantial and continuing concentration of economic activity in central regions, relative to the periphery. Within this, however, there was also a clear urban to rural shift. There was a further significant widening of the gap between central and peripheral regions, in terms of GDP per capita and GDP per employee. As hypothesized, peripheral regions are significantly more dependent on agriculture while central regions specialise far more on manufacturing and producer services. Intermediate regions recorded intermediate values of these variables. Generally, there is a tendency for these centre-periphery differences in regional specialization to widen, relative to one another.

Manufacturing employment levels show a decline in all three types of region, though intermediate regions show an above average performance. Manufacturing employment declined fastest in peripheral regions. These trends are consistent with the view that central regions are undergoing capital-labour substitution, increasing productivity, and loss of

activity to neighbouring intermediate areas - a notion confirmed by a marked urban-rural shift of manufacturing employment. Manufacturing structure indices show an intensifying central region bias towards modern, research-oriented and technologically-advanced manufacturing industry but an intensifying peripheral region bias towards more traditional and labour-intensive industry. This pattern of manufacturing specialisation bears out predictions of "filter-down theory".

An EEC wide shift-share analysis along centre-periphery and urban-rural lines shows that from 1973-79, total employment in peripheral regions grew by 1.5 million workers, that is, ten times faster than employment in central regions. The central regions, in aggregate, showed a negative, and peripheral ones a positive, differential shift - the opposite to that expected on theoretical grounds and from trends in output. However, central regions' job losses may be an indicator not of economic weakness but increasing efficiency and labour productivity, while contrasting peripheral employment growth, particularly in consumer services in the Italian periphery, may reflect a unique demographic situation, limited job opportunities in higher-income production activities, and thus a weak rather than a strong regional economy.

Disaggregating the periphery still further into Italian, French and Northern (incl. Denmark) groups for shift-share analysis, shows that the Italian and French peripheral regions differ from the Northern in employment performance. The former record negative structural shifts, indicating unfavourable employment structure, but positive differential employment gains. The Northern periphery records a small positive structural shift but a negative differential employment loss. This difference may have implications for policy devised to deal with problems of peripheral areas.

Service industry employment in peripheral regions has grown more rapidly and by a greater volume of jobs than in either the central or intermediate categories. Within the periphery there has been remarkably rapid growth in the Italian case but slower growth elsewhere. Changes in an index of the structure of service industry show an increasing relative specialisation on producer services in central regions but an increasing relative and absolute specialisation on consumer services in peripheral regions. A similar and very consistent trend applies at the urban-rural scale, comparing more and less urbanised regions.

The dramatic growth in total EEC unemployment since 1973 has been heavily concentrated in its central, not peripheral, regions. However, for young people the opposite applies, with a more rapid growth of youth unemployment in the periphery. By 1979, youth unemployment rates averaged 20% in peripheral regions, compared to only 7% in central regions.

The relative strength of these observed relationships is tested by simple and multiple regression techniques. EEC-wide regional location is found to be consistently and significantly related to a wide range of indicators of regional economic structure, prosperity and evolution. In particular, simple regression equations highlight a 'peripherality syndrome' of low regional output per head, unfavourable manufacturing and service structure indices and high unemployment rates, all of which combine to present a picture of considerable

relative economic disadvantage. A noticeable slight diminution in some  $r^2$  values over time is probably due to growth of intermediate region values relative to central and peripheral regions, rather than any reduction of centre-periphery disparities per se - many of which are actually intensifying.

Stepwise multiple regression analyses with four independent variables - EEC-wide potential values, national potential values, a regional policy index, and an urbanisation index - and a variety of dependent variables, confirms the much greater importance of regional accessibility to EEC-wide economic activity in 'explaining' statistically regional economic variations within the Community, compared with the other three measures.

Two-way analyses of variance show that the wide range of very significant economic differences between central, intermediate and peripheral regions persist even when the effect of differences in urban-rural composition is allowed for. Relatively few significant differences remain between groups of regions classified by level of urbanisation, however, when allowance is made for centre-periphery variations.

Finally, some general conclusions on the impact of peripherality on regional economic development in the European Community are presented in Chapter 5.

1.

INTRODUCTION

The study of centrality, peripherality and regional economic development has been a two year research project carried out by a team from the Department of Geography at the University of Cambridge, England, on behalf of the Directorate-General for Regional Policy in the Commission of the European Communities and the U.K. Department of Industry. The study's aims have been two-fold. First, it seeks to measure the extent of, and changes over time in, variations in regional accessibility to economic activity within the European Community. In a direct sense, therefore, it investigates variations and trends in relative regional centrality or peripherality. It does this via the concept and measurement of regional economic potential, values of which are calculated for each of the 108 Level II regions of the EEC and for different years. Secondly, it uses those potential values both directly and as the basis for regional classification into three categories, 'central', 'intermediate' and 'peripheral', in an investigation of the relationship between relative centrality or peripherality and regional economic structure, performance and evolution during the late 1970's. The study thus attempts to address itself to three inter-related questions: do significant economic differences exist between the central and peripheral regions of the Community; are these different groups of regions evolving differently over time; and how far may observable differences be explained by, or related to, relative location within the Community?

This Final Report brings together work which appeared in working form in four earlier Interim Reports, plus some unreported analyses. Readers interested solely in the results can consult the Summary for main findings, or turn immediately to Chapters 3 and 4. Detailed technical and statistical matters are dealt with in Appendices B to E. The main body of the Report is divided into four chapters.

Chapter 2 reports the results of extensive bibliographic surveys of recent published and unpublished literature on regional economic change in the ten individual countries of the Community, as a necessary background to later Community-wide analysis.



Chapter 3 investigates the question of changing regional accessibility in the Community, both before and after enlargement to EUR9 and then EUR12, in terms of 'regional economic potential'. Analyses here involved the use of a series of regional GDP estimates, of a road distance matrix for distances between regional nodes within the Community, and of various adjustments for ferry links, tariff barriers and the economic weight of neighbouring non-EEC areas.

Chapter 4 uses potential values to classify each of the Community's regions into three groups, central, intermediate and peripheral. It also groups regions by level of urbanization. It then investigates the extent to which relative accessibility and level of urbanization are related to a wide range of measures of regional economic structure, performance and evolution during the 1970's. Numerous tables are presented identifying significant trends in the distribution of population, Gross Domestic Product, manufacturing and service industry, unemployment and other variables. Simple and multiple regression analyses, and analyses of variance, then seek to relate changes in these key variables to combinations of locational variables, notably EEC economic potential.

Finally, some general conclusions are presented in Chapter 5.

2.

REGIONAL ECONOMIC TRENDS

In this section recent research on regional trends and problems within each of the ten member countries is reviewed separately. These reviews attempt: to identify the degree to which regional economic structures in each country conform in any sense to a centre-periphery pattern, and whether trends are one of concentration in central regions or dispersion to peripheral areas; to discuss any attempts at economic potential modelling which may have been carried out in particular countries; and to consider possible reasons for observed regional trends suggested by particular research. Inevitably, however, coverage of recent research does vary from country to country, with perhaps the fullest coverage for the United Kingdom, Ireland, France and Italy, and the most limited coverage for Belgium and Greece.

## 2.1 BELGIUM

The most striking features of the regional economic geography of Belgium are the contrasts which exist between the northern and southern provinces, and the dominant role of Brussels which straddles this major division. The northern provinces (Antwerp, Limburg, East and West Flanders) are Flemish speaking. In the southern provinces (Liege, Namur, Hainaut, Luxembourg) French is the first language and in Brabant, which includes Brussels, there is a mixed language population. A major proportion of the population live in the north and although the population of Belgium has been growing slowly, the north maintains a relatively balanced age structure. In contrast the south has a declining and ageing population and has also been forced to accept a high level of outmigration of economically active residents. Thus, in 1969 the north accounted for 56% of the population against 32% in the south (Thoman, 1973). Between 1962 and 1970 the population increased from 9.22m to only 9.69m, but despite this low rate of growth which reflects the second lowest birthrate of the EEC countries, it is interesting that no less than 75% of all the natural increase in the population came from Flanders while the north in total accounted for 90% (Gay, 1975). Brussels grew from 1961-1970, but 75% of the increase was due to migration, principally from the Ardennes and western coalfield areas (Gay 1975). The weakness of the southern provinces and the dominance of Brussels in this respect is well illustrated by Thoman (1973). He points out that the percentage of total residents available for work shows extreme variation from province to province so that in Brussels in 1967 there were 43% more workers than residents of working age, whereas in Limburg and Luxembourg only 80% of residents are able to find work locally.

The dynamics of population change reflect differing levels of economic opportunity in north and south. The south has only 27% of the working industrial population and has structural problems associated with long established coalfield industries, but the north has 55% of the industrial working population, and dynamic manufacturing and port-based industries. Between 75% and 90% of foreign investment went to Flanders alone from 1961 to 1970 (Gay, 1975).

Thoman (1973) used the relationship between provincial GDP and unemployment rates to reproduce, with empirical evidence, Klassen's (1965) classification of Belgian regions (Table 1).

Table 2.1 Classification of Belgian regions

Highly Prosperous Regions	Depressed but Developing Regions	Potential Depressed Regions	Depressed Regions
Antwerp	W. Flanders	Liege	Limburg
Brabant	E. Flanders		Luxembourg
	Namur		Hainaut

Thoman (1973) makes the following observations based on table 2 to justify adoption of the above classification. Antwerp and Brabant were the only two provinces in 1967 where GDP per head was above and unemployment rates below average. In Namur and the Flanders provinces both GDP and unemployment values were below average. The GDP of Liege was well above average but unemployment was also very high. Hainaut and Limburg were relatively most depressed having higher than average unemployment and low GDP per head. Limburg however unexpectedly recorded the highest GDP growth rate of the Belgian provinces during the 1960's (tab. 2.2), albeit from a relatively low base. Luxembourg is interesting in that high dependence on agriculture (self employed small-holders) masks unemployment though GDP per head was very low.

Table 2.2 GDP and unemployment by region

	Per capita regional GDP 1967 at current factor prices - \$US	% Increase in GDP 1960-1970	Unemployment Rate - 1967
Antwerp	1811	94.2	2.0
West Flanders	1558	82.6	2.1
East Flanders	1356	84.3	2.2
Limburg	1235	114.8	3.5
Hainaut	1418	62.9	3.5
Liege	1782	55.4	4.1
Luxembourg	1280	64.2	1.6
Namur	1510	58.7	1.6
Brabant	2090	82.6	1.4
BELGIUM	1650	79.0	2.4

## 2.2. DENMARK

Denmark's economy has traditionally been highly centralised on Copenhagen. The pre-eminence of the capital was enhanced during the 1950's and 1960's as structural unemployment associated in particular with the shedding of labour from agriculture, became a problem in peripheral areas. During the 1950's some 10,000 - 15,000 agricultural jobs were lost annually and in the 1960's loss was still running at 8,000 - 10,000 jobs per year (Elbo, 1974). New employment in manufacturing and services tended to be established in the core area. In response to this situation the Danish Government has pursued a decentralisation policy from the introduction of the Regional Development Act 1958 and several studies have recently examined the dynamics of regional development in the country.

Pedersen (1978) used factor and regression analysis to analyse unemployment series data for nine provinces and twenty three employment exchange areas. His work confirms that the period up to 1974 saw quite considerable decentralisation of industrial employment from the core area and that associated with this the economies of the peripheral regions became more diversified, albeit with varying success. He argues that the post 1945 regional development of Denmark can be depicted as a more or less simple cycle whereby agricultural areas with high levels of structural unemployment develop increased sensitivity to fluctuations in the business cycle once manufacturing industry gains a foothold. As 'development' areas gradually embrace more manufacturing industry, structural unemployment further declines and so too does cyclical sensitivity until finally the regions pass through a phase of highly differentiated, stable industrial development into one where their industries become obsolete and structural unemployment again rises.

Using factor analysis to analyse provincial unemployment series data for 1950 - 1974 Pedersen found 3 factors which explained 97% of the variance in the data and was able to show that the factors defined 2 distinct thresholds delimiting important regional structural changes in the economy. In the 1950's (structural) unemployment was highest in Jutland, but during the economic expansion of the 1950's

East, West and South Jutland enjoyed substantial employment growth. This meant that in the 1960's it was the so called problem provinces of Bornholm, Lolland - Falster and North Jutland which were left with the highest levels of unemployment. Again in the 1970's structural economic changes meant a relative improvement in the problem areas because of increased unemployment in other provinces such as East Jutland and Funen.

Pedersen's conclusion concerning a marked reversal of manufacturing location trends in Denmark around 1960 is also supported by Jensen-Butler (1979). The latter argues, however, that the shift away from the centre (Copenhagen) to the periphery was spearheaded by labour-intensive industries, notably textiles, clothing and furniture manufacturing. While Jensen-Butler's interpretation of this trend is couched in terms of Marxist theory, this empirical finding is very much in line with the logic of industrial "filter-down theory", discussed later in section 4.7. He also suggests that the periphery's attractiveness to manufacturing investment increased still further in the 1970's.

This intensification of the centre-periphery manufacturing shift in the 1970's is clearly documented by Illeris (1980), in a study based on employment data for the period 1973-78. During this period, the Copenhagen region recorded a manufacturing employment decline of 33 thousand jobs or 21%, a far greater rate of loss than that for any other part of Denmark. In contrast, West and North Jutland and Bornholm actually recorded net gains of manufacturing jobs, by 19% in the case of Viborg. However, the strength of Illeris' analysis lies in two key findings. The first is that there is a very marked continuum of manufacturing employment change with regard to settlement size, with the heaviest loss in the most urbanised region, Greater Copenhagen, substantial but lower losses in Denmark's larger towns (Aarhus, Odense and settlements of between 20 and 100 thousand population), a static 'no-change' performance in small settlements (5 to 10 thousand population) and actual gains (+13%) in truly rural areas. This urban-rural manufacturing shift is exactly in line with that currently occurring in other member countries such as the United Kingdom (see section 2.9), although it should be noted that the history of industrialization in the

cases of Denmark and the UK is quite different, industrialization only really taking firm root in Denmark after 1945.

Illeris' second finding, based on shift-share analysis, is that this shift to smaller settlements - and hence to the periphery - was not due to differences in manufacturing structure between different areas or settlements, but to a broad sector-wide shift of a whole range of industries: "in almost all sectors there has been a strong displacement away from the capital region into West and North Jutland and Bornholm, partly into provincial towns under 20,000 inhabitants and into rural parishes" (Illeris, 1980,33). This contrasts with Jensen-Butler's earlier finding for the 1960's, suggesting that the forces promoting the urban-rural shift are now so powerful as to be influencing all manufacturing activity, not just labour-intensive industry. Illeris speculates that these forces reflect a decline in the significance of urbanization economies, improved communications, growing factory space needs, and the residential attractiveness of rural areas for skilled labour. A post-1950 urban-rural shift of population in Denmark is certainly suggested by the following table.

Table            Population of Denmark

	Copenhagen (%)	Provincial Towns (%)	Rural Kommunes (%)
1950	22.7	26.4	50.8
1960	20.2	27.1	52.7
1970	16.7	28.3	55.0

(Abstracted from Elbo, 1974)



## 2.3 FRANCE

Postwar economic development in France has been markedly focussed on the Paris region, with the result that centre-periphery relationships have been much researched and have had particular influence on regional policy. Two themes, interregional disparity and centrifugal tendencies, constantly recur in published research which itself tends to emphasise three related aspects of the French regional problem. The first is the dominance of the Paris area as the 'central pole' of the country. Second, the peripheral regions of the West have been persistently less successful in attracting development than most other parts of France. The third aspect is the decline of old industrial regions such as Nord and Lorraine, which have found it difficult to overcome diseconomies associated with their 19th century legacy. The aim of regional policy has generally been to promote industrial decentralisation from Paris, in order both to relieve congestion in the capital and help develop the more peripheral regions. The stimulus for an active policy came in the early 1950's because of growing realisation and concern that Paris was continuing to extend its dominance.

Greater Paris is a massive conurbation, almost 10 times larger than its nearest rivals - Lyons, Marseille, Lille - Roubaix - Tourcoing, - which each have a population of about one million. Just after the last war 60% of production in, for example, vehicles, electrical goods, machine industries and pharmaceuticals was concentrated in the Paris area and two thirds of French taxes were collected there (Merlin, 1974). Prud' Homme (1974) neatly illustrates the preeminent influence of Paris in the early sixties with employment statistics and by calculation of an index of household income. Between 1954 and 1962 employment in France grew by only 1%, but in Paris growth was 11%. The index of household income for the Paris region in 1962 was 16.4 as against 10.8 for France as a whole. Also an extremely high proportion of population growth has been absorbed by Paris, largely by migration from provincial towns (Merlin, 1971). Between 1901 and 1962 the national population increased by only 1.8 million to 37.8 million, but that of Paris almost doubled from 4.7 million to 8.4 million (Prud' Homme, 1974).

In the 1950's more than 50% of population growth in Paris was due to migration (Clout, 1975).

Beaujeu-Garnier (1974, p113) has succinctly drawn attention to the disparity between the West and the rest of France. "Forty-four per cent of the area is northeast of a line from Le Havre to Marseille, but this area has 63% of the population, 76% of the employment in industry, and 85% of the employment in specialised and dynamic production such as electrical machinery."

There is much evidence that a decentralisation policy has only been partially successful. Between 1955 and 1971 some 2,745 instances of decentralisation (or decentralised expansion) were negotiated. But those regions with most unemployment gained comparatively few new jobs or industrial building because diffusion tended to be in close proximity to the Paris conurbation (Merlin, 1974). For example, Bretagne, Aquitaine, and Limousin, respectively, accounted for only 3.5%, 2.6% and 1.3% of new factories from 1955 - 1971 and 5.4%, 2.0% and 0.8% of new industrial employment (Clout, 1975). In contrast the two Normandie regions, Picardie and the Centre region, accounted for 50.5% of new buildings associated with relocated industry and 43.5% of new industrial jobs (Clout, 1975). The impact on individual regions of diffusion from Paris was considerable. From 1954 - 1968 the industrial employment growth of the conurbation was negligible (0.6%), but in Basse-Normandie it was 47.8%, Centre 34.6%, Haute-Normandie 28.8% and Pays de Loire 32.5%. Again in contrast growth in Languedoc was only 3.2%, in Midi-Pyrenees 3.5%, Alsace 3.9% and in Lorraine a mere 1.6% (Clout, 1975).

Merlin (1974) also emphasises the important point that while decentralisation policy focussed on industrial employment, industrial new jobs made up only 13% of new employment between 1955 and 1971. Taking tertiary employment into account Paris attracted 25% of new employment from 1955 - 1977 and in net terms (allowing for the decline in agriculture over the period) this meant over 60% of all new employment (Merlin, 1974).

Despite regional policy the population of the Paris conurbation increased by 780,000 between 1962 and 1968, though as a proportion this was only 9.1% compared with population growth of 17.1% in Provence and 10.8% in Rhone-Alpes, for example (Clout, 1975). A simple but effective index based on the relationship between public expenditure in region and its total population was calculated by Prud' Homme (1974), for the period 1966 - 1977 and again demonstrates that regional policy was not able effectively to achieve its objectives. The index shows that only three regions were clearly favoured by the distribution of public expenditure (Paris +48, Haute-Normandie +31, Languedoc +51) while the majority of regions, especially in the West, fared relatively poorly (Aquitaine -24, Poitou-Charent -29, Pays de la Loire -33).

Interregional disparity and the dominance of Paris is so pronounced in France that many authors have relied on simple descriptions of statistical data to illustrate trends. However, Briquel, Perrin and Planque have adopted more analytical approaches in some of their recent work and have produced some interesting results. Briquel (1976) analysed the employment dependency of French regions by calculating a coefficient comparing the relationship between employment dependent on companies with head offices outside a region and employment supported by companies based within the region for 1971. His results allowed him to distinguish three groups of regions which again emphasises the pattern of diffusion in close proximity to Paris and contrasts between East, West and North and the healthy economy of Rhone-Alpes. Thus, the coefficient of dependency was high for all regions of the Paris Basin with locally based firms providing only 30% - 40% of industrial employment, but firms based in Ile de France accounting for about 50%. A second group comprised regions - Champagne, Nord, Lorraine, Franch-Comté, the West, Midi-Pyrenees, Auvergne, Provence-Cote d'Azur and Corsica - which were characteristically less dependent on extra-regional firms. In these regions local firms provided 50% - 66% of industrial employment (Ile de France 40%) and it is interesting that Nord and Lorraine with their dependence on long established traditional, and therefore probably local, industries come into this group. Lastly, Briquel recognised Aquitaine, Limousin, Languedoc and Alsace where exogenous firms employed less than 35% of the regional workforce.

In the case of the first three regions Briquel attributed this to weak, low density industrial structure and a consequent unattractiveness to a dynamic industry with centralised (i.e. Ile de France) headquarters. Rhone-Alpes appeared to be a special case as it was largely self sustaining in view of its growth as a (very) secondary pole in competition with Paris. Briquel (1976) also shows that the regions were somewhat more dependent on extra-regional investment than employment. In total 43.6% of provincial employment was extra-regional compared to 61.9% of investment (Ile de France companies alone responsible for 56%). Planque (1977) has produced a similar classification to Briquel, based on 3 regional groupings. However, it is interesting that he discusses regional differences in development in a more specific periphery context and emphasises the importance of accessibility to Paris as a determinant of the relative ability of regions to attract or repel industry, in addition to their structural economic characteristics. To illustrate this point Planque observes that where regional policy did achieve growth to the West of Paris it was in the regions nearer to the capital that the policy was most successful (for example, see table 2.4).

Table 2.4 An example of differential growth west of Paris

	1962-1968	1969-1973
	%	%
Poitou-Charentes	18	23
Aquitaine	6	16

Abstracted from Planque (1977)

Planque recognised 'active poles' capable of generating cumulative development (Paris, Rhone-Alpes), 'passive regions' with inadequate structure but not hindered by serious external diseconomies (e.g. Bretagne, Aquitaine, Limousin), and regions with repellent structures with a high level of external diseconomies and obsolete industries (e.g. Nord, Lorraine). Planque argues that the repellent regions are gradually becoming less competitive than the passive regions because their

external diseconomies outweigh the advantages of a pool of industrial workers in comparison with the benefits of scattered urban structure in the latter areas. Furthermore, he argues that proximity to the central poles will determine which passive regions develop most rapidly. Perrin (1975) also classified French regions into three groups, which broadly correspond to the typologies suggested by Briquel (1976), and Planque (1977), this time based on a 'weight of urban support' calculated for 1954 - 1968 (tab.2.5) and shows that this correlated well with rates of urbanisation, industrialisation and demographic change. Using factor analysis to examine the relationship between industrial structure and spatial economic change Perrin was able to show a tendency for growth to diffuse from the centre to periphery 'by a process of radio-concentric interregional expansion depending on communications axes and the location of urban centres'. The analyses by Perrin (1975) and Planque (1977) both emphasise the very important point that diffusion in France has meant that it is the dynamic industries (e.g. chemicals) which have tended to establish themselves in close proximity to Paris. In contrast 'filtering' has resulted in industry which requires less skill (e.g. textiles) becoming decentralised to peripheral regions furthest from the poles and/or with the least modern economic structure.

Table 2.5 Classification of French Regions

		<u>Wt. of Urban Support</u>
Group 1	Paris	498
<hr/>		
Group 2	Provence-Cote d'Azur	240
	Nord	
	Rhone-Alpes	
	Alsace	
	Lorraine	
	Midi-Pyrenees	
	Aquitaine	
	Bretagne	83
<hr/>		
Group 3	Languedoc-Roussillon	60
	Auvergne	
	Limousin	17

Abstracted from Perrin (1975)

## 2.4 GERMANY

Despite the legacy of destruction left by the second World War, the German economy has been completely revitalised, so that today it is the strongest in Western Europe. In terms of the centre-periphery model, north-western Germany in particular is often regarded as the core of the whole EEC. Thus, for example, studies such as Steinle (1979) measure peripherality in EEC terms by simple distance from the triangle Liege-Cologne-Duisburg. However, although this zone of Germany, and the Federal Republic as a whole, are of central importance to the development of the EEC it is difficult to evaluate recent regional economic trends within Germany because relatively few comparative studies have been attempted. There are three principal reasons for this.

First, although Germany has often been considered as a central country within an EEC centre-periphery context, its own internal structure is polycentric and does not fit the centre-periphery model. Partly because of the severance of and from Berlin, there is no obvious national core area, but rather a series of major nodal cities such as Nurenberg, Munich, Cologne and Frankfurt. Much government authority is devolved to the ten provinces (Lander) focussed on these centres. Second, because the Länder enjoy substantial autonomy, series of social statistics which are collected are not fully harmonised. Third, although the Lander themselves are long established, there have been several important boundary changes during the last few years which have affected smaller administrative areas. This makes it extremely difficult to obtain consistent detailed regional data for series analysis. Notwithstanding these difficulties a broad review of recent regional economic trends is attempted in the following paragraphs.

The composition and distribution of the German population has changed considerably since 1945. The Federal Republic constitutes approximately 30% of the territory which made up the former Reich. Today its population is over 60 million and is 60% urban (Blacksell, 1975).

Because of the bombardment and destruction during the war, the German population became dispersed into the rural areas. However the immediate post war years saw rapid reconcentration in towns and cities as the

unemployed took up new jobs which were offered in these centres of agglomeration, though even in the mid 1950's the population was still more dispersed than it had been before the war (Boventer, 1969). At the same time agricultural employment fell rapidly from 25% in 1950, to 13.7% in 1960, 8.8% in 1970 and is less than 5% today (Krumme, 1974).

The most important single influence on the composition of the German population since 1945 has been immigration. Following the war there was a large influx of refugees from Eastern Europe who were admitted for compassionate and political reasons. But in particular large scale immigration was possible because the refugees were readily absorbed by the growing economy. The first waves of refugees tended to settle in British and American occupation zones such as Lower Saxony and Bavaria. These zones were located near the eastern borders, were rural and so offered surer food supplies and may have appeared politically more stable. However, the location of refugees in these areas did mean that there was a rapid increase in the rural population just as the cities were beginning to require large amounts of labour. With the closure of the eastern border in 1961, increasing numbers of workers entered from other less developed countries such as Turkey (table 2.6).

Table 2.6 Population Change in Germany

Year	Natural Increase	<u>Migration Gains</u>		
		From former Reich	Foreign	Berlin
1956	271,200	260,200**	-5,950	77,710
1960	340,270	117,740**	176,850	70,610
1964	421,310	36,770	237,150	-22*
1970	76,080	23,580	547,090	---

\* From West Berlin only

\*\* Figures do not include East Berlin

Abstracted from Krumme, 1974, p108



While foreign immigration has been particularly important for the maintenance of rapid economic growth in Germany the pattern of natural population increase has been typical of industrial Western Europe generally in that since 1964 the birth rate has declined substantially. For example, by 1971 there was a surplus of deaths over births of 40,000 per year and it was the regions which had previously known particularly high birth rates (for example, Emsland, Western Eifel and parts of Baden Württemberg) which saw the greatest decline (Krumme, 1974). In 1970 foreign immigration reached over 570,000 which accounted for no less than 88% of the population increase of the Federal republic for that year (table 2.6) . As would be expected immigrants were particularly attracted to the expanding industrial areas of Baden - Wurttemberg, Hessen, Sud-Bayern and Nordrhein - Westfalen where in 1970 the rate of employment of foreigners was 16.0%, 13.2%, 12.3%, and 10.4% respectively (Krumme, 1974).

As the German economy has expanded, coal-based industries have tended to lag behind new high technology, consumer goods industries such as electronics and car manufacture. The contrast is a stark one since much of the expansion in the latter took place at new locations rather than in the traditional industrial areas. Thus, iron and steel production remains concentrated in the Ruhr and the chemical industry is centred on the Ruhr, Middle Rhine and Frankfurt areas, but cars tend to be produced around Wolfsburg, Rhine-Main and Baden-Württemberg and the electronics industry has developed particularly in Bayern, Baden-Württemberg and Hessen (Blacksell, 1975). Despite this trend, regional differences in production and income have tended to diminish in the period 1950 - 1970 (table 2.7). For example, lagging regions such as Schleswig-Holstein, Lower Saxony, Bavaria and Rheinland-Pfalz reduced the difference between their gross regional product and the federal average for 1972 by 50% - 75% (Krumme, 1974).

Table 2.7 Per Capita Gross Regional Product Deviation  
from Federal Average (In Percent)

	1950	1960	1970
Hamburg	+67.1	+48.4	+56.6
Hessen	-1.0	0	+8.1
Berlin	n.d.	-3.3	+7.7
Nordrhein-Westfalen	+21.3	+6.7	+5.6
Bremen	+38.2	+15.1	+4.4
Baden Württemberg	0.2	+3.0	+0.7
Bayern (Bavaria)	-16.3	-11.3	-4.2
Rheinland-Pfalz	-15.0	-11.8	-6.4
Lower Saxony	-18.5	-10.2	-8.6
Saar	n.d.	-8.0	-12.5
Schleswig-Holstein	-28.6	-17.1	-14.0
Federal Republic, (in DM)	2386*	5958**	8530**

\* 1954 prices

\*\* 1962 prices

Abstracted from Krumme, 1974, p105.

Birg (1975) was able to use shift-share analysis to examine previously unpublished data on regional employment growth. During his study period, 1961 - 1970, the total number of jobs in the Republic declined by 213,000 to 26.3 million. The main results of Birg's analyses are summarised in table 8.

Table 2.8 Structure, location and regional employment factors for the Federal Länder for 1961 and 1970. Results are aggregated from labour market regions.

Land	Structural	Locational	Regional
Schleswig-Holstein	-2.0	2.6	0.6
Hamburg	7.4	-10.4	-3.7
Bremen	5.7	-5.2	0.2
Lower Saxony	-3.1	2.6	-0.7
Nordrhein-Westfalen	0.1	-3.7	-3.6
Hessen	1.2	2.7	3.9
Rheinland-Pfalz	-5.5	1.4	-4.2
Saarland	-4.3	-1.0	-5.2
Baden-Württemberg	-0.7	3.9	3.2
Bayern	-4.7	6.1	1.2
Berlin (West)	11.5	-17.8	-8.3

Abstracted from Birg (1975)

The third 'regional' column in the above table gives percentage change in total regional employment over the period, and indicates that while some highly-urbanized regions, notably West Berlin, Hamburg and Nordrhein-Westfalen, declined, employment in several more rural regions, notably in the south (Baden-Württemberg and Bayern), increased. The latter moreover achieved this result despite a negative structural

impact (column 1), indicating a bias towards slow-growing or declining industries because of a markedly positive 'locational' (or in the terminology of other studies, 'differential') component. A positive locational shift was also recorded by other more rural areas such as Schleswig-Holstein and Lower Saxony. In contrast, the more-urbanized regions revealed the opposite pattern, with a negative locational impact out-weighing a positive structural component.

This striking difference in component performance between Länder categorized as urban or rural is even more apparent at the detailed labour market region scale (Birg, 1975), a finding which echoes that of workers in other countries such as the United Kingdom (see section 2.10).

Biehl has developed a 'potential concept' which he has examined in several studies of Germany (Biehl, 1975; 1978; Biehl & Munzer, 1979 in press). Biehl suggests that a region has the 'potential' to reach a certain level of development; this is dependent on the level of provision of 'potential factors' - agglomeration, economic structure, size and relative location of region. Biehl (1975, 1978) tested the proposition that differences in the availability of public infrastructure are an important determinant of 'potential' and showed that there was a significant relationship between the amount of infrastructure available within a region and per capita income levels. In general his results also conformed well with the suggestion that there is a regional centre periphery structure at the European scale.

Adlung et al (1979) have developed the Biehl concept still further. One by-product of their work is the identification of a close statistical relationship between relative location within Germany, measured by economic potential values, and GDP per head, across the 37 official planning regions of the Republic (see Appendix C). Another is the finding that the 16 regions officially designated for Federal support (39% of the area, 29% of the population) were generally poorly equipped with 'potential factors' and were characterised by low income per head, relatively high unemployment and outmigration.

## 2.5 IRELAND

The existence of a general centre-periphery pattern of postwar regional prosperity and development in the Republic of Ireland is suggested by various indicators, if the Eastern region focussed on Dublin is accepted as the economic core of the country (Johnson, 1975). Thus in 1973, per capita personal income in the East was 17 per cent above the average for the Republic (22 per cent above in Dublin itself), but 24 and 31 per cent below in Donegal and the far North West, two of the regions furthest from Dublin (Ross and Jones 1977). Until 1965, moreover, regional income disparities were widening in Eire, as measured by Williamson's  $V_w$  index, with relatively fast income-per head growth in the Dublin region (Martin, 1971).

The East has also gained population by migration and, especially, a very high rate of natural increase. Its share of the national total rose from 30.0% in 1951 to 36.6% in 1975 (National Economic and Social Council, 1975: O'Farrell, 1979). Again, it was Donegal (-19%) and the North-West (-26%) which suffered the greatest population losses over this period, both relatively and absolutely, with another peripherally-located region, the West (-15%), not far behind. O'Farrell's shift-share analysis (1972) also shows that between 1951 and 1966, Greater Dublin was the only part of the Republic to record employment growth, its share of total national employment thus increasing from 23.7 to 28.2%. This was due primarily to a relatively very favourable industrial structure. The greatest employment losses were suffered by peripheral counties in the far north west and, interestingly, south west (Kerry). This generally reflected both adverse industrial structures and a negative differential shift. The growth of service industry and employment has been particularly concentrated in the Eastern region, which thus contained 49% of total Irish white-collar workers by 1971 (Bannon, Eustace and Power, 1977, p.80). Overall, the large-scale factor analysis of regional performance between 1961 and 1971 conducted by a team at An Foras Forbartha concluded that "disparity between the more and less developed regions is continuing to increase even though conditions in the latter are improving", and despite some shift in investment from the East to other more peripheral regions by the late 1960s (Walker, O'Neil, Ho and Kamann, 1977).

As with other European countries, however, this picture of apparently increasing centralization on the core area must be qualified to some extent with regard to recent trends. Thus core-periphery per capita income disparities have in fact been declining since the mid-1960s, with an especially rapid convergence between the East and most remaining regions over the period 1969-1973 (Ross and Jones, 1977). And while a big rise in agricultural prices and incomes in undoubtedly involved here, so too almost certainly is the shift of manufacturing employment to the more peripheral regions documented by O Huiginn (1972, p.24) and O'Farrell (1975, p.55). Thus between 1973 and 1977, manufacturing employment in the East fell by 12% (11 thousand jobs), because of industrial decline in Dublin County (-16% or 13 thousand jobs): whereas manufacturing employment in the West, South West and Midlands regions grew by 11 thousand jobs. Even the far North West and Donegal gained substantially in relative terms (Industrial Development Authority, 1979; O'Farrell, 1978a, p.154). Perhaps as a result, population growth has replaced earlier decline in several of these regions since the mid-1960s (the South West and Mid West, for example), although the north-western counties are still net losers (O'Farrell, 1979, p.36). The location of many new factories in peripheral regions during the last fifteen years is ascribed by most researchers to Irish government regional policy, although as O'Farrell (1978b, p.205) stresses, when allowance is made for variations in plant location preference by town size and regional differences in the sizes of towns, apparent regional variations in plant numbers per town cease to be statistically significant. This is reminiscent of the subregional explanation for regional performance discussed in the U.K. review.

## 2.6 ITALY

Italy provides the best example of economic dualism within Western Europe, combining one of its most advanced industrial economies with one of the poorest and most depressed areas of the continent. The whole of southern Italy has long been regarded by many observers as the problem region of Europe and as such has attracted much academic interest (for example, see Rodgers 1979, Mountjoy 1973, and the bibliographies associated with these texts). But in terms of regional comparative studies the problem of disparity between the Mezzogiorno (Abruzzi Molise, Campania, Apulia, Basilicata, Calabria, Sicily and Sardinia) and the North appears so great that research is almost always reported in the context of a North versus South dichotomy, without reference to smaller scale breakdown. Similarly, the dichotomous treatment of North and South means that the potential concept, central to the present research, is unlikely to have been applied to Italy. Of course, empirical work has confirmed the peripherality and low potential of the Mezzogiorno at a Western European scale (Clark et al, 1969).

The government first introduced policies aimed at development of the south at the beginning of the 1950's. The scale of disparity between the two Italies at that time is illustrated by the selection of social indicators shown in table 2.9. (King 1975).

Table 2.9 Socio-economic indices for Italy at the beginning of the 1950's.

	<u>North</u>	<u>South</u>
Annual per capita income 1951 (£)	220	90
Annual per capita electricity consumption 1950 (KWh)	98	30
Agricultural employment 1951 (%)	35	56
Average natural increase per 1000 population 1947-49	7	17

Abstracted from King (1975, p.93).

In 1951 the South had 38% of the Italian population, 50% of births and 75% of natural increase (Dickinson, 1955) but despite the high propensity of the Mezzogiorno to increase its population its proportion of the total Italian population declined from 37% to 34% between 1951 and 1971 (Cao-Pinna, 1974). This was possible because throughout the 1950's and 1960's there was substantial emigration from the South. For example, between 1961 and 1970 net migration averaged 230,000 per year (SVIMEZ, 1978). Most of the migrants were destined for the industrial northwest so that between 1951 and 1971 the population of Lombardia and Piemonte-Valle d'Aosta increased by 30% and 26% respectively, whereas in the south as a whole, population increased by only 5% and in Abruzzi-Molise, Basilicata and Calabria it actually decreased by 10% (Cao-Pinna, 1974).

There has, however, been a partial improvement in the relative position of the Mezzogiorno since 1971. In 1978 the South's share of total population was 34% just as it had been in 1971, representing a population of 19.2 million out of a total of 55.9 million (SVIMEZ, 1978). The main reason for this partial improvement, or at least stabilisation, of the relative decline of the Mezzogiorno was that the pattern of migration had changed substantially. Rodgers (1970) was able to show that on a macro scale the level of migration from the South between 1952 and 1968 correspond very well with the pattern of expansion and investment in Northern industry. However, in the 1970's, a period which has witnessed major economic crises, net migration from the South has been dramatically curtailed. Between 1971 and 1973 it fell to 110,000 per year and since 1974 has been running at about 30,000 per year. This striking change also reflects a big increase in the number of former migrants returning to the South (SVIMEZ, 1978).

Although the changing pattern and rate of exchange of population between the Mezzogiorno and the North is by far the most impressive aspect of demographic change in Italy since 1950, two further important trends should not be overlooked. First, Rodgers (1979) shows that migration within the South, from rural to urban and metropolitan locations, was also particularly strong ( table 2.10 ), although it must be admitted that it was still not so marked as in the dominant North.



The figures reinforce Rodgers' (1970) conclusion that industrialisation within the Mezzogiorno was the most important factor accounting for spatial variation in migration ratios within the South.

Table 2.10 Changes in the Population of Italian Metropolitan Areas 1951 - 1971 (In per cent)

Southern metropolitan areas	36.6
Southern non-metropolitan areas	- 3.4
Northern metropolitan areas	54.5
Northern non-metropolitan areas	- 3.3

Abstracted from Rodgers, 1979, p.96

Second, in addition to transfers of population within Italy there was considerable emigration to other countries, but the origin of the emigrants again reinforces the distinction between North and South. Between 1959 and 1969 no less than 81% of Italy's emigrants were from the South (Cao-Pinna, 1974). The overall effect of these migratory movements was that, to one destination or another, the South lost one million of its rural male workforce (a decline from 2½ million to 1½ million between 1950 and 1965 (King, 1975).

As would be expected the distribution of manufacturing employment and output reflects the distribution of population, except that industry is even more heavily concentrated in the North. The South accounted for only 13% of GDP in 1971 while the northwest alone had a 52% share (Cao Pinna 1974). The North maintained its share of manufacturing employment between 1951 and 1971, the proportions being 84% and 85% respectively (Rodgers, 1979). However, more recent trends during the recession of the 1970's are quite interesting. Rodgers (1979) presents figures that show that while the Southern economy is much smaller it also appears to be less susceptible to economic fluctuations (tab. 2.11). To explain this Rodgers repeats an

argument first advanced by Podbielski that the stability of the South could reflect structural backwardness in the Mezzogiorno so that with its greater dependence on production for the local market it would be far less sensitive to fluctuations than the producer-good economy of the North.

But at the same time unemployment in the South has remained consistently higher (averaging 5.3% from 1970 - 1977) than in the North (where it averaged 2.6% for the same period). In another study of GDP in Italy, Raule (1978) used Williamson's  $V_w$  index as a measure of spatial inequality of income and found that inequality increased until 1963, but once the growth period of the 1960's became established, inequality (and the value of the index) declined until 1969. One final study by Salvatore (1972) is of interest for although it covers the period 1952-1967 it does attempt an empirical measure of the success of the Italian development program for the South. Salvatore shows that between 1952 and 1967 the per capita income of the South increased by 62% and that 21% of the increase could be attributed to the unhampered operation of market forces. He concludes that market competition, rather than being to the detriment of the South, benefitted its development.

Table 2.11 Changes in Gross Domestic Products in Italy  
1970 - 1977 (In per cent)

Year	Italy	North	South
1970-71	1.6	0.7	4.3
1971-72	3.1	3.9	0.8
1972-73	6.9	6.9	7.0
1973-74	3.9	4.0	3.8
1974-75	-3.5	-4.5	-0.5
1975-76	5.6	7.1	3.7
1976-77	2.1	?	?

Abstracted from Rodgers, 1979, p.125.

## 2.7 LUXEMBOURG

Luxembourg is the smallest of the nine member countries, but it is nonetheless interesting to consider a few trends which are revealed by EUORSTAT (1979). Overall the population is in decline and as a small country with economically powerful neighbours migration is particularly important - net migration was -4% in 1976 and the population decline was -5.6%. The share of agriculture (6%), industry (41%) and services (53%) in total employment reflect the pattern found in the most developed of the member countries. Luxembourg has been particularly susceptible to changes in the importance of these sectors from 1970 to 1976, over which period agricultural employment declined by 45%, industry remained stable and service employment grew by 17%. Even in the 1970s, however, Luxembourg's unemployment rate as recorded by the EEC Labour Force Survey has remained very low by Community standards.

## 2.8 NETHERLANDS

At the European scale the Netherlands stand out as a small, densely populated and highly developed country located in the 'central core' area of the EEC; but despite their geographical position and overall high level of development there has been an increasing national commitment to regional policies during the post-war years. The pattern of regional economic development during this post war period has been typical of other developed western European countries. Following a major pre-war decline in agricultural employment and complementary expansion of secondary and tertiary employment, there was continued decline in the agricultural sector, but the secondary sector became relatively more important as a source of replacement employment in comparison with the already large tertiary sector (table 2.12).

In general, studies have characterised regional disparity in the Netherlands in terms of the prosperous and 'central' provinces of the West, including in particular the Randstad cities of Amsterdam, Rotterdam, The Hague and Utrecht, and the less prosperous 'peripheral' provinces of the North and South (for example see Bartels, 1976; Hendriks 1974; Oosterhaven and Van Loon, 1979). In another recent study Van der Knapp (1978) used a relatively simple statistical technique, the coefficient of localisation, to map regional employment specialisation by sector in comparison with average national distribution of employment within the different sectors. On the basis of this analysis Van der Knapp distinguishes the three zones in the following way. The provinces of the North remain predominantly agricultural while, in contrast, the provinces of the South have above national average employment in industry as well as a high level of agricultural employment and the provinces of the West are dominated by the service sector. This classification is supported by earlier work (Van der Knapp and Lesnis, 1976) in which inter-provincial interaction was measured for 1970. For example, the study examined truck haulage movement and railway passenger flow data which it was found closely corresponded to population migration flows and gave a three sub-system classification similar to that based on the results of the coefficient of localisation analysis.

Table 2.12 Netherlands' Employment by Sector and Period

Sector	1950	1960	1970
Agriculture (primary)	17.6	10.7	8.1
Industry (secondary)	36.1	42.4	43.8
Services (tertiary)	46.1	46.7	48.0

Furthermore Van der Knapp and Slegers (1978) analysed migration data on an annual basis for 1948-1976 and concluded that the distinction between North, South and West was stable throughout that period.

In a very recent paper Oosterhaven and Van Loon (1979) compared the sectoral and spatial structure of the Netherlands in relation to regional wage differentials using modified shift share methodology to analyse 1973 data for the 40 COROP regions. The results again confirmed that it is useful to consider the Netherlands as divisible into three broad regional economic zones. Wage leads were found in the West, particularly the Randstad, and more generally in regions with industrial harbours. Wage lags were found in the North, with its agro-industrial complexes, and in the South, characterised by old established industries such as textiles, clothing and mining.

Regional policy in the Netherlands was first introduced in response to the problem of structural unemployment (which was largely due to the decline of agriculture). In 1952 eight development areas were designated and, using what would now be regarded as a conventional range of incentives (for example, provision of infrastructure, re-training schemes, migration allowances etc.) the aims of the government's policy were twofold: to attract mobile capital into the development areas and to promote migration of unemployed workers to the West. By the late 1960's two types of development area were distinguished: those with long standing structural unemployment and those which had become dependent on a single old established industry.

However, by the end of the 1960's it was also evident that the migration policy was misconceived and that there had been only limited success in decentralising industry. There had been selective migration of skilled workers into the West and in any case by 1968 50% of the population were in the core region occupying 25% of the country's area. Decentralising firms tended to be those using labour-intensive processes which could easily be trimmed back during slumps in the economy. Self-sustaining capital intensive growth industries were not generally responsive to regional policy. Currently the government operates selective investment rules (for example tax penalties on investment in the West) to encourage location of firms in the periphery and it is now possible for firms to receive substantial grants towards capital equipment and machinery. Migration policy has been radically altered so that incentives are now offered to migrate from the West to the North.

## 2.9 UNITED KINGDOM

The regional distribution of population and economic activity in the United Kingdom has been viewed in centre-periphery terms by many studies (e.g. Caesar, 1964; Clark, 1966; Keeble, 1976). Generally, these have drawn attention to marked traditional differences in population growth, economic performance and socio-economic characteristics between the relatively prosperous 'central' regions of the South East, West and East Midlands, and the relatively depressed 'peripheral' regions/nations of Northern Ireland, Scotland, Northern England and Wales. The remaining regions (Yorkshire and Humberside, North West and South West England, and East Anglia) have generally been viewed as intermediate, although specific parts such as Merseyside and the far South West have often also been characterised as peripheral.

The 20th-century development of this centre-periphery structure, which is clearly illustrated by maps of such indicators as subregional unemployment rates (Sant, 1974; Keeble, 1976), female activity rates (Moseley and Darby, 1978) and per capita personal incomes (Sant, 1974) is explained in various studies by differences in regional comparative advantage for economic, and especially industrial, development. One, if not the chief, comparative advantage of the central regions noted by these studies is much greater market accessibility, to customers for manufactured goods as the former are distributed spatially throughout the United Kingdom. Rapid and cheap access to the national market has been viewed as powerfully influencing the locational choice of much new, so-called footloose, manufacturing industry in Britain.

Moreover, the extent of regional differences in market accessibility, as measured by calculations of 'market' or 'economic potential' (Clark, 1966; Sant, 1967; Gudgin, 1978), would seem to be considerable. Clark's study, based on 1961 personal income data and tapered transport costs, gives potential values for northern Scotland, West Wales and Cornwall over 35 per cent below that for London, the highest value. Gudgin's potential transport cost measure (see Appendix C) gives a maximum difference based on regional population of over 40 per cent (Birmingham-Northern Scotland), while Sant's calculation based on retail sales and distance yields a difference of no less than 80 per cent (London-Northern Scotland).

Differences in market or economic potential are also viewed in some studies as indicators of other regional comparative advantages for economic growth, such as agglomeration economies, information access and innovation leadership, and quality of transport facilities.

Statistical analyses have shown (Keeble, 1976) that Clark's potential values are significantly correlated with spatial variations in such static indicators of economic development and prosperity as subregional unemployment rates ( $r = 0.670$  using 1966 data), manufacturing employment levels ( $r = 0.452$ , 1959 data), and even indices of manufacturing structure. However, Brown's research (1972, p.162) failed to find any correlation with the pattern of subregional growth rates of total employment in Britain between 1961 and 1966, while more recent work (Keeble, 1976, p.106) has actually identified a significant negative relationship between potential and manufacturing employment change, measured in absolute not percentage terms, for 1966-71. The latter is of course the opposite of the trend hypothesised by Clark (1966) with regard to manufacturing location. At a more detailed geographical scale, Rich (1975) did find a statistically significant association between population potential values and county manufacturing employment density changes during the 1960s within Scotland alone. His regression model was however specified in quadratic, not linear, terms. This implies low manufacturing growth in areas of both high and low potential, with maximum growth in areas of medium potential. The strength of this relationship declined over time (1960-65,  $r = 0.766$ : 1965-70,  $r = 0.546$ ).

In more general terms, and at the broader regional rather than subregional level, various studies nonetheless indicate that the three more-central regions of Britain as defined earlier have performed markedly better economically and demographically than their peripheral counterparts during the 20th-century, at least until the 1960's. Thus the share of United Kingdom population resident in these three central regions increased from 42.3 to 46.7% between 1921 and 1961, whereas that of the peripheral regions fell, from 26.8 to 23.7% (Lee, 1971). Similarly, Brown's analyses of variance (1972, p.134) show, also for this period, that employment expansion in the peripheral regions was severely retarded not merely by adverse industrial structures but also in most cases by a very poor 'growth' (or in shift-share terminology,



'differential') performance. Most individual industries in these particular regions thus performed less well than their counterparts elsewhere. The converse was generally true of the three central regions, in that they grew rapidly both through possession of favourable industrial structures and a good 'growth' component. It should however be noted, as Brown (1972, pp. 160-3) does, that if regional centrality or peripherality is more narrowly defined by Clark's potential values, then the picture becomes much less clearcut, with one high potential region - the North West - performing badly on both population and employment change indicators, but two relatively low potential regions - East Anglia and the South West - recording above average growth.

Perhaps the most important finding of recent research on regional economic trends in Britain, however, is that during the period 1960-1975, the traditional picture of an expanding South East-Midlands centre and declining northern and western periphery was substantially modified, if not reversed (Keeble, 1977: Randall, 1979). Demographically, for example, the total residential population of the South East fell during the 1970's, for the first time this century. This reflected heavy net outmigration. In contrast, migration losses from the North and Scotland have been cut substantially in recent years, compared with the early 1960's. Indeed, Wales has been gaining, not losing, population by net migration, in complete contrast to earlier trends (Rees, 1978).

Reversal of traditional central concentration is also suggested by research on regional trends in manufacturing employment since the mid-1960's (Keeble, 1976, 1980a: Fothergill and Gudgin, 1981: Tyler, 1979). Thus the share of United Kingdom manufacturing employment recorded by the three central regions fell continuously, from 48.8 to 47.2%, over the decade 1966-76, whereas that of the four peripheral regions grew from 19.6 to 20.7%. Various shift-share studies agree that this reversal reflected a radically improved 'differential' manufacturing employment performance in the peripheral regions, with the exception of Northern Ireland, but marked deterioration in that of the South East and to a lesser extent West Midlands. This differential trend more than offset the effect of more favourable industrial structures in central regions. However, it should be noted that since 1976, peripheral region manufacturing employment decline has quickened once again, so that the earlier reversal has not been maintained (Keeble,

1981). For service industry, recent employment shifts and decline in the dominance of the South East have benefitted adjacent regions and Northern Ireland, not other peripheral regions (Marquand, 1978).

Other economic indicators reveal trends similar to those of manufacturing. Centre-periphery disparities in regional unemployment relativities diminished between 1965 and 1977 (Keeble, 1977). "Most noticeable is the major improvement in the relative position of three regions of highest unemployment (Scotland, the North and Wales) over the period, and the deterioration in the position of the West Midlands" (Randall, 1979, p. 120). The same picture is presented by trends in regional GDP and personal incomes. "While GDP per head rose in all the regions, relative improvements over most of the seventies were greatest in the North, Scotland, Wales and Northern Ireland" (Central Statistical Office, 1979). Since 1977, however, peripheral region unemployment relativities have worsened, in contrast to the earlier improvement.

Space does not permit any detailed discussion of the possible reasons for these trends. However, regional industrial structure has played a diminishing role (Fothergill and Gudgin, 1981) while most workers agree that government regional policy exerted a significant impact upon manufacturing investment and employment in the 1960's (Moore, Rhodes and Tyler, 1977; Marquand, 1980), largely through the promotion of industrial migration from central to peripheral regions (Ashcroft and Taylor, 1979). It is probable that this in turn influenced trends in population migration, GDP, and unemployment. North Sea oil has had some effect on Scotland's performance. Recent unemployment divergence may reflect a weakening of regional policy and a differential impact of the severe 1979-80 recession. Lastly, Fothergill and Gudgin (1979, 1981) argue that regional trends in manufacturing have also been influenced by substantial subregional manufacturing shifts, from more urban to more rural areas: and that differences in performance between regions thus mainly reflect their differing subregional composition in terms of conurbations or rural areas. The importance of the urban-rural manufacturing shift in Britain during the 1970's is certainly attested by other recent work (Keeble, 1980a) and conforms to trends in other member countries such as Denmark (see section 2.2): Its explanation may be linked to a shift of high-investment industry from congested urban centres in the context of agglomeration diseconomies and increasing space needs because of rapid technological change.

## 2.10 GREECE

Greece was admitted as the tenth member of the European Community in January 1981. Greek membership thus postdates the period of this study, and no comparable regional data is available for subsequent analysis, with the exception of the GDP figures obtained for the hypothetical EUR12 potential analysis (see section 3.3(v)). However, the existence of severe regional disparities in Greece warrants emphasis in this review section and in the context of EEC regional policy for the 1980's. Thus in 1973, the Greater Athens area alone contained manufacturing firms employing no less than 46.3 percent of Greek total manufacturing employment, with a further substantial concentration in the Thessaloniki area (Yannopoulos, 1979). In 1978, these two areas contained 61.4% of all manufacturing establishments in the country and an even larger share of modern industries (Giannopoulos and Giaoutzis-Flitzanis, 1981). Moreover, trends during the 1970's indicate an increased polarisation of manufacturing and service industry in these two economic core regions, with a faster growth of output in each than in all other Greek regions. By 1977, output per head was thus 124% and 108% of the national average in the Nomos of Athens and Thessaloniki, respectively (Commission of the European Communities, 1981). However, regional depopulation in areas of Epirus, Thrace and Macedonia has occasioned a slight narrowing of regional per capita GDP disparities.

National government regional policies, in force since 1958, attempt to encourage industrial relocation from the two core areas by government tax incentives, loans and grants for infrastructure investment in the so-called 'depressed regions' of Crete, Eastern Macedonia, Thrace, and Epirus. While these incentives have recently been strengthened by the 1981 Act no.1116, the impact of earlier policies has been limited. Some slight trend towards outward dispersion of industry from Greater Athens has however been noted during the later 1970's (Doxiadis, 1980).

### 3. REGIONAL ECONOMIC POTENTIALS AND ACCESSIBILITY

#### 3.1 The Concept of Regional Economic Potential

The concept of regional economic potential, as defined and developed by researchers such as Harris (1954), Clark (1966) and Rich (1975, 1980), relates specifically and solely to a region's relative accessibility, or nearness, in geographic space to economic activity (manufacturing and service industry, extractive industry, agriculture, and so on) as that is actually located within a particular country or group of countries such as the European Community. Thus as defined in this study, the economic potential value calculated for, say, the Brabant region of Belgium is a measure of Brabant's relative nearness geographically to economic activity in the EEC, as that is actually distributed regionally throughout the Community in a particular year. The adoption of the word 'potential' for this measure of nearness or accessibility by its first proponent, J.Q. Stewart, in the 1940's reflected an analogy with gravitational potential and the laws of Newtonian physics. The use of the word potential in this and the earlier studies cited above thus does not imply any attempt at measuring general possibilities or capacity for future economic development of particular regions, as for example has some recent German research on regional "potentialfaktoren" (see Biehl, Hussman, Rautenberg, Schnyder and Sudmeyer, 1975; Adlung, Gotzinger, Lammers, Schatz, Seitz and Thoroe, 1979).

The standard formula for regional economic potential calculation, as given by Rich (1980), is:

$$P_i = \sum_{j=1}^n M_j / D_{ij}$$

where  $P_i$  is the economic potential of region  $i$ ,  $M_j$  is a measure of the volume of economic activity in region  $j$ , and  $D_{ij}$  is a measure of the distance or cost of transport between region  $i$  and region  $j$ . Summing for all  $n$  regions considered yields the potential value for region  $i$ . Most economic potential analyses measure the volume of economic activity in different regions by values of regional Gross Domestic Product, as the best available summary index of the economic activity which is present and the output of goods and services by organizations and individuals in each region. Resultant potential values are expressed in units of economic activity (e.g. GDP) per unit or distance of trans-

port cost used (e.g. per kilometre).

The significance of these values for EEC regional economic analysis is threefold. First, they provide an objective general measure of the degree to which any given region is relatively central or relatively peripheral within the Community, with respect to the actual geographical distribution of EEC economic activity. By definition, regions recording high potential values will be on average closer, more accessible - and therefore more central - to existing economic activity than regions with low potential values, which in this sense will be peripheral. In most applications of the economic potential model this fact results in a pattern of regional potential in which the highest values are recorded by regions which are also reasonably central purely geometrically with regard to the whole country (or in our case, Community) involved. Conversely, regions recording low potential values normally are found to be located around the edges of the country (or Community), in geometrically peripheral zones. This is certainly the case with the present application. The key point, however, is that the potential values calculated here do provide an objective measure of a region's relative centrality or peripherality with regard to the geographical distribution of economic activity within the European Community. They thus provide a logical basis for classifying regions as central or peripheral, for subsequent comparison of regional economic trends.

Secondly, as a quantitative index of relative proximity to economic activity, the potential values can also be regarded as a summary measure of possible regional comparative advantage for economic growth, if advantages are conferred on a region, its firms and organizations, by relative accessibility to economic activity. Certainly much previous research and theoretical literature has argued that relative accessibility - or centrality - within a trading community confers a comparative advantage on firms in the region concerned, by reducing the various distance costs - on products, inputs, information - incurred by them. Conversely, firms in more peripheral and inaccessible regions suffer a comparative disadvantage in the form of higher distance costs. If differences in accessibility and distance costs are large, and if such costs are of significance in the creation, competitive performance and hence growth of firms, then over a medium or longer ~~time~~ scale differences may be expected to emerge in the nature and rate of economic

growth taking place in central and peripheral regions, respectively. The use of economic potential values as an index of such possible accessibility-related comparative advantage underlies the analysis and results presented in section 4, where the theoretical logic of this approach is also set out more fully.

The third way in which the potential results are of value for EEC regional economic analysis is that they provide an objective measure of changes in relative regional accessibility to EEC economic activity both over time and as a result of the enlargement of the Community to EUR9 in 1973 and, prospectively, to EUR12 by 1984. Calculation of potential values for a series of different years - in this case, 1965 - 1977 - and for the different stages of Community enlargement and tariff barrier adjustment yields a picture of changes in relative regional accessibility over this period and as a result of enlargement. Specifically, it enables conclusions to be drawn as to whether regional differences in accessibility have been narrowing or widening within the Community, both as a result of different rates of growth of economic activity in different regions, and as a result of tariff reductions accompanying enlargement.

### 3.2 Methodological Issues

Economic potential calculation raises a number of technical and methodological problems, both of a general nature and with regard to the particular application involved. These problems, and the precise ways in which they have been handled in this study of EEC potentials, are set out in detail in Appendix C. A brief summary of the approach adopted is nonetheless useful at this point, as a background to the discussion of results.

In calculating potential values, the regional distribution of economic activity within the EEC - the mass  $M_j$  term in the potential equation - has been measured by Eurostat gross regional product estimates expressed in European Units of Account in current prices and current exchange rates. The choice of EUA rather than Purchasing Power Parity values which are also of course available from Eurostat reflected the judgement that the former provided the better measure of the volume of economic activity in different countries and regions, with regard to possibilities of trade and interchange of goods. Similarly, the use of EUA values measured in terms of current rather than constant prices and exchange rates reflects the view that current values provide the better measure of the real evolution of regional and national economies within the Community during the 1970's. These GDP figures have been adjusted by the project team to a comparable 1977 regional basis to allow for certain minor boundary changes during the 1970's with respect to the "regierungsbezirke" of Nordrhein-Westfalen and certain United Kingdom regions. The potential analyses also incorporate GDP values for adjacent European countries which possess significant trading links with the Community.

Estimation of the distance or transport cost component,  $D_{ij}$ , in the potential model has been based on shortest road (or road plus sea ferry) distances between nodes - the largest city or town - in each EEC region and adjacent country. The network of road links is shown in diagrammatic form in Figure 3.1. These shortest road distance values have then been adjusted to take account of two different types of barrier to the free flow of goods, capital and labour within Europe, namely sea crossings and tariff/trading area barriers. Incorporation of the extra cost and general barrier effect of ferry crossings involved conversion of these costs into road distance equiv-

# Primary Road Network Nodes and Links

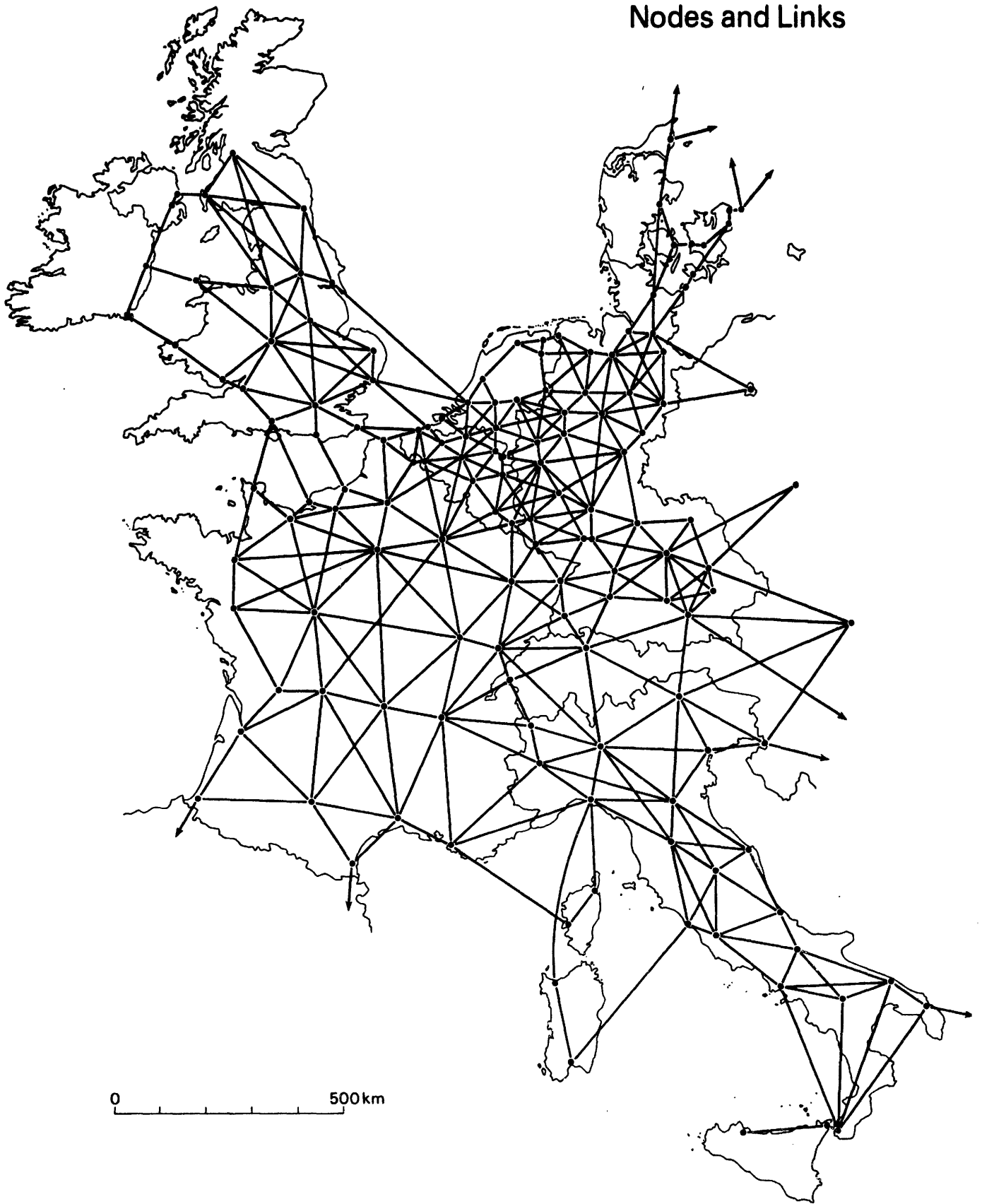


Figure 3.1



alents. This conversion used empirical data on actual shipping and lorry transport costs per kilometre within Europe, and allowed for improvements in ferry services and links during the study period. A similar translation of the cost penalties associated with the tariff barrier on manufactured goods around the original six members of the Community before 1973, and around the nine after that date, was also carried out and applied to those network links which crossed the relevant Community boundaries. Omission of this tariff barrier adjustment thus permits estimation of the effect of enlargement of the Community in 1973 and, hypothetically, by 1984 upon relative accessibility to economic activity of different regions. Although the lowering of tariff barriers after 1973 was of course subject to a transitional period of phased reductions, the 'enlargement' effect is most clearly illustrated by comparison of two sets of potential values, each based on 1973 (or for EUR12, 1977) GDP data. Other more technical issues, such as the basis for 'self-potential' calculation and the question of distance exponents other than unity, are considered in detail in Appendix C.

For the potential analyses, GDP and road distance data were available or estimated for each of 108 level II EEC regions. A list of these regions is given in table 3.5, which also records their 1977 economic potential values in millions of EUAs per kilometre given in rank order from highest to lowest.

### 3.3 Regional Economic Potential: Results

It can be argued that the regional potential values computed by the Cambridge project represent the best objective measure of relative centrality and peripherality to economic activity within the EEC since the Community's enlargement in 1973 which has yet been calculated. This claim may be supported by the careful attention given to technical questions, and by the logical and appropriate procedures for tariff incorporation, etc., adopted by the project team (see Appendix C). Certainly the results achieved are far more authoritative, in addition of course to being more up-to-date, than the only previous application to the EEC as a whole, namely the study by Clark, Wilson and Bradley (1969).

For simplicity and clarity, these results are presented in the form of a series of potential 'contour' maps, in which each region's potential value has been expressed as a percentage of the highest potential value in the EEC (in each application, this is the value for the Rheinhessen-Pfalz region of Germany), and contours interpolated at successive intervals. The actual potential values calculated for each application are recorded in Appendix C, while the maximum value is also given on each map. Results are presented for four years, 1965, 1970, 1973 and 1977. The 1973 GDP data were used to generate two sets of potential values, one including (EUR6), one excluding (EUR9), the pre-enlargement tariff barrier on manufactured goods between the original Six and the three entrant countries. Comparison of these two sets of values permits identification of the once-for-all impact of Community enlargement on relative regional accessibility, with all else - and especially the regional distribution of economic activity - held constant. The analysis for 1977, at the end of the actual phased tariff reduction period, provides a measure of relative regional accessibility for the first year after full dismantling of the tariff barrier. The final potential analysis and map (EUR12) yields results on the assumption of entry to the Community of Spain and Portugal, along with its newest actual member, Greece. This analysis thus utilizes regional GDP estimates for these three countries and omits any previous tariff barrier between them and the Nine.

The chief findings of the potential analyses can be considered under five headings.

(i) The 1977 pattern

The analysis is based on the most recent available regional GDP data, and relates to the first year of full economic integration within the Community of the Nine, in the sense of the complete dismantling of previous tariff barriers. The pattern of regional potentials for this year (fig. 3.6) will therefore be discussed in detail.

The most striking feature of the pattern is the wide disparity in regional accessibility values. In 1977, the most inaccessible or peripheral region of the Community as defined by potential, Calabria, recorded a value (.1134.3 million EUAs per km) only 11.7 percent that of Rheinhessen-Pfalz. A further ten regions - seven of them in Italy (Campania, Abruzzi, Molise, Puglia, Basilicata, Sicilia and Sardegna) plus Corse, Northern Ireland and Ireland - were below twenty percent of the maximum. At the other extreme, some twelve regions in addition to Rheinhessen-Pfalz, (Hamburg, Dusseldorf, Koln, Arnsberg, Karlsruhe, West Berlin, Zuid-Holland, Noord-Brabant, Antwerpen, Brabant, Hainaut, and Ile-de-France) achieved potential values more than sixty percent of the maximum. These high-potential central regions may thus be thought of as being more than three times as accessible to EEC economic activity in 1977 as the low-potential peripheral regions listed above. This marked disparity in relative regional accessibility, as measured objectively by the potential index, indicates that if accessibility is important for the location and growth of economic activity, the peripheral regions of the Community are at a considerable disadvantage compared with central regions.

The second feature of the 1977 potential map requiring comment is its geographical pattern. The map's dominant feature as measured by the 50% potential contour, is a triangular 'plateau' of high accessibility located in the north-east of the Community with corners on Stuttgart, Hamburg and Lille. Peaks of exceptional accessibility (over 70%) rise from this plateau at three points, Hamburg, Dusseldorf and Rheinhessen-Pfalz/Karlsruhe. In addition, three other neighbouring but separate regions, Ile-de-France, South East England and West Berlin form outlying peaks of relatively high accessibility around the plateau. The map does therefore in some ways support the popular notion of an EEC 'golden triangle' covering parts of

Germany, Belgium and the Netherlands, at least in terms of exceptional regional accessibility. Conversely, regions of low potential, as defined broadly by the 30% contour, are located on the southern, western and northern (but not eastern) margins of the Community. On this measure, the EEC's relatively inaccessible periphery, comprising 47% of the Community's total land area, includes most of southern, central and northeastern Italy, southern and western France, northern and western Britain and Northern Ireland, the republic of Ireland, and Denmark outside Storkobenhavn.

(ii) Regional accessibility trends 1965-73

Comparison of the results of the potential analyses for 1965 (Fig. 3.2), 1970 (Fig. 3.3) and 1973 (Fig. 3.4) prior to the enlargement of the original Community in that last year reveals a clear trend towards widening regional disparities in relative accessibility as between the most central and most peripheral regions of the Nine. This trend is noteworthy in that it involved regions not only in the three present member countries which were at that time outside the Community and its encircling tariff barrier (for example, North West and South East England: see maps), but also in southern Italy and southern and western France, which were within it. Examples of the latter changes are given in table 3.1.

Table 3.1. Selected peripheral region potentials, 1965-73

	Potential as % of maximum EEC value		
	1965	1970	1973
Calabria	12.7	12.3	10.9
Puglia	17.4	16.7	14.8
Midi-Pyrenees	21.8	20.6	19.1
Bretagne	28.3	26.9	25.4

The reason for this trend was quite clearly a relative concentration of economic growth during this period in the more central regions of the Community, leading to a relatively rapid rise in central region GDP and hence economic potential. This, together with the relative isolation of the above peripheral regions from the central core, and slower rates of GDP growth in the periphery, explains the trend towards widening disparities in accessibility levels. The table also indicates that this trend apparently quickened appreciably between 1970 and 1973 compared with the earlier 1965-70 period, with an annual decline in the percentage potential values for these peripheral regions during the early 1970's which was between two and five times faster than during the second half of the 1960's.

(iii) The impact of the 1973 enlargement

Figure 3.5 (1973:EUR9) is included simply to illustrate the effect of the removal of the tariff barrier on trade following the enlargement of the Community in 1973, holding everything else - and notably the regional distribution of economic activity as measured by GDP - constant. In fact, of course, the removal of the EEC external tariff barrier between the Six and the Three was phased over the five year transition period to 1977, with a 20 percent reduction each year. So too were other measures of Community economic integration. The EUR9 map, which is based on exactly the same 1973 regional GDP estimates as Figure 3.4, thus records a purely hypothetical regional accessibility surface, but one which demonstrates and isolates the particular effect upon accessibility values of tariff barrier removal.

Comparison of Figures 3.4 and 3.5 reveals that, as might be expected, complete tariff removal, if effected in a single year, would have increased the relative accessibility to EEC-wide economic activity of regions in the three new member countries considerably, compared to more central regions in the Six. As Table 3.2 indicates, potential values for different peripheral regions of the United Kingdom, Denmark and Ireland would have risen by between 40 and 76 percent, compared with rates of growth for the central regions listed of only 6 to 11 percent. Interestingly, enlargement and tariff removal would also have benefitted the periphery of the original Six proportionally more than the centre, with

gains of 14 to 17 percent for the regions shown. However, this apparent differential in favour of the periphery of the Six of course chiefly reflects the mathematics of percentage calculations in the context of very low base potentials. In absolute terms, Table 3.2 reveals that the gain to central regions of tariff removal was much greater than that to the periphery, as illustrated by the two extreme cases, Calabria (+93 million EUAs per km) and Rheinhessen-Pfalz (+365 million EUAs per km). For the regions of the Six, therefore, tariff removal widened still further the absolute disparity in relative accessibility to economic activity between centre and periphery, possibly because of the greater proximity of the former than the latter to the new member countries involved. The peripheral regions of the Three did however benefit absolutely as well as relatively compared with the centre, the absolute gap in potentials narrowing following entry even in the extreme comparison of Rheinhessen-Pfalz (see above) and Ireland (+390 million EUAs per km).

Table 3.2 Selected regional potentials and EEC enlargement 1973

	EUAs per km		CHANGE	
	1973 EUR6 mio	1973 EUR9 mio	mio	%
Scotland	813	1233	+420	+40
Northern Ireland	1059	1583	+524	+49
Ireland	660	1050	+390	+59
Vest for Storebaelt	776	1378	+602	+76
Calabria	618	711	+93	+15
Puglia	839	962	+123	+15
Midi-Pyrenees	1085	1236	+151	+14
Bretagne	1442	1685	+243	+17
Rheinhessen-Pfalz	5667	6032	+365	+6
Dusseldorf	4730	5045	+315	+7
Ile-de-France	4270	4570	+300	+7
Brabant	3323	3693	+370	+11

(iv) Regional accessibility trends 1973-77

Comparison of the 1977 EUR9 (Figure 3.6) and 1973 EUR6 (Figure 3.4) and EUR9 (Figure 3.5) potential analyses clearly indicates that the most striking actual changes in regional accessibility over this period were due to the eventual complete removal of tariff barriers within the Nine by the later year. The precise impact of removal has however been isolated and discussed in the previous section. Instead of repeating those findings, therefore, this section examines that component of the actual changes in regional accessibility which arose from trends in the regional distribution of economic activity. In other words, this involves holding the tariff barrier adjustment constant, and comparing the 1973 EUR9 and 1977 results, both of which incorporate the same external tariff barrier around the Nine.

Comparison of Figures 3.5 and 3.6 reveals that the 1973-77 period again witnessed a tendency towards widening of EEC centre-periphery accessibility disparities, as a result of trends in the regional distribution of economic activity. However, this occurred at a much slower rate than during either the early 1970's or later 1960's. The widening in disparities was most evident in the case of the Italian and British periphery. This can be seen by visual comparison of the precise positions of potential contours in Figures 3.5 and 3.6, which exhibit a general slight shift inwards towards the central EEC core in both cases (the decline of Lombardia to a potential value below its previous 40% level is particularly obvious). It is also indicated, however, by the data in Table 3.3 for selected regions. These show that three of the more peripheral regions chosen recorded a decline in potential expressed as a percentage of the maximum between 1973 and 1977 (columns 3 and 4), whereas all four central regions maintained or increased their relative values. The increase in Brabant's percentage potential value is particularly striking. Increased potentials in percentage terms for central regions other than Rheinessen-Pfalz suggests of course that even peripheral regions which maintained their percentage values, such as Ireland, were probably subject to a widening accessibility gap relative to the EEC core area as a whole. Only in the case of the two French peripheral regions listed was there a narrowing of the relative accessibility differential, with an increase in their percentage values. In absolute terms, however, as the table strikingly illustrates (column 1),

Table 3.3 Change in selected regional potentials, 1973-77

	POTENTIAL CHANGE 1973*-77		POTENTIALS AS % OF MAXIMUM	
	<u>mio EUAs per km</u>	<u>%</u>	<u>1973*</u>	<u>1977</u>
Scotland	+722	+59	20.4	20.2
Ireland	+636	+61	17.4	17.4
Calabria	+423	+59	11.8	11.7
Puglia	+566	+59	16.0	15.8
Midi-Pyrenees	+783	+63	20.5	20.9
Bretagne	+1050	+62	27.9	28.3
Rheinhessen-Pfalz	+3632	+60	100.0	100.0
Dusseldorf	+3037	+60	83.6	83.6
Ile-de-France	+2777	+61	75.8	76.0
Brabant	+2656	+72	61.2	65.7

\* EUR9 analysis

central region accessibility gains were invariably far greater than those for any peripheral region, by a factor of as much as nine in some cases. In absolute terms, therefore, the centre-periphery accessibility differential widened substantially during this period, as a direct result (see section 4.4) of the faster growth of economic activity as measured by GDP in more central regions.

(v) The impact of enlargement in the 1980's: Greece, Spain, and Portugal

Figure 3.7 maps potential values on the assumption of the enlargement of the Community of the Nine during the 1980's to incorporate Greece (which became the tenth member of the Community in 1981), Spain and Portugal. The potential analysis used the most recent - 1977 - EEC regional GDP data available for the Nine, together with 1977 regional GDP estimates for the other three countries derived by the Cambridge



team from national government and semi-official sources (such as the Banco de Bilbao for the Spanish provinces). In each case, these latter regional estimates were harmonized to a common Eurostat-derived national base, expressed in European Units of Account. Data were thus obtained for 9 Greek, 13 Spanish and 4 Portuguese regions.

For this EUR12 potential analysis, the basic EEC road network was of course also extended to incorporate links to and between the major towns in the 26 additional regions, as well as to include new ferry services which were established between 1977 and 1980. Lastly, the tariff barrier which had been incorporated for the 1977 analysis between the original Nine and Spain was removed.

The chief - and inevitable - result of prospective enlargement revealed by the EUR12 potential analysis is a further widening of EEC regional accessibility disparities. In the Community of the Twelve (and also of the present Ten), the lowest potential is recorded by the Aigaiou (Aegean) region of Greece, with a value only 7.0 percent of the maximum. Six other Greek regions record potentials below 10 percent while the highest Greek value, that for Athinai, is only 13.4 percent of the maximum. Regional potentials in Spain are appreciably higher than in Greece, with one region, Cataluna, achieving a value 22.0 percent of the maximum, higher than no less than 16 other regions in the original Nine. The next highest potential within Spain is also for a northern region bordering France, Vascongadas Y Navarra (19.1 percent), while the lowest values are for regions in the far south-west (Extramadura, 11.1 percent) and north-west (Galicia, 11.5 percent) of the country. Regional potentials in Portugal are in fact lower than for Athinai in Greece (10.7 to 12.7 percent of the maximum), with the highest value being recorded by the Norte Litoral region centred on Porto, the lowest value by the Sud Interior region inland from Lisbon.

The impact of enlargement on potential values for regions in the original Nine is small and largely confined to French peripheral regions bordering Spain, as illustrated by Table 3.4. This lack of impact reflects the preferential treatment accorded manufactured goods entering the EEC from the three new or prospective member countries after 1973, with in effect a zero tariff barrier in the case of goods from Greece and

Portugal. The tariff barrier against Spanish manufactured goods was also lower than that previously in force around the Six before 1973 (see Appendix C). Its removal thus benefits neighbouring French regions only slightly, and central EEC regions scarcely at all.

Table 3.4 Selected regional potential changes and Community enlargement: EUR12

	Potential Values		Change, EUR9-EUR12	
	mio EUAs per km EUR9	mio EUAs per km EUR12	mio EUAs per km	%
Midi-Pyrenees	2019	2076	+57	+2.8
Aquitaine	2207	2213	+6	+0.3
Languedoc-Roussillon	2263	2324	+61	+2.7
Rheinhessen-Pfalz	9664	9672	+8	+0.1
Dusseldorf	8082	8085	+3	+0.0

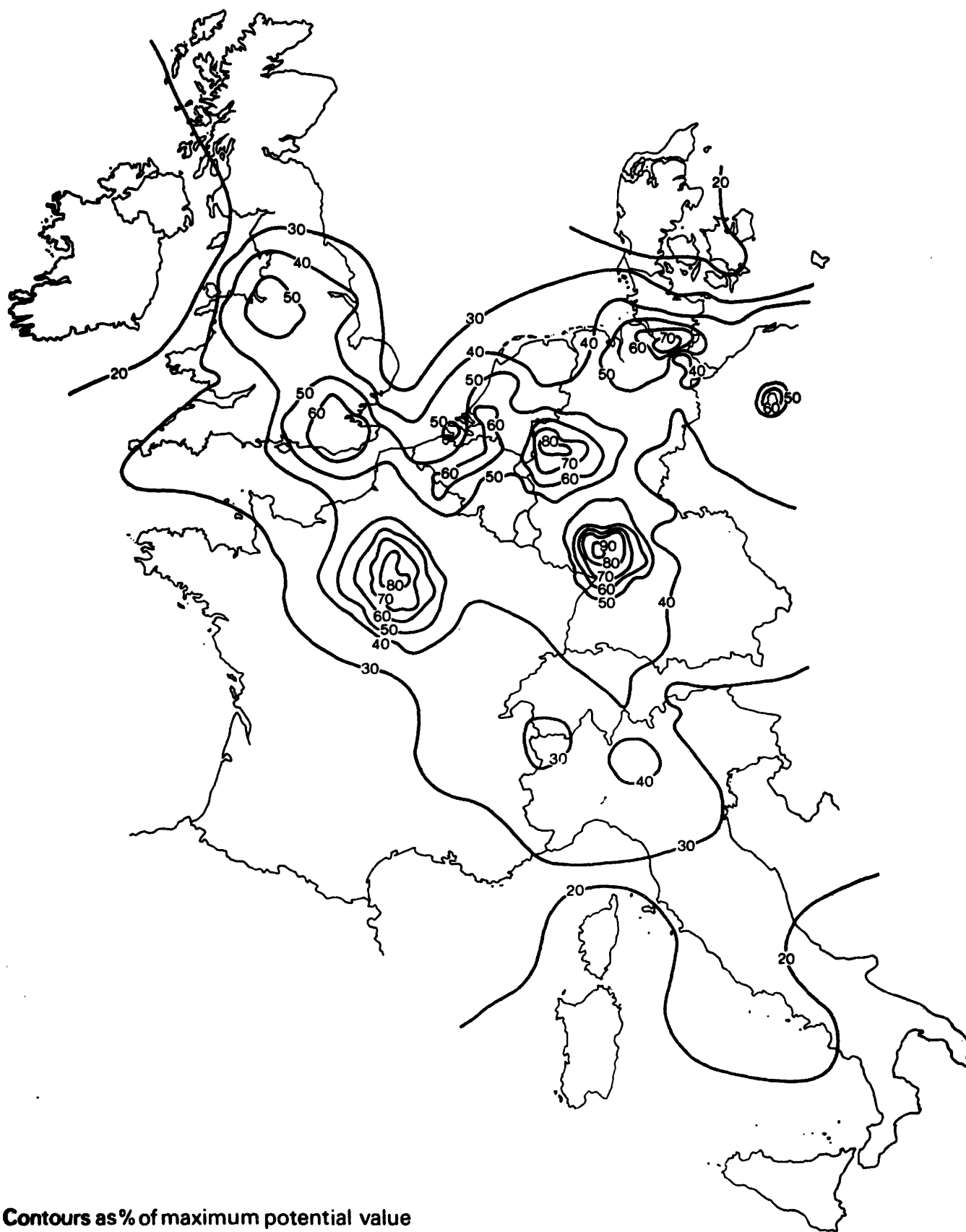
Table 3.5 Economic Potential Values, 1977

Region	Country	mio EUAs per km	Region	Country	mio EUAs per km
Rheinhessen-Pfalz	BRD	9664.1	Namur	BEL	4311.9
Karlsruhe	BRD	8529.0	Luxembourg G.D.	LUX	4234.6
Dusseldorf	BRD	8082.3	Hannover	BRD	4222.0
Ile de France	FRA	7346.6	Luxembourg	BEL	4186.1
Hamburg	BRD	6855.9	Picardie	FRA	4167.1
Koln	BRD	6651.5	Lorraine	FRA	4126.2
Zuid-Holland	NED	6389.7	Trier	BRD	4080.9
Brabant	BEL	6349.2	North West	UKI	3994.7
Berlin-West	BRD	6225.0	Zeeland	NED	3992.5
Antwerpen	BEL	6162.3	Haute-Normandie	FRA	3987.7
Arnsberg	BRD	6024.0	Champagne-Ardenne	FRA	3987.2
Hainaut	BEL	5869.9	Oberbayern	BRD	3971.8
Noord-Brabant	NED	5834.4	Unterfranken	BRD	3915.3
Darmstadt	BRD	5499.1	Kassel	BRD	3838.5
Bremen	BRD	5485.4	Groningen	NED	3828.5
Noord-Holland	NED	5445.7	Lombardia	ITA	3828.0
Munster	BRD	5422.3	Mittelfranken	BRD	3821.9
Limbourg	BEL	5420.1	Braunschweig	BRD	3775.2
Oost-Vlaanderen	BEL	5409.5	Schwaben	BRD	3719.4
Utrecht	NED	5396.0	West Midlands	UKI	3622.6
Limburg	NED	5366.8	Drenthe	NED	3486.9
Nord-Pas-de-Calais	FRA	5310.5	Franche-Comte	FRA	3479.1
Gelderland	NED	4974.3	Luneburg	BRD	3426.1
Stuttgart	BRD	4972.8	Yorks Humberside	UKI	3409.9
South East	UKI	4951.4	East Midlands	UKI	3378.5
Detmold	BRD	4767.3	Bourgogne	FRA	3345.3
Alsace	FRA	4738.2	Storkobenhavn	DAN	3329.1
West-Vlaanderen	BEL	4699.2	Rhone-Alpes	FRA	3271.8
Liege	BEL	4669.6	Friesland	NED	3236.3
Freiburg	BRD	4668.2	Oberfranken	BRD	3233.1
Koblenz	BRD	4665.6	Niederbayern	BRD	3192.3
Overijssel	NED	4600.9	Oberpfalz	BRD	3163.5
Saarland	BRD	4526.5	Schleswig-Holstein	BRD	3118.0
Tubingen	BRD	4510.4	South West	UKI	3099.6
Weser-Ems	BRD	4491.9	Piemonte	ITA	3051.9
			Basse-Normandie	FRA	3047.6
			Liguria	ITA	2977.4
			Centre	FRA	2936.6
			East Anglia	UKI	2880.8
			Emilia Romagna	ITA	2835.0

Table 3.5 continued.

Region	Country	mio EUAs per km
Wales	UKI	2758.5
Bretagne	FRA	2734.7
Valle d'Aosta	ITA	2685.7
Auvergne	FRA	2665.5
Pays de la Loire	FRA	2628.0
Veneto	ITA	2615.4
P.A. Cote d'Azur	FRA	2514.7
Toscana	ITA	2507.1
North	UKI	2486.0
Limousin	FRA	2446.5
Trentino-Alto A.	ITA	2445.3
Vest for Storebaelt	DAN	2368.8
Poitou-Charentes	FRA	2351.3
Ost for Storebaelt	DAN	2304.4
Languedoc-Roussillon	FRA	2262.7
Lazio	ITA	2229.9
Aquitaine	FRA	2206.5
Friuli-Venezia G.	ITA	2036.0
Marche	ITA	2022.6
Midi-Pyrennees	FRA	2019.2
Scotland	UKI	1954.7
Umbria	ITA	1951.1
Campania	ITA	1924.0
Abruzzi	ITA	1754.2
Ireland	IRE	1686.2
Corse	FRA	1634.0
Northern Ireland	UKI	1614.9
Molise	ITA	1534.6
Puglia	ITA	1527.8
Sicilia	ITA	1385.9
Basilicata	ITA	1369.1
Sardegna	ITA	1350.8
Calabria	ITA	1134.3

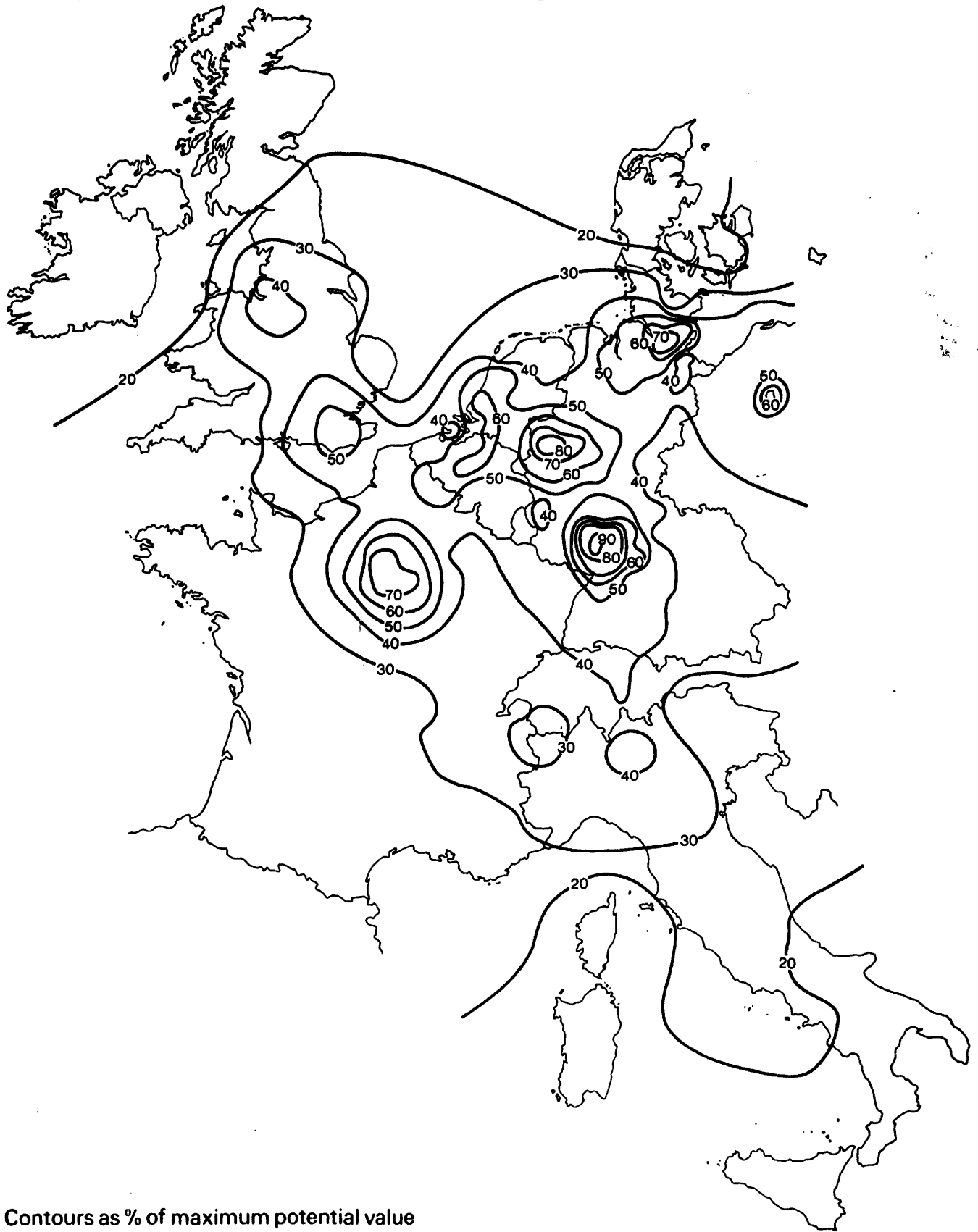
## EEC Regional Economic Potentials 1965



Contours as % of maximum potential value  
(2184.9mio EUAs per km)

Figure 3.2

# EEC Regional Economic Potentials 1970



Contours as % of maximum potential value  
(3641.7 mio EUAs per km)

Figure 3.3

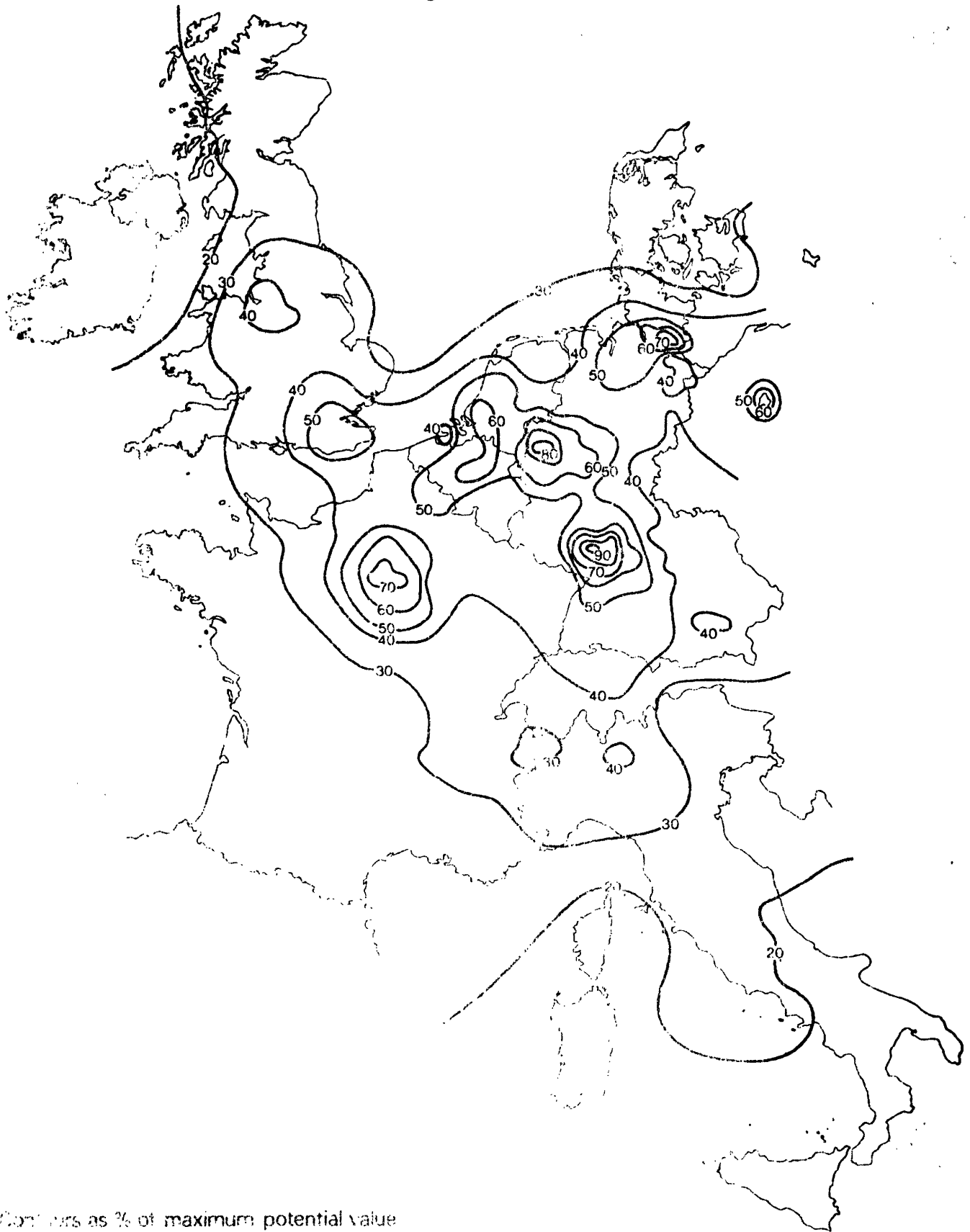
## EEC Regional Economic Potentials 1973: EUR 6



Contours as % of maximum potential value  
(5666.7 mio EUAs per km)

Figure 3.4

# EEC Regional Economic Potentials 1973: EUR 9



Contours as % of maximum potential value  
(€0.04 mio EUAs per km)

Figure 3.5



## EEC Regional Economic Potentials 1977



Contours as % of maximum potential value  
(1966: 1 mio EUAs per km)

Figure 3.6

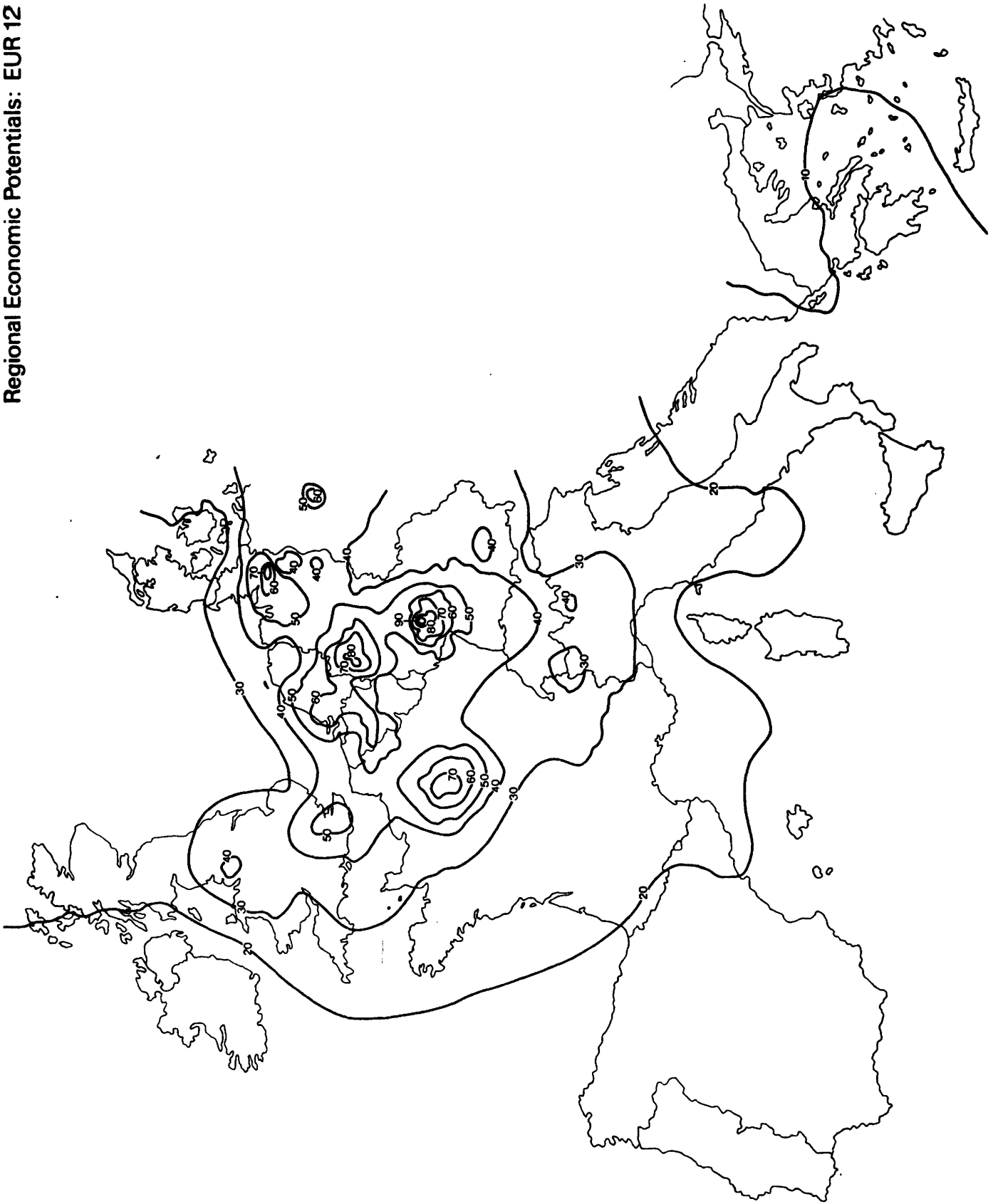


Figure 3.7



#### 4. CENTRALITY, PERIPHERALITY AND REGIONAL ECONOMIC CHANGE

##### 4.1 The Theoretical Framework

"In any geographical space - whether a nation, a group of nations (like western Europe) or the world, there is a tendency for inequalities to grow, because an advanced area or 'core' attracts resources that increase its leadership and thus its relative income" (Seers, 1980, 656).

"Freedom of investment choice and the need to minimize transport costs has of course favoured the 'Golden Triangle' countries in the EEC and operated to the disadvantage of peripheral industrial countries, especially the UK and Italy" (Kilby, 1980, 9).

The above two quotations neatly summarize a widely-held view of the nature and reasons for the development of regional inequalities in a trading and economic Community such as the EEC. This view partly reflects observed empirical reality in many countries, with the cumulative economic growth during the 20th century of such relatively central core regions as the West Midlands and South East of England (Keeble, 1980b), the Region Parisienne, and Piemonte-Lombardia. Also involved, however, are theoretical arguments on the role of relative regional centrality in investment decisions and the location of manufacturing and service industry in free-market economies. These theoretical arguments stress in particular various comparative advantages for economic growth in centrally-located regions - the "centre-periphery model" of regional industrial development (Keeble, 1976, chapter 4) - which engender cumulative concentration of economic activity in these regions, relative to peripheral areas. While this is not the place for extended discussion of these arguments, brief reference to four important postulated advantages - market accessibility, innovation leadership, agglomeration economies, and labour market characteristics - is necessary as a context for subsequent analysis.

For manufacturing and higher-order service industry, the most obvious advantage of centrality is accessibility to markets for products, whether these are intermediate components supplied to other manufacturers,

final-demand capital or consumer goods, or financial, business or other services. Viewed from the customer's perspective, this comparative advantage thus also incorporates the advantage of accessibility to suppliers, of components, materials or services, given the complex chains of inter-organisational product and information linkages which increasingly characterize modern EEC industry. For manufacturing firms, market accessibility within a trading community such as the EEC of course minimizes actual transport costs on finished products: and transport costs, though relatively small for many industries in most member countries (Vanhove and Klaassen, 1980, 126) may well be quite considerable if considered in terms of EEC-wide distribution from a peripheral region. Certainly Kilby (1980) cites a recent General Motors investment decision in which a peripheral EEC location was ruled out by a transport cost disadvantage relative to a central location of 7 percent as compared with only 1 percent of total costs. The peripheral plant would thus have incurred an annual operating cost penalty of 2 million U.S. dollars a year, equivalent to 13 percent of expected profits. In addition, however, market accessibility may be even more important for manufacturing performance in terms of maximizing customer contact, information about changing demand and hence sales (Keeble, 1976, 49). In a rapidly changing economic and technological environment, firms located close to customers may well be able to compete more successfully for sales than rivals elsewhere, while greater demand may in turn permit economies of scale which reduce production costs, in a cumulative process of economic growth in accessible regions. Thus, as Vanhove and Klaassen (1980, 235) argue explicitly in the EEC context, "the area of greatest attraction to industry will be the region where the distance costs to all possible markets are the lowest. Central location is likely to become of increasing importance as the productive capacity of firms expands owing to economies of scale, and each firm becomes able to supply a larger market." Similar arguments may well apply with even greater force to much higher order service industry, especially firms supplying financial and business services.

The theory of central region innovation leadership is a more recent component of the centre-periphery model, developed from work in Sweden, Denmark and North America on the spatial diffusion of new ideas and technology. Basically, this theory argues that many technological and other innovations in modern manufacturing and service industry are first developed and adopted in central regions of particular countries,

only spreading to more peripheral regions at a later stage. Central region innovation leadership reflects the advantages such regions enjoy in terms of information-maximization and risk-minimization (Keeble, 1976, 51-54). Centrality carries with it almost by definition maximum access to national and international information networks, including access to information emanating from the headquarters offices which cluster so strikingly in central regions (Commission of the European Communities, 1981, 58). Equally, innovating firms minimize risks of market failure if they first launch new products or services in central regions, where potential customers, individuals and firms are more accessible, generally wealthier, and frequently more progressive and willing to consider innovation adoption. These theoretical arguments are supported by empirical evidence on the remarkable concentration both of industrial research activity by private and public sector organisations and of actual manufacturing innovations in core regions such as South East England and the Region Parisienne. Thus one recent British study (Oakey, Thwaites and Nash, 1980) has shown that in Britain, no less than 46 percent of a large sample of key recent manufacturing innovations were first implemented or developed in the South East and its two adjacent regions, East Anglia and the South West, these three regions recording far higher innovation rates than the peripheral regions of Wales and Scotland. It should be noted that central region innovation leadership theory is quite closely related to the filter-down theory discussed later in section 4.7.

The role of agglomeration economies in encouraging cumulative central region growth has attracted much attention in the literature. Such economies may be viewed as derived advantages of earlier above-average growth encouraged by centrality, rather than a direct result of centrality itself. The concentration of economic activity which has developed in the central regions of the EEC, however, is thought by many observers to engender cost savings to firms through various mechanisms, notably benefits from close functional inter- and intra-organizational linkages and ready access to capital markets, and from increasing internal economies of scale at both plant and firm levels (Townroe and Roberts, 1980). At broad regional scales, empirical analyses provide statistical support for the existence of agglomeration economies as a stimulus to above-average manufacturing productivity

and output per head (Brown, 1972, 155-156). However, there is considerable evidence at the more detailed urban scale in various member countries for the recent impact of agglomeration diseconomies, at least upon the location of manufacturing activity. The significance of this for the present analysis is discussed below.

The last component of the theoretical context of cumulative centre-periphery disequilibria in economic growth concerns the development of advantageous labour market characteristics in central regions, notably in terms of labour quality and skills (Keeble, 1976, 64-69). In terms of the availability of skilled labour, there is no doubt that within the EEC, "high levels of highly qualified manpower are strongly associated with advanced central regions whereas peripheral regions within countries suffer from lack of high skilled job opportunities" (Commission of the European Communities, 1981, 60). This differential in labour market characteristics may in part reflect a growing functional and hierarchical separation of 'high-level' research, development, marketing and decision-making activities from basic mass-production of standardized products within large multi-unit organizations, with the former gravitating to accessible, information-rich, central regions, the latter being hived-off as externally-controlled branch plants to low labour-cost peripheral regions (Massey, 1979). To the extent that such a hierarchical separation has developed within the EEC, it would certainly intensify centre-periphery differences in the skills and quality of available labour. The latter also, and more fundamentally, reflect a long history of age-, education- and skill-selective migration from peripheral to central regions, together with marked differences in industrial structure and the development of skill-intensive, technologically sophisticated industry - electronics, aerospace, motor vehicles, chemicals, etc. The cumulative effects of such differences are expressed in a concentration of available skilled manpower in these industries in central regions, enhancing still further their relative advantages for further investment in these modern industries.

The above brief review of the theoretical arguments for centre-periphery disparities in both the nature and evolution of regional economies within the EEC provides a context for the various hypotheses which have been investigated by the Cambridge project. Before discussing the results of these investigations, however, four related problems must be noted.

The first of these concerns the relationship between regional and national economic growth within the Community. As various studies have pointed out (Molle, 1980: Commission of the European Communities, 1981, 51), certain economic indices, notably GDP per head, vary systematically as much if not more between countries of the Community as between regions of the same country. Put another way, specifically national economic performance may have an important effect upon regional economic performance, with all regions of, for example, Belgium and the Netherlands recording above-EEC-average rates of growth of GDP 1973-1977, whereas the opposite, of below-average growth rates, is broadly true for all the regions of the United Kingdom and Italy (see Figure 4.4).

This fact, which reflects national economic differences in productivity, competitiveness, and so on, has important implications for the present analysis since, as the above example indicates, the countries with the weakest economies in the EEC happen also to be located on the periphery of the Community, whereas the apparently stronger national economies tend to be central. It could therefore be argued that any EEC-wide centre-periphery regional differences in economic performance which are identified by the present analysis are primarily a product of a fortuitous correspondence between peripherality and weak national economies on the one hand, and centrality and strong economies on the other. On this argument, relative regional location and accessibility within the Community, as measured for example by EEC potential values, may not in itself be of importance in influencing investment decisions and regional economic growth, notwithstanding the identification of significant differences in performance between central and peripheral regions. This view is supported to some extent by recent research for the Commission on trends in the structure of regional output in the Community, which found that "national factors were strongly positive for the regions of the Netherlands, Belgium and Denmark; they were somewhat less so for Germany, Luxembourg and France, while regions in the United Kingdom, Italy and, to a lesser extent, Ireland were affected negatively by national development factors" (Commission of the European Communities, 1981, 86).

This said, however, there are also important counter-arguments against a simple dismissal of any identified centre-periphery differences



as being purely a fortuitous result of the location of strong and weak national economies within the Community. First, studies such as that referred to above have also identified powerful regionally-specific trends which cannot be explained simply by national factors: "the analysis has shown that specifically regional forces are highly significant and in some cases (e.g. Italian regions) they have gone a long way to offset the influence of poor national performance" (Commission of the European Communities, 1981, 87). Relative regional accessibility may play an important role in this context of regionally-specific forces.

Secondly, and even more important, it must be stressed that national economic performance itself is of course in one sense the product of a number of regional performances: and if the economic performance of a majority of regions in a particular country is aided or handicapped by relative centrality or peripherality in EEC terms, then national performance itself may reflect the comparative economic advantage enjoyed or disadvantage suffered in this way. Specifically, the above-average economic performance of Belgium and the Netherlands, for example, located broadly within the Community's highest-accessibility triangle, may to a significant degree reflect investment decisions prompted by the comparative accessibility advantages enjoyed by most of their regions: while conversely, the poor performance of Italy, the United Kingdom and Ireland may in part reflect poor regional performances rooted in the general relative inaccessibility of most or many of their particular regions. In other words, it can be argued that socalled 'national' factors may themselves incorporate to a significant degree the impact of relative EEC location on the structure and evolution of economic activity within their various regions, such that it is not possible to identify separately the impact of truly 'national' influences - i.e. non-locational factors specific to particular countries - and truly locational influences - in terms of EEC-wide accessibility - on regional economic change. This argument, which is certainly accepted by some other commentators on this issue (c.f. the quotation by Kilby at the head of this section) is clearly of great importance in interpreting the subsequent results. It also explains the deliberate decision (section 4.6) to adopt a shift-share methodology based solely on an EEC-wide datum, in contrast to the two-level shift-share approach (EEC and national bases) used in studies such as that referred to above.

A second and less significant problem might be raised with regard to the period of time which has elapsed since enlargement of the Community in 1973. It might be argued that six years is too short a period for the locational impact of membership of an integrated economic community to affect regional performance and evolution, at least in the case of the Three newer member countries. Actual tariff barriers, after all, were not finally removed between the Six and the Three until as recently as 1977. Clearly, a longer period would be even more appropriate for evaluation than that available. But this said, a six-year period does provide considerable opportunity for the impact of investment and locational decisions by EEC firms, and for differences in regional economic efficiency, to become apparent: while for the great majority of EEC regions (92 out of 105 for most subsequent analyses), the impact of Community-wide centrality or peripherality has been felt not for six but for twenty years. It is thus argued here that Community economic integration has operated for a sufficiently long period for centre-periphery regional impacts to be apparent, if such impacts do occur in reality.

The third issue deserving attention is whether centre-periphery influences on regional economic change at the Community level may not be accompanied, or indeed dominated, by centre-periphery forces operating solely within each country. After all, many EEC manufacturing and service firms predominantly supply domestic national markets in their own member country and are thus likely to make locational and investment decisions in a national rather than EEC-wide centre-periphery context. And the theoretical arguments for centre-periphery differences outlined above certainly apply to the national as well as Community scale. Against this view however is the undoubted fact of increasing EEC-wide integration of economic activity during the 1960's and 1970's expressed in substantial increases in intra-Community trade in manufactured goods: while an EEC-wide perspective undoubtedly characterizes the long-term strategic planning of the Community's largest multi-plant companies, with their increasing importance for regional output and employment. Much greater distances and hence disparities in distance costs and accessibility levels also strongly support the argument that it is at the EEC rather than national scale that relative location is likely to be important for regional economic development. The main analyses of the project are therefore conducted in terms of EEC-wide accessibility differences. But subsidiary analyses which incorporate an objective

measure of national-scale regional centrality or peripherality as a control variable are presented in section 4.11, in the form of simple and multiple regression tests. These in fact provide strong empirical support for the adoption of the EEC-wide centre-periphery framework used in the main analyses.

A fourth and last problem also relates to the issue of the most appropriate geographical scale for analysis of the location of investment, employment and economic activity within the Community. As noted in several of the brief national reviews presented in section 2 - and particularly those for the United Kingdom and Denmark - there is growing evidence that regional trends in the location of manufacturing and to a lesser extent service industry in some member countries reflect in part at least regional differences in levels of urbanization, in the context of a marked urban-rural shift of manufacturing industry operating within as well as between regions. This urban-rural shift is viewed by some observers (Fothergill and Gudgin, 1981) as primarily a response to urbanization diseconomies in the form of a lack of space to accommodate manufacturing investment in big cities in the face of rapidly rising labour productivity, mechanization of production processes and the use of ground-floor flow-line manufacturing techniques. Other factors may however also be involved, such as changing residential space preferences by industrialists and workers in the context of increasing skill requirements by modern technologically-changing industry, improved communications, and government regional planning policies. Recent more limited office and service industry decentralization from big cities may be prompted by locational shifts in residential population and hence consumer demand, and an increase in the gradient of operating costs for routine office activities as between central business districts and outlying settlements which nonetheless possess good communications with the CBD.

An urban-rural shift of economic activity - or at least a marked decline of manufacturing and some service industry in older highly-urbanized areas - is likely to affect regional economic trends in the EEC for at least two reasons. One is that some of the official Level II statistical regions as defined by member countries are in fact individual urban areas, or small regions dominated by big cities. Obvious examples are Hamburg, Bremen, West Berlin, Storkobenhavn and Antwerpen. The other and more important point is that differences between EEC regions generally

in internal urban-rural settlement composition are highly likely to result in different rates of regional economic change, if big cities and towns are indeed being affected by agglomeration diseconomies, relative to rural areas and small settlements.

In view of these arguments, the level of urbanization of each EEC region is therefore incorporated in the following analyses as a kind of 'control variable', for comparison and consideration alongside results based on an EEC centre-periphery framework. Specifically, regions have been classified objectively into four groups by two measures of level of urbanization, and results for these four groups are presented in tabular form. In addition, an urbanization index for each region is incorporated in the multiple regression analyses reported in section 4.11.

#### 4.2 The Regional Framework

As noted above, the regional framework in terms of which Community GDP, Labour Force Survey and other data are available poses various problems for analysis. Most notably, marked differences in the size and urban-rural composition of different regions introduces the likelihood of considerable apparently random variation in regional trends because of urban-rural shifts which are picked up by regional boundaries in some cases but not others. The most extreme differences here are between certain small highly urban German regions and large UK regions such as the South East (Commission of the European Communities, 1981, 4). United Kingdom regions in general are substantially larger (mean 1977 population size 5.084 million) than regions in most other member countries (e.g. the Netherlands, with a mean regional population size of only 1.260 million). Ireland and Denmark, for which latter country separate regional statistics are not available for most analyses, are also unusually large both areally and in terms of population. The net effect of these problems of regional heterogeneity is undoubtedly to increase the likelihood and scale of apparently random variations in statistical analysis of regional economic performance and evolution.

As noted in section 3.1, regional economic potential values provide a summary index of possible regional comparative advantage for economic growth in terms of accessibility to economic activity within the EEC. The 1977 potential values mapped in Figure 3.6 were therefore used to classify or group each level II region into one of three EEC locational categories, central, intermediate or peripheral. The grouping procedure, which reflected the adoption of three logical and objective criteria for classification, is outlined and justified in detail in Appendix D. In summary, this procedure was based chiefly on the existence of significant gaps or escarpments in the potential surface and series, at the 4400 mio EUAs per km level (45.5% of the maximum) for the centre-intermediate boundary and at the 2800 mio EUAs per km level (29.0%) for the intermediate-periphery boundary. Possible alternatives were rejected on two other criteria, the separation, geographically, of individual central and peripheral regions by at least one intervening intermediate region, and a preference, all else being equal, for roughly equal-sized locational groups so as to minimise the possibility of random variations due to small samples. However, as Appendix D describes, sensitivity

testing of results comparing values for the study grouping with ones for a narrower definition of 'centre' and 'periphery' revealed that subsequent study findings are essentially robust and not significantly altered by quite large changes in these groupings. This reflects the magnitude of the differences which exist between the Community's peripheral and central regions, even if these were to be defined somewhat differently from the logical and objective grouping adopted here.

The three groups of central, intermediate and peripheral regions defined by 1977 economic potential values are listed in Appendix D and mapped in Figure 4.1. As this shows, the 35 central regions of high accessibility are found in five different member countries, although the largest concentrations, not surprisingly, form a continuous zone in West Germany (17), the Netherlands and Belgium (7 each). Peripheral regions (33 in all) are also to be found in five different countries, the largest numbers being in Italy (16 out of the country's 20 regions) and France (10). The inclusion of two Danish regions in this category, which might appear surprising, in fact reflects low potential values occasioned by the fairly small size of the Danish economy in volume GDP terms and, more important, its relative geographical peripherality, notwithstanding Denmark's high GDP per head of population. Only Ireland, a single (peripheral) level II region in an EEC context, is not represented amongst the countries in which are to be found at least one of the 40 intermediate regions. Overall, it is striking how closely this grouping resulting from logical and objective partitioning of the 1977 economic potential values fits the pattern suggested by most general perceptions of 'peripherality' and 'centrality' within the Community.

As required by the project's terms of reference (see Appendix A), subsequent tables thus present results for these three locational categories, together with a subsidiary division of the peripheral group into the Italian, French and Northern (Ireland, Northern Ireland, Scotland, Wales, Northern England, Ost and Vest for Storebaelt) periphery. This subsidiary grouping was adopted because of the much greater geographical variation within the periphery in terms of latitude, climate and so on than exists within the central, far more compact and geographically restricted group of regions, while it also permits assessment of the degree to which overall peripheral trends or patterns are common

to all three subsidiary groups. The latter is clearly of importance with regard to possible policy implications. It should however be noted (see Appendix D) that data problems necessitated inclusion of statistics for Denmark as a whole in the peripheral region category, thus perhaps weighting results for the Northern periphery somewhat towards intermediate region values, compared with the French and Italian peripheries. This must be borne in mind when considering differences in results for the three peripheral region subgroups.

A parallel grouping of regions was also adopted with regard to their level of urbanization, as measured by the proportion of their 1971 population resident in urban agglomerations of 100 thousand inhabitants or more and by their overall 1971 regional population density. Again, the grouping procedure, which yielded four urbanisation categories - highly urbanised (22 regions), urbanised (23 regions), less urbanised (32 regions) and rural (30 regions) - is outlined in Appendix D, which also lists the regions in each category and cross-tabulates them against the EEC centrality-peripherality grouping. As Figure 4.2 shows, regions in each urbanisation category are to be found in virtually every member country, excluding the "single region" countries of Ireland and Luxembourg. This spread is well illustrated by the highly-urbanised category, with 7 regions from Germany, 4 from the United Kingdom, 3 each from France and the Netherlands, 2 each from Belgium and Italy, and one from Denmark.

Evaluation of regional characteristics and trends based on the central, intermediate and peripheral framework defined objectively by potential values permits conclusions to be drawn on at least two of the key questions posed in paragraph 1 of the terms of reference (Appendix A), namely "do significant economic differences exist between the central and peripheral regions of the Community", and "are these different categories of regions evolving differently over time"? These conclusions are presented in the following sections.

# Central, Intermediate and Peripheral Regions in the EEC

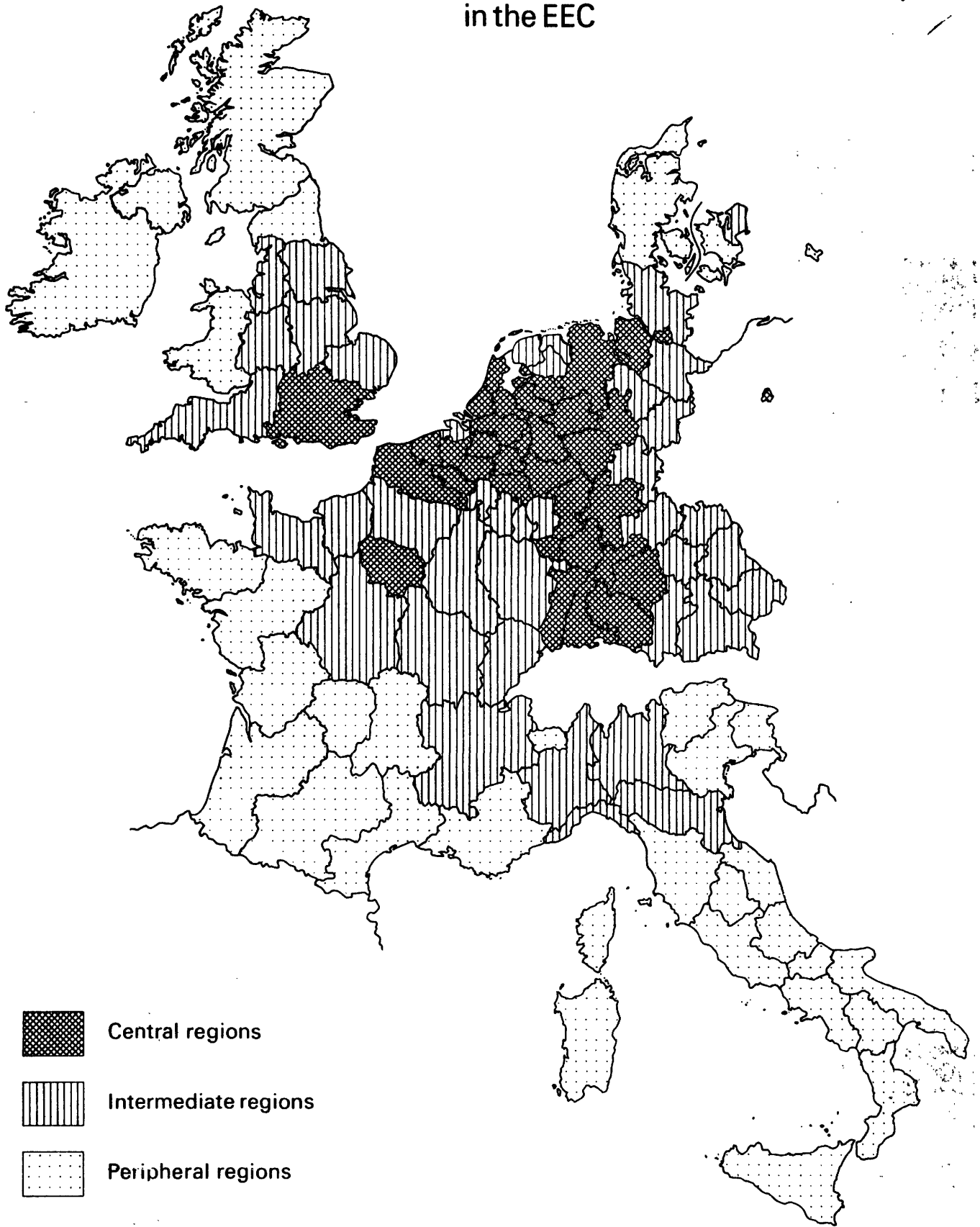


Figure 4.1



# Urbanization Category .

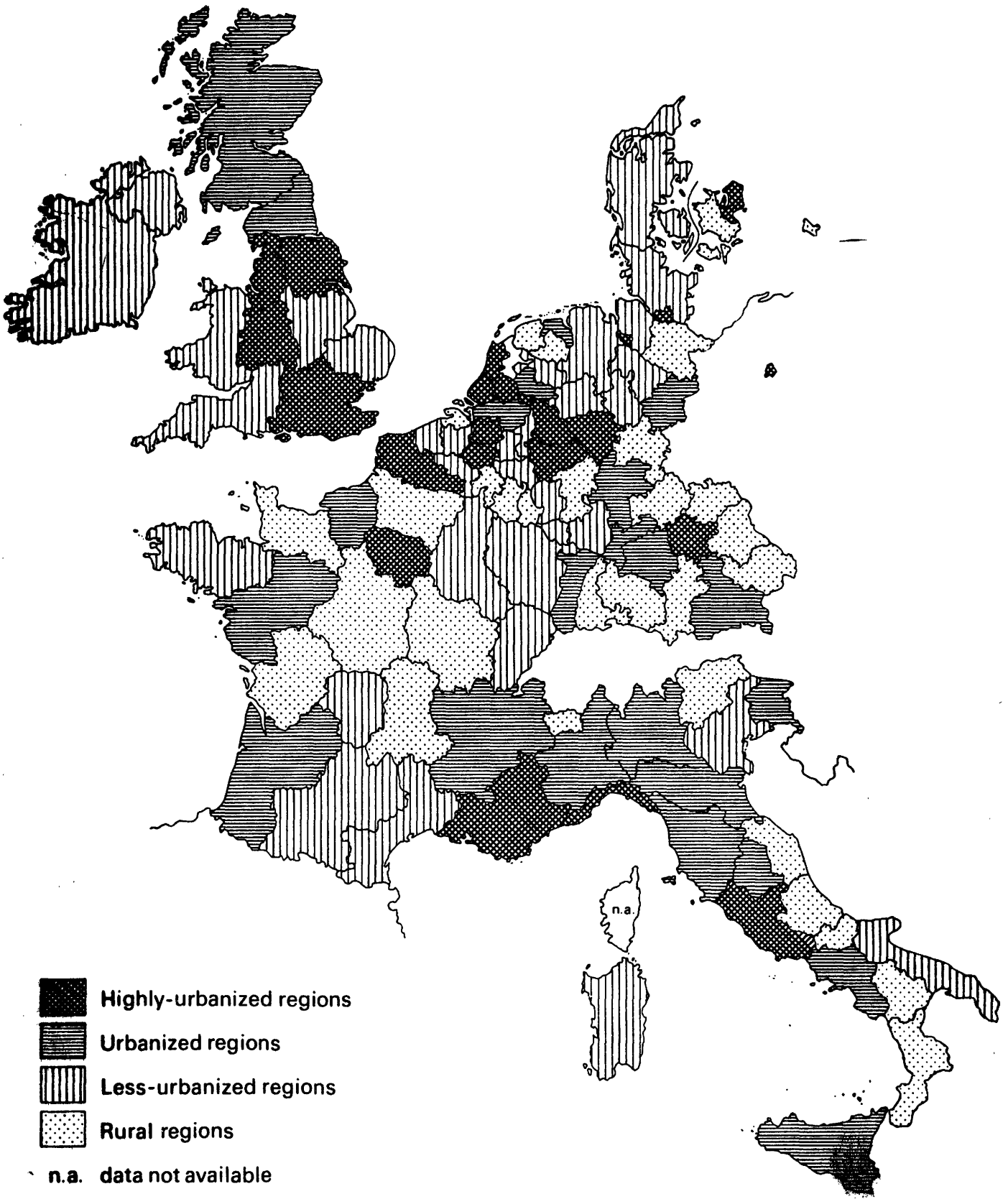


Figure 4.2

### 4.3 Population

While the concern of the Cambridge project is with regional economic change and evolution, Tables 4.1 and 4.2 and Figure 4.3 provide a broad picture of recent regional population trends within the Community. The latter provide an essential demographic background to questions of changes in employment and unemployment, as well as affecting directly calculation of such measures as gross domestic product per capita.

The first table reveals that within a context of only slow changes in the proportional distribution of population between the three groups of regions, a slower absolute growth of population in the central category resulted in a decline in this group's share of Community population between 1970 and 1979, from 36.94 to 36.34 percent. Nearly all the growth which did occur was recorded before 1973, the centre's population growing by a mere 170 thousand or 0.2 of one percent between 1973 and 1979. In contrast, relatively rapid demographic growth in peripheral regions, involving a gain of over 4 million inhabitants, increased this group's share from 29.65 to 30.17 percent over the same period. Moreover, most of this growth was recorded after 1973 (2.55 million). Population in the intermediate category grew during both subperiods, but the faster growth of the periphery after 1973 resulted in a slight decline in the intermediate group's share of the Community total after that year.

Table 4.2 reveals even more strikingly the different demographic behaviour of the Community's periphery as compared to its central and intermediate regions after 1973. Before that year, all three groups of regions recorded a fairly high annual rate of population growth, with the peripheral regions' rate being in fact lower than that of the intermediate group but higher than that of the central group. After that year, however, the last two rates fell substantially, whereas that for the peripheral group did not. The main conclusion of this analysis, therefore, is that demographic trends in the Community's peripheral regions between 1973 and 1979 were in aggregate markedly different from those in central regions, with substantial population growth in the former but virtually no population increase in the latter. This difference reflects major differential shifts in both birth rates and migration trends as between centre and periphery after 1973 (Commission of the European Communities,

1981, 10-15). Its chief and considerable significance for later analyses centres on its implications for centre-periphery differences in employment creation, given that demographic shifts after 1973 have been heavily focussed on people - migrants and potential migrants - of working age (Commission of the European Communities, 1981, 13).

Table 4.1 Regional Shares of Total Resident Population, 1970-1979

	1970		1973		1979	
	POPULATION (000 's)	% OF TOTAL	POPULATION (000 's)	% OF TOTAL	POPULATION (000 's)	% OF TOTAL
Central Regions (35)	92,894	36.94	94,466	36.82	94,636	36.34
Intermediate Regions (39)	84,003	33.41	86,035	33.54	87,214	33.49
Peripheral Regions (31*)	74,553	29.65	76,041	29.64	78,586	30.17
Total EEC9 Regions (105)	251,450	100.00	256,542	100.00	260,436	100.00

Based on: LFS data from Eurostat

\* Includes single value for Denmark

**Table 4.2 Rates of Change in Regional Shares of Total Resident Population, 1970-1979**

	Average Annual Change		
	1970-73	1973-79	1970-79
Central Regions (35)	+0.56	+0.03	+0.21
Intermediate Regions (39)	+0.81	+0.23	+0.42
Peripheral Regions (31*)	+0.66	+0.56	+0.60
Total EEC9 Regions (105)	+0.68	+0.25	+0.40

Based on: LFS data from Eurostat

\* Includes single value for Denmark

## Percentage population change, 1973-79

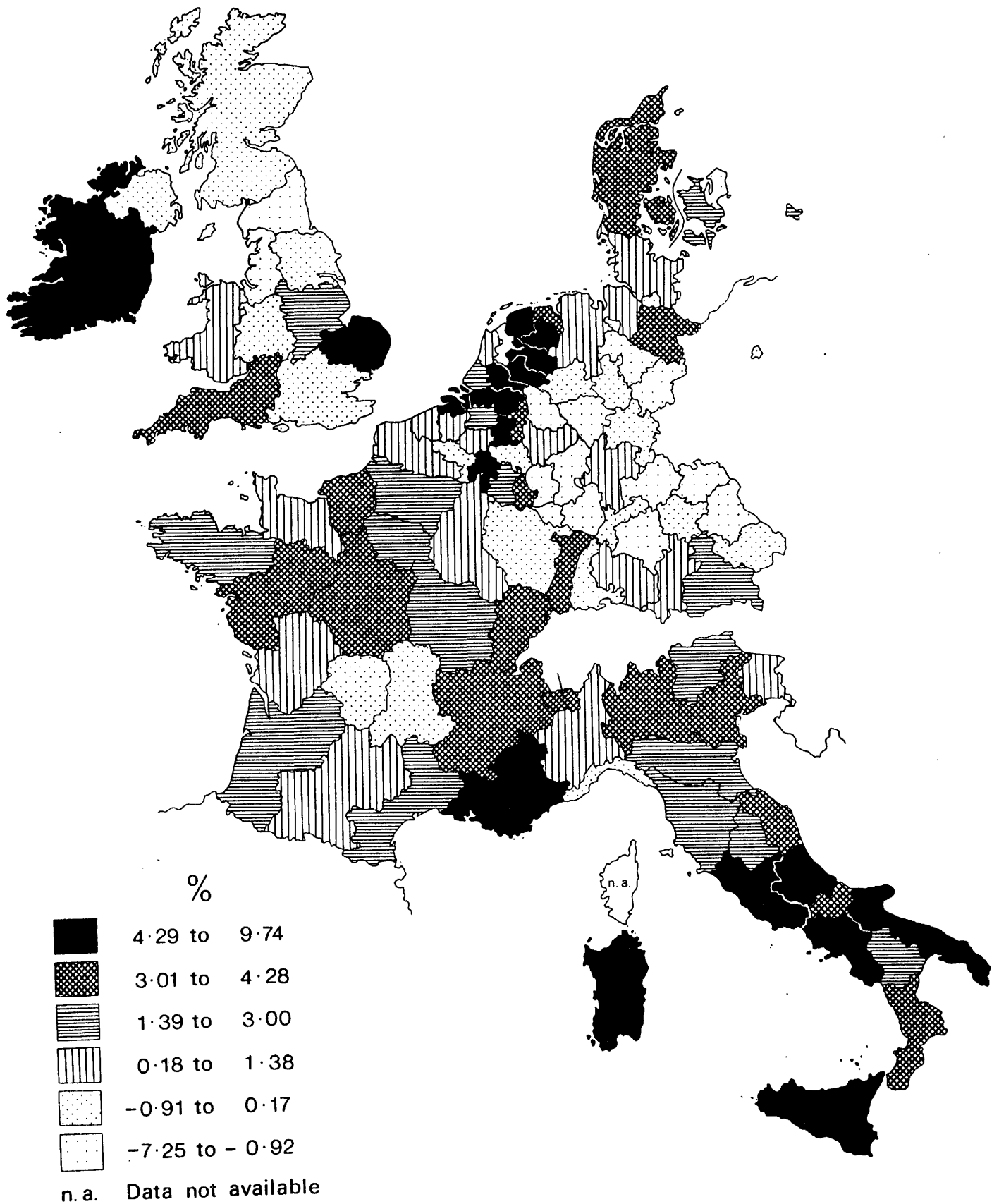


Figure 4.3

#### 4.4 GDP

As Appendix C explains, changes in the volume of economic activity in different regions have been measured in this study by values of regional Gross Domestic Product expressed in European Units of Account at current market prices and exchange rates. GDP refers of course to the value of output of producer units - agricultural, extractive, manufacturing, service and so on - in a given area (region) in a given year. While calculation in terms of EUAs at current prices and international exchange rates is by no means an ideal measure of such output in the EEC context, the Cambridge team concur with the authors of the recent Commission periodic regional report that it provides a better index than GDP valued at purchasing power parities of "the income generating capacity of regions in an international economic framework" (Commission of the European Communities, 1981, 42).

The first major finding of the GDP analysis is that the 1970's witnessed substantial and continuing concentration of economic activity in the central regions of the Community, relative to the periphery. As Table 4.3 shows, the centre's share of Community economic activity as measured by GDP rose steadily throughout the period, from 43.5 percent in 1965 to 46.7 percent in 1977. The periphery's share declined equally consistently, from 21.8 to 20.2 percent, as also did that of the intermediate category. Indeed, Table 4.4 reveals that the periphery's GDP growth rate was slower than that of the centre in each of the subperiods listed, leading in each subperiod to a widening differential in GDP levels. This table also indicates a striking continuum in GDP growth rates during the 1970's with respect to relative regional location within the Community, with the centre growing faster than the intermediate group, and the intermediate group growing faster than the periphery, in both 1970's subperiods and during the whole 1965-77 period. The only slight cause for optimism with regard to the periphery's economic performance is the fact that the wide gap in growth rates between centre and periphery in 1970-73 narrowed somewhat after 1973, with the periphery's growth rate rising from a value equivalent to only 74 percent of the centre's to one of 95 percent. Figure 4.4 suggest that this reflects an improvement in the performance of French peripheral regions, rather than of the periphery generally.

For comparison with the centre-periphery results, regional trends in GDP growth by urban category are recorded in tables 4.5 and 4.6. The pattern of change is quite striking. Within a Community-wide trend to central region concentration is occurring a clear relative urban-rural shift of economic activity. Thus since 1970, the more urbanised the region, the slower the rate of GDP growth, as shown by the first two columns of Table 4.6. The continuum of growth rates with level of urbanisation is even more strikingly revealed by the third column of this table, which records the rate of change in each category's percentage share of total Community GDP between 1970 and 1977. Thus the share of the highly urbanised group declined appreciably, while that of the urbanised category also fell but less rapidly. The shares of both the less urbanised and rural groups however increased, with much the faster growth in the latter. This table thus demonstrates that the urban-rural shift of economic activity known to be occurring in certain member countries is in broad terms an EEC-wide trend, taking place at a more detailed scale within the framework of general centre-periphery concentration. The latter is however rendered the more noteworthy by this secondary finding of an urban-rural shift, since as the table in Appendix D indicates, the largest single concentration of highly-urbanised regions, the slowest-growing urbanisation category, is in fact to be found amongst the central region grouping, with its clear record of above-average GDP growth relative to the Community's lagging peripheral and intermediate regions.

The third major finding of the GDP analyses is that the 1970's also witnessed a significant widening of the gap between central and peripheral regions in terms of GDP per head, whether the latter is measured in terms of resident population (Table 4.7) or employees (Table 4.8). Thus GDP per head of the resident population in central regions rose from 124.2 percent of the EEC average 1973 to 127.2 percent in 1977, while the value for the peripheral regions fell, from 70.8 to 68.9 percent. Again, the tables suggest that the regional distribution of GDP per head within the Community is strongly related to relative centrality or peripherality, with a striking continuum of values from central, to intermediate, to peripheral regions in every column of the two tables, with the exception of per capita change 1973-77. This close association between the pattern and rate of change of GDP per head and relative regional location is also visually evident from Figures 4.5 and 4.6, the only significant anomalies being Denmark and, perhaps, South East England.



The subsidiary analyses for the three subgroups of peripheral regions (Tables 4.9 and 4.10) reveal that as is normal in most statistical investigations, disaggregation into smaller samples produces greater heterogeneity of mean values. Nonetheless, all three individual sub-group averages for GDP per head and per employee are still far below the corresponding values for central regions in each year, while the Italian and Northern groups also record growth rates of GDP per head and per employee which are significantly below the corresponding central region rate. Only in the case of the French periphery does the 1973-77 growth rate equal (GDP per capita) or exceed (GDP per employee) the corresponding central region mean, indicating a more favourable performance than in the rest of the EEC periphery (see also Figure 4.6). Interestingly, mean GDP per capita or per employee differences between the four urbanisation categories used in the study are nowhere as great or as consistent as with centre-periphery differences, while evidence of slightly faster GDP per capita growth in rural and less-urbanised regions, to parallel that for the urban-rural shift of GDP itself, is less striking. The relevant tables are therefore not included here.

Table 4.3 Aggregate Shares of Gross Domestic Product, 1965-1977  
(current prices and exchange rates)

	1965		1970		1973		1977	
	mio EUA's	% OF TOTAL	mio EUA's	% OF TOTAL	mio EUA's	% OF TOTAL	mio EUA's	% OF TOTAL
Central Regions (35)	172,339	43.5	271,889	44.4	401,183	46.2	653,472	46.7
Intermediate Regions (39)	137,631	34.7	209,154	34.2	290,251	33.4	463,808	33.1
Peripheral Regions (31*)	86,178	21.8	131,043	21.4	177,341	20.4	282,929	20.2
Total EEC 9 Regions (105)	396,148	100.0	612,086	100.0	868,775	100.0	1,400,209	100.0

Based on: GDP estimates from Eurostat

\* Includes single value for Denmark

Table 4.4 Regional Growth Rates of Gross Domestic Product (Central, Intermediate, Peripheral Regions, 1965 - 1977; from Table 4.3)

	Average Annual Rate		
	1965-70 %	1970-73 %	1973-77 %
Central Regions	11.55	15.85	15.72
Intermediate Regions	10.39	12.92	14.95
Peripheral Regions	10.41	11.78	14.88
<b>Total (EEC 9)</b>	<b>10.90</b>	<b>13.98</b>	<b>15.29</b>
			1965-77 %
			23.26
			19.75
			19.03

Table 4.5 Aggregate Shares of Gross Domestic Product, by Urban Category, 1965-1977  
(current prices and exchange rates)

	1965		1970		1973		1977	
	mio EUA's	% OF TOTAL	mio EUA's	% OF TOTAL	mio EUA's	% OF TOTAL	mio EUA's	% OF TOTAL
Highly Urbanised Regions (21)	160,324	40.5	238,152	38.9	328,069	37.8	521,284	37.2
Urbanised Regions (23)	104,712	26.4	168,676	27.6	238,671	27.5	381,430	27.2
Less Urbanised Regions (32*)	90,157	22.8	138,922	22.7	201,730	23.2	330,382	23.6
Rural Regions (29)	40,955	10.3	66,336	10.8	100,305	11.5	167,113	11.9
Total EEC9 Regions (105)	396,148	100.0	612,086	100.0	868,775	100.0	1,400,209	100.0

Based on: GDP estimates from Eurostat

\* Includes single value for Denmark

Table 4.6 Rates of Change of Gross Domestic Product, by Urban Category, 1970-1977

	Average Annual Growth Rate		Change in EEC Percentage Share of GDP, 1970-77
	1970-73 %	1973-77 %	
Highly Urbanised Regions (21)	12.59	14.72	-4.4
Urbanised Regions (23)	13.83	14.95	-1.5
Less Urbanised Regions (32*)	15.07	15.94	+4.0
Rural Regions (29)	17.07	16.65	+10.2
Total EEC9 Regions (105)	13.98	15.29	0.0

Based on: GDP estimates from Eurostat

\* Includes single value for Denmark

Table 4.7 Aggregate Regional GDP per Capita, 1973-1977

	1973		1977		1973-77	
	EUAs per cap (EEC9=100)	INDEX (EEC9=100)	EUAs per cap (EEC9=100)	INDEX (EEC9=100)	EUAs per cap	CHANGE (%)
Central Regions (35)	4,204.7	124.2	6,872.8	127.2	+2,668.1	+63.5
Intermediate Regions (40)	3,329.9	98.3	4,964.2	91.9	+1,634.3	+49.1
Peripheral Regions (32)	2,397.2	70.8	3,720.9	68.9	+1,323.7	+55.2
Total EEC9 Regions (107)	3,386.2	100.0	5,403.9	100.0	+2,017.7	+59.6

Based on: LFS and GDP data from Eurostat

Table 4.8 Aggregate Regional GDP per Employee, 1973-1977

	1973		1977		1973-77	
	EUAs per empl. (EEC9=100)	INDEX (EEC9=100)	EUAs per empl. (EEC9=100)	INDEX (EEC9=100)	EUAs per empl.	CHANGE (%)
Central Regions (35)	10,563.8	118.8	17,146.5	122.1	+6,582.7	+62.3
Intermediate Regions (39)	8,250.5	92.9	12,844.3	91.5	+4,593.8	+55.7
Peripheral Regions (31*)	7,252.3	81.6	11,172.0	79.6	+3,919.7	+54.0
Total EEC9 Regions (105)	8,885.8	100.0	14,039.9	100.0	+5,154.1	+58.0

Based on: LFS data from Eurostat

\* Includes single value for Denmark

Table 4.9 Aggregate Regional GDP per Capita in Peripheral Regions, 1973-77

	1973		1977		1973-77	
	EUA'S per cap. (EEC9=100)	INDEX (EEC9=100)	EUA'S per cap. (EEC9=100)	INDEX (EEC9=100)	EUA'S per cap.	CHANGE (%)
Peripheral Regions:						
Italian (16)	1,926.1	56.9	2,812.7	52.1	+886.6	+46.0
French (9)	3,096.6	91.5	5,062.0	93.7	+1,965.4	+63.5
Northern (6*)	2,836.2	83.8	4,523.7	83.7	+1,687.5	+59.5
Total Peripheral Regions (31)	2,469.0	72.9	3,841.3	71.1	+1,372.3	+55.6

Based on: LFS and GDP data from Eurostat

\* Includes single value for Denmark



Table 4.10 Aggregate Regional GDP per Employee in Peripheral Regions, 1973-1977

	1973		1977		1973-77	
	EUAS per empl. (EEC9=100)	INDEX (EEC9=100)	EUAS per empl. (EEC9=100)	INDEX (EEC9=100)	EUAS per empl.	CHANGE (%)
Peripheral Regions:						
Italian (16)	6,765.1	76.1	9,450.3	67.3	+2,685.2	+39.7
French (9)	8,213.2	92.4	13,791.5	98.2	+5,578.3	+67.9
Northern (6*)	7,025.1	79.1	11,189.9	79.7	+4,164.8	+59.3
Total Peripheral Regions (31)	7,252.3	81.6	11,172.0	79.6	+3,919.7	+54.0

Based on: LFS data from Eurostat

\* Includes single value for Denmark

# Percentage change in Gross Regional Product 1973-77

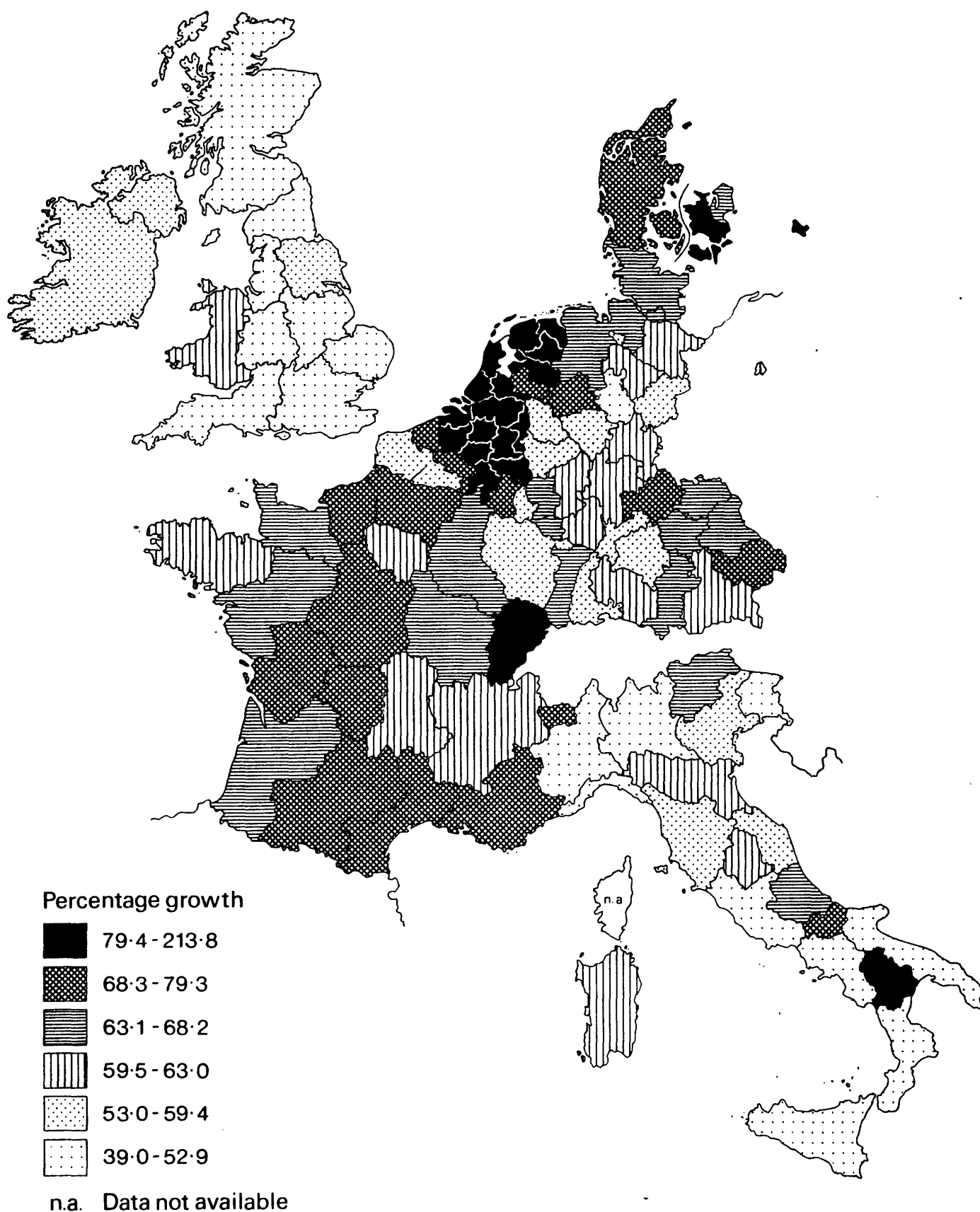


Figure 4.4

## Gross Regional Product per head, 1977

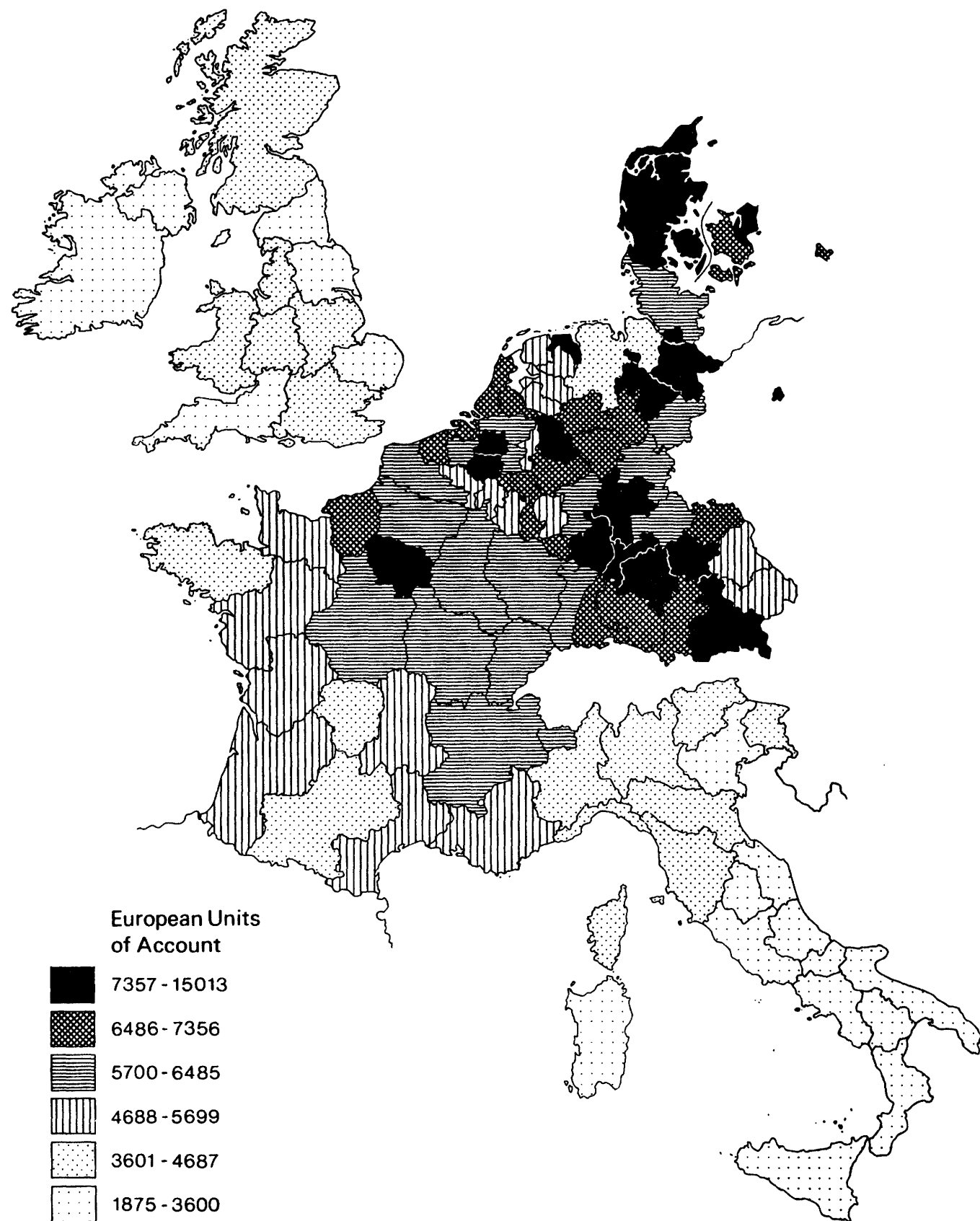


Figure 4.5

## Percentage growth in Gross Regional Product per capita 1973-77

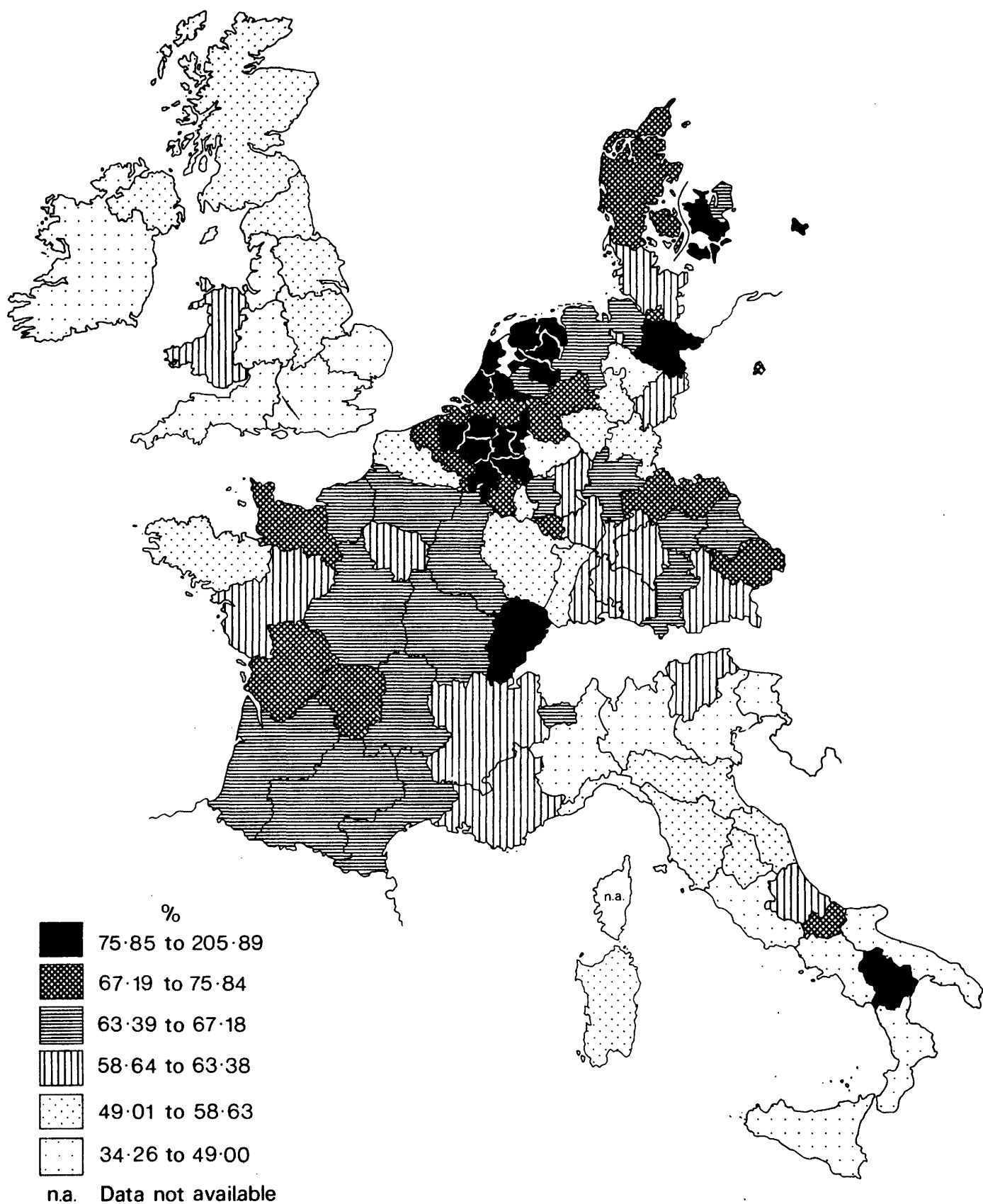


Figure 4.6

#### 4.5 Regional Economic Structure

The theoretical context for the centre-periphery regional development model considered earlier suggests several simple hypotheses about the economic structure of central and peripheral regions within the Community. Specifically, the latter might be expected to be significantly more oriented to agricultural and, possibly, consumer service industry than the EEC as a whole, whereas the economies of central regions might be expected to be more specialized than average on manufacturing and related producer services (finance, banking, insurance, business services, transport and communications, etc). The logic behind these hypotheses is that the theoretical comparative advantages conferred on central regions by relative accessibility as outlined in section 4.1 are by their nature likely to be of much greater significance for manufacturing and producer service location and growth than for agriculture and, possibly, consumer services. With distance costs and related disadvantages inhibiting the development of manufacturing and producer services, peripheral regions are thus left with an inevitable relative specialization on other sectors of economic activity, notably agriculture. The same logic might suggest a similar 'residual' peripheral specialization on consumer services (health, education, distributive trades, tourism, public administration, etc). Against this, however, is the argument that central region specialization on manufacturing and producer services is likely to generate significantly higher personal incomes and hence spending on consumer services there, leading via the regional multiplier to greater development of consumer service industry. The likely pattern of relative regional specialization on consumer services as between central and peripheral regions is thus more difficult to predict.

Table 4.11 lists the results of the analyses of regional economic structure, measured in terms of employment and by mean regional proportional shares in the four sectors of economic activity discussed above. Definitions of these sectors are given in Appendix D. These results provide striking evidence of the validity of the three main hypotheses advanced above. In each year, peripheral regions were significantly more dependent than central regions on agriculture, whereas central regions were significantly more specialized than peripheral regions on manufacturing and producer services. Moreover, in all but one case

(1979 manufacturing), the intermediate group recorded an intermediate mean value, indicating a clear general association between relative regional location within the EEC and regional specialisation on agriculture, manufacturing and producer services. The pattern of regional specialisation on consumer services is however much less clear-cut, all three groups of regions recording high and broadly similar mean percentage values in both years. This is at least consonant with the view that 'residual' specialisation on consumer services in peripheral regions is balanced or matched by the impact of higher consumer service spending in central regions, leading for quite different reasons to similar levels of specialization on this sector.

The general impact of rising personal incomes in the Community is suggested by the fact that in the EEC as a whole and in each group of regions considered separately, the sector which recorded the biggest increase in its share of total employment between 1973 and 1979 was consumer services. However, the most significant fact about the evolution of central and peripheral regional economies revealed by Table 4.11 is that the periphery's already much lower specialisation on manufacturing relative to the centre was reduced still further over the period, its percentage share declining by 13.4 percent compared with only 8.0 percent for central regions. No doubt linked to this was a smaller peripheral increase in specialisation on producer services (+4.8 percent compared with 6.7 percent for central regions). Lastly, the periphery's dependence upon consumer services increased more rapidly (+17.1 percent) than was the case with central regions (+10.6 percent). These findings indicate that the economies of the Community's central and peripheral regions are indeed evolving differently, with a relative increase in specialisation on consumer services in the periphery, but a more rapid growth of specialisation on producer services in central regions. The latter's specialisation on manufacturing is also diminishing less rapidly than in peripheral regions.

Table 4.11 Mean Regional Percentage Employment in Different Sectors, 1973-1979

	1973					1979				
	AGRI- CULTURE %	MANUFAC- TURING %	PRODUCER %	SERVICES CONSUMER %	ALL %	AGRI- CULTURE %	MANUFAC- TURING %	PRODUCER %	SERVICES CONSUMER %	ALL %
Central Regions (35)	5.3	33.7	11.9	37.6	49.5	4.0	31.0	12.7	41.6	54.4
Intermediate Regions (39)	10.2	33.6	9.9	35.6	45.5	8.5	31.3	10.8	39.0	49.7
Peripheral Regions (31*)	18.8	23.8	8.3	36.9	45.2	14.6	20.6	8.7	43.2	51.9
Total EEC Regions (105)	11.1	30.7	10.1	36.6	46.7	8.8	28.0	10.8	41.1	51.9

Based on: LFS data from Eurostat

\* Includes single value for Denmark

# Producer services as percentage of total employment, 1979

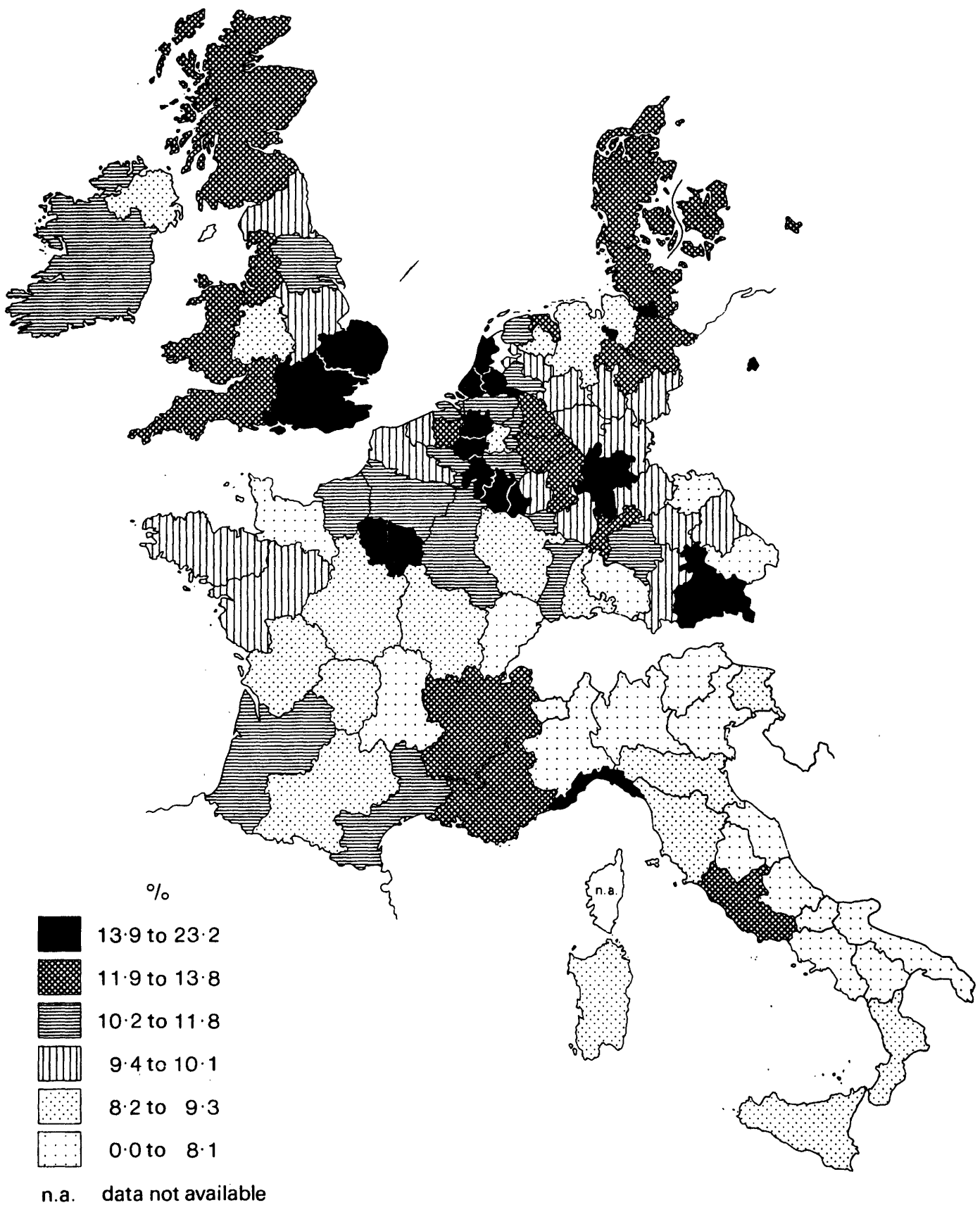


Figure 4.7



#### 4.6 Employment Shift-Share Analysis

A still more informative and detailed investigation of centre-periphery differences in regional economic evolution and performance has been carried out in the form of a shift-share analysis based on Labour Force Survey regional employment data disaggregated into 11 NACE sectoral categories (see Appendices B and D). Shift-share analysis is a widely used descriptive technique for disaggregating regional economic change, measured by employment or output, into two main components, the structural shift and the differential shift. In this case, the former provides a measure of the employment change which would have occurred in a region, over and above the EEC average rate of change of total employment, if each industry in the region had grown or declined at the EEC rate for that industry. It thus reflects the region's particular industrial structure and differences in Community-wide rates of employment change for different industries. A positive structural shift is indicative of a favourable industrial structure, biased towards industries which are expanding their employment at the wider, Community, level: a negative structural shift indicates a poor or unfavourable industrial structure in these terms.

The differential shift is the residual difference between a region's actual employment change and that expected on the basis of EEC-wide trends and the region's industrial structure. It thus represents the extent to which industries in the region have grown or declined faster or slower than their counterparts at the Community-wide level. Previous studies have often interpreted the differential shift as reflecting differences in regional comparative advantage for economic growth. When measured in terms of employment, however, other explanations are possible, including differences in rates of change of labour productivity and labour-shedding, and supply-side (demographic-related) considerations.

The present analysis represents the first-ever EEC-wide shift-share analysis of regional employment trends for the period since the Community's enlargement in 1973, using a reasonably detailed sectoral (industrial) breakdown. For reasons discussed in section 4.1, the analysis adopts the Community as a whole rather than individual countries as the datum for measuring and evaluating rates of change by industry. It should be noted that the aggregate results presented are based on detailed shift-share computations for each individual region considered separately.

The starting point for the analysis is the pattern of aggregate regional employment change, as recorded in Tables 4.12 to 4.14 and mapped in Figure 4.8. The first major finding revealed by Table 4.12 is of a marked centre-periphery difference in employment growth. Since 1973, employment in the Community's peripheral regions has grown by 1.5 million workers, nearly ten times faster than employment in central regions. As a result, the centre's share of Community employment declined by more than one percentage point to 37.7 percent, while that of the periphery increased from 26.4 to 27.0 percent. Employment in the intermediate group of regions expanded at a slower rate than in the periphery, but by a slightly larger volume of workers. Its share therefore also increased relative to the centre.

Within the periphery, Table 4.13 indicates that Italy's peripheral regions recorded a very substantial employment growth, of over 10 percent or one million workers. While much lower, growth rates in the French and Northern peripheral regions - both 2.6 percent - were however still far above that for central regions (0.4 percent). So a pattern of relatively rapid employment growth as compared with central regions is valid for the periphery as a whole, notwithstanding the exceptional increase in the Italian case.

When ordered by urbanisation categories (Table 4.14), the chief finding is of a markedly lower than average rate of employment growth in the Community's most highly urbanised regions. This contrasts with high growth rates in the next two urbanisation categories, and a slightly below-average rural region growth rate. The continuum of urban-rural shift of output indicated by Gross Domestic Product (section 4.4) is not therefore apparent for employment.

The main findings of the shift-share analysis are summarized in Table 4.15 and mapped in Figures 4.9 and 4.10. The table shows that when compared with an expected value based on the average Community-wide rate of employment growth (the Total Shift column), central regions can be thought of as having 'lost' over one million jobs (-2.8 percent), with 'gains' to intermediate and peripheral regions of nearly 500 thousand (+1.4 percent) and 600 thousand (+2.2 percent) respectively. These differences become even more striking however when industrial structure is taken into account: for in 1973 the structure of economic activity

in central regions was significantly more favourable for subsequent employment growth, as measured by the centre's positive structural shift and hence specialization on industries which subsequently expanded their employment at the Community level, than was the case with the intermediate or, worst of all, the peripheral region group. The latter's economic activity, in clear contrast to that of the centre, was biased structurally towards industries which were declining or growing more slowly than average. Furthermore, the three structural shift rates show a clear association with relative accessibility within the Community, with the intermediate group rate lying between those for the centre and periphery.

The final conclusion evident from Table 4.15 follows inevitably from those above. When allowance has been made for industrial structure, the central regions of the Community can be thought of as having 'lost' 1.6 million jobs, or over 4 percent of their 1973 total, whereas the peripheral regions can be regarded as 'gaining' over 800 thousand or 3 percent of the 1973 figure. The intermediate category 'gained' three quarters of a million jobs, at an intermediate rate of just over 2 percent. This striking difference in centre-periphery rates and volumes of employment gains and losses is remarkable in that unlike the pattern of structural shifts, the pattern is precisely the opposite of that hypothesised by the centre-periphery model. It is also at variance with the results of the earlier analysis of trends in output of economic activity, measured by GDP. A last point is that the centre-periphery differences in differential shift are much larger than and outweigh those for the structural shift, indicating that non-structural forces are much more important in explaining centre-periphery differences in overall regional employment change.

In summary, then, the shift-share analysis reveals that the central regions of the Community do indeed possess a significantly more favourable sectoral structure of economic activity, biased towards growing industries, than does the periphery which is biased towards declining industries. However, allowing for this, the centre has in fact been 'losing' large numbers of jobs through a negative differential shift, while peripheral region employment has been growing rapidly via a positive differential shift. This trend is the opposite of that expected on theoretical grounds and from trends in output.

At first sight, then, the employment shift-share analysis suggests that the economic performance of the Community's peripheral regions has recently been much better than that of central or indeed intermediate regions, with the creation of large numbers of new jobs and hence, presumably, growth of economic activity, perhaps even as a result of successful regional policies. However, before this conclusion is accepted, it is necessary to probe more deeply into the nature of recent employment trends. This is done in Tables 4.16 to 4.20.

The main conclusion evident from Table 4.16 is that the Mediterranean and southwestern periphery of the Community (Italy and France) differs from the Northern periphery in employment performance. Both the French and Italian peripheral regions record negative structural shifts, indicating unfavourable employment structures, but positive differential shifts. In particular, it is the massive Italian differential shift of nearly one million workers or 10 percent of 1973 employment which accounts for the periphery's overall positive shift relative to the centre. In contrast, the Northern periphery recorded a small positive structural shift but a negative differential shift, indicating the operation of non-structural forces which are producing a relative decline in employment. This difference suggests that the nature of the regional employment problems facing different parts of the Community's periphery varies appreciably, a fact which may well have implications for regional policy.

Tables 4.17 and 4.18 investigate trends in industrial structure in more detail, by presenting individual sectoral components of the structural shift. The first of these reveals that at the Community level, different sectors (industries) recorded very different employment performances between 1973 and 1979. The most striking differences were between Other Manufacturing (-2.1 million jobs) and Agriculture (-1.6 million), on the one hand, and Other Services (+3.2 million) and Banking, Finance (+0.8 million), on the other. The different regional distribution of these within the Community explains both the positive overall central region structural shift (e.g. +1.25 million jobs in Other Services, +0.4 million in Banking, Finance) and the negative peripheral shift (relatively heavy losses from Agriculture, -0.8 million jobs, and Other Manufacturing, -0.5 million). Within the periphery (Table 4.18), the Italian and French subgroups record broadly similar sectoral patterns of structural shifts,

focussed on losses from Agriculture and Other Manufacturing, offset only partially by gains from Other Services. The Italian periphery's greater structurally-related losses of NACE 4 manufacturing employment - textiles, clothing, footwear, etc. - are perhaps particularly noteworthy. In comparison, the Northern periphery lost less heavily from Agriculture and gained somewhat more from its greater bias towards Other Services and Banking, Finance.

The most interesting sectoral tables are however those for the differential employment shift (Tables 4.19 and 4.20). The first of these shows that within central regions, differential losses were spread across a wide range (9 out of 11) of industries. This suggests that the forces responsible for the centre's overall differential loss are not specific to only a few sectors, but endemic to central region economic activity as a whole. This said, the largest individual differential losses were recorded by, surprisingly, Distributive Trades, followed by a varied group of sectors (Other Mining and Chemicals; Banking, Finance; Building; Other Services). Similarly, the periphery's relative gains were also fairly widely spread across sectors (8 out of 11), suggesting a general tendency for employment growth there. Again, surprisingly, the largest gain was recorded by Distributive Trades, followed by Building, Other Mining and Chemicals, and Public Administration. Within the peripheral group, Table 4.20 indicates that the latter pattern largely reflects trends in the Italian regions, with a substantial gain in Distributive Trades which is not replicated elsewhere. In particular, the Northern subgroup recorded differential losses from 7 of 11 industries, the exceptions being the three manufacturing sectors plus Building. Gains (6 sectors) and losses (5 sectors) in the French subgroup were fairly evenly balanced, but with largest gains in Other Manufacturing and Other Services, largest losses in Distributive Trades and Other Mining, Chemicals.

What interpretation, then, should be placed on the striking overall centre-periphery differential employment shift reported earlier, in the light of these sectoral changes? Two contentions will be argued here. First, the data support the view that central region relative employment decline, in its common incidence across a wide range of primary, secondary and tertiary industries, is a product of broad economic forces constraining and reducing employment growth in these regions. When considered in relation to the continuing above-average growth of output

and GDP in central regions documented in section 4.4, this employment decline strongly suggests a powerful process of capital-labour substitution and rising labour productivity. This is of course directly indicated by the very high and steeply-rising level of GDP per employee in central regions noted earlier (table 4.8). It also however fits closely with subsequent findings of marked centre-periphery differences in economic structure and recent sectoral shifts, with central regions exhibiting a striking trend towards even greater specialisation on technologically-advanced and research-intensive rather than labour-oriented manufacturing industry (section 4.7), and towards high-income producer services - finance, banking, insurance - rather than lower-income consumer services (section 4.8). The latter point is illustrated by the substantial differential central region loss of employment in Distributive Trades (table 4.19), which in part at least probably reflects increasing labour productivity resulting from the continuing growth of supermarkets and hypermarkets, and the decline of small labour-intensive retail outlets. In general, then, and taken with much other independent evidence (Commission of the European Communities, 1981), the present finding of differential central region employment losses is almost certainly primarily indicative not so much of economic weakness but of increasing efficiency and productivity in most sectors of economic activity, with a corresponding relative reduction in labour inputs but growth in competitiveness. It is however possible that a secondary factor is the actual dispersion of some mobile central region economic activity to adjacent intermediate regions, as in the United Kingdom and France (see Figure 4.10 and sections 2.3 and 2.9).

The second main finding concerns the periphery's - and specifically the Italian periphery's - differential employment gains, which are concentrated in non-production activities with the exception of Chemicals and Building. This strongly suggests that these gains are a reflection, not of an improved peripheral region economic performance and growing demand for labour from expanding regional economic activity, but of the demographic changes noted in section 4.3. Specifically, it would seem most probable that these employment gains, especially those in Distributive Trades (retailing, wholesaling, catering, hotels), represent job creation by individuals who would otherwise be unemployed in marginal, low-income, service activities to which entry is easier than to manufacturing or other production industries. This employment

growth thus reflects a dearth of employment opportunities in productive activity, but considerable Italian peripheral growth in population of working age in the context of some return migration from the European core, much-reduced emigration, and a 1960's higher than EEC-average birth rate (Commission of the European Communities, 1981, 13).

In addition, differential gains in employment in public administration and chemicals could reflect Italian government locational policies on public sector and state-holding company investment, which are oriented to the development of the Mezzogiorno (Cendali Pignatelli, 1980).

In sum, it may be argued that differential employment growth in consumer services in the Italian periphery is largely a reflection of a unique demographic situation, only limited employment growth in higher-income production activities, and a generally weak rather than strong regional economy. In contrast, small French peripheral region differential gains would seem to be more soundly based on growth in demand for labour by manufacturing and finance services, while relative losses in the Northern periphery (with the exception of Ireland: see Figure 4.10) reflect widespread decline in primary and service industry employment but some gain in manufacturing. The latter could be interpreted as a reflection of national and Community regional policy (see Figure 4.22).

Finally, at the urban-rural scale (Table 4.21), the chief finding is of a large negative differential employment loss in highly urbanised regions, offsetting the effects of a very favourable sectoral mix. This again fits the argument advanced above concerning increasing labour productivity and capital-labour substitution, this time in congested urban centres, coupled with possible localised dispersal of manufacturing and service industry from these regions. However, no simple urban-rural continuum appears, as with GDP growth, since the rural category exhibits both the worst structural shift and the smallest differential gain. The pattern of change is thus not as consistent or clear cut as with the centre-periphery results.

Table 4.12 Aggregate Regional Employment, 1973-79

	1973		1979		1973-79	
	EMPLOYMENT	% OF	EMPLOYMENT	% OF	CHANGE	CHANGE
	(000 's)	TOTAL	(000 's)	TOTAL	(000 's)	(%)
Central Regions (35)	37,977	38.84	38,112	37.73	+135	+0.36
Intermediate Regions (39)	34,006	34.78	35,628	35.27	+1,622	+4.77
Peripheral Regions (31*)	25,787	26.37	27,281	27.01	+1,494	+5.79
Total EEC9 Regions (105)	97,771	100.00	101,021	100.00	+3,250	+3.32

Based on: LFS data from Eurostat

\* Includes single value for Denmark



Table 4.13 Aggregate Regional Employment in Peripheral Regions, 1973-79

	1973	1979	1973-79	
	EMPLOYMENT (000 's)	EMPLOYMENT (000 's)	CHANGE (000 's)	CHANGE (%)
Peripheral Regions:				
Italian (16)	10,250	11,344	+1,094	+10.67
French (9)	7,175	7,360	+185	+2.58
Northern (6*)	8,362	8,577	+215	+2.57
Total Peripheral Regions (31)	25,787	27,281	+1,494	+3.32

Based on: LFS data from Eurostat

\* Includes single value for Denmark

Table 4.14 Aggregate Regional Employment, 1973-79, by Urban Category

	1973		1979		1973-79	
	EMPLOYMENT (000's)	% OF TOTAL	EMPLOYMENT (000's)	% OF TOTAL	CHANGE (000's)	CHANGE (%)
Highly Urbanised Regions (21)	35,037	35.84	35,373	35.02	+336	+0.96
Urbanised Regions (23)	26,979	27.59	28,347	28.06	+1,368	+5.07
Less Urbanised Regions (32*)	24,020	24.57	25,196	24.94	+1,176	+4.90
Rural Regions (29)	11,734	12.00	12,105	11.98	+371	+3.16
Total EEC9 Regions (105)	97,771	100.00	101,021	100.00	+3,250	+3.32

Based on: LFS data from Eurostat

\* Includes single value for Denmark

Table 4.15 Aggregate Regional Employment Shifts, 1973-1979

	TOTAL SHIFT (000 's)	% OF 1973 AGGREGATE REGIONAL EMPLOYMENT	STRUCTURAL SHIFT (000 's)	% OF 1973 AGGREGATE REGIONAL EMPLOYMENT	DIFFEREN- TIAL SHIFT (000 's)	% OF 1973 AGGREGATE REGIONAL EMPLOYMENT
Central Regions (35)	-1,061.0	-2.79	+539.5	+1.42	-1,600.5	-4.21
Intermediate Regions (39)	+492.6	+1.44	-253.6	-0.75	+746.2	+2.19
Peripheral Regions (31*)	+568.5	+2.20	-285.9	-1.11	+854.4	+3.31

Based on: LFS data from Eurostat

\* Includes single figure for Denmark

Table 4.16 Aggregate Regional Employment Shifts in Peripheral Regions, 1973-1979

Peripheral Regions:	% OF 1973		% OF 1973		% OF 1973	
	TOTAL SHIFT (OOO's)	AGGREGATE REGIONAL EMPLOYMENT	STRUCTURAL SHIFT (OOO's)	AGGREGATE REGIONAL EMPLOYMENT	DIFFERENTIAL SHIFT (OOO's)	AGGREGATE REGIONAL EMPLOYMENT
Italian (16)	+691.5	+6.75	-287.9	-2.81	+979.4	+9.55
French (9)	-71.1	-0.99	-78.3	-1.09	+7.2	+0.10
Northern (6*)	-52.0	-0.62	+80.2	+0.96	-132.3	-1.58
Total Peripheral Regions (31)	+568.5	+2.32	-285.9	-1.11	+854.4	+3.31

Based on: LFS data from Eurostat

\* Includes single value for Denmark

Table 4.17 Aggregate Structural Employment Shifts by Industry Group,  
1973-1979

INDUSTRY GROUP (NACE)	CENTRAL REGIONS (35)	INTERMEDIATE REGIONS (39)	PERIPHERAL REGIONS (31*)	TOTAL EEC9 REGIONS (105)
Agriculture (0)	-299,913	-520,753	-785,448	-1,606,114
Energy and Water (1)	-68,999	-53,475	-35,391	-158,405
Other Mining, Chemicals (2)	+47,008	+38,460	+17,207	+102,675
Engineering and Metals (3)	-289,659	-279,889	-107,264	-676,813
Other Manufacturing (4)	-705,615	-821,881	-541,931	-2,069,426
Building (5)	-100,526	-85,811	-81,497	-267,834
Distributive Trades (6)	+210,465	+175,293	+133,245	+519,002
Transport (7)	+1,850	+1,351	+1,125	+4,327
Banking, Finance (8)	+444,321	+237,711	+147,711	+829,743
Public Administration (91)	+43,880	+33,980	+28,411	+106,271
Other Services (9 excl 91)	+1,256,717	+1,021,386	+938,451	+3,216,554
ALL INDUSTRY	+539,531	-253,626	-285,920	----

Based on: LFS data from Eurostat

\* Includes single value for Denmark

Table 4.18 Aggregate Structural Employment Shifts by Industry Group,  
in Peripheral Regions, 1973-1979

INDUSTRY GROUP (NACE)	P E R I P H E R A L   R E G I O N S			
	ITALIAN (16)	FRENCH (9)	NORTHERN (6*)	TOTAL (31)
Agriculture (0)	-387,306	-260,652	-137,489	-785,448
Energy and Water (1)	-9,937	-7,075	-18,919	-35,391
Other Mining, Chemicals (2)	+3,263	+5,116	+8,828	+17,207
Engineering and Metals (3)	-34,714	-27,416	-45,134	-107,264
Other Manufacturing (4)	-269,753	-110,882	-161,296	-541,931
Building (5)	-36,023	-23,769	-21,706	-81,497
Distributive Trades (6)	+46,477	+41,872	+44,896	+133,245
Transport (7)	+442	+295	+388	+1,125
Banking, Finance (8)	+27,346	+52,351	+68,014	+147,711
Public Administration (91)	+11,212	+7,651	+9,548	+28,411
Other Services (9 excl 91)	+361,130	+244,206	+333,114	+938,451
ALL INDUSTRY	-287,862	-78,302	+80,244	-285,920

Based on: LFS data from Eurostat

\* Includes single value for Denmark

Table 4.19 Aggregate Differential Employment Shifts by Industry Group,  
1973-1979

INDUSTRY GROUP (NACE)	CENTRAL REGIONS (35)	INTERMEDIATE REGIONS (39)	PERIPHERAL REGIONS (31*)
Agriculture (0)	-143,177	+129,949	+13,221
Energy and Water (1)	+23,054	+2,977	-26,031
Other Mining, Chemicals (2)	-224,757	+88,344	+136,411
Engineering and Metals (3)	-17,806	+129,432	-111,634
Other Manufacturing (4)	+13,294	+17,292	-30,595
Building (5)	-195,058	+46,939	+148,118
Distributive Trades (6)	-639,795	+178,660	+461,130
Transport (7)	-26,894	+16,436	+10,453
Banking, Finance (8)	-196,628	+135,451	+61,173
Public Administration (91)	-20,655	-104,284	+124,934
Other Services (9 excl 91)	-172,154	+104,959	+67,192
ALL INDUSTRY	-1,600,575	+746,154	+854,372

Based on: LFS data from Eurostat

\* Includes single value for Denmark

Table 4.20 Aggregate Differential Employment Shifts by Industry Group, in Peripheral Regions, 1973-1979

INDUSTRY GROUP (NACE)	P E R I P H E R A L R E G I O N S			
	ITALIAN (16)	FRENCH (9)	NORTHERN (6*)	TOTAL (31)
Agriculture (0)	+65,446	-8,687	-43,538	+13,221
Energy and Water (1)	-3,370	+5,714	-28,376	-26,031
Other Mining, Chemicals (2)	+169,541	-61,434	+28,304	+136,411
Engineering and Metals (3)	-121,834	-20,213	+30,413	-111,634
Other Manufacturing (4)	-135,737	+92,348	+12,794	-30,595
Building (5)	+100,365	+8,070	+39,683	+148,118
Distributive Trades (6)	+620,781	-87,547	-72,104	+461,130
Transport (7)	+73,285	-45,113	-17,719	+10,453
Banking, Finance (8)	+45,311	+24,684	-8,822	+61,173
Public Administration (91)	+156,180	+32,709	-63,955	+124,934
Other Services (9 excl 91)	+9,427	+66,705	-8,940	+67,192
ALL INDUSTRY	+979,396	+7,235	-132,260	+854,372

Based on: LFS data from Eurostat

\* Includes single value for Denmark



Table 4.21 Aggregate Regional Employment Shifts by Urban Category, 1973-1979

	TOTAL SHIFT (000's)	% OF 1973 AGGREGATE REGIONAL EMPLOYMENT	STRUCTURAL SHIFT (000's)	% OF 1973 AGGREGATE REGIONAL EMPLOYMENT	DIFFEREN- TIAL SHIFT (000's)	% OF 1973 AGGREGATE REGIONAL EMPLOYMENT
Highly Urbanised Regions (21)	-661.7	-1.89	+749.0	+2.14	-1,410.7	-4.03
Urbanised Regions (23)	+418.7	+1.55	-355.8	-1.32	+774.5	+2.87
Less Urbanised Regions (32*)	+340.9	+1.42	-114.9	-0.48	+455.8	+1.90
Rural Regions (29)	-97.9	-0.83	-278.3	-2.37	+180.4	+1.54

Based on: LFS data from Eurostat

\* Includes single value for Denmark

# Percentage total employment change, 1973-79

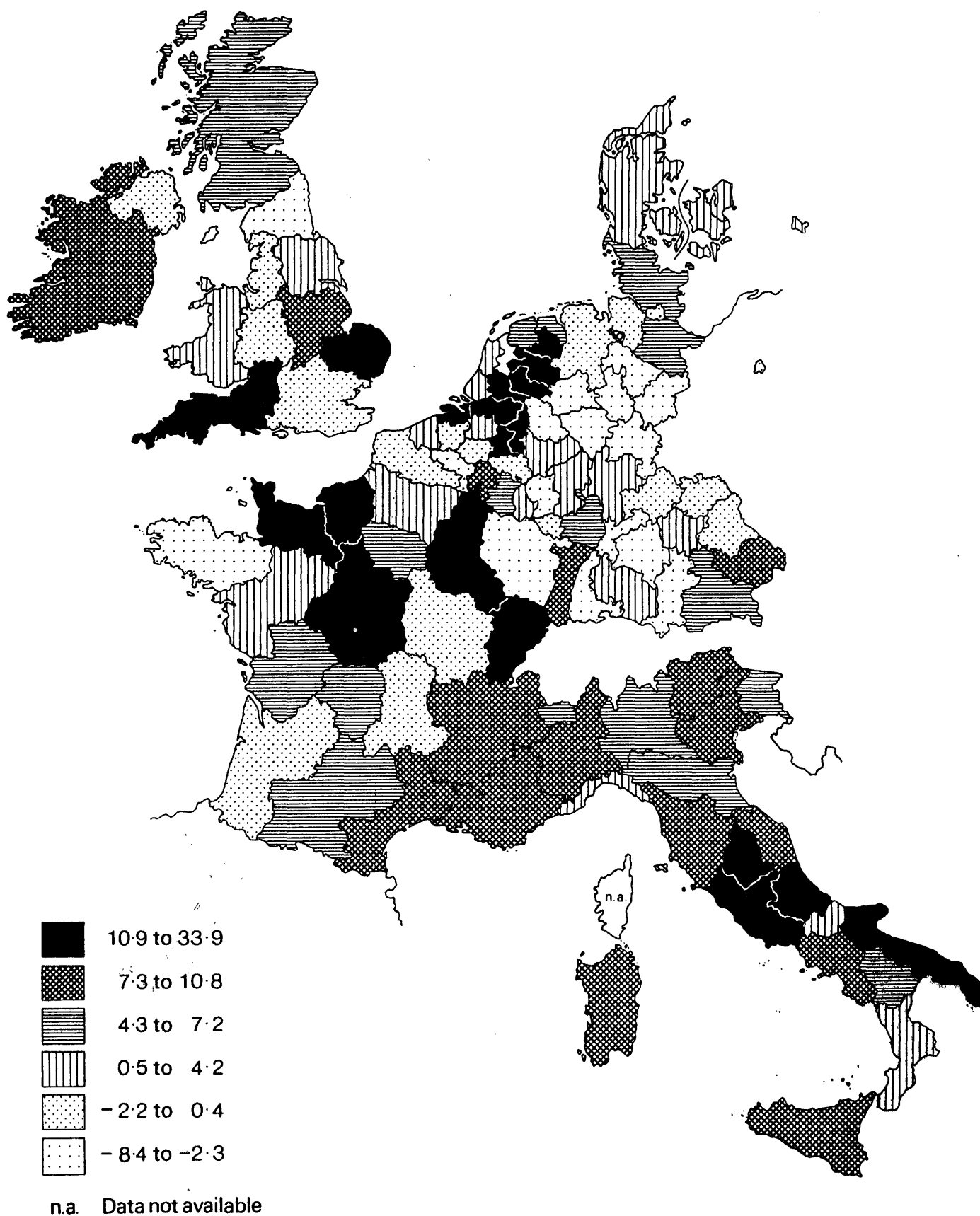


Figure 4.8

## Percentage structural employment shift, 1973-79

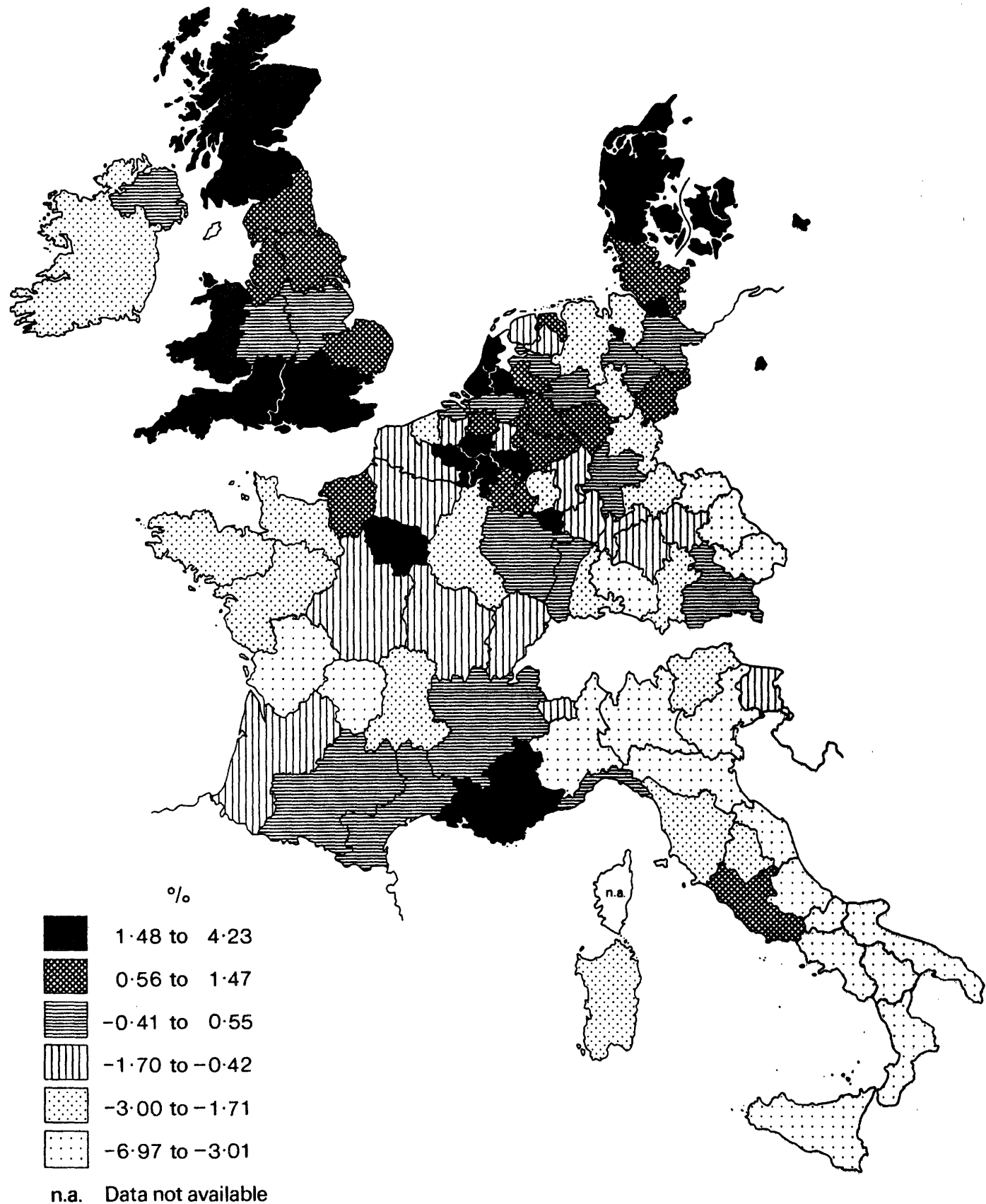


Figure 4.9

# Percentage differential employment shift, 1973-79

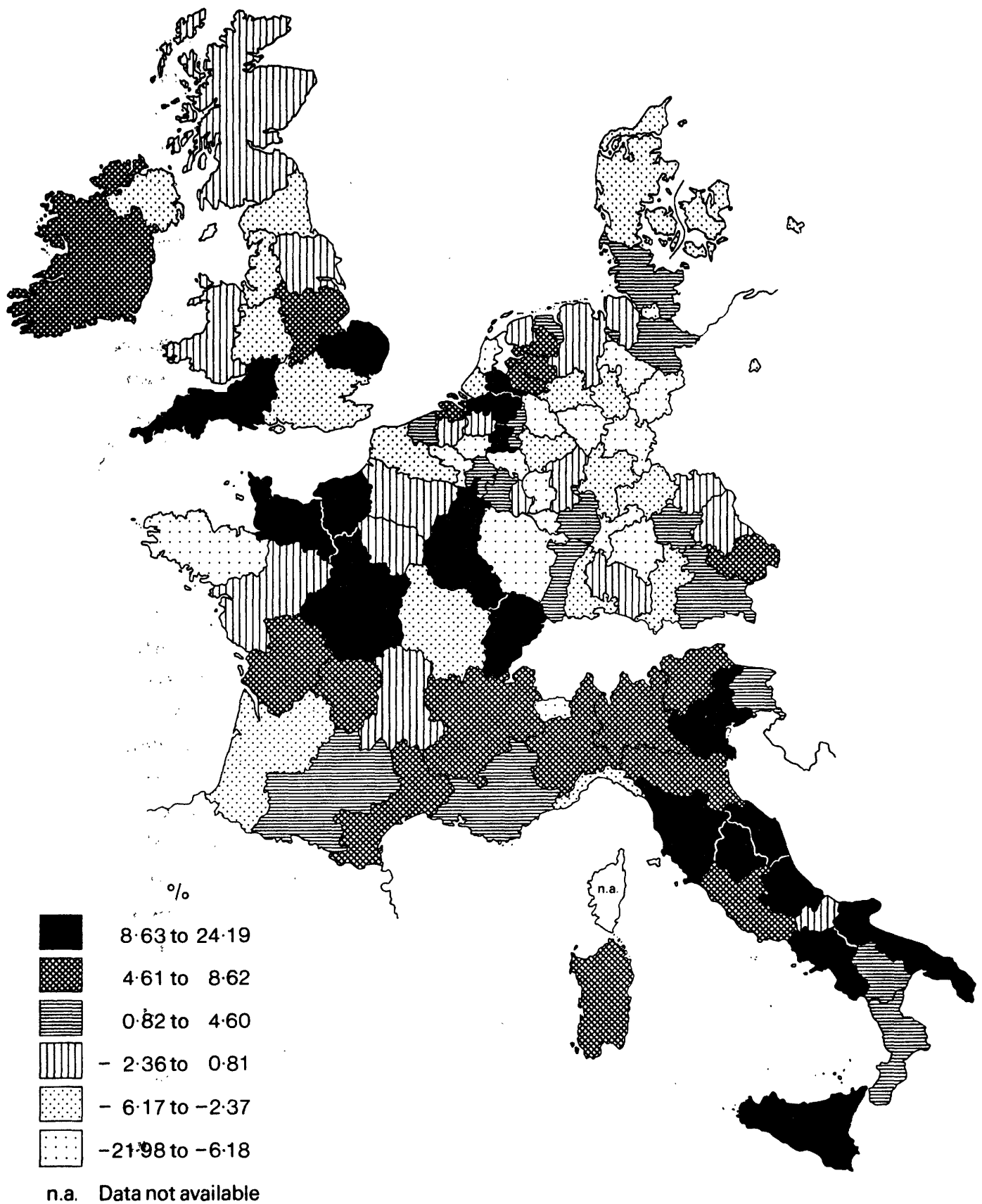


Figure 4.10

#### 4.7 Manufacturing Industry

Throughout the Community, manufacturing industry plays a particularly important role in the generation of regional income and employment, and is the chief target of national and Community regional policy (Keeble, 1976, 201-5; Romus, 1979, 83-89). Moreover, theoretically, most of the arguments outlined earlier (section 4.1) for the development of centre-periphery economic disparities focus primarily on the hypothesised advantages of central locations for manufacturing investment and growth. This section therefore considers the extent to which regional manufacturing employment trends within the Community conform to or diverge from expectations based on these arguments. Unfortunately, the absence of data rules out investigation of certain important current issues for policy, such as the possible development of centre-periphery differences within the Community in manufacturing organization, level of control functions and branch plant colonization (see section 4.1). But aggregate and sectoral trends in manufacturing employment can be examined using Labour Force Survey data.

Tables 4.22 and 4.23 record aggregate and mean regional manufacturing employment changes between 1973 and 1979, while rates of change are mapped in Figure 4.11. These reveal that within a context of overall EEC manufacturing employment decline, of 4.9 percent 1973-79, only the intermediate group of regions achieved a better-than-average performance (-3.1 percent). Both central and peripheral region manufacturing employment declined by 6 percent or more. The highest mean and median rates of loss were however recorded by peripheral regions (Table 4.23). These results suggest two conclusions. First, in a period of intense international manufacturing competition and rapid technological change, the Community's weakest and most vulnerable manufacturing plants and firms would appear to be those located in its peripheral regions. Secondly, central region employment decline may reflect capital-labour substitution and increasing labour productivity, coupled with actual dispersal of manufacturing capacity to adjacent intermediate regions. The latter is clearly suggested by Figure 4.11, and is in line with some of the findings of national studies of the United Kingdom, France, and Germany (see sections 2.3, 2.4, and 2.9).

These conclusions may be further extended on the basis of the results presented in Tables 4.24 and 4.25. The first of these reveals a marked difference in rate of manufacturing losses as between the Italian and Northern peripheries, with French peripheral regions occupying an intermediate position. Specifically, the Italian periphery alone sustained one-fifth (300 thousand) of the Community's total manufacturing job losses over the period. This finding supports the contention that southern Italy's extreme peripherality (see section 3.3(i)) poses an exceptional handicap for efficient manufacturing production. On the other hand, the relative success, in a Community-wide context, of the Northern periphery in maintaining manufacturing employment levels is at least in line with the hypothesis that in this case, national (specifically, Irish) and regional policies have had some impact on the location of mobile manufacturing investment.

The second table (Table 4.25) records differences in manufacturing employment change by urbanisation category. The results confirm, for the first time at the EEC-wide scale, the existence of a marked relative urban-rural shift of manufacturing employment within the Community, in line with trends in GDP already noted (section 4.4) and with findings for various member countries. Thus the two most urbanised regional categories recorded rates of manufacturing employment decline between two and four times faster than those experienced by the less urbanised and rural regions. Put another way, regions in the two most urbanised groups accounted for 66 percent of Community manufacturing employment in 1973, but 86 percent of total subsequent job losses. Their shares of total Community manufacturing employment thus declined. Less urbanised and rural areas, with 34 percent of manufacturing workers in 1973, sustained only 14 percent of the subsequent losses. Their shares therefore rose. This clear relative shift of manufacturing employment away from congested urban regions and in favour of areas characterized by smaller settlements and lower population densities appears also to be linked to the shift to intermediate regions noted above, at least in terms of the visual evidence of Figure 4.11. Possible explanations for this urban-scale shift are noted in earlier sections (e.g. 4.2).

Changes in overall levels of manufacturing industry viewed as a single sector are however only part of the picture. For it can be argued that of equal importance for long-term regional economic progress is the precise

internal structure of manufacturing activity in different areas, and how this is evolving over time. In this context, the so called 'filter-down theory' of regional industrial shifts is of considerable relevance. Filter-down theory, as developed by Thompson (1968, 1969) in a North American context, argues that both urban-rural and centre-periphery manufacturing shifts in advanced economies reflect a continual process of new industry creation in urbanised, metropolitan regions, coupled with continuing decentralisation of older ageing industries from urban core regions to labour-surplus rural and peripheral regions. (Howells, 1981). The theory is neatly summarized by Townroe (1979, 147):

"Thompson's core idea is that the larger urban areas are more than proportionately sources of creative entrepreneurship and innovation. These larger areas tend to combine a mix of fast-growing industries with a steadily declining share of these growth industries." The latter occurs because of a "successive spinning-off of these industries... as the product ages and the technology matures. Mass-production becomes possible and skill requirements fall. The ageing industry seeks pools of available cheaper labour and so plants filter down the skill and wage hierarchy of urban areas, from the large cities to the small non-metropolitan towns."

While Townroe's summary is couched in urban-rural terms, Thompson and other workers have also applied it to centre-periphery regional shifts at a continental (USA) scale. Basically, the theory predicts a marked difference in the nature and evolution of manufacturing industry as between growing central and lagging peripheral regions, with central regions continually evolving new industries as a result of high rates of innovation, investment and technological change. Peripheral regions, however, will be characterized by older, labour-intensive industries nearing the end of their product life-cycle, dispersed from core regions by a search for low-cost labour. A further development of this set of ideas is to be found in the work of Holland (1976) and Ewers and Wettmann (1980), who stress the fact of increasing competition for older, labour-intensive peripheral industries from competitors, whether multi-national or indigenous, in low wage cost Third World countries. Thus Holland (1976, 59) claims that there is an "evident trend for major areas in the EEC to share the main features of national problem regions in as much as multi-national capital misses their peripheral areas in its migration to

the Third World", while Ewers and Wettman (1980, 165) stress that within the EEC, "the previous comparative advantages of many peripheral regions over the agglomerated areas - particularly lower wage, real-estate and environmental costs - have been called into question by the new international division of labour."

As a simple test of the hypothesised operation of filter-down theory within the enlarged Community, the present study has devised a regional manufacturing structure index which, though very crude, does pinpoint important differences in internal regional manufacturing composition. This index is the ratio in a given year of regional employment in NACE sector 3 to that in NACE sector 4. Sector 3, labelled 'Engineering and Metals' in earlier tables, in detail includes the metal goods, mechanical, electrical and instrument engineering, vehicles and aerospace industries. It thus incorporates the great majority of the EEC's more modern, technologically-advanced and research-intensive industries, with the exception of chemicals, included in NACE 2 with non-energy minerals. In the British case, for example, NACE 3 industries currently account for about 80 percent of all public and private sector expenditure on - and employment in - research and development of new products and technologies, most of the remainder being in chemicals. In contrast, NACE 4 'Other Manufacturing' industries are markedly biased towards older, more traditional and labour-intensive sectors, notably textiles, clothing, footwear, paper and printing, food and drink, and furniture. Several of these industries are currently experiencing severe difficulties with regard to foreign competition, especially from Third World producers.<sup>1</sup> Thus Community employment in textile manufacturing fell substantially during the later 1970's, by 600 thousand jobs or 15 percent 1975-79, whereas imports of textiles have risen sharply, to about 40 percent of EEC consumption by 1980 (Marzotto, 1981). NACE 4 industries are thus the kinds of industries which filter-down theory predicts will locate in peripheral regions of the Community, whereas NACE 3 industries would be expected to be concentrated in central regions.

Table 4.26, and Figures 4.12 and 4.13, present the results of the manufacturing structure index analysis. A high ratio relative to the EEC average value indicates a bias towards NACE 3 industries, a low ratio

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<sup>1</sup> Admittedly, this is also to some extent true of certain NACE 3 industries, such as consumer electrical products and, perhaps, motor cars. But the severity and impact of competition is generally much greater for NACE 4 industries.



a bias towards NACE 4 industries. The results are remarkably consistent and exactly in line with the predictions suggested by filter-down theory. First, they reveal that in both years, the manufacturing structure of the Community's peripheral regions differed considerably from that of central regions, with a marked bias towards more modern, technologically-advanced and research-intensive engineering industries in central areas but an even more striking bias towards older, more traditional labour-intensive industries in peripheral areas. This major structural difference suggests that manufacturing industry in the Community's peripheral regions is likely to face continuing severe difficulties in the 1980's, in the context of the labour-cost advantages of Third-World competitors. As with other regional economic indicators, the intermediate group of regions recorded ratios between those of the central and peripheral regions, though much nearer the former, again supporting the hypothesis that the evolution of regional manufacturing structures has been influenced by relative accessibility and location within the EEC.

Secondly, and even more worryingly, Table 4.26 shows that trends in the location of these industries within the Community are intensifying still further the already major differences in manufacturing structure between central and peripheral regions. Thus the mean NACE 3/4 ratio for central regions rose both absolutely and relative to the EEC average (119.4 to 121.4: EEC = 100) over the period, whereas that for the peripheral regions fell, again both absolutely and relatively (63.3 to 54.5: EEC = 100). The periphery is thus becoming even more dependent on traditional labour-intensive industry, while the centre is increasing its already marked orientation to technologically-advanced industry. This is exactly the trend predicted by filter-down theory, and suggests that in the 1980's, the manufacturing industries of central regions in the EEC will be appreciably better placed to maintain and increase output if not employment than will their counterparts in the Community's peripheral regions.

Table 4.27 extends the above results by demonstrating that the marked bias towards traditional industries is not confined to one area of the periphery, but is characteristic of all three subgroups, Italian, French and Northern. In each case and each year, NACE 3/4 ratios were appreciably lower than either central region, intermediate region or EEC average values, indicating a common historic peripheral bias towards

older, labour-intensive industries. Moreover, the Italian and French subgroups each also exhibited a marked intensification of this bias over the period, whatever measure (mean or median) is used, while the Northern periphery fell behind both central and intermediate regions in terms of average structural change. The latter did however achieve a higher median rate of change in its manufacturing structure index than the central or intermediate groups, indicating that certain Northern regions - in fact Northern England, Scotland, and the Republic of Ireland (Figure 4.13) - did achieve some success in re-orienting their manufacturing structures towards more modern manufacturing industries, possibly as a result of government policies (O'Farrell, 1981: Townroe, 1981).

The last finding with regard to regional manufacturing structure is that in terms of mean values at least, the analysis also fully and strikingly bears out the predictions of filter-down theory with regard to the urban-rural pattern of manufacturing specialization. Again, in both years and generally with regard to structural evolution over time, Table 4.28 reveals a remarkable and consistent gradient of mean values from most highly urbanised to rural regions, with the former exhibiting a markedly greater bias to more technologically-advanced industries, the latter a bias towards more traditional industries. Moreover, these different biases intensified still further over the period, with lower change rates than the EEC average towards a greater proportion of NACE 3 industries in the two least urbanised groups, but higher change rates than average in the two most urbanised categories. However, while thus fully supporting the predictions of filter-down theory at this urban-rural scale, the disparities in manufacturing structure revealed by Table 4.28 are not as wide as those between central and peripheral regions. The analyses thus confirm that it is at the centre-periphery scale within the Community that differences in regional manufacturing structure and evolution give greatest cause for concern.

Table 4.22 Aggregate Regional Manufacturing Employment, 1973-1979

	1973		1979		1973-79	
	EMPLOYMENT (000's)	% OF TOTAL	EMPLOYMENT (000's)	% OF TOTAL	CHANGE (000's)	CHANGE %
Central Regions (35)	12,481	39.49	11,743	39.04	-748	-5.99
Intermediate Regions (39)	12,673	40.07	12,281	40.83	-392	-3.09
Peripheral Regions (31*)	6,467	20.45	6,052	20.12	-415	-6.42
Total EEC9 Regions (105)	31,631	100.00	30,076	100.00	-1,555	-4.92

Based on: LFS data from Eurostat

\* Includes single value for Denmark

Table 4.23 Regional Manufacturing Employment Change (%), 1973-1979

	MEDIAN	MEAN
Central Regions (35)	-6.34	-6.59
Intermediate Regions (39)	-4.19	-1.70
Peripheral Regions (31)	-9.09	-9.84
Total EEC9 Regions (105)	-6.34	-5.73

Based on: LFS data from Eurostat

Manufacturing employment taken as sum of NACE categories 2, 3 and 4

\* Includes single value for Denmark

Table 4.24 Aggregate Regional Manufacturing Employment in Peripheral Regions, 1973-79

	1973	1979	1973-79	
	EMPLOYMENT	EMPLOYMENT	CHANGE	CHANGE
	(000's)	(000's)	(000's)	(%)
Peripheral Regions:				
Italian (16)	2,609	2,310	-299	-11.5
French (9)	1,504	1,433	-71	-4.7
Northern (6*)	2,354	2,309	-45	-1.9
Total Peripheral Regions (31)	6,467	6,052	-415	-6.4

Based on: LFS data from Eurostat

\* Includes single value for Denmark

Table 4.25 Aggregate Regional Manufacturing Employment by Urban Category, 1973-1979

	1973		1979		1973-79	
	EMPLOYMENT (000 's)	% OF TOTAL	EMPLOYMENT (000 's)	% OF TOTAL	CHANGE (000 's)	CHANGE (%)
Highly Urbanised Regions (21)	11,019	34.84	10,362	34.45	-657	-5.96
Urbanised Regions (23)	9,905	31.31	9,225	30.67	-680	-6.87
Less Urbanised Regions (32*)	6,998	22.12	6,887	22.90	-111	-1.59
Rural Regions (29)	3,708	11.72	3,602	11.98	-106	-2.86
Total EEC9 Regions (105)	31,631	100.00	30,076	100.00	-1,555	-4.92

Based on: LFS data from Eurostat

\* Includes single value for Denmark

Table 4.26 Regional Trends in Manufacturing Structure 1973-1979

	MEDIAN		MEAN	
	CHANGE RATE		CHANGE RATE	
	NACE 3/4 RATIOS* 1973	1979	NACE 3/4 RATIOS* 1973	1979
Central Regions (35)	0.969	1.160	1.131	1.264
Intermediate Regions (39)	0.957	1.123	1.040	1.192
Peripheral Regions (29**)	0.489	0.447	0.599	0.567
Total EEC9 Regions (103)	0.844	0.942	0.947	1.041
				1.119

Based on: LFS data from Eurostat

\* NACE 3 = metal goods, mechanical, electrical and instrument engineering, vehicles, aerospace  
 NACE 4 = textiles, clothing, footwear, paper and printing, food and drink, furniture, other

\*\* Valle D'Aosta, Molise: data not available

N.B. Change rates are means and medians of each locational group's whole set of regional change rates, not values calculated by crude division of the 1979 by 1973 mean or median values shown.

Table 4.27 Regional Trends in Manufacturing Structure for Peripheral Regions, 1973-1979

	MEDIAN		MEAN	
	NACE 3/4 RATIOS		NACE 3/4 RATIOS	
	1973	1979	1973	1979
		CHANGE RATE		CHANGE RATE
		1973-79		1973-79
Peripheral Regions:				
Italian (14*)	0.400	0.357	0.403	0.339
French (9)	0.795	0.709	0.729	0.655
Northern (6**)	0.759	0.836	0.859	0.967
Total Peripheral Regions (29)	0.489	0.447	0.599	0.567

Based on: LFS data from Eurostat

\* Excl. Val d'Aosta, Molise

\*\* Includes single value for Denmark

N.B. Change rates are means and medians of each locational group's whole set of regional change rates, not values calculated by crude division of the 1979 by 1973 mean or median values shown.



Table 4.28 Regional Trends in Manufacturing Structure, by Urban Category, 1973-1979

	MEDIAN			MEAN		
	NACE 3/4 RATIOS*		CHANGE RATE	NACE 3/4 RATIOS*		CHANGE RATE
	1973	1979	1973-79	1973	1979	1973-79
Highly Urbanised Regions (21)	1.185	1.172	1.094	1.300	1.430	1.153
Urbanised Regions (23)	0.795	0.925	1.125	0.913	1.088	1.190
Less Urbanised Regions (32)	0.786	0.815	1.119	0.847	0.934	1.085
Rural Regions (27**)	0.905	0.923	1.055	0.819	0.824	1.071
Total EEC9 Regions (103)	0.844	0.942	1.103	0.947	1.041	1.119

Based on: LFS data from Eurostat

\* NACE 3 = metal goods, mechanical, electrical and instrument engineering, vehicles, aerospace  
 NACE 4 = textiles, clothing, footwear, furniture, paper and printing, food and drink, furniture, other

\*\* Valle D'Aosta, Molise: data not available

N.B. Change rates are means and medians of each locational group's whole set of regional change rates, not values calculated by crude division of the 1979 by 1973 mean or median values shown.

# Percentage manufacturing employment change, 1973-79

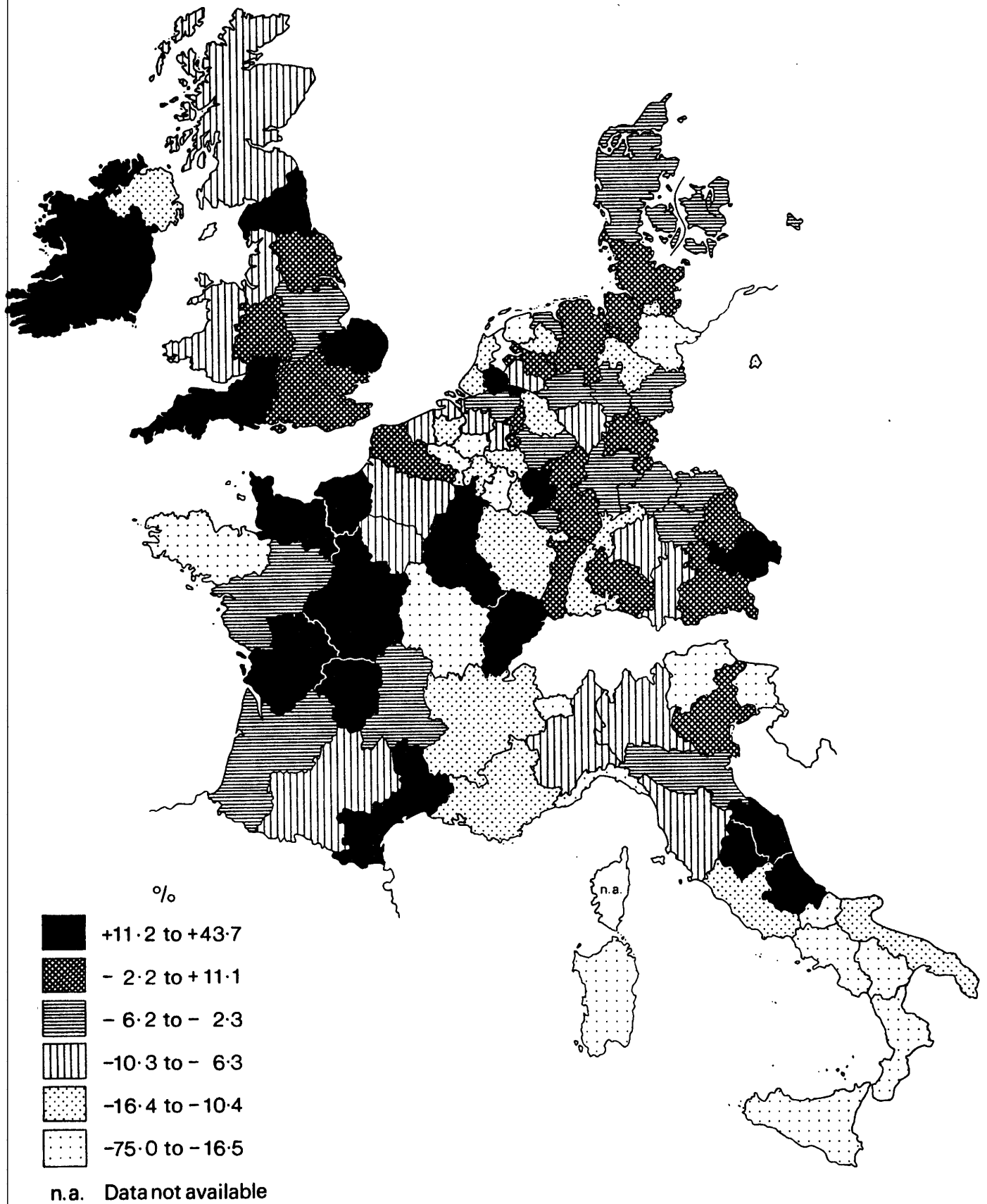


Figure 4.11

# Manufacturing Structure Index, 1973

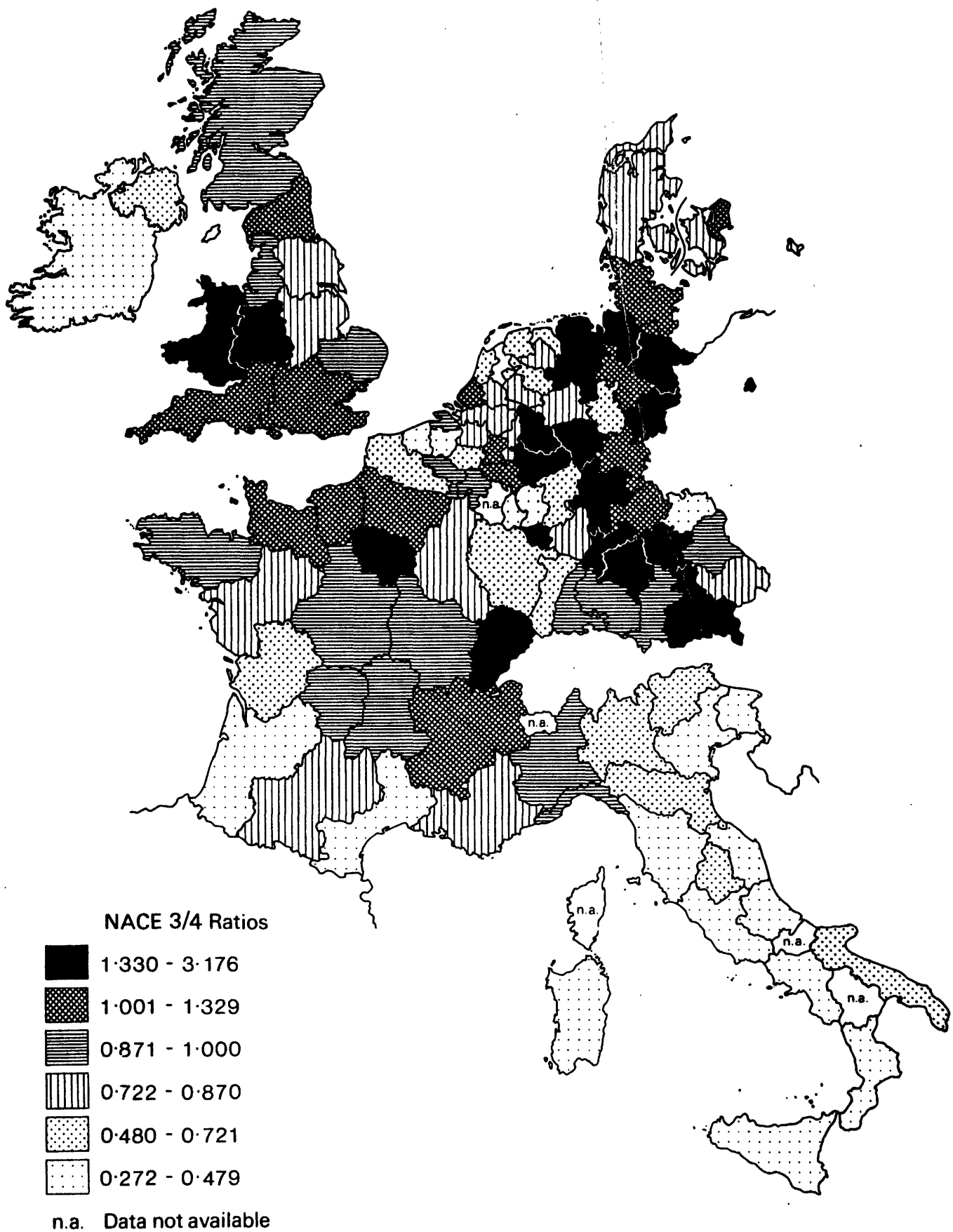


Figure 4.12

# Manufacturing structure index: changes 1973-79

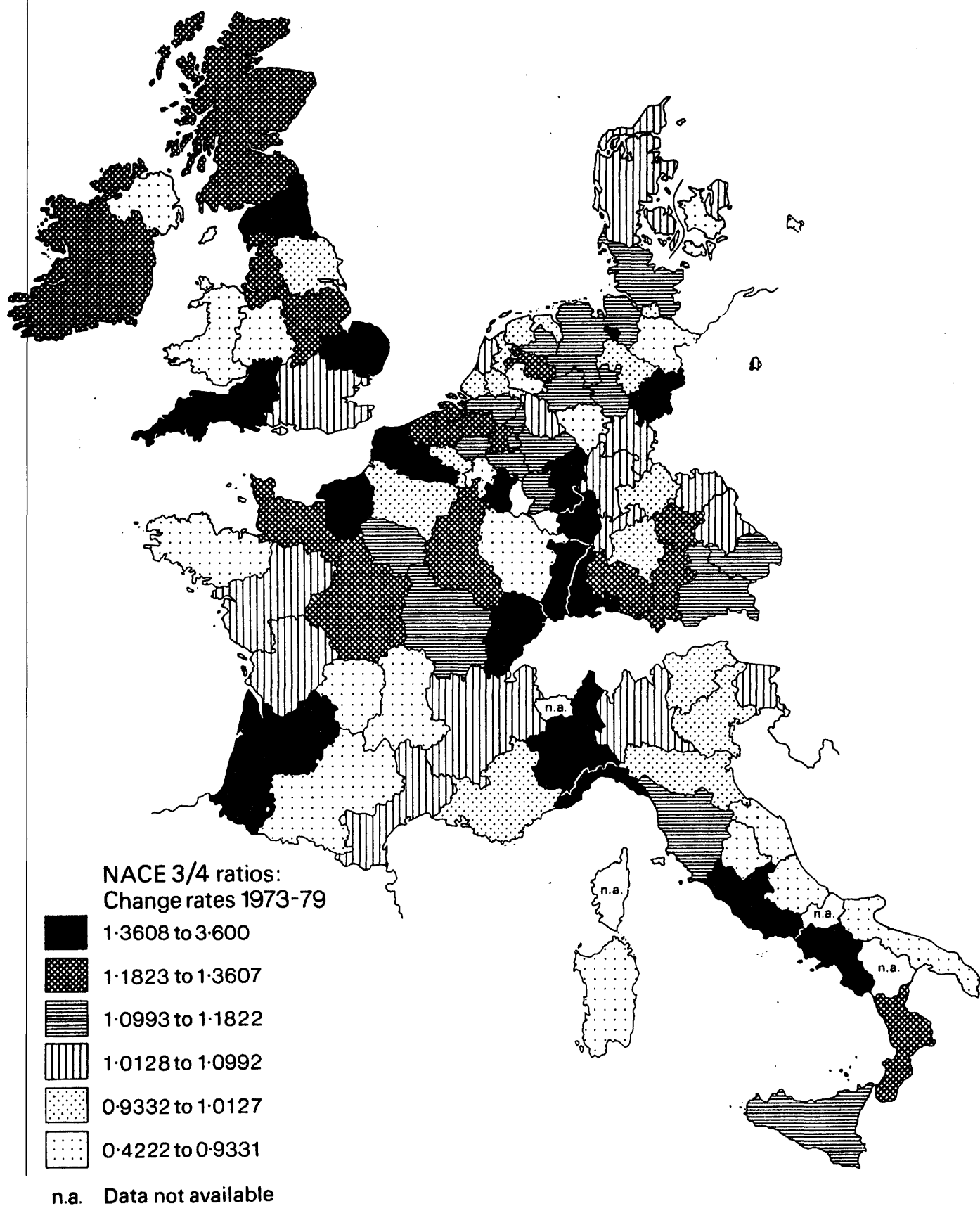


Figure 4.13

#### 4.8 Service Industry

In employment terms, the shift-share analysis of section 4.6 revealed that service industries are by far the most important sources of regional growth within the Community. Rising personal incomes and consumer expenditures and the growing complexity and needs of productive industry have generated a considerable expansion of both consumer and producer services of many different kinds. This section therefore investigates the regional pattern of service employment change, in an exploratory test of whether the centre-periphery model is relevant to tertiary activity.

Table 4.29 and Figure 4.14 record trends in the regional distribution of service employment. The table reveals that in a context of substantial Community-wide service industry growth (+6.3 million jobs, or 13.4 percent, 1973-79), service employment in peripheral regions has grown more rapidly and by a greater volume of jobs than in either the central or intermediate categories. The peripheral group of regions thus witnessed an expansion of 2.4 million service employees or 20 percent, compared with a central region growth of only 1.6 million or 8 percent. The intermediate category, as with so many previous analyses recorded an intermediate rate of growth (15 percent), though one still above the Community average.

Not surprisingly, this inverse association between relative accessibility and rate of service employment growth mirrors that of total employment growth discussed earlier (section 4.6), since the latter is dominated by the service sector. Equally, the distribution of service employment growth within the periphery (Table 4.30) is similar to that of total employment change (Table 4.13), with remarkably rapid growth in the Italian case but slower growth elsewhere. Service growth rates in the French and Northern peripheral regions were nonetheless appreciably higher than the average for central regions. Lastly, service employment trends reveal no consistent pattern with respect to regional levels of urbanisation (Table 4.31), unlike manufacturing employment. However, the most highly urbanised regions did record much the slowest growth rate.

Aggregate regional service employment trends thus conform to a pattern of centre-periphery dispersion within the Community which, it was argued earlier, particularly reflects the differential growth in the Italian periphery of relatively marginal jobs in distribution and public administration, as a response to demographic rather than economic pressures. The latter activities are of course consumer, not producer, services. This introduces the question of variations in the regional structure of service industry, and whether patterns and trends in service structures are operating to the advantage or disadvantage of the peripheral regions, including the Italian periphery.

In this study, service structures are measured by the simple index of regional employment in a given year in producer services to that in consumer services. The broad division of what are a heterogeneous group of service industries into these two categories is crude and inexact. Thus the inclusion in the producer services category, along with Banking, Finance, Insurance and Business Services, of Transport and Communication services clearly incorporates a certain element of consumer-oriented activity (e.g. travel agents) into this group (see Appendix D). Similarly, the consumer services category, made up of Distributive Trades, Hotels, Catering, Public Administration, and Other Services (health, education, personal services), also includes such obvious producer activities as separate research and development units for manufacturing industry.

However, this said, it can clearly be argued that the nature of these two groups of service trades is basically different. One serves and is closely integrated with production activities - manufacturing, energy, extractive industry, agriculture - outside the service sector. The other is chiefly related to and dependent on consumer demands from the resident population of a region, albeit filtered through different private and public sector mechanisms. While value judgements may not be appropriate here, it might also be suggested, as a tentative hypothesis, that growth in producer services is of greater economic value to a region than a similar increment of consumer services employment, because producer services are more likely to form part of the economic base of a region in the sense of generating exogenous income. Their development may also strengthen the competitive efficiency of regional production activities. A relatively high producer-consumer services

ratio may therefore be an indicator of a more favourable long-term service industry structure.

Table 4.32 and Figures 4.15 and 4.16 record regional patterns and trends in service structure, measured by the simple index. As with the similar manufacturing structure index, the analysis reveals the existence of wide and intensifying centre-periphery disparities in the structure of regional service industry. In each year, service industry in central regions was on average markedly more biased towards producer services than service industry in peripheral regions, which was significantly more oriented towards consumer services. Intermediate regions recorded a familiarly intermediate index. Moreover, this clear disparity widened still further over the period. Thus the centre's average services structure index rose, relative to the EEC value (100.0), from 113.9 to 115.6; whereas that for peripheral regions fell, from 82.1 to 76.4. Service industry structure is thus evolving differently in the central and peripheral regions of the Community, with an increasing relative specialization on producer services in central regions but an increasing relative and absolute specialization on consumer services in peripheral regions. Moreover, Table 4.33 indicates that markedly lower service structure indices than in central regions are found throughout the periphery, with especially low and declining values in the Italian case. Again, this provides powerful support for the view that the structure of service industry is indeed influenced by relative regional accessibility within the Community.

Finally, Table 4.34 reveals the existence of a further striking relationship between service industry structure and the urban-rural status of different regions. The more urbanised a region, the higher the bias towards producer services. Moreover, the clear continuum in regional service structure from highly-urbanised to rural regions extends to rates of change in the service structure index. The more urbanised the region, the more rapidly its service structure is evolving towards a greater relative bias to producer services: the more rural the region, the more rapidly its service structure is evolving towards a greater relative dependence on consumer services. These trends, which are in line with expectations based on knowledge of the differing locational requirements of producer and consumer services, again indicate that urban-rural differences represent an important secondary dimension

of regional economic change in the Community, within a framework of major centre-periphery variations in structure and evolution.



Table 4.29 Aggregate Regional Services Employment, 1973-1979

	1973		1979		1973-79	
	EMPLOYMENT (000 's)	% OF TOTAL	EMPLOYMENT (000 's)	% OF TOTAL	CHANGE (000 's)	CHANGE (%)
Central Regions (35)	19,707	41.85	21,287	39.87	+1,580	+8.02
Intermediate Regions (39)	15,123	32.11	17,445	32.67	+2,322	+15.35
Peripheral Regions (31*)	12,263	26.04	14,659	27.46	+2,396	+19.54
Total EEC9 Regions (105)	47,094	100.00	53,391	100.00	+6,297	+13.37

Based on: LFS data from Eurostat

\* Includes single value for Denmark

Table 4.30 Aggregate Regional Services Employment in Peripheral Regions, 1973-1979

	1973		1979		1973-79	
	EMPLOYMENT (000 's)	% OF TOTAL	EMPLOYMENT (000 's)	% OF TOTAL	CHANGE (000 's)	CHANGE (%)
Peripheral Regions:						
Italian (16)	4,433	36.15	5,937	40.50	+1,504	+33.93
French (9)	3,517	28.68	3,976	27.12	+459	+13.05
Northern (6*)	4,313	35.17	4,746	32.38	+433	+10.04
Total Peripheral Regions (31)	12,263	100.0	14,659	100.0	+2,396	+19.54

Based on: IFS data from Eurostat

\* Includes single value for Denmark

Table 4.31 Aggregate Regional Services Employment, by Urban Category, 1973-1979

	1973		1979		1973-79	
	EMPLOYMENT (000's)	% OF TOTAL	EMPLOYMENT (000's)	% OF TOTAL	CHANGE (000's)	CHANGE (%)
Highly Urbanised Regions (21)	19,058	40.47	20,494	38.38	+1,436	+7.53
Urbanised Regions (23)	11,683	24.81	14,030	26.28	+2,347	+20.09
Less Urbanised Regions (32*)	11,488	24.39	13,212	24.75	+1,724	+15.01
Rural Regions (29)	4,865	10.33	5,655	10.59	+790	+16.24
Total EEC9 Regions (105)	47,094	100.00	53,391	100.00	+6,297	+13.37

Based on: IFS data from Eurostat

\* Includes single value for Denmark

Table 4.32 Regional Trends in Services Structure, 1973-1979

	MEDIAN			MEAN		
	NACE 7+8/6+9 RATIOS		CHANGE RATE	NACE 7+8/6+9 RATIOS		CHANGE RATE
	1973	1979	1973-79	1973	1979	1973-79
Central Regions (35)	0.292	0.275	0.993	0.312	0.304	0.971
Intermediate Regions (39)	0.264	0.278	0.989	0.278	0.275	0.997
Peripheral Regions (31*)	0.216	0.200	0.955	0.225	0.201	0.892
Total EEC9 Regions (105)	0.263	0.259	0.983	0.274	0.263	0.957

Based on: LFS data from Eurostat

\* Includes single value for Denmark

N.B. Change rates are means and medians of each locational group's whole set of regional change rates, not values calculated by crude division of the 1979 by 1973 mean or median values shown.

Table 4.33 Regional Trends in Services Structure for Peripheral Regions, 1973-1979

	MEDIAN		MEAN	
	NACE 7+8/6+9 RATIOS		NACE 7+8/6+9 RATIOS	
	1973	1979	1973	1979
Peripheral Regions:				
Italian (16)	0.190	0.168	0.199	0.163
French (9)	0.250	0.233	0.246	0.231
Northern (6*)	0.265	0.263	0.263	0.259
Total Peripheral Regions (31)	0.216	0.200	0.225	0.201
				CHANGE 1973-79
				0.822
				0.957
				0.983
				0.892

Based on: LFS data from Eurostat

\* Includes single value for Denmark

N.B. Change rates are means and medians of each locational group's whole set of regional change rates, not values calculated by crude division of the 1979 by 1973 mean or median values shown.

Table 4.34 Regional Trends in Services Structure by Urban Category, 1973-1979

	MEDIAN			MEAN		
	NACE 7+8/6+9 RATIOS		CHANGE RATE	NACE 7+8/6+9 RATIOS		CHANGE RATE
	1973	1979	1973-79	1973	1979	1973-79
Highly Urbanised Regions (21)	0.327	0.307	1.003	0.337	0.334	0.994
Urbanised Regions (23)	0.258	0.266	0.988	0.268	0.259	0.960
Less Urbanised Regions (32*)	0.252	0.243	0.972	0.254	0.244	0.967
Rural Regions (29)	0.259	0.237	0.959	0.253	0.235	0.918
Total EEC9 Regions (105)	0.263	0.259	0.983	0.274	0.263	0.957

Based on: LFS data from Eurostat

\* Includes single value for Denmark

N.B. Change rates are means and medians of each locational group's whole set of regional change rates, not values calculated by crude division of the 1979 by 1973 mean or median values shown.

# Percentage service employment change, 1973-79

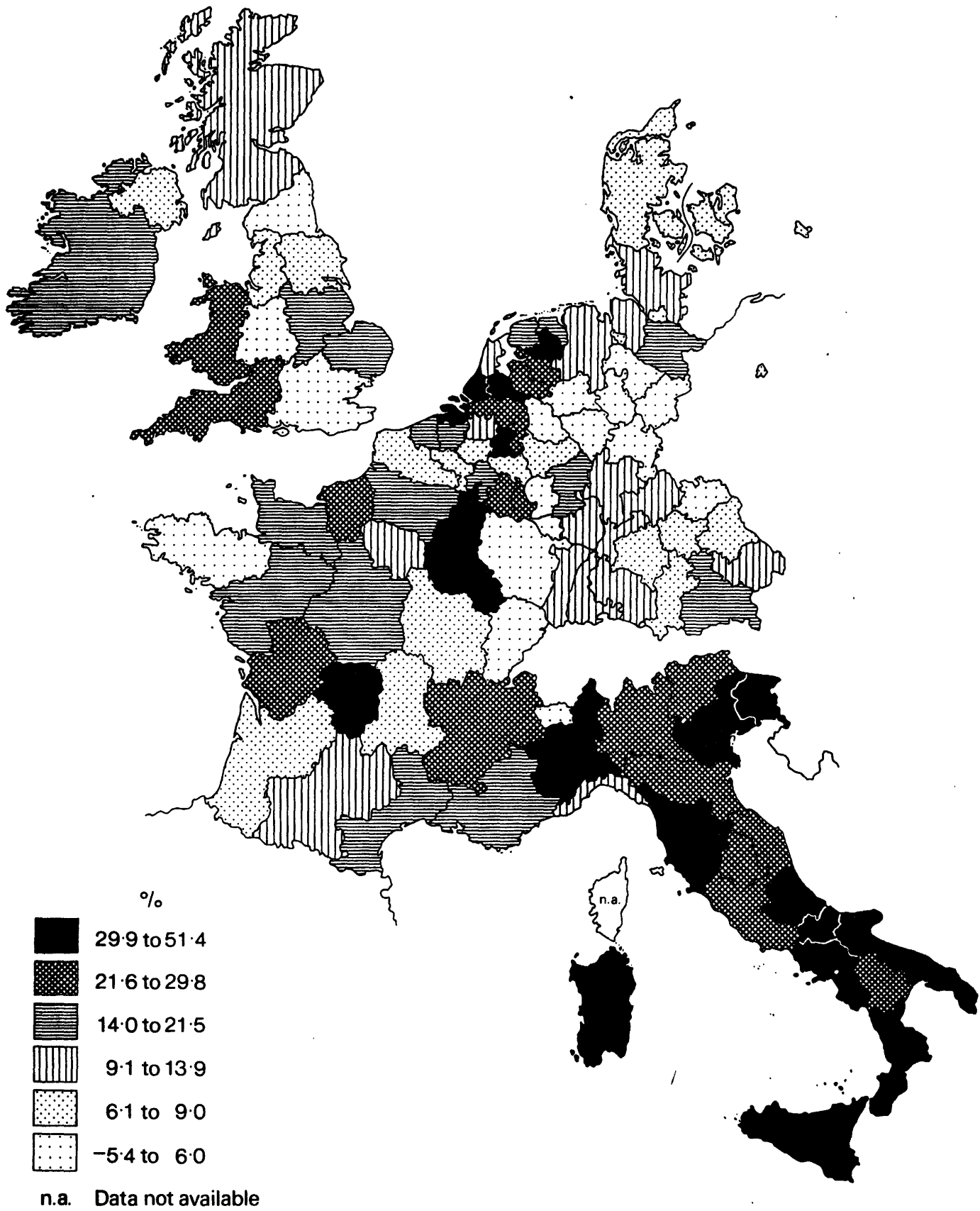


Figure 4.14

## Services structure index, 1973

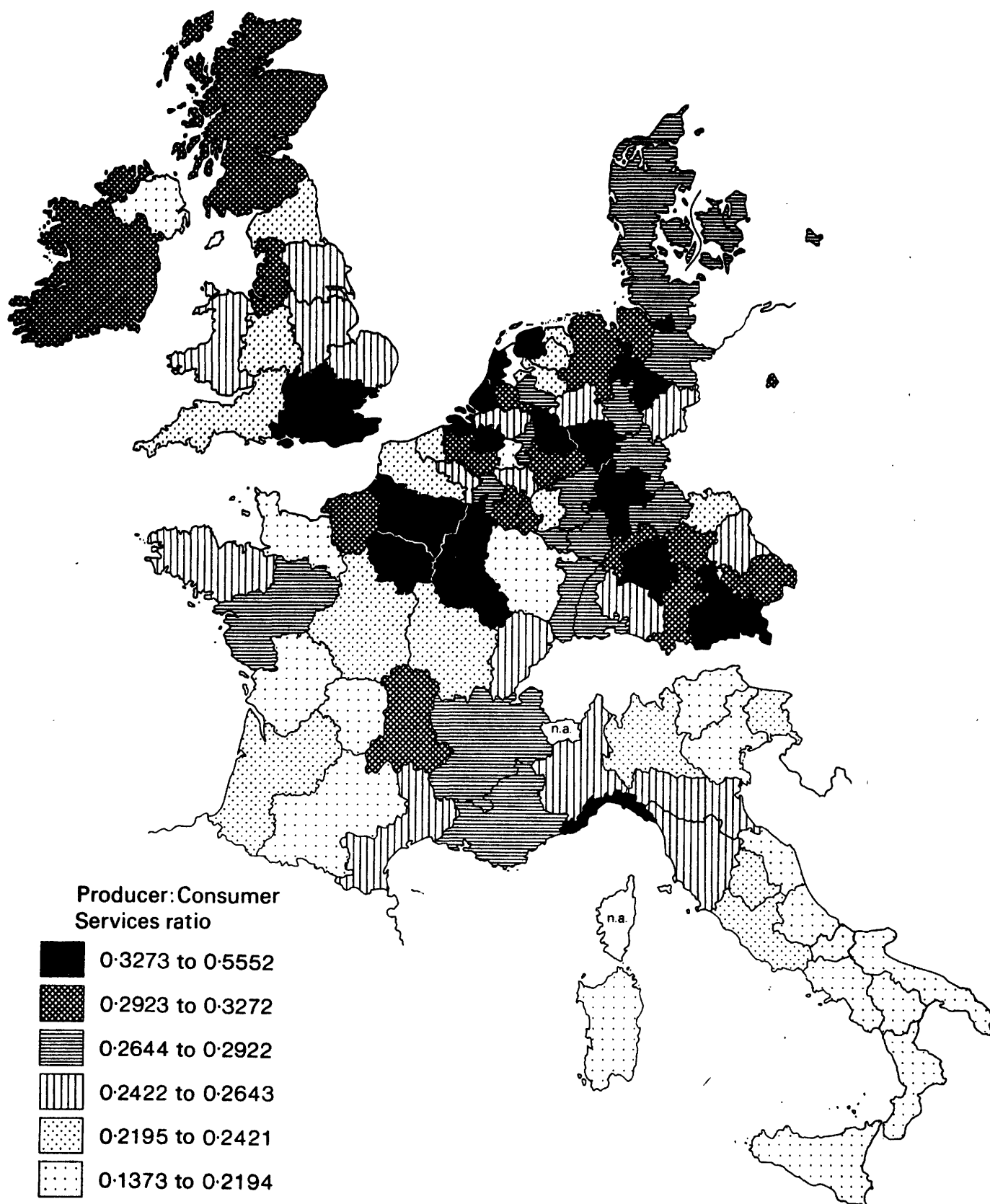


Figure 4.15



# Services Structure Index: changes, 1973-79

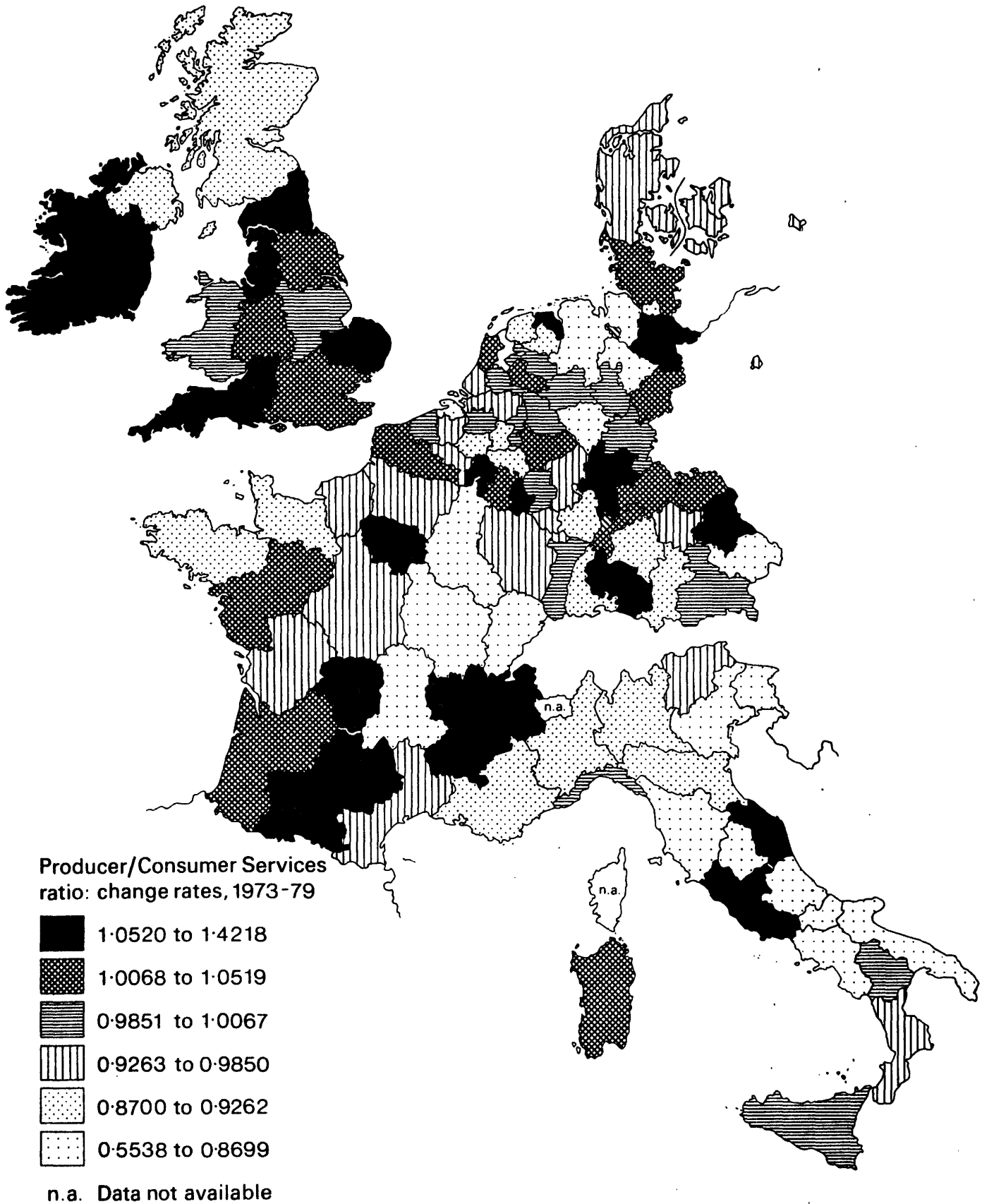


Figure 4.16

#### 4.9 Unemployment

The theoretical framework discussed in section 4.1, with its emphasis of differential centre-periphery economic growth and hence demand for factors of production such as labour, carries with it very clear implications of higher regional unemployment rates in peripheral as compared to central regions of the Community. Data on such rates are recorded in Table 4.35 and Figure 4.17. These data, derived from the Labour Force Survey, measure unemployment not in terms of workers actually registering with government agencies under the differing provisions of national unemployment legislation, but with respect to all respondents to the survey who regarded themselves as unemployed and were actively seeking paid employment. Numbers and percentages thus differ from official national values, but are appreciably more comparable between member countries and regions.

The first and basic finding is of a very marked difference in unemployment rates between central and peripheral regions of the Community. In 1973, the mean rate for the latter was nearly 3½ times that for the former, with the intermediate region rate occupying, yet again, an intermediate position but closer to the central region value (Table 4.36). Moreover, as Figure 4.17 indicates, exceptionally high regional unemployment rates are characteristic of all three peripheral sub-groups, Italian, French and Northern. High unemployment would seem to be one of the most characteristic and endemic features of peripheral region economies throughout the Community, relative to central economies. This association with periphererality rather than nationality is particularly well illustrated by the Italian and British Isles cases (see Figure 4.17), while a complete lack of relationship with the secondary urban-rural dimension is evident from Table 4.36. This analysis is thus fully consonant with the view that regional unemployment rates within the Community principally reflect a differential demand for labour as between central, relatively accessible, and peripheral, relatively inaccessible, regions, intensified perhaps by supply-side (demographic) differences.

The second finding of the unemployment analyses however qualifies the first. For in terms of changes in unemployment levels and rates, Tables 4.35 and 4.37 and Figure 4.18 reveal unequivocally that since

1973, the dramatic growth in unemployment within the Community (+2.5 million or +128 percent) has been relatively heavily concentrated in its central, not peripheral, regions. Thus on Labour Force Survey evidence, unemployment increased between 1973 and 1979 by one million or 233 percent in central regions, compared with a growth of (only) 800 thousand, or 83 percent, in the periphery (Table 4.37). Differences in rates of change of unemployment rates were even more strikingly at the expense of central regions (Table 4.35). As a result, unemployment rates in certain central (and immediately adjacent intermediate) regions - Brabant, Liege, Hainaut, Nord-Pas-de-Calais - had risen by 1979 to levels equivalent to those in the periphery (Figure 4.17). The highest rates of increase of unemployment rates have however occurred in central German regions (Figure 4.18), in part reflecting the very low rates recorded by these regions at the start of the period. Again, unemployment growth in different parts of the EEC periphery (Table 4.38), though varying as between the extremes of the Italian and French subgroups (relatively slow and rapid unemployment growth, respectively), was everywhere appreciably slower than the average for central regions. Lastly, rates of growth of unemployment by urban category (Table 4.39) reveal no very clear pattern of change, other than a possible tendency towards slightly faster unemployment growth in less-urbanised and rural regions, compared with the urbanised and highly-urbanised categories.

These changes in regional unemployment levels and rates are dramatic, and almost certainly previously unparalleled. Development of a satisfactory explanation for them is likely to be complex, and is certainly beyond the scope of analysis of the present project. However, possible mechanisms include the decline of certain central industrial regions which are over-specialised on older declining industries (Belgium, northern France); a rapid growth of labour-shedding and capital-labour substitution in central region manufacturing plants faced with the need to increase productivity and efficiency in a period of fierce international competition; the 'barrier' effects of already very high unemployment in peripheral regions on job-seeking by redundant female workers who therefore resume the status of 'house-wives'; and variations in the opportunities for marginal low-income service employment in peripheral regions as an alternative to actual unemployment.

Finally, Tables 4.40 and 4.41 record results for trends in unemployment amongst young people, aged 14 to 24 years, as an important and specialized subset of the unemployed work force of the Community. Again, the results are dramatic, in that youth unemployment, which was already markedly more severe in peripheral than in central regions of the Community in 1975, grew considerably faster in the periphery after that year than it did in the centre. This was of course the opposite of the trend for unemployment as a whole. As a result, centre-periphery differences in youth unemployment rates within the Community have widened alarmingly in recent years, with an average peripheral rate by 1979 of no less than 20 percent compared with a central rate of (only) 7 percent. While the explanation for this very serious trend is undoubtedly partly demographic, with large numbers of young people entering the labour market for the first time in the Italian and French peripheral regions (Commission of the European Communities, 1981, 32), labour demand factors in the context of weak peripheral regional economies must also be involved.

The latter view is supported by table 4.41, which breaks down the average peripheral region figures into values for the three subgroups. Again, as with many previous analyses, this reveals that each of the three separate groups of peripheral regions records a markedly worse youth unemployment situation, measured by 1975 and 1979 mean and median rates, than either central regions, intermediate regions, or the EEC average. High youth unemployment rates are a consistent characteristic of EEC peripheral regions, wherever these are located. Table 4.41 also reveals that both the French and Italian peripheries recorded a dramatic growth in youth unemployment between 1975 and 1979, at rates far higher than for the rest of the Community. While the Northern periphery apparently differed in this respect, it should be stressed that the table perforce excludes data for Ireland and Denmark, the former of which, at least, undoubtedly suffers from a very high youth unemployment rate. There is also no doubt that youth unemployment in Britain's peripheral regions has risen very steeply since 1979. At the urban scale, table 4.42 reveals that growth of youth unemployment has been least rapid in the most highly urbanised regions. Differences at the urban-rural scale are however much less striking than those between central and peripheral regions.

Table 4.35 Regional Unemployment Rates, 1973-1979

	REGIONAL MEDIAN			REGIONAL MEAN		
	1973	1979	CHANGE IN RATE, 1973-79	1973	1979	CHANGE IN RATE, 1973-79
	%	%	%	%	%	%
Central Regions (35)	0.83	2.93	+333	1.11	3.91	+368
Intermediate Regions (39)	1.20	3.28	+200	1.39	3.54	+227
Peripheral Regions (29*)	3.60	5.50	+52	3.78	5.86	+82
Total EEC9 Regions (103)	1.51	3.53	+189	1.97	4.32	+235

Based on: LFS data from Eurostat

\* Includes single value for Denmark

N.B. Change rates are means and medians of each locational group's whole set of regional change rates, not values calculated by crude division of the 1979 by 1973 mean or median values shown.

Table 4.36 Regional Unemployment Rates, by Urban Category, 1973-1979

	REGIONAL MEDIAN			REGIONAL MEAN		
	1973 %	1979 %	CHANGE IN RATE, 1973-79 %	1973 %	1979 %	CHANGE IN RATE, 1973-79 %
Highly Urbanised Regions (21)	1.58	3.28	+154	1.75	3.99	+242
Urbanised Regions (23)	2.00	3.63	+93	2.25	4.22	+188
Less Urbanised Regions (30*)	1.35	4.55	+238	1.85	4.92	+263
Rural Regions (29)	1.30	3.30	+163	2.02	4.02	+237
Total EEC9 Regions (103)	1.51	3.53	+189	1.97	4.32	+235

Based on: LFS data from Eurostat

\* Includes single value for Denmark

N.B. Change rates are means and medians of each locational group's whole set of regional change rates, not values calculated by crude division of the 1979 by 1973 mean or median values shown.

Table 4.37 Aggregate Regional Unemployment, 1973-1979

	1973		1979		1973-79	
	UNEMPLOYED (000 's)	% OF TOTAL	UNEMPLOYED (000 's)	% OF TOTAL	CHANGE (000 's)	CHANGE (%)
Central Regions (35)	431	21.9	1,435	32.0	+1,004	+233
Intermediate Regions (39)	558	28.4	1,259	28.1	+701	+126
Peripheral Regions (31*)	979	49.7	1,789	39.9	+810	+83
Total EEC9 Regions (105)	1,968	100.0	4,484	100.0	+2,516	+128

Based on: LFS data from Eurostat

\* Includes single value for Denmark

Table 4.38 Aggregate Regional Unemployment in Peripheral Regions, 1973-1979

	1973		1979		1973-79	
	UNEMPLOYED (000's)	% OF TOTAL	UNEMPLOYED (000's)	% OF TOTAL	CHANGE (000's)	CHANGE (%)
Peripheral Regions:						
Italian (16)	546	55.8	791	44.2	+245	+44.9
French (9)	170	17.4	457	25.5	+287	+168.8
Northern (6*)	263	26.9	541	30.2	+278	+105.7
Total Peripheral Regions (31)	979	100.0	1,789	100.0	+810	+82.7

Based on: LFS data from Eurostat

\* Includes single value for Denmark



Table 4.39 Aggregate Regional Unemployment, By Urban Category, 1973-1979

	1973		1979		1973-79	
	UNEMPLOYED (000's)	% OF TOTAL	UNEMPLOYED (000's)	% OF TOTAL	CHANGE (000's)	CHANGE (%)
Highly Urbanised Regions (21)	641	32.6	1,464	32.6	+823	+128
Urbanised Regions (23)	641	32.6	1,253	27.9	+612	+95
Less Urbanised Regions (32*)	447	24.2	1,261	28.1	+784	+175
Rural Regions (29)	209	10.6	505	11.3	+296	+142
Total EEC9 Regions (105)	1,968	100.0	4,484	100.0	+2,516	+128

Based on: LFS data from Eurostat

\* Includes single value for Denmark

Table 4.40 Regional Youth Unemployment Rates, 1975-1979

	REGIONAL MEDIAN			REGIONAL MEAN		
	CHANGE RATE			CHANGE RATE		
	1975 %	1979 %	1975-79 %	1975 %	1979 %	1975-79 %
Central Regions (35)	5.6	5.6	+15.8	6.0	7.1	+17.3
Intermediate Regions (39)	6.8	6.4	+4.9	7.0	8.4	+27.1
Peripheral Regions (28*)	10.5	15.0	+49.1	12.9	19.9	+53.8
Total EEC9 Regions (102)	6.9	9.2	+25.4	8.3	11.1	+31.1

Based on: LFS data from Eurostat

\* Ireland, Provence-Alpes-Cote d'Azur - Corse, Denmark: data not available

N.B. Change rates are means and medians of each locational group's whole set of regional change rates, not values calculated by crude division of the 1979 by 1975 mean or median values shown.

Table 4.41 Regional Youth Unemployment Rates in Peripheral Regions, 1975-1979

	REGIONAL MEDIAN			REGIONAL MEAN		
	1975 %	1979 %	CHANGE 1975-79 %	1975 %	1979 %	CHANGE 1975-79
Peripheral Regions:						
Italian (16)	18.2	26.0	49.2	15.5	24.8	57.7
French (8)	9.1	14.2	56.9	9.3	15.0	70.1
Northern (4)	9.5	10.0	3.0	10.0	10.5	5.8
Total Peripheral Regions (28*)	10.5	15.0	49.1	12.9	19.9	53.8

Based on: LFS data from Eurostat

\* Ireland, Provence-Alpes - Cote d'Azur-Corse, Denmark: data not available

N.B. Change rates are means and medians of each locational group's whole set of regional change rates, not values calculated by crude division of the 1979 by 1975 mean or median values shown.

Table 4.42 Regional Youth Unemployment Rates, by Urban Category, 1975-1979

	REGIONAL MEDIAN		REGIONAL MEAN	
	1975 %	1979 %	1975 %	1979 %
			CHANGE RATE 1975-79 %	CHANGE RATE 1975-79 %
Highly Urbanised Regions (20*)	6.0	6.2	+15.8	+19.1
Urbanised Regions (23)	8.2	10.8	+32.5	+39.6
Less Urbanised Regions (30**)	6.7	10.5	+28.3	+30.3
Rural Regions (29)	7.5	7.2	+46.0	+33.4
Total EEC9 Regions (102)	6.9	9.2	+25.4	+31.1

Based on: LFS data from Eurostat

\* Provence-Alpes-Cote d'Azur - Corse: data not available

\*\*Ireland, Denmark: data not available

N.B. Change rates are means and medians of each locational group's whole set of regional change rates, not values calculated by crude division of the 1979 by 1975 mean or median values shown.

## Unemployment rate 1979

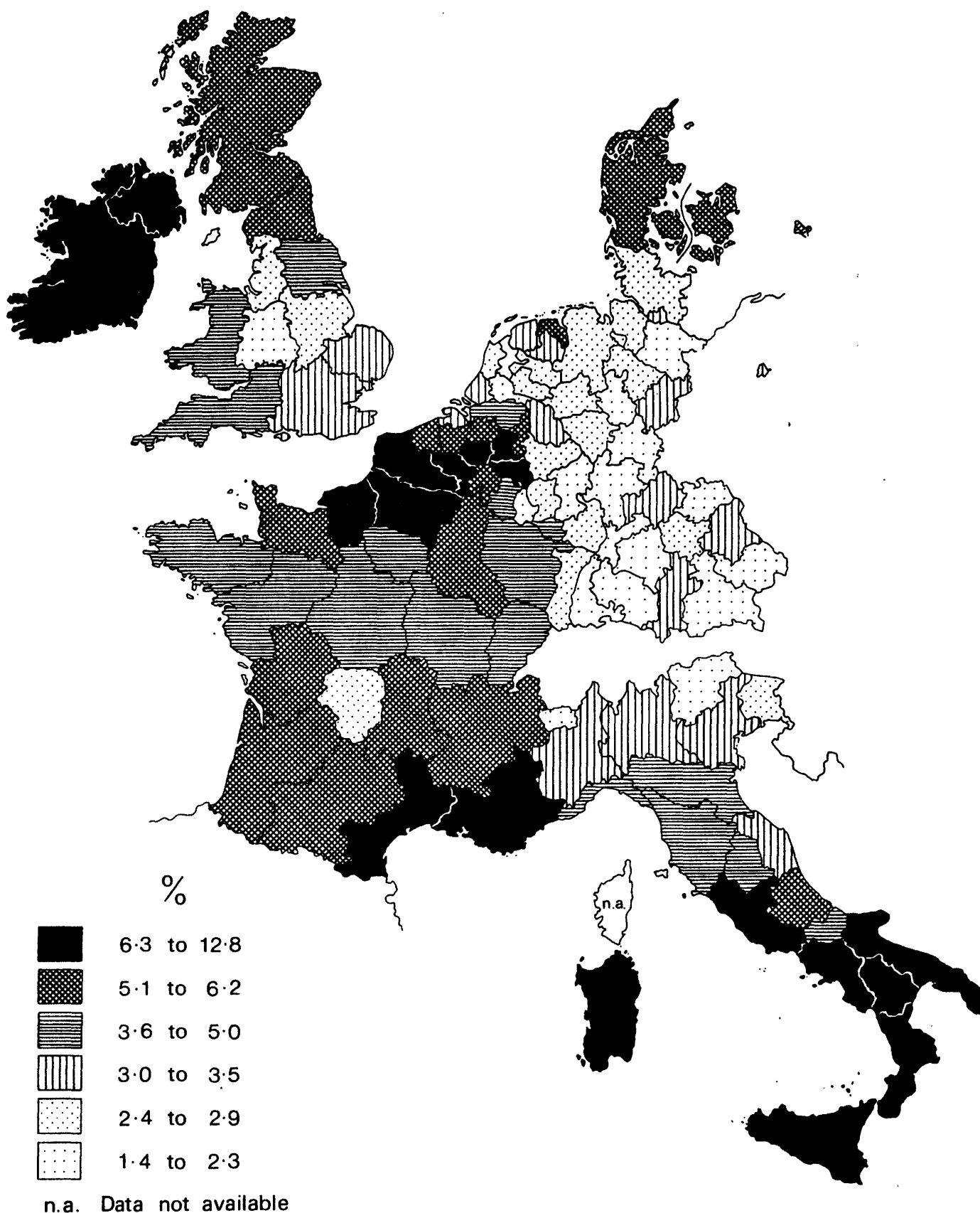


Figure 4.17

# Percentage unemployment change, 1973-79

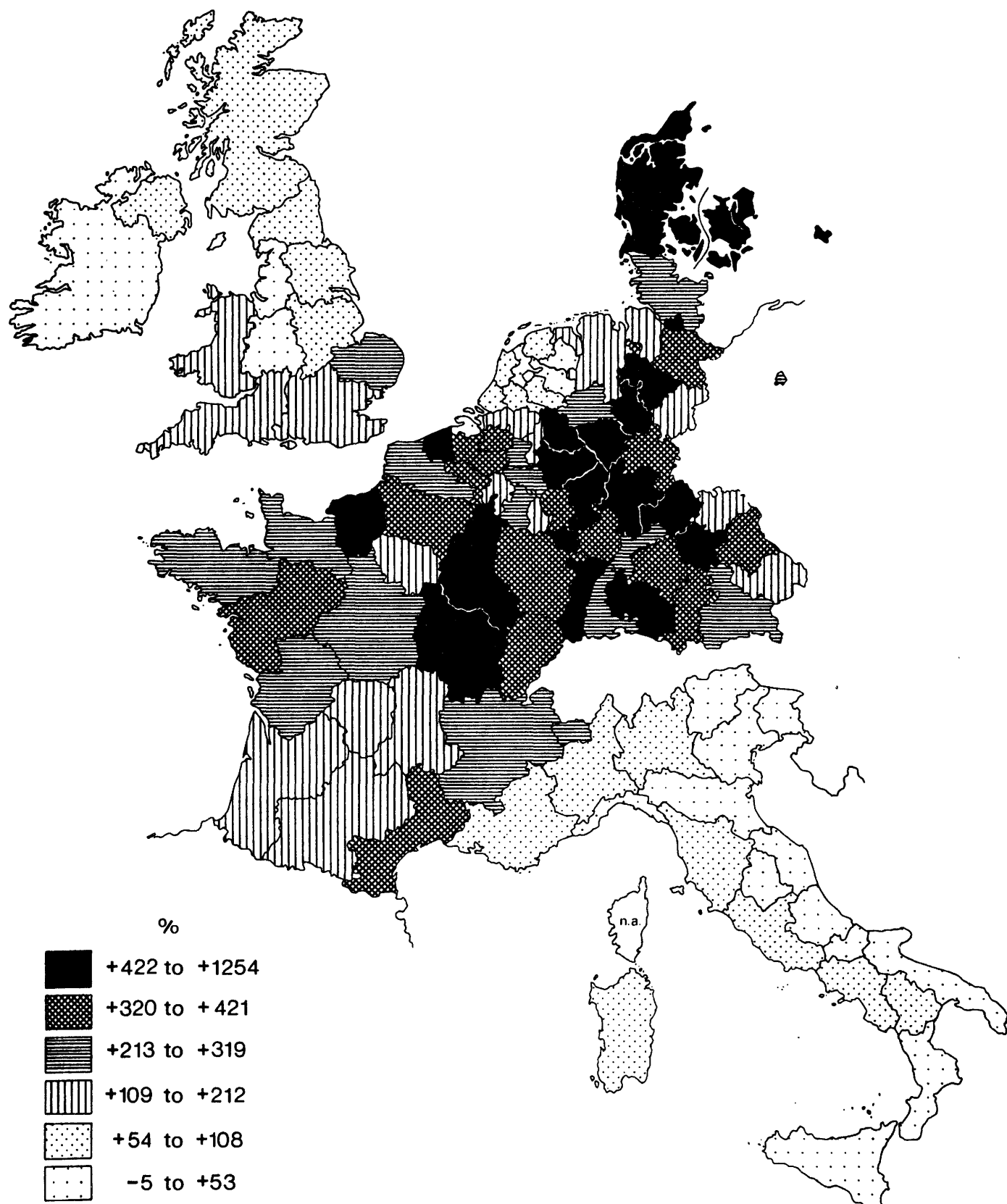


Figure 4.18

#### 4.10 Female Activity Rate

The last variable to be analysed as a labour market characteristic closely related to regional economic performance and evolution is the female activity rate. This is defined as the proportion of the female population of working age who are in paid employment, or are unemployed but actively seeking paid employment. Its adoption reflects its role in some countries as an alternative yet related measure to unemployment of regional variations in pressure of demand for labour. In the United Kingdom, for example, industrial dispersal to government-assisted peripheral regions and rural areas has been accompanied - some would argue, channelled (Massey, 1979) - by an increased employment of female labour and hence a rising female activity rate (Keeble, 1980a). However, national socio-cultural differences are also of great importance in influencing the female activity rate within the Community.

The female activity rates recorded in Table 4.43 and plotted in Figure 4.21 reveal that the peripheral regions of the Community do exhibit below-average values. However, the average differences between central and peripheral regions are not as marked as with unemployment rates, while the highest female activity rates are in fact to be found in intermediate regions, one of the very few variables where this applies. Inspection of Figure 4.21 strongly suggests that national socio-cultural factors do play an important part in determining the relatively low female activity rates recorded by Belgium and the Netherlands, while these factors interact with low pressure of demand for labour in the Italian and Irish cases.

At the same time, Table 4.43 and Figure 4.22 do show that peripheral region female activity rates are rising faster than those for central or intermediate regions, so that in aggregate terms, they are converging towards the Community average. Especially rapid increases in female activity rates were recorded between 1973 and 1979 by the Italian and French peripheral regions (Table 4.44). However, an exception here was the Northern periphery, which recorded both an already-higher female activity rate in 1973 than those for central or intermediate regions (with the notable exception of Ireland - Figure 4.21), and a lower rate of growth in female participation

thereafter. Relatively rapid growth of the female labour force in the French and Italian periphery might appear to indicate an improved regional economic performance there. In fact, however, above-average increases in female activity rates in these regions have been accompanied by sharply-rising rates of female unemployment, since participation is measured as including unemployed workers (Commission of the European Communities, 1981, 33-35). Moreover there is evidence that in a number of peripheral regions, notably in France and parts of the United Kingdom (Wales and Northern Ireland: see Figure 4.13), rising female activity rates are associated with the 'filtering-down' of older, traditional labour-intensive manufacturing industries, whose long term prospects may be in question (see section 4.7). This thesis is certainly strongly supported by the results of the present study, with its identification of a clear coincidence in the case of the French periphery between rapid growth of female activity rates (Table 4.44) and a massive positive differential employment shift in NACE 3 Other Manufacturing industry such as textiles and clothing (Table 4.20).

Perhaps surprisingly, urban-rural differences in female activity rates are shown by Table 4.45 to be even smaller than centre-periphery differences, and no clear or consistent patterns of change emerge.



Table 4.43 Regional Female Activity Rates, 1973-1979

	REGIONAL MEDIAN			REGIONAL MEAN		
	1973 %	1979 %	CHANGE IN RATE, 1973-79 %	1973 %	1979 %	CHANGE IN RATE, 1973-79 %
Central Regions (35)	30.9	32.8	4.0	31.3	33.0	7.1
Intermediate Regions (39)	36.2	36.9	9.1	33.6	36.2	8.8
Peripheral Regions (31*)	26.4	29.5	15.1	27.7	31.8	17.5
Total EEC9 Regions (105)	33.0	34.1	10.0	31.1	33.8	10.8

Based on: LFS data from Eurostat

\* Includes single value for Denmark

N.B. Change rates are means and medians of each locational group's whole set of regional change rates, not values calculated by crude division of the 1979 by 1973 mean or median values shown.



Table 4.45 Regional Female Activity Rates, by Urban Category, 1973-1979

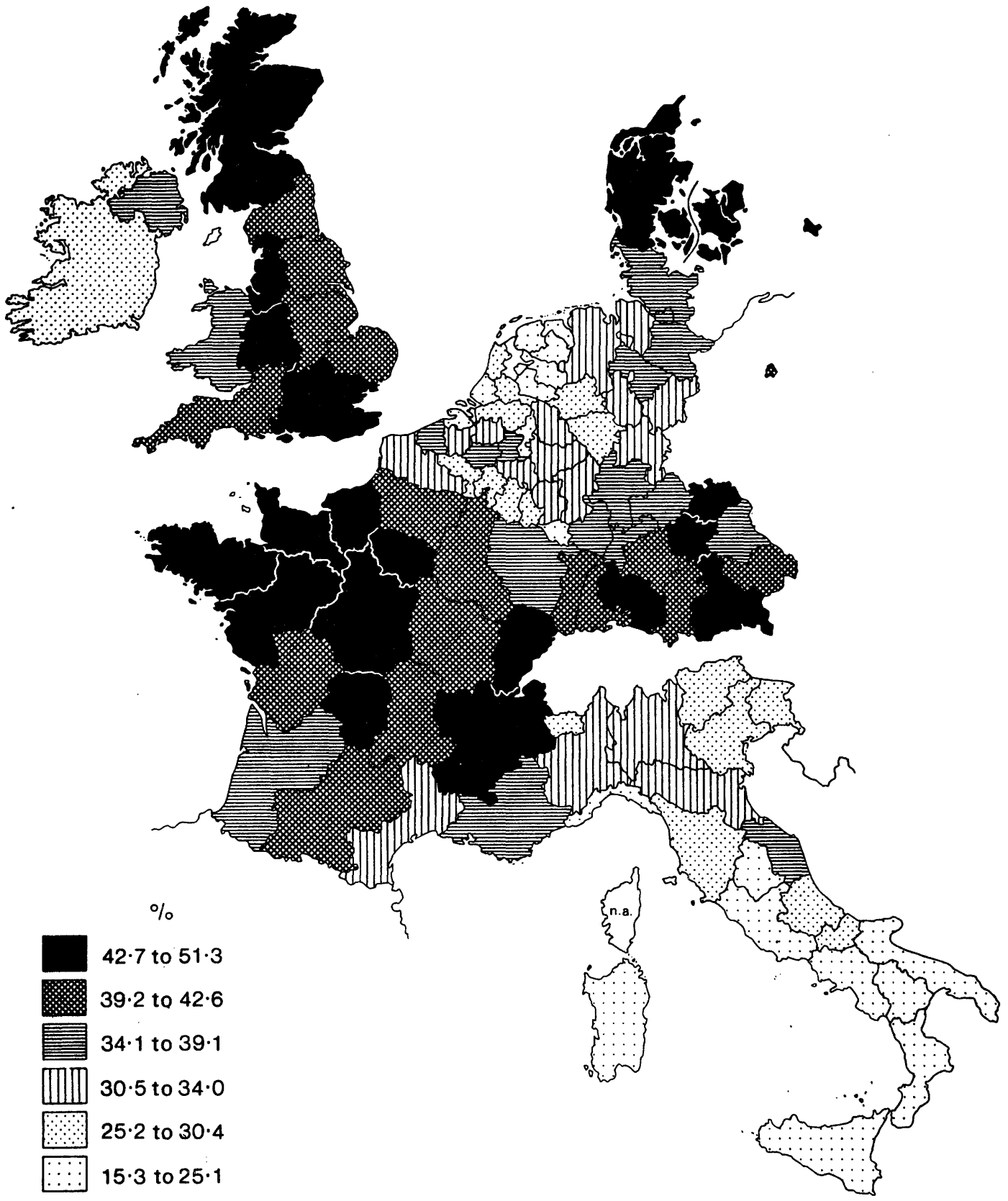
	REGIONAL MEDIAN		REGIONAL MEAN		CHANGE IN RATE, 1973-79 %
	1973 %	1979 %	1973 %	1979 %	
Highly Urbanised Regions (21)	32.6	33.9	32.7	34.7	7.9
Urbanised Regions (23)	33.5	33.7	29.9	33.3	14.1
Less Urbanised Regions (32*)	33.1	34.2	31.2	34.2	10.8
Rural Regions (29)	31.7	34.1	30.7	33.3	10.2
Total EEC9 Regions (105)	33.0	34.1	31.1	33.8	10.8

Based on: LFS data from Eurostat

\* Includes single value for Denmark

N.B. Change rates are means and medians of each locational group's whole set of regional change rates, not values calculated by crude division of the 1979 by 1973 mean or median values shown.

# Female activity rate, 1979



- %
- 42·7 to 51·3
  - ▣ 39·2 to 42·6
  - ▣ 34·1 to 39·1
  - ▣ 30·5 to 34·0
  - ▣ 25·2 to 30·4
  - ▣ 15·3 to 25·1
- n.a. Data not available

Figure 4.21

# Percentage change in female activity rate, 1973-79

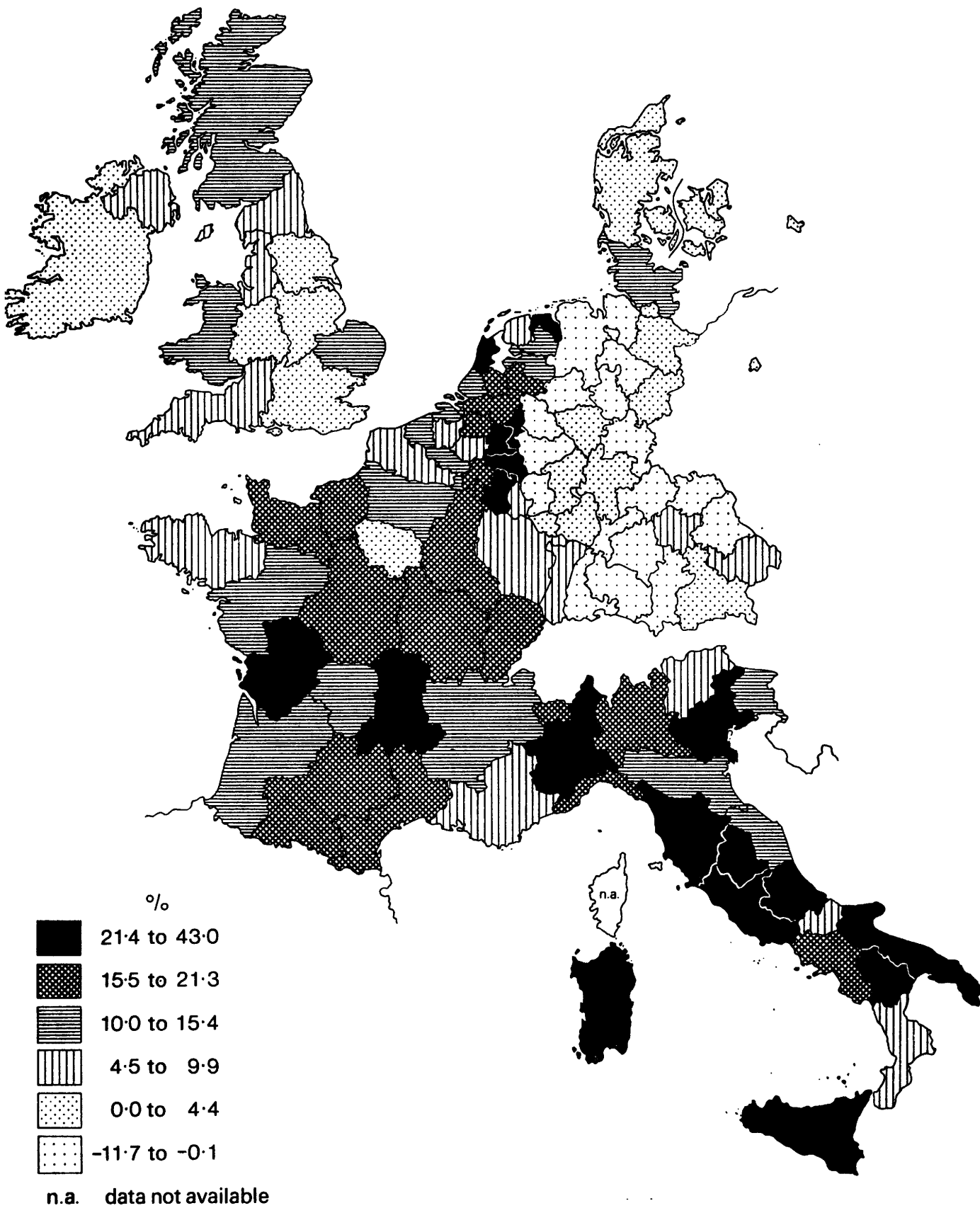


Figure 4.22

#### 4.11 Regression Analyses

As specified in the Programme of Work, the regional grouping analyses discussed in the preceding section have been accompanied by related statistical hypothesis testing using simple and multiple regression techniques. Regression analysis is a standard statistical technique which has been widely used in regional economic research for estimating the relative strength and direction of the relationship between two or more variables, measured over a set of regions (see, for example, Keeble, 1976 chapter 5 and 1980a: Vanhove and Klaassen, 1980, 76-77, 99-100). The structure of the simple general linear regression model,

$$Y = a + bX + e$$

is such that Y, the dependent variable, is conceptualised as being influenced in a one-way dependency relationship by one or more separate independent variables, X.

The logic behind these additional regression analyses is two-fold. Firstly, estimation of coefficients of determination ( $r^2$ ) and significance levels of regression coefficients provides additional information as to the relative strength of different previously observed relationships between regional accessibility as measured by potential and measures of regional economic structure, performance and evolution. Specifically, this permits identification of those economic variables which are associated most strongly with regional centrality or peripherality differences, as part of a possible interrelated syndrome of peripherality-determined economic disadvantage. Secondly, multiple regression permits the incorporation of other independent variables in addition to EEC potential, as 'control' variables to allow for other possible hypothesised locational influences on regional economic structure, performance and evolution. Three such control variables, as proposed in the Second Interim Report of the project, have been measured and investigated.

(i) Simple Regression

Simple regression analysis between pairs of dependent and independent variables has been used to investigate most of the hypotheses listed in the Second Interim Report of the project (1980, 18-26). As Table 4.46 indicates, this investigation involved some 47 separate analyses, and was carried out separately with two alternative independent variables, 1977 EEC economic potential values (Table 3.5) and 1970 National economic potential values. The latter were used for comparison with the parallel investigation of EEC-wide potential values, as the most logical measure of the hypothesised impact on regional economic change of relative location within a particular member country in terms of national, not Community-wide, relative accessibility, centrality and peripherality. This national potential analysis thus investigates the general hypothesis that specifically intra-national accessibility and relative regional location may be a more significant influence on processes of regional economic change in most EEC countries than location relative to the Community's territory as a whole. This hypothesis is suggested by the undoubted fact that much EEC economic activity is primarily oriented to national rather than Community-wide markets and suppliers, and that cultural and other barriers still inhibit trade between member countries.

Measurement of intra-national relative regional accessibility was carried out by running separate potential analyses for each member country considered in isolation. The computed potentials are thus based solely on regional GDP values for the particular country concerned, omitting values for the remainder of the Community. Since no problem of EEC enlargement arises in this case, as with the choice of the year for EEC-wide potentials, it was decided to base the national potentials on 1970 GDP data, as a measurement of regional accessibility at the beginning of the 1970's period under study. The calculated potential values are listed at the end of Appendix C. For incorporation in the regression analyses, however, these 'raw' values were expressed as deviations from each country's mean potential value (mean = 1.00), in order to standardise for different average levels of potential in different countries. Single-region countries (Ireland, Luxembourg, Denmark) were included with values of 1.00. The resultant standardised national potentials are mapped in Figure 4.23. The relative 'peaking'

## National-scale regional economic potentials, 1970

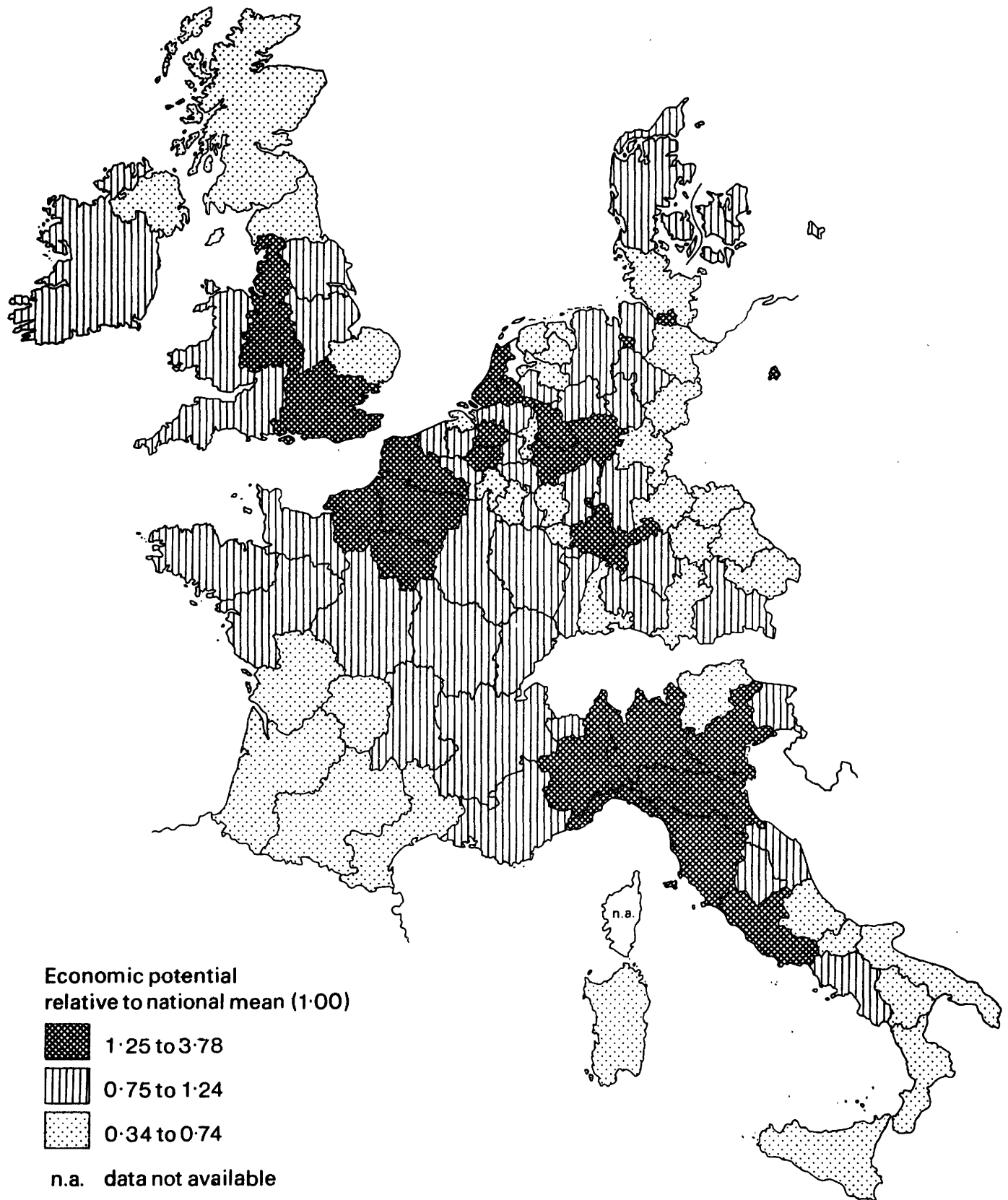


Figure 4.23



of above-average national potential in only a few regions of France (4 out of 21) compared with the more evenly distributed, bimodal pattern recorded by Italy (7 above-average, 8 below-average) is noteworthy.

The most important finding of the simple regression analyses was that relative EEC-wide regional location and accessibility as measured by EEC potentials is consistently and very significantly related to a wide range of indicators of regional economic structure, prosperity and evolution. In the case of no less than 33 of the 47 analyses, EEC potential was very or highly significantly related statistically to the dependent variable under investigation (Table 4.46). A further 4 variables yielded significant but lower-order relationships. In contrast, national potential was associated in this way and at this level far less frequently. Only 15 of the equations yielded very or highly significant relationships, and in all but one case,  $r^2$  values were substantially lower. These findings clearly support the contention that relative regional location and accessibility within the Community considered as an entity does exert a powerful influence on the nature and development of regional economies. The influence of relative location within member countries on regional economic patterns, however, is either weaker or more complex than that implied by the potential hypothesis of regular centre-intermediate-periphery gradients in regional variables.

Comparison of the EEC potential equations listed in Table 4.46 yields further findings on the nature of the regional characteristics most associated with and related to variations in EEC-wide accessibility. Selection of the 17 equations recording highly significant  $r^2$  values of at least 0.20 or above focusses particular attention on three groups of regional characteristics. The peripherality 'syndrome' focusses on low regional output (GDP) per head, unfavourable structural indices especially related to agriculture and service industry, and high unemployment rates. Peripherality is highly associated with low levels of output per head of the population and per employee, as well as with low rates of actual GDP growth during the early 1970's. It is closely related to regional economic structures which are highly specialized, dependent, on agriculture but relatively lacking in producer services. Indeed, peripheral regions are clearly identified as having both a service structure which is heavily biased towards consumer services rather than producer services (services structure indices), and an

overall economic structure which is unfavourable for employment growth as measured by the 1973-79 structural shift. Finally, the peripherality 'syndrome' is characterised by historically high aggregate and youth unemployment rates. However, this is qualified by a markedly lower recent peripheral rate of growth of aggregate unemployment rates. On all counts, and by definition, central regions exhibit precisely the opposite characteristics.

Secondary characteristics which are still nonetheless highly significantly related to peripherality ( $r^2 = 0.11$  to  $0.19$ ) include above-average growth in population and consumer service employment, a positive differential employment shift 1973-79, below-average specialisation on manufacturing, an unfavourable manufacturing structure for long-term growth, lower than average increase in unemployment, and above-average growth in female activity rates. Together, these primary and secondary attributes of regional peripherality within the Community combine to present a general picture, with certain limited exceptions, of considerable relative economic disadvantage compared with intermediate and, especially, central regions.

This said, it is also true that within a framework of continuing marked centre-periphery economic differences, the detailed Community-wide pattern of regional economic structure, output, unemployment and so on appears to be becoming more complex. As a result, the strength of certain historic simple linear 'gradient' relationships between relative regional location, on the one hand, and measures of economic performance and disadvantage, on the other, is weakening. This is shown by comparison of regression results of the same variable for different years, and by regression results for patterns of change, in Table 4.46. Declining  $r^2$  values of a simple linear relationship over time with EEC economic potential are recorded for percentage change in GDP, GDP per capita, percentage change in GDP per capita, GDP per employee, percentage of total employment in manufacturing and services, the services structure index, unemployment rate, youth unemployment rate, and female activity rate. However, the strength of the marked simple linear relationship between potential and percentage of total employment in agriculture remained unaltered, while those recorded for percentage of total employment in producer services and the manufacturing structure index actually increased. The latter result suggests that the problem of unfavourable manufacturing structures in peripheral

regions should probably be regarded as a primary rather than secondary component of the peripherality disadvantage syndrome. Moreover, it must be stressed that the main reason for the more common reduction in strength of simple linear relationships is almost certainly not any marked diminution in centre-periphery disparities over time, but rather the growth of intermediate region values relative to both central and peripheral regions. This trend, observable in a number of the tables and figures presented earlier, is of course bound to reduce overall  $r^2$  values which are based on a best-fit simple regression with a gradient of potential observations. The overall evolution of the distribution of economic activity within the Community, then, though reducing simple relationships between distance from its 'golden triangle' and regional performance because of above-average intermediate region growth, is almost certainly not diminishing - and indeed in many cases is actually intensifying - a variety of centre-periphery economic disparities.

(ii) Multiple Regression

The extension of regression testing to the multiple regression case involved the definition and measurement of two further independent locational variables, in addition to the EEC and national potential measures of regional accessibility. These were an index of the level of urbanisation of each region and an index of national government regional policy assistance to economically disadvantaged regions. The first of these, included as a natural extension of earlier arguments and findings on the role of secondary urban-rural differences in influencing regional economic evolution, was initially measured in two alternative ways, by 1971 regional population density (resident population per square kilometre) and the proportion of 1971 regional population actually residing in logically-defined urban agglomerations of 100 thousand people or more (see Appendix D). However, test analyses with a number of different dependent variables using these as alternatives revealed that the latter was more frequently and strongly related to the variables concerned, while more importantly, it would seem a significantly more satisfactory measure conceptually with regard to differences in the urban character of different regions. The urban agglomeration index was therefore used in all the multiple regression analyses reported in this section.

The selection and measurement of any kind of consistent and meaningful index of the possible EEC-wide regional impact of member country regional policies is exceedingly difficult if not impossible. Indeed, the voluminous literature on regional policy evaluation in member countries such as the United Kingdom (e.g. Marquand, 1980) indicates the enormous difficulty and controversy which attaches to identifying such impact even in the case of a single country, let alone across the Nine. However, rather than abandon any attempt at inclusion of such a measure, as proposed in the Second Interim Report (1980, 28), given its possible significance for trends in centre-periphery disparities within the Community, an index of the probable intensity of member country policies with regard to economically-disadvantaged regions was devised, based on EEC Regional Development Fund payments. The logic of this apparently paradoxical approach is based on the argument that Community ERDF regional allocations since 1975 have in practice been almost totally determined by national government judgments and policies on regional aid. Thus national quota allocations would seem to reflect a national government and Commission consensus on the relative intensity of the regional problem and of existing regional policies in different member countries, while within member countries, the Commission's Fourth Annual Report (1979, 23) on the operation of the Fund expressly states that

"regions and areas eligible for Fund assistance shall be limited to those areas aided by Member States under their own systems of regional aid. To give maximum impact to Fund assistance, however, priority must be given to investments located in national priority areas."

After reviewing the actual grants made in 1978, the Report then concludes that "the Commission considers that attempts to concentrate Fund assistance on priority regions as defined by national systems of aid has in general had satisfactory results" (present author's underlining). In short, it can be argued that the regional incidence of European Regional Development Fund payments during the later 1970's directly reflected and paralleled the intensity of national member country aid to problem regions, and that these therefore provide a comparable and consistent surrogate index of variations in such national aid across the regions of the Community. The stress on national aid, notwithstanding the existence of the Community's Fund and policy, reflects the much larger sums spent on regional policy by national governments and problems

# European Regional Development Fund payments 1975-78

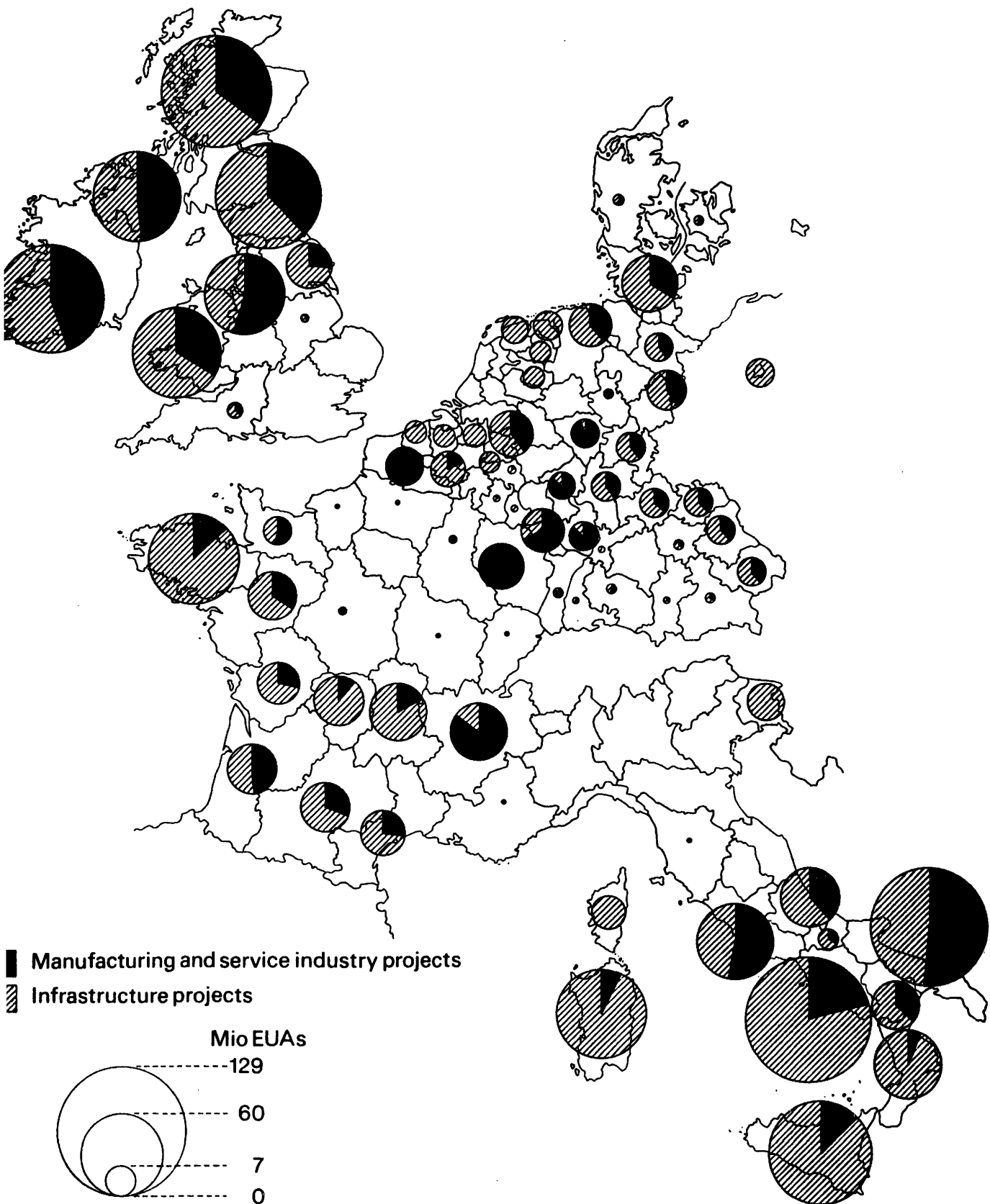


Figure 4.24

over the 'additionality' of Community aid in certain countries. The regional policy index was therefore measured as ERDF payments in million EUAs to each region of the Community during the four years 1975-78 (Figure 4.24), expressed as a percentage of 1977 regional Gross Domestic Product. While this ignores any negative effects of member country regional policies on relatively advantaged areas, through for example the UK IDC or French Agreement control systems, it is widely argued that the latter have operated only weakly under the conditions of recession experienced by member countries since 1973. Nonetheless, for this and other reasons, the policy index must be regarded as only a very crude and limited surrogate measure of possible regional policy impacts during the study period.

The main results of 28 multiple regression analyses of selected dependent variables are recorded in Table 4.47. In each case, the analysis incorporated the main independent locational variable hypothesised in this study as influencing regional economic structure and change, namely Community-wide accessibility as measured by 1977 economic potential, together with the three 'control' independent variables listed. The table records which, if any, of these variables were identified by stepwise regression as being significantly (0.05 level) related to the dependent variable concerned, allowing for the presence in the equation of other selected variables and their influence on the overall result. It also records the ranked significance of each included variable in terms of its contribution to the overall fit, and the direction of the relationship. It should be noted that only one equation (% change in producer services) failed to yield a significant overall fit between independent and dependent variables, while the equations were invariably technically satisfactory on other grounds. Thus multicollinearity problems did not arise, the highest inter-correlation between independent variables being only 0.611 (EEC and National potentials), below the level generally regarded as posing problems in this respect.

The results provide striking evidence of the much greater importance of EEC-wide accessibility as measured by potential in 'explaining' statistically regional economic variations, compared with the other three locational measures. As Table 4.48 shows, EEC potential was selected in far more equations than was any other variable as being the most strongly associated locational measure. In the majority of the 28

analyses, EEC potential 'explained' statistically a much greater percentage of the total variation in the dependent variable than did the other independent variables included. These findings provide yet further support for the view that Community-wide centre-periphery differences in accessibility are of greater significance than other locational factors in influencing regional economic structures, performance and prosperity. The national potential measure, in contrast, was never selected as of leading importance, although it was identified as the second or third most related measure more frequently than either of the other two 'control' variables.

Table 4.48 Relative Rankings of Independent Variables

Number of Times Independent Variable  
Included in the Selected Equations

Rank	EEC Economic Potential	National Economic Potential	Regional Policy Index	Urbanisation Index
1	18	0	5	4
2	5	9	4	6
3	0	8	3	4
4	0	2	2	2

The urbanisation index was identified in four analyses as being the independent variable most strongly associated with the regional variable concerned, ranking second in a further six analyses. This again supports the view that urbanisation variations now play an important secondary role in influencing regional economic change within the Community. Interestingly, the variables which were more strongly related to this variable than to EEC potential were (negatively) percentage change in GDP 1973-77, and (positively) consumer, producer and total services as a percentage of regional employment. It ranked second, in each case to EEC potential, with regard to population losses, favourable structural shifts, agriculture as a percentage of total employ-

ment, and favourable manufacturing and services structures.

Lastly, it must be stressed that the apparently significant relationships between the regional policy index and various dependent variables do not in fact provide any general support for the view that member government policies have exerted a measurable impact in simple spatial terms on recent regional economic change. The reason for this is simply that in each case of its identification as the most significantly associated variable, and in nearly all those where it ranked second, it is clear that the actual relationship between the policy index and the dependent variable concerned is the other way round. In other words, the regional policy index is strongly associated with certain regional economic indicators because these indicators - notably high total and youth unemployment rates, losses of manufacturing employment, deteriorating manufacturing structures, and low rates of GDP growth - have understandably attracted regional policy aid to the regions characterised by them in an attempt to ameliorate their economic problems. The only possible exception to this general conclusion is the finding of a secondary and positive relationship with the growth of consumer services employment, a significant proportion of which is of course public sector employment and hence capable of being directly influenced by government policies. In general, however, the comments concerning the inadequacy of the regional policy index made earlier should be recalled to mind.

While time and space prevent detailed evaluation here of the various, and interesting, results of particular multiple regression equations, the overall conclusion noted above remains. Significant statistical relationships between the measure of Community-wide accessibility calculated in this study and a wide range of regional economic indicators, while controlling for other identifiable locational influences, support the view that relative location is a powerful influence on the nature and evolution of regional economies within the Community.



Table 4.46 Regression Results: Simple Linear Regression, EEC and National Economic Potential

DEPENDENT VARIABLE	INDEPENDENT VARIABLES			EEC ECONOMIC POTENTIAL <sup>1</sup>			NATIONAL ECONOMIC POTENTIAL <sup>2</sup>		
	r <sup>2</sup>	SIGNIFI- CANCE OF F	SLOPE COEFFI- CIENT (b)	r <sup>2</sup>	SIGNIFI- CANCE OF F	SLOPE COEFFI- CIENT (b)	r <sup>2</sup>	SIGNIFI- CANCE OF F	SLOPE COEFFI- CIENT (b)
% Change GDP, 1970-73	0.22815	***	0.00418	0.01193	NS	-3.06030			
% Change GDP, 1973-77	0.02260	NS	0.00179	0.02119	NS	-5.54374			
GDP per Capita, 1970	0.50328	***	0.00028	0.27072	***	0.66897			
GDP per Capita, 1973	0.52283	***	0.00048	0.14955	***	0.82687			
GDP per Capita, 1977	0.45330	***	0.00086	0.08759	**	1.21269			
% Change in GDP per Capita, 1970-73	0.16758	***	0.00385	0.02443	NS	-4.71005			
% Change in GDP per Capita, 1973-77	0.05395	**	0.00267	0.01138	NS	-3.92222			
GDP per Employee, 1970	0.55440	***	0.00590	0.16400	***	1.02661			
GDP per Employee, 1973	0.51345	***	0.00104	0.12163	***	1.62237			
GDP per Employee, 1977	0.34760	***	0.00200	0.03484	*	2.02650			
% Change in GDP per Employee, 1970-73	0.03631	*	0.00210	0.00046	NS	-0.75850			
% Change in GDP per Employee, 1973-77	0.08279	**	0.00369	0.01545	NS	-5.09789			
% Change in Population, 1973-79	0.13788	***	-0.00072	0.03319	*	-1.12835			

I N D E P E N D E N T   V A R I A B L E S

Table 4.46 , continued.

DEPENDENT VARIABLE	EEC ECONOMIC POTENTIAL <sup>1</sup>		NATIONAL ECONOMIC POTENTIAL <sup>2</sup>		
	r <sup>2</sup>	SIGNIFI- CANCE OF F	r <sup>2</sup>	SIGNIFI- CANCE OF F	
			SLOPE COEFFI- CIENT (b)	SLOPE COEFFI- CIENT (b)	
% Change in Total Employment, 1973-79	0.08873	**	-0.00137	0.00115    NS	-0.49873
Structural Shift as % of Total Employment, 1973	0.25213	***	0.00072	0.14297    ***	1.73764
Differential Shift as % of Total Employment, 1973	0.14228	***	-0.00185	0.01052    NS	-1.61269
% of Total Employment in Agriculture, 1973	0.40369	***	-0.00330	0.18945    ***	-7.23572
% of Total Employment in Manufacturing, 1973	0.17702	***	0.00217	0.07149    **	4.41815
% of Total Employment in All Services, 1973	0.08848	**	0.00137	0.09178    ***	4.45398
% of Total Employment in Producer Service, 1973	0.00070	NS	-0.00009	0.00868    NS	0.97237
% of Total Employment in Consumer Services, 1973	0.01381	NS	0.00037	0.02632    *	1.64094
% of Total Employment in Agriculture , 1979	0.40572	***	-0.00265	0.18902    ***	-5.78842
% of Total Employment in Manufacturing, 1979	0.16619	***	0.00224	0.04324    *	3.65193

I N D E P E N D E N T   V A R I A B L E S

Table 4.46, continued.

DEPENDENT VARIABLE	EEC ECONOMIC POTENTIAL <sup>1</sup>			NATIONAL ECONOMIC POTENTIAL <sup>2</sup>		
	r <sup>2</sup>	SIGNIFI- CANCE OF F	SLOPE COEFFI- CIENT (b)	r <sup>2</sup>	SIGNIFI- CANCE OF F	SLOPE COEFFI- CIENT (b)
% of Total Employment in All Services, 1979	0.04667	*	0.00100	0.07550	**	4.06181
% of Total Employment in Producer Services, 1979	0.24894	***	0.00108	0.19736	***	3.08945
% of Total Employment in Consumer Services, 1979	0.00070	NS	-0.00009	0.00868	NS	0.97237
% Change in Agricultural Employment, 1973-79	0.00032	NS	-0.00030	0.00646	*	4.31463
% Change in Manufacturing Employment, 1973-79	0.00123	NS	0.00034	0.00003	NS	-0.16113
% Change in Service Employment, 1973-79	0.13638	***	-0.00281	0.00905	NS	-2.31951
% Change in Producer Services Employment, 1973-79	0.01069	NS	-0.00120	0.00002	NS	-0.15294
% Change in Consumer Services Employment, 1973-79	0.14535	***	-0.00311	0.01217	NS	-2.87740
Manufacturing Structure Index, 1973	0.15594	***	0.00013	0.04398	*	0.22031
Manufacturing Structure Index, 1979	0.17819	***	0.00016	0.05394	**	0.27421
% Change in Manufacturing Structure Index, 1973-79	0.02356	NS	0.00349	0.00104	NS	2.32542

Table 4.46, continued

DEPENDENT VARIABLE	EEC ECONOMIC POTENTIAL <sup>1</sup>		NATIONAL ECONOMIC POTENTIAL <sup>2</sup>	
	R <sup>2</sup>	SIGNIFI- CANCE OF T	SLOPE COEFFI- CIENT (b)	SIGNIFI- CANCE OF T
Services Structure Index, 1973	0.35040	***	0.00002	***
Services Structure Index, 1979	0.31879	***	0.00003	***
% Change in Services Structure Index, 1973-79	0.01816	NS	0.00130	NS
Unemployment Rate, 1973	0.35104	***	-0.00064	*
Unemployment Rate, 1979	0.11604	***	-0.00047	NS
% Change in Unemployment Rate, 1973-79	0.21881	***	0.06128	NS
% Change in Numbers Unemployed 1973-79	0.14349	***	0.05680	NS
Youth Unemployment Rate, 1975	0.31869	***	-1.92114	*
Youth Unemployment Rate, 1979	0.28986	***	-0.00293	NS

I N D E P E N D E N T   V A R I A B L E S

Table 4.46, continued

DEPENDENT VARIABLE	EEC ECONOMIC POTENTIAL <sup>1</sup>		NATIONAL ECONOMIC POTENTIAL <sup>2</sup>		
	r <sup>2</sup>	SIGNIFI- CANCE OF r	SLOPE COEFFI- CIENT (b)	SIGNIFI- CANCE OF r	SLOPE COEFFI- CIENT (b)
% Change in Youth Unemployment Rate, 1975-79	0.04220	*	-0.00744	NS	11.22194
Female Activity Rate, 1973	0.03680	*	0.00101	*	2.73149
Female Activity Rate, 1979	0.00891	NS	0.00047	*	2.59273
% Change in Female Activity Rate, 1973-79	0.13618	***	-0.00244	**	-1.71770

<sup>1</sup> 1977 EEC economic potential: data as in Table 3.5

<sup>2</sup> 1970 National economic potential: values measured relative to the national mean for each country.

\*\*\* Highly significant (<0.001)

\*\* Very significant (<0.01)

\* Significant (<0.05)

NS Not significant

Table 4.47 Multiple Regression Results: Regional Economic Change and Location Variables

DEPENDENT VARIABLE	SIGNIFICANT INDEPENDENT VARIABLES*				R <sup>2</sup>
	EEC ECONOMIC POTENTIAL	NATIONAL ECONOMIC POTENTIAL	REGIONAL POLICY INDEX	URBANI- SATION INDEX	
% Change in GDP, 1973-77	2+	3-		1-	0.124
GDP per Capita, 1977	1+	3-	2-	4+	0.586
% Change in GDP per Capita, 1973-77	1+	2-			0.153
GDP per Employee, 1970	1+	4-	2-	3+	0.646
GDP per Employee, 1977	1+	2-	4-	3+	0.448
% Change in GDP per Employee, 1973-77	1+	2-			0.227
% Change in Population, 1973-79	1-	3+		2-	0.228
% Change in Total Employment, 1973-79	1-	2+		3-	0.150
Structural Shift as a % of 1973 Total Employment	1+	3-		2+	0.396
Differential Shift as a % of 1973 Total Employment	1-	2+		3-	0.206
Agriculture as a % of 1979 Total Employment	1-	4+	3+	2-	0.526
Manufacturing as a % of 1979 Total Employment	2+		1-		0.268
Services as a % of 1979 Total Employment	2+			1+	0.222

Table 4.47, continued.

DEPENDENT VARIABLE	SIGNIFICANT INDEPENDENT VARIABLES *				R <sup>2</sup>
	EEC ECONOMIC POTENTIAL	NATIONAL ECONOMIC POTENTIAL	REGIONAL POLICY INDEX	URBANI- SATION INDEX	
Producer Services as a % of 1979 Total Employment	2+			1+	0.436
Consumer Services as a % of 1979 Total Employment			2+	1+	0.124
% Change in Manufacturing Employment, 1973-79		1-	1-		0.062
% Change in Services Employment, 1973-79		3+	2+	4-	0.263
% Change in Producer Services Employment, 1973-79					---
% Change in Consumer Services Employment, 1973-79	1-	2+	4+	3-	0.276
Manufacturing Structure Index, 1973	1+	3-		2+	0.237
Manufacturing Structure Index, 1979	1+	3-	4-	2+	0.318
Manufacturing Structure Index Change Rate, 1973-79			1-		0.068
Services Structure Index, 1973	1+	2+	3-		0.474
Services Structure Index, 1979	1+			2+	0.429
Unemployment Rate, 1979			1+		0.336
% Change in Unemployment Rate, 1973-79	1+	2-			0.317

Table 4.47, continued.

DEPENDENT VARIABLE	SIGNIFICANT INDEPENDENT VARIABLES *				R <sup>2</sup>
	EEC ECONOMIC POTENTIAL	NATIONAL ECONOMIC POTENTIAL	REGIONAL POLICY INDEX	URBANI- SATION INDEX	
% Change in Numbers Unemployed, 1973-79	1+	2-	3-		0.254
Youth Unemployment Rate, 1979	2-	3+	1+		0.553
% Change in Female Activity Rate, 1973-79	1-	2+			0.170

\* For a coefficient to be significant at the 5% level, with (4,100) degrees of freedom, F must be greater than approximately 2.47 (see Table J, p. 570 in Blalock H, "Social Statistics", 2nd edition, 1972)

+ = positive relationship  
- = negative relationship

1, 2, 3, 4 = rank order of explanatory power of independent variables.



#### 4.12 Analysis of Variance

An alternative approach to investigating the impact of relative EEC location on regional economic structure and evolution, allowing for or holding constant the effect of other 'control variables' such as level of urbanisation, involved the use of analysis of variance (ANOVA). Two-way analysis of variance is a powerful parametric statistical technique for identifying whether significant differences in mean values of variables measured for different groups (e.g. of central, peripheral and intermediate regions) persist when allowance is made for the impact of another factor or variable expressed in terms of an alternative grouping. In the light of the findings of the previous section, ANOVA tests were therefore carried out on mean differences for EEC central, peripheral and intermediate regions, holding constant the differences for the four-fold urbanization grouping defined in section 4.2, and vice-versa. It should be noted that while analysis of variance is relatively robust and insensitive to problems of violation of most of the technical assumptions on which it is based (Norcliffe, 1977, 159), two-way ANOVA demands that the effects due to the two key hypothesised sources of variation (EEC accessibility, and level of urbanization) are additive and separate, not interactive. An initial test is therefore necessary as to whether significant interaction effects exist between the two sources of variation such that two-way ANOVA cannot be used (Blalock, 1972, 337).

Table 4.49 thus records F values and associated significance levels for two-way ANOVA tests on mean regional differences for 33 economic structure, evolution and performance variables. The first column reveals that in no less than 30 of the 33 tests, no significant interaction effect exists between mean differences for the two regional categories or sources of variation. Analysis of variance is therefore an appropriate framework for identifying significant differences in all these cases. The exceptions are GDP per employee (1973 and 1977) and the services structure index (1979 only), where a slight and only just significant (0.05 level) interaction effect is present. This is itself an interesting minor finding, indicating as it does that when combined, centrality and high levels of urbanization act together to boost values of GDP per employee and producer-consumer services ratios somewhat more than would be expected simply from average differences across the defined groups of regions.

In all other cases, however, no significant interaction effect can be detected, the two locational dimensions acting independently of each other in their impact on values of the variable concerned.

The two other columns of table 4.49 record respectively F values for centre-intermediate-periphery mean differences, holding constant variations between these groups in urbanization categories, and urban-rural mean differences for the four urbanization groups defined earlier, holding constant variations between these groups in EEC relative location categories. These results provide further strong corroboration of the findings of earlier sections. First, no less than 20 of the 30 'valid' analyses identify EEC-wide centre-intermediate-periphery differences which are very or highly significant (0.01 or 0.001 levels), controlling for the impact of differences in urbanization level between the four urbanization groups. A further four analyses recorded significant centre-periphery differences at the 0.05 level, giving a total of 24 out of 30 analyses in which EEC-wide differences in accessibility and relative location are significantly associated with variations in regional economic structure, performance and so on, holding urbanization effects constant. Particularly striking and marked centre-periphery differences are to be found in the case of % changes in GDP 1970-73, GDP per capita, manufacturing as a percentage of regional employment, manufacturing structure indices, the services structure index, youth and total unemployment rates, and changes in unemployment rates and levels, and in female activity rates.

In contrast, and secondly, the last column reveals that when controlled for centre-intermediate-periphery differences, differences between urbanization groups are very or highly significant in only six out of thirty cases, namely % change in GDP 1970-73, manufacturing structure index 1979, services structure index 1973, and structural and differential employment shifts. Altogether, only nine variables record urbanization differences which are significant (0.05 level or more) when controlled for centre-periphery variations. These findings confirm earlier judgements on the role of urban-rural differences as an important but very much secondary influence on regional economic structure and evolution within the Community, with EEC-wide relative accessibility as the dominant influence. Indeed, in only one case, of structural employment shift (albeit measured in both volume and percentage terms), is the F value for urbanization

differences higher than that for centre-periphery variations, suggesting that in this case, urban-rural differences are more striking than those between central, intermediate and peripheral regions. In general, then, the two-way ANOVA results simply provide additional clear support for earlier findings on the relative significance of these two important locational influences on regional economic change.

Table 4.49 Analyses of Variance: Results

VARIABLE	INTERACTION EFFECT		CENTRE-INTERMEDIATE-PERIPHERY DIFFERENCE		URBAN-RURAL DIFFERENCE	
	F	Sig.	F	Sig.	F	Sig.
% Change in GDP, 1970-77	1.66	NS	11.33	***	3.07	*
% Change in GDP, 1970-73	2.10	NS	32.75	***	8.46	***
% Change in GDP, 1973-77	1.65	NS	2.73	NS	1.12	NS
GDP per Capita, 1973	1.84	NS	31.19	***	1.49	NS
GDP per Capita, 1977	1.89	NS	27.61	***	0.97	NS
% Change in GDP per Capita, 1973-77	1.73	NS	4.80	**	1.18	NS
GDP per Employee, 1973	2.78	*	35.80	***	1.46	NS
GDP per Employee, 1977	2.28	*	21.50	***	0.81	NS
Change in GDP per Employee, 1973-77	1.77	NS	10.97	***	0.58	NS
% Change in Total Employment, 1973-79	0.64	NS	2.13	NS	0.38	NS
Manufacturing as a % of 1979 Total Employment	1.71	NS	24.88	***	3.14	*
% Change in Manufacturing Employment, 1973-79	0.60	NS	3.24	*	2.29	NS
Manufacturing Structure Index, 1973	0.60	NS	7.52	***	2.78	*
Manufacturing Structure Index, 1979	0.47	NS	14.16	***	4.21	**

VARIABLE	INTERACTION EFFECT		CENTRE-INTERMEDIATE-PERIPHERY DIFFERENCE		URBAN-RURAL DIFFERENCE	
	F	Sig.	F	Sig.	F	Sig.
Manufacturing Structure Index Change Rate, 1973-79	1.80	NS	5.05	**	0.92	NS
% Change in Services Employment, 1973-79	0.54	NS	4.12	*	1.70	NS
% Change in Consumer Services Employment, 1973-79	0.74	NS	5.95	**	2.11	NS
% Change in Producer Services Employment, 1973-79	0.62	NS	0.72	NS	0.73	NS
Services Structure Index, 1973	1.64	NS	14.76	***	7.59	***
Services Structure Index, 1979	2.67	*	19.84	***	8.75	***
Services Structure Index Change Rate, 1973-79	1.11	NS	4.51	*	1.28	NS
Structural Employment Shift, 1973-79	0.77	NS	0.95	NS	7.26	***
Structural Shift as a % of 1973 Total Employment	1.52	NS	6.66	**	12.13	***
Differential Employment Shift, 1973-79	1.21	NS	5.75	**	5.00	**
Differential Shift as a % of 1973 Total Employment	0.24	NS	2.98	NS	1.28	NS
Unemployment Rate, 1973	1.22	NS	36.74	***	0.60	NS
Unemployment Rate, 1979	1.77	NS	12.70	***	1.21	NS
% Change in Unemployment Rate, 1973-79	1.39	NS	19.66	***	1.92	NS
% Change in Number Unemployed, 1973-79	1.85	NS	14.59	***	2.22	NS

Table 4.49, continued.

VARIABLE	INTERACTION EFFECT		CENTRE-INTERMEDIATE-PERIPHERY DIFFERENCE		URBAN-RURAL DIFFERENCE	
	F	Sig.	F	Sig.	F	Sig.
Youth Unemployment Rate, 1979	2.15	NS	30.13	***	0.24	NS
% Change in Youth Unemployment Rate, 1975-79	1.96	NS	2.68	NS	0.07	NS
Female Activity Rate, 1979	1.01	NS	3.22	*	0.49	NS
% Change in Female Activity Rate, 1973-79	0.84	NS	8.41	***	0.58	NS

\*\*\* Highly Significant ( $\leq 0.001$ )

\*\* Very Significant ( $\leq 0.01$ )

\* Significant ( $\leq 0.05$ )

NS Not Significant



5.

CONCLUSIONS

The Terms of Reference of the project define as its chief aim the investigation of three related questions, namely: Do significant economic differences exist between the central and peripheral regions of the Community? Are these different categories of regions evolving differently over time? And how far may observable differences be explained by, or related to, relative location within the Community?

In the light of these Terms of Reference, the first major conclusion of the study is that central and peripheral regions do indeed differ markedly in their economic structure, performance and evolution during the 1970's.. Structurally, the study has demonstrated striking centre-periphery differences in levels of specialisation on agriculture, manufacturing and service industries, in overall regional orientation to growing or declining industries at the EEC-wide level, in the balance of traditional and technologically-advanced manufacturing industry, and in the relative levels of producer and consumer service activities. In addition, there are major differences in the volume of output (GDP) per head and per employee, and in adult and youth unemployment levels and rates. Moreover, the preceding analyses clearly suggest that in many cases, central and peripheral regional economies are evolving in quite different directions. Thus differences in the structure of both manufacturing (modern : traditional) and service (producer : consumer) industries are widening, not narrowing, over time, while already severe centre-periphery disparities in output per head and youth unemployment rates have intensified, not diminished, during the 1970's. These widening structural differences clearly in turn relate to the major disparities in regional economic performance identified by the study, notably the differential rate of growth of output and economic activity (GDP). The factors underlying marked centre-periphery differences in the growth of overall employment and adult unemployment are however probably more complex, in being related to demographic as well as economic forces.

The many striking centre-periphery differences in regional economic structure, evolution and performance thus identified naturally prompts the third question posed by the Terms of Reference. To what extent are these differences explained by, or related to, relative location within



the Community? Have much greater - and increasing - regional accessibility and related economies of agglomeration as briefly set out in section 4.1 acted directly to boost economic growth, competitiveness and structural adaptation in central areas relative to the periphery? Or are the observed differences the product of other factors which happen by chance to yield a centre-periphery pattern of economic disparities?

Though more contentious, the results of this study suggest several conclusions. First, the variety and extent of the differences seem clearly to rule out the argument that they have developed purely by chance, or by accident, and are not related to systematic forces of some kind, whether national or Community-wide. Secondly, however, the precise nature of the differences also suggests that while specific national factors unrelated to accessibility undoubtedly do influence regional variations, as noted in section 4.1, relative regional accessibility within the EEC as a whole does exert a powerful underlying influence on regional economic development irrespective of nationality. That national factors are important is noted in various sections of the preceding analysis, as for example in the discussion of differences in female activity rates between regions of the United Kingdom, France and Denmark on the one hand, and Italy, Ireland, Belgium and the Netherlands on the other (section 4.10). Centre-periphery differences in regional population and GDP growth (sections 4.3 and 4.4) are also undoubtedly affected by different national trends and performances, the United Kingdom's generally very poor GDP growth rate after 1973 (Figure 4.4) contrasting with the above-average growth achieved by the Danish and, to a lesser extent, French economies, notwithstanding the relative EEC peripherality of major parts of each of these countries.

But this said, the nature of the centre-periphery differences identified by the study strongly supports the view that relative EEC accessibility also influences regional structure, evolution and performance, over and above national factors. Two key pieces of evidence are relevant here. First, it is striking how many of the preceding analyses reveal the existence not just of centre-periphery differences, but of a gradient in regional economic indicators from central, through intermediate, to peripheral regions. Indeed, a gradient pattern is directly linked with accessibility differences, with intermediate regions

recording economic indices between those for high accessibility central and low accessibility peripheral regions, in no less than 74 percent (29 out of 39) of the separate analyses<sup>1</sup> recorded in earlier tables. This gradient relationship is to be found in one form or another in every single variable investigated - population, GDP per capita, regional economic structure, employment shifts, manufacturing and service industry structures, unemployment, and female activity rates: while a direct and statistically very significant linear relationship between relative accessibility values and different economic indicators was of course identified in no less than 33 out of the 47 regression analyses presented in section 4.11. The clear implication of these findings is that relative accessibility influences regional economic structure and performance throughout all parts of the EEC, its central, intermediate and peripheral areas. Centre-periphery economic differences simply represent the extreme effects of the general pervasive impact of variations in relative accessibility upon regional economies throughout the Community.

The second piece of evidence relates to variations within the periphery. It has already been suggested that national factors are clearly involved here, as in the case of GDP growth. Yet again, notwithstanding this, the striking fact is that in the great majority of cases (13 out of 19 separate analyses, or 68%)<sup>2</sup>, all three subgroups of peripheral regions recorded values for different economic indicators which were consistently lower - or in such cases as unemployment consistently higher - than the central region average. In other words, despite national factors, peripherality and poor relative accessibility in very different parts of the European Community is consistently associated with different, and nearly always relatively poorer, economic structures and performance, compared with central regions. Again, this is compelling evidence for the pervasive impact of relative inaccessibility and associated disadvantages on regional economic structure, performance and prosperity.

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<sup>1</sup> The count is based on mean, not median, values for the separate indices recorded in the tables in chapter 4. Values are included only for the earlier of the two years usually recorded, together with rates of subsequent change.

<sup>2</sup> Calculated in the same way as the gradient frequency count: see footnote 1.

If relative Community-wide accessibility is influential notwithstanding national factors, the present study also, and even more clearly, demonstrates the former's importance relative to other possible 'locational' considerations. Thus in simple linear terms, section 4.11 shows that relative regional accessibility at the national, not EEC, scale is associated much less frequently and significantly with regional economic performance than is EEC potential; while multiple regression tests and analyses of variance (section 4.12) clearly suggest that agglomeration diseconomies in more urbanized regions, though significant in certain cases, are also a much less important influence on regional structures and trends. Regional policy effects can only be detected, by inference rather than statistical analysis, with regard to trends in manufacturing industry in parts of the Northern, and perhaps Italian, periphery (sections 4.6 and 4.7).

The general conclusion from all the preceding evidence and analysis must be that the economic advantages conferred on relatively central regions of an integrated trading Community such as the EEC do indeed, as section 4.1 hypothesized, encourage a cumulative concentration there of investment and economic activity, especially of innovative, technologically-advanced and productive activity. The latter is clearly indicated by the increasing relative bias of central region manufacturing to modern NACE 3 industries such as electronics and electrical engineering, aerospace and vehicles, in contrast to the periphery's increasing bias towards older and rapidly declining NACE 4 industries such as textiles, clothing and footwear (section 4.7). It is also indicated by the centre's above-average growth in key producer services, such as banking, finance and insurance (section 4.8), with the clear implication this involves of growing central concentration of financial control and economic decision-making. And these trends are of course set in a context of ever-increasing relative concentration of total economic activity and markedly above-average levels and growth of output per head in the Community's central regions (section 4.4). Even apparently adverse trends, such as a poor differential employment performance (section 4.6) and a steep rise in central region adult, though not youth, unemployment (section 4.9), seem likely to be associated not with central economic decline but with increasing productivity, efficiency and competitiveness (section 4.6). Central region economies thus seem to be adjusting

and evolving in ways which seem likely to permit continuing above-average economic if not employment growth in the 1980's.

In striking contrast, this study's analyses of peripheral region economic structure and development have identified a complex of inter-related economic problems which in combination render the inhabitants and firms of the Community's periphery economically significantly disadvantaged, relative to their counterparts in central regions. Substantially higher aggregate and youth unemployment rates, a growing concentration of unemployed young workers, lower output and regional income per head and per employee, proportionally fewer job opportunities in manufacturing and producer services, with a corresponding greater dependence on agriculture and consumer services, unfavourable and deteriorating manufacturing structures, a general bias towards economic activities which are declining or growing only slowly at the Community level, increasing relative inaccessibility to economic activity because of faster growth in central regions - all these have been clearly identified as highly undesirable components of what the study calls 'the Community's peripherality syndrome' (section 4.11). Even apparent relative improvements in peripheral job opportunities and female activity rates have been related in this study to growth of possibly marginal consumer services as an alternative to even higher unemployment, or to the filtering-down to certain peripheral regions of older, traditional manufacturing industries whose long-term prospects are likely to be poor.

Admittedly, there are important differences within the Community's periphery which policy must recognise. On nearly all counts, the peripheral Italian regions record the worst economic performance, structure and disadvantage. In contrast, Ireland has made considerable strides to improve its manufacturing structure and growth, an achievement which, together with Denmark's exceptional output per head, contributes towards a somewhat better performance for the six northern peripheral regions on certain measures, though not on differential employment shifts. The French peripheral regions tend more often to occupy a middle, average, peripheral position. But all three groups are identified time and again as exhibiting economic indicators which are markedly poorer than the average central region values: and the Northern periphery, notably Scotland and Northern England, shares with parts of the Italian periphery the disadvantage of high levels of urbanization. The latter point

relates of course to the study's finding, for the first time at an EEC-wide level, of a clear urban-rural shift within the Community with regard to economic activity in general (GDP), and manufacturing employment in particular, notwithstanding more favourable - and indeed, increasingly more favourable - manufacturing and service industry structures in the most urbanized regions. This finding on the urban-rural shift however renders central region economic buoyancy, performance and growth even more remarkable, since it is the centre which contains the largest single concentration of the most highly-urbanized regions.

In conclusion, then, the findings of this study provide substantial support for the thesis that notwithstanding the improvements in peripheral region transport links and communications which have taken place in recent years, relative inaccessibility and greater distance costs of all kinds do constitute an underlying determinant of the periphery's poor economic performance. Other factors, and notably differences in national economies unrelated to location, undoubtedly play a part in this. But the frequency and consistency of centre-periphery differences and gradients in regional economic indicators within the Community lead inevitably to the conclusion that accessibility-related comparative advantages and disadvantages do operate to boost investment, innovation and economic growth in central regions but retard it in peripheral regions.

Elaboration of the implications of this conclusion for government regional policies, whether at member state or Community levels, was not one of the specified aims of this study, given limited time and resources and the extent of the analyses required by the questions actually posed in the Terms of Reference. But such elaboration is clearly the next step demanding consideration from policy makers. And while specific policy measures addressed to particular aspects of the peripherality syndrome of economic disadvantage, such as exceptional and rising youth unemployment, or poor and deteriorating manufacturing structures, may well be necessary, the logic of this study focusses attention on the central issue of how resources and instruments might be developed so as to offset the periphery's long-term underlying handicap of marked, and widening, relative inaccessibility.

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APPENDIX A: TERMS OF REFERENCE AND PROGRAMME OF WORK

**Project Title:** THE INFLUENCE OF PERIPHERAL AND CENTRAL  
LOCATIONS ON THE RELATIVE DEVELOPMENT OF  
REGIONS

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**Joint Sponsors:** Commission of the European Communities  
Directorate-General for Regional Policy,  
Brussels  
United Kingdom Department of Industry,  
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**Duration:** March 1979 to June 1981

**Project Office:** Department of Geography  
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1. The research will establish, analyse and attempt to explain recent trends in the levels of economic activity and population within the different regions of the countries of the European Economic Community, in the context of assessing whether there exists a significant tendency towards increasing concentration of people and industry in the more central areas of the Community. Three related questions will thus be investigated, namely: do significant economic differences exist between the central and peripheral regions of the Community; are these different categories of regions evolving differently over time; and how far may observable differences be explained by, or related to, relative location within the Community?
2. Definition of relative 'centrality' or 'peripherality' will be based on nearness to the economic, rather than physical, centre of gravity of the Community, in terms of the 'economic potential' measure used in previous studies. The potential measure may also be used as a general indicator of recent EEC-wide trends in regional GDP, employment and population. The effect on potential values of the possible admission to the Community of Spain, Portugal and Greece may also be assessed.
3. Statistical analysis of recent concentration or dispersion of population, employment and GDP or personal incomes within the Community will include both calculation of general indicators of trends in regional disparity, such as Theil's entropy index and Williamson's  $V_w$  measure, and attempts to estimate the degree to which trends may be related to or explained by relative centrality or peripherality, as defined by potential. The study will look at variations within each group of 'central', 'peripheral' and, possibly, 'intermediate' regions and will seek to disaggregate employment change into primary, manufacturing and service categories. In examining the impact of factors other than location, such as variations in economic structure or levels of urbanisation, the study may investigate particular countries as case studies. This may also involve some analysis at a more detailed subregional level, to assess whether trends and relationships found at the regional scale also hold here.

1. The initial aim of the research will be to identify and evaluate previous published and unpublished work which analyses trends in regional concentration or dispersion of population and economic activity within particular countries of the Community. The emphasis in this desk study will be on relatively recent trends since the mid-1960s, although studies of trends in the 1950s will be of important background relevance. The director of the research project is already fully cognizant of relevant research pertaining to the United Kingdom and the Republic of Ireland.
2. Studies of trends in the other countries of the Community and elsewhere will however be identified in three different ways. First, use will be made of the comprehensive and up to date bibliographies on regional development trends and policies in each country of the Community which have very recently been compiled by workers at the International Institute of Management in Berlin under the editorship of Kevin Allen. The availability of these bibliographies will be of very considerable help to the project. Second, a sub-contract may be placed with library or bibliographic services in certain Community countries, for the specific extraction from library catalogues of appropriate references. Third, the project consultants whose appointment is proposed in section 13 will be asked to produce a list of appropriate references for the countries known to them, while academics in other Community countries with whom the research director has contacts may be approached on an informal basis for suggestions.
3. Once identified, studies which appear from their titles or from recommendation to be of greatest relevance to the project will be located by visits by the research assistant to libraries in particular countries, and if at all possible, xeroxed so that they may be translated into English in Cambridge. Provision is thus made for translation costs in the costing of the project.
4. The more substantive work of the project will involve two types of analysis, the first being concerned with calculation of regional variations within the Community at different dates of economic, population and employment 'potential'. The economic potential concept, used in various previous studies, involves calculation of an index of potential for each region which measures that region's nearness to Community-wide GDP or income, as this varies geographically between different areas. If at all possible, 'nearness' will be measured in terms of actual transport costs between regions and, where appropriate, of tariffs.
5. It may prove of interest to attempt to calculate potential values using GDP and transport cost data both for a recent date and for an earlier year, perhaps in the mid-1960s, although one previous study (Clark, Wilson and Bradley, Regional Studies, 1969) does contain certain estimates for the early-1960s. This would provide a measure of possible changes in

relative accessibility or peripherality over time. Similar temporal comparisons may be attempted using population and employment levels as the 'mass' term in the potential equation, together with road or time distance as the measure of nearness. The effect on potential values in each case of the possible extension of the Community to include Spain, Portugal and Greece may also be assessed, although this depends on data availability.

6. This part of the research will thus permit classification of different regions into such categories as 'central', 'peripheral' and possibly, 'intermediate', in terms of their relative accessibility to economic activity in the nine countries as this is distributed, geographically, throughout the Community. This will provide one basis for the second type of analysis.
7. The second part of the analytical work will involve measurement and evaluation of recent trends in the regional distribution of population and economic activity within the Community considered as a whole, using data made available by the Directorate-General for Regional Policy of the Commission of the European Communities and, where necessary, obtained from government statistical services. The project will compile and analyse as consistent and comparable a regional data set on levels of population, employment, GDP and/or personal incomes as possible, for different years since 1970. Every effort will be made to disaggregate the employment variable in terms of the three sectors of economic activity noted in the terms of reference. In addition, some analysis may be carried out of the data compiled by the FLEUR study for the 1950-60 and 1960-70 periods, and of other regional data for different years in the 1960s if this is available. The advice and guidance of the project consultants will be sought on possible technical or classificatory problems with the national data with which they are familiar.
8. Analysis of the 1970s and earlier data sets will focus on whether or not recent trends support the hypothesis of increasing relative concentration in those regions defined as 'central' within the Community. In assessing this hypothesis - and its obverse, of increasing relative dispersion of economic activity with faster growth in 'peripheral' regions - use may be made of certain analytical techniques. One such is computation of Theil's entropy index, which can be used to describe the relative concentration of, for example, population or GDP at both the 'within-country' and 'between-country' scales, simultaneously. Comparison of the index for different years, but measured over the same set of geographical units, indicates the rate and direction of trends at these different scales towards either concentration in already-large regions or countries, or relative dispersion with faster growth in hitherto small regions.

9. Another technique which may be employed is computation for different years of Williamson's  $V_w$  index of weighted regional per capita income disparities, both within individual countries and within the Community as a whole. This approach provides a summary measure of whether such disparities are increasing or decreasing over time.
10. More explicit evaluation of the relationship between relative location within the Community and regional change may involve three related approaches. First, rates of change of population, employment and GDP in the 1960s and 1970s - together possibly with recent population forecasts for the 1980s - will be analysed with respect to the groups of central, peripheral and intermediate regions defined by the earlier potential analysis. Statistical techniques may be used to estimate whether significant differences exist in rates of change between each group. Variations between regions within each group, and in terms of primary, manufacturing and service employment, will also be examined. Second, regression techniques may be used to estimate the degree to which variations in relative centrality or peripherality, as measured by economic, population or employment potential, are associated with economic differences - economic structure, GDP per head, etc. - between regions and with changes in levels of economic activity and population over time. Third, and in order to investigate the effect of location in relation to other influences on regional economic change, such as variations in economic structure or levels of urbanization, the project may look in more detail at individual countries as case studies, utilizing regression techniques in relation to such other approaches as shift-share analysis. This may also permit some analysis at a subregional scale, to assess whether regional trends and relationships also apply at this more detailed level.



APPENDIX B: DATA SOURCES AND COMPUTINGB.1 Data Sources

While 1973 Labour Force Survey data were taken from Regional Statistics volumes published by Eurostat, much of the project's statistical base takes the form of unpublished GDP and 1979 LFS data<sup>1</sup> kindly made available directly by representatives of the latter organisation, notably Mme. Franchi and M. Langevin. Greek GDP data was provided by Sr. Curzi of the commission, Spanish data by Dr. Bradshaw of Nottingham University, and Portuguese data by Prof. A. Simoes Lopes of the Universidad Tecnica di Lisboa.

The employment, unemployment, population and GDP series for years prior to 1979 have all been adjusted to conform to the latest regional boundary system<sup>2</sup> from the earlier system<sup>3</sup> under which they originally appeared by using updated and adjusted regional population data kindly provided by Eurostat. For 1973, for example, correction factors were calculated by comparing original 1973 population estimates with the 'current' 1973 population figures which have been adjusted by Eurostat to the latest regional boundary definitions. In the vast majority of cases (98 out of 108 regions) this adjustment involved only very slight modification, by a maximum of two percent increase or decrease in the original data. Values for seventy-nine regions were effectively unchanged. Only in the case of a few north German regions notably Weser-Ems, Hannover and Luneburg, were substantial adjustments, of up to 30 percent, necessary because of fairly large boundary changes after 1973. In addition, disaggregated 1973 LFS employment data for the 11 NACE economic activity sectors were adjusted to ensure full conformity with the 1979 'employment by main or principal occupation' definition. Again, this adjustment, which utilized regional totals by principal

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<sup>1</sup> As of December 1980.

<sup>2</sup> "Nomenclature des Unites Territoriales Statistiques, Etat au 1/6/80" Statistical Office of the European Communities, Luxembourg; 18pp.

<sup>3</sup> "Codification des Unites Territoriales de la C.E.E.", DG 16/A/4, 24th October 1979, Statistical Office of the European Communities, Luxembourg; 26pp.

DATA SOURCES

<u>DATA</u>	<u>YEAR</u>	<u>EUR</u>	<u>SOURCE AND ADJUSTMENTS</u>
Regional Classification		12	Eurostat
Region Code Number		12	Project devised
Employment by NACE category; unemployment; youth unemployment; female activity rates	1973 1975 1977 1979	9 9 9 9	Eurostat: "Regional Statistics" (employment figures adjusted to "principal employment" and NUTS80)
Gross Domestic Product	1965 1970 1973 1974 1977	9 9+GRE,POR 9 GRE 9	Eurostat: estimates and "National Accounts". Greek data from: Ministère de la Coordination, Direction Generale des Comtes Nationaux, Rep. Grecque, via Sr. Curzi. Spanish data from: Banco de Bilbao, via Dr. Bradshaw. Portuguese data from: Prof. Lopes. (Early GDP data from GRE, SPA and POR was used to allocate the Eurostat 1977 "National Accounts" estimates among regions).
Population	1965 1970 1973 1974 1977	9 9 9 GRE 9+GRE	Eurostat; "Regional Statistics" (adjusted to NUTS80 in unpublished 1979 data)
Population Density	1971	9	Eurostat: "Regional Statistics"
Urbanisation	1971	9	Hall P. and Hay D., "European Urban systems: Definition and Measurement of Urban Areas", 1979, Report to the Commission of the European Communities, Appendix 1, p 91.
ERDF Payments	1975-8	9	ERDF 4th Annual Report, 1978, Table 8.

occupation given in the 1973 Regional Statistics volume (table 19), involved only small modifications, by no more than two percent in all but 10 cases, with a maximum adjustment for the West Midlands of 3.3 percent. The accompanying table gives a breakdown of data sources.

As chapter 4 demonstrates, the study has made considerable use of Labour Force Survey data collected and published by Eurostat. This is the only available source of reasonably consistent and comparable employment, unemployment and female activity rate estimates for the regions of the Community. This survey of labour force levels and characteristics is conducted every two years throughout the member countries on the basis of a substantial spatially-stratified sample of households (between 60 and 100 thousand in the Federal Republic of Germany, France, Italy and the United Kingdom, between 30 and 50 thousand for Belgium and the Netherlands, between 30 and 40 thousand for Ireland and Denmark, and 10 thousand in Luxembourg). Information is obtained according to a detailed coding scheme which specifies the nature of the definitions agreed on a Community-wide basis, for such characteristics as unemployment, occupational status and economic activity. A common questionnaire is not however used. The economic activity classification follows the NACE (General Industrial Classification of Economic Activities within the European Communities) system, which divides all economic activity into eleven basic categories. The sample results are 'grossed up' to accord with the total 'reference population' in each country, as estimated by the national statistical organisation, to allow for the different sample sizes in different countries (SOEC, 1977).

The LFS thus provides sample-based regional data collected according to an agreed format throughout the Community. However, these data do possess important limitations. An obvious major restriction is the fact that LFS results prior to 1973 (1968 to 1971 inclusive) relate only to the original six member countries. This limits analysis to the period beginning in 1973. The 1973 LFS included the United Kingdom but not Denmark or Ireland, figures for which had thus to be estimated by SOEC. Full coverage of all member countries is available for 1975, 1977 and 1979. In addition, there have at times been changes in methods of sampling, in the exact questionnaires used, and in grossing-up factors (consequent for example upon revised national



population estimates) in particular countries. The small size of the sample in particular regions also means that changes in levels (e.g. of employment) between different successive years may not be significant. This qualification is however much less applicable to changes over the six-year period studied here, and to aggregate totals for large groups of regions, as presented in Chapter 4. In general, Eurostat argues that "the 1973, 1975 and 1977 surveys... constitute a fairly uniform series" (SOEC, 1977, 46), which of course now extends to include the 1979 survey. Nonetheless, it must be stressed that the regional estimates used are based on sample data and are therefore likely to be subject to some degree of random variation. This, inter alia is one factor likely to reduce the strength of the statistical relationships reported in section 4.11. The deliberate organisation of most of the project's LFS-based analyses in terms of aggregate results for large groups of regions - central, peripheral, highly-urbanized, rural, and so on, together with the frequent use of ratio indices, does however mean that these problems are unlikely significantly to affect the results presented in Chapter 4. Even in the most disaggregated tables, relating to the shift-share analysis, results relate after all to aggregate levels of employment in a varied group of regions running into tens - and often hundreds - of thousands of workers, not to single regions with small employment totals. In general, it can be argued not only that "the Survey is ... the best source available at present for comparable data on employment and unemployment at the level of the Community" (Commission of the European Communities, 1981, 25), but also that the broad and aggregate framework for analysis adopted by the present study minimizes the problems associated with it.

## B.2. Computing Details

LFS, GDP, population, and urbanisation data, together with ERDF payments, 1977 EEC-wide potential values and 1970 National potential values, were organised into a single SPSS system file<sup>1</sup>, while actual potential calculations were performed separately in a series of custom-written programs.

Raw data was input to the University of Cambridge Computer Laboratory's IBM-370/165 computer as a single file on disk. SPSS control cards and data-description and data-modification cards were entered as a separate file, which, when submitted as a program, called up and used the data file to produce and save an SPSS System File. The System File remains the master source to be accessed by subsequent smaller SPSS analysis programs, but the two original files have been retained for safety back-up and for ease of creating updated versions of the System File.

The System File occupies 8 tracks of space in 'binary' character code and contains data on 137 cases (with 9 lines of data per case) and 178 variables. Saving it required 530 control cards, 5.65 secs. of CPU time, and 27.48 secs. of disk time. Facilities are available for transferring this material to an IBM 2,400 feet, standard density, 1600 bpi, 9-track magnetic tape, for transport to the European Commission and DoI archives at the end of the Project, if desired.

Organising data in this way allowed use of the versatile SPSS package for sorting, selecting and labelling of material, as well as for performing tasks such as multiple regression. For calculation of potentials, a data-set was created with one numbered node for each region, and the distance (in kilometres) by main road (or sea-crossing) to surrounding nodes. A Fortran program then went through a sequence of adding possible links to find the shortest possible paths between any pair of nodes. These distances were entered into a matrix which

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<sup>1</sup> "Statistical Package for the Social Sciences" by Nie N. et al (1975, 2nd edn.), McGraw-Hill.

became one input file (along with a second containing regional GDP for the relevant year) for a second Fortran program to calculate potentials, via the formula outlined in Appendix C. The list of potentials thus produced was in turn input to a SYMAP program<sup>1</sup> already containing the coordinates for each node and pre-set to produce contour lines at intervals of 10% of, and up to, the maximum potential value for that year. These could then be easily transferred to a pre-drawn overlay of EEC boundaries.

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<sup>1</sup> SYMAP Manual, The Harvard Graphics Laboratory, 1979.

APPENDIX C. METHODOLOGY AND CALCULATION OF REGIONAL ECONOMIC POTENTIAL

As stated in Chapter 3, the formula used here for calculating regional economic potential is the simplest and standard one given by Rich (1980). Namely,

$$P_i = \sum_{j=1}^n M_j / D_{ij}$$

where  $P_i$  is the economic potential of region  $i$ ;  $M_j$  is a measure of the volume of economic activity in region  $j$ ; and  $D_{ij}$  is a measure of the distance or cost of transport between region  $i$  and region  $j$ . Summing for all  $n$  regions considered, yields the potential value for region  $i$ . The resultant potential values are expressed in units of economic activity (e.g. GDP) per unit of distance or transport cost (e.g. per kilometre). These potential values thus provide one objective measure of the degree to which particular regions are relatively central or relatively peripheral to the whole Community's economic activity, as well as of changes in the relative accessibility of particular regions over time.

However, precise choice and estimation of the components poses several statistical, technical, and conceptual questions, especially with respect to economic activity and distance measurement, tariff barrier values, and self-potential calculation. These are discussed more fully below, and followed by tables of calculated potential values for different years, firstly on an EEC-wide basis, and then on a national basis.

### C.1 Measuring the Volume of Economic Activity

Specifying the mass or  $M_j$  variable presents a problem in as much as different variables may yield different patterns or maps of potential within a given area. Thus as noted in the U.K. review, the potential gradient suggested by different studies varies in steepness, and this could partly reflect the use of different mass variables. Even so, the actual maps of isolines produced by different U.K. potential analyses are very similar. The key point is that the mass variable selected must be appropriate to the phenomenon - in this case, the volume of economic activity - under investigation.

In addition, the spatial coverage of mass values should also be appropriate to the problem. Thus the extent of trading across EEC extreme boundaries indicates that allowance for the volume of economic activity in adjacent non-EEC European countries should be incorporated in the economic potential analyses, as in the pioneering Clark, Wilson and Bradley study (1969) of European economic potentials.

The volume of economic activity in each region was therefore measured by GDP values at market prices, expressed in European Units of Account. These were kindly provided by Eurostat for 1965, 1970, 1973 and 1977. Data for the last three of these years are a regionalisation of the European System of Accounts. According to Eurostat, with the exception of the "regierungsbezirke" of Nordrhein-Westfalen and certain of United Kingdom regions, they are comparable over time. The nature of economic potential calculations means that the small boundary changes which affected these German and British regions during the 1970's are extremely unlikely to have had any measurable effect on actual potential values. For calculation of the GDP growth rates used in the analyses reported in section 4, however, these particular regional GDP values have been adjusted by the project team to a comparable 1977 regional base.

The 1965 figures are estimates obtained by applying to the 1970 regional values the rate of increase of an indicator of GDP between 1965 (1966 in the United Kingdom) and 1970, the resultant figures being adjusted to the national ESA 1965 total.

After much discussion with the sponsors and other workers these GDP values were expressed in EUAs at current prices and current exchange rates, not in constant prices as suggested in the Second Interim Report (page 9). The reason for this was the view expressed by representatives of the sponsoring authorities that 'cross-sectional' international GDP comparisons within the Community for different years in the 1970's, if based on exchange rates rather than purchasing power parity values, were more meaningfully expressed by a current price/current exchange rate relationship than the hybrid constant price/current exchange rate approach suggested in the Second Report. One important point here is that different national rates of price inflation are to some degree compensated for by changes in exchange rates, while in general, it may be argued that current rates and prices reflect the real evolution of regional and national economies within the Community over time more accurately than would the arbitrary choice of 1970 prices and rates.

The decision to express GDP in EUA units, a conversion based on weighted exchange rates for a basket of European currencies, rather than in PPP (purchasing power parity) values which are also now available from Eurostat, reflected the judgement that the former provided the better measure of the volume of economic activity in different countries and regions, with regard to possibilities of trade and interchange of goods (van der Knapp, 1980, p.12) PPP values, reflecting as they do variations in the cost of living, including presumably the indirect if not direct cost of non-traded goods and services such as housing, would seem to be more a measure of welfare and income relative to living standards in different areas, rather than of the volume of economic activity and output with which economic potential is concerned.<sup>1</sup>

For potential calculation, each region's GDP was allocated to that region's largest city or town, which was nominated as its "node".

As noted in the First Report (page 47), it is logical to include in the analysis mass values for adjacent non-EEC European countries which possess significant trading links with the Community. National GDP data expressed in EUA values has been obtained from published Eurostat sources,

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<sup>1</sup> The Clark, Wilson and Bradley study (1969, p.199) also reached this conclusion, for somewhat similar reasons.

or estimated by the project team, for the following countries: Norway, Sweden, East Germany, Czechoslovakia, Austria, Switzerland and Yugoslavia, in addition to the newest member country, Greece, and to the two potential entrant countries, Spain and Portugal. For each EUR6 and EUR9 analysis, the national GDP of each surrounding country was allocated to its largest city (e.g. Sweden's to Stockholm, Spain's to Madrid, etc.). For the EUR12 analysis, however, regional GDP estimates were obtained and allocated to the major regional cities of Greece, Spain and Portugal.

## C.2 Distance Measurement

The chief empirical work of the project in calculating economic potential surfaces has centred on the estimation of the distance or transport cost component  $D_{ij}$ .

The Clark, Wilson and Bradley study (1969) argued that the most appropriate measure was an estimate of the average transport cost of manufactured goods shipped from the central node of region  $i$  to that of region  $j$ . The calculation should allow where appropriate for any tapering of freight charges with distance, for ferry charges for sea crossings, and for tariffs levied at international boundaries. A particular problem considered was the question of transport modal split between road and rail. The complexity of actual firm behaviour here is illustrated by the Ford of Europe case. For component shipments between its European factories, the Ford company uses both high-speed special trains in the U.K., Belgium and Germany, and a mixture of road and rail movements between its Bordeaux, Valencia, Belgian and German plants. Thus the Bordeaux transmission plant supplies the U.K. and Spain by road, but Belgium and West Germany by rail: while special 'dropbody' containers from Cologne, Genk and Saarlouis are actually transferred from road to rail en route to another factory (Gooding, 1979). Shipments of finished cars to dealers are equally complex, since while road movement is always involved at some point (self-propulsion up to 25 miles in Britain, lorry transporters in the rest of Europe), rail shipments are very common for long distance deliveries. Thus commercial vehicles manufactured in Britain travel by rail from Dieppe to depots in Italy (Lavorno and Vercelli) for road distribution thereafter: while Fiestas produced at Valencia for Britain are either railed to Pasjes in Northern Spain for

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the sea crossing to Harwich or despatched directly in specially-chartered ships (as also are cars destined for the Italian market via Laveno).

The Clark, Wilson and Bradley (1969) approach to this problem of modal split was to assume a 200-mile limit to road movement with journeys over this distance being handled by rail. Certainly the Ford case indicates that rail movements are still preferred for longer distance journeys by at least one European multi-national company. The earlier study also adopted a somewhat arbitrary cost value for ferry shipments of glass products as an allowance for sea crossings. A better approach would seem to be the use of the formula suggested by Rich (1975, p.67) following much empirical testing in the Scottish case, namely

$$SC = 160 + \frac{CC}{2}$$

where SC is a sea-crossing element in a road distance matrix, and CC is the length of the sea-crossing in kilometres. Rich argues that this formula, though inevitably somewhat arbitrary,

"represents reasonably well the high break of bulk and terminal costs involved in sea crossings, and their relatively low movement cost per unit of distance, as well as the psychological barrier and inconvenience inherent in such crossings. Short crossings are weighted relatively much more heavily than long ones".

Use of road or time distance measures raises the possibility of using more complex formulae as the denominator in the potential equation. Thus recent German work (Hussman, 1976: Adlung, Gotzinger, Lammers, Schatz, Seitz and Thoroe, 1979) has suggested consideration of two alternatives to the standard distance expression,

$$(1) \quad D_{ij}^{-\alpha}$$

Namely

$$(2) \quad \left[ 1 + \left( \frac{d_{ij}}{\beta} \right)^2 \right]^{-1}$$

$$(3) \quad (1 + \gamma)^{-d_{ij}}$$

In these formulae, the parameters  $\alpha$ ,  $\beta$  and  $\gamma$  represent empirically-derived constants selected to give as good a fit as possible between potential values and some other spatially-distributed 'control' variable such as GDP per head. In equations (1) and (2) the larger the constant  $\alpha$  or  $\beta$ , the smaller the influence of distant GDP values on a region's potential. The converse is true for  $\gamma$  in equation (3). The three equations can yield somewhat different distance-decay curves for the influence of a given mass value in particular instances, and different levels of correlation with the 'control' variable. Hussmann's research, adopted as a basis for the Kiel analysis, found that it was the third formula which gave the best fit in his study of market potential and GDP-per-head variations across 178 labour market areas in West Germany. For the 37 official planning regions of the Republic, and using similar data to Hussmann, the Kiel team (Adlung *et al*, 1979) obtained a correlation coefficient of 0.81 with a  $\gamma$  parameter of 0.056. However, there is no obvious theoretical justification for using one of these distance equations in preference to the others.

Related to the distance measurement problem is the question of an appropriate distance exponent. Various empirical research has argued that when simple distance is used, exponents greater than unity yield better statistical fits with other variables (such as GDP per head). Thus Chisholm and O'Sullivan (1973, p.8) actually argued from 1962 road transport data that for potential modelling "the appropriate empirical distance exponent for road freight in Britain in -2.5"; while Rich (1978) found that testing for bestfit relationships in the Scottish case with 1960's data yielded a typically sharply-peaked calibration curve, centred on exponent values between -1.5 and -2.5. At the same time, however, Chisholm and O'Sullivan nonetheless chose to use an exponent of unity in their modelling work, for technical reasons associated with the self-potential calculation: while it would seem highly probably that increasing speed and ease of motorway movement, coupled with increased scale economies through the use of much larger lorries and hence a longterm fall, until 1973 at least, in the real costs of transport, had led to a reduction in the best-fit empirical distance exponent by the 1970's from values as high as 2.5.

In the light of all these points, and after discussions with the sponsors, it was decided to employ the simplest and standard distance formula given above (1), and to estimate potential (accessibility) values

by shortest road distances between nodes representative of each Level II region and adjacent country. This reflected inter alia the judgement that the considerable extra difficulty and time involved in obtaining meaningful transport cost data was unlikely to be justified in terms of appreciable differences in the final potential surface. It was also decided that in the absence of any clear theoretical justification for distance exponents other than unity, the most logical basis for potential measurement was the latter. In fact, sensitivity testing, using higher distance exponents (1.5 and 2.0), revealed that such exponents generate more sharply peaked EEC potential (accessibility) surfaces, and that these surfaces yield much poorer statistical relationships with other variables. Thus  $R^2$  values for regressions of potential against 1977 GDP per head for the Community's Level II regions were 0.453 for  $d^{1.0}$ , 0.322 for  $d^{1.5}$ , and 0.280 for  $d^{2.0}$ . The main reason for using  $d^{1.0}$ , however, is the absence of theoretical justification for incorporating a variable exponent.

The project team therefore compiled a road distance matrix between all adjacent nodes, utilising national and European road atlases and shortest road distance estimates provided by national motoring organisations for 1971. Shortest path road distances between all pairs of nodes in the system were then calculated by computer program. The final diagonal matrix thus included over 7,000 distances. It may be argued that this approach is much to be preferred to the simpler alternative straight-line distance method adopted in some potential studies, given the configuration of different European countries and the resultant fact that straight-line distance would in many cases cross large areas of sea (e.g. Spain-Italy, Denmark-United Kingdom, Italy-Greece, etc.). The emphasis on road rather than rail distance is a direct reflection of the evolving pattern of goods movement in the EEC, and the fact that by 1972, road transport was responsible for handling a larger share of intra-national goods movement, measured in tonne-kilometres, than any other form of transport in all member countries except the Netherlands and Luxembourg. In the cases of each of the four most peripheral countries, Denmark, Ireland, Italy and the United Kingdom, the road transport share was over 66 per cent (Robinson and Bamford, 1978, p.137). While rail movements are of course still important for bulky goods and, perhaps, over longer distances within individual countries (First Interim Report, p.49), there is also evidence that much goods movement between EEC countries is now

handled by lorry container units, given the difficulties of transferring rail freight consignments between different national rail organisations. All these factors would seem to support the road distance approach adopted here.

The largest town (1970 or 1971 population census data) in each Level II region was selected as the network node for distance calculation, as were the largest cities in adjacent non-EEC countries. In addition, a series of ferry ports and links were defined, on the basis of detailed 1970 ferry information obtained from European road atlases, and identification of all such links which possessed at least one roll-on/roll-off (ro-ro) ferry service per day. Of the 20 ferry links thus incorporated, eight were between the United Kingdom and mainland Europe, and two each to Ireland (from the U.K.), Corse (from Marseille and Genova), and Sardegna (from Genova and Civitavecchia). Estimation of the distance to be allocated to such links utilised a variation of the Rich formula given earlier, namely:

$$SC = 150 + \frac{CC}{1.5}$$

The parameters in this formula were derived directly from data in a recent unpublished report (Bell, 1979) on the actual costs of shipping goods by container lorries and ro-ro ferries between various origins and destinations in Britain, Germany and France. This report provided comprehensive and detailed 1978 land movement, ferry terminal and sea movement costs for a standard 32 ton articulated container lorry. Conversion of these costs into distance equivalents on the basis of road kilometre costs for an arbitrary but probably reasonably typical 500 km journey yielded the parameters given in the above formula. Their remarkably close correspondence with those estimated earlier in a different context by Rich (160 and 2.0) provides valuable confirmation of the general validity of this approach, if the additional movement costs of ferry crossings are taken as imposing additional barriers to the movement of goods and people within Europe. Incidentally, while it is true that total road haulage costs have risen in real terms since the early 1970s, the relative balance between land, terminal and sea costs given by the Bell report is unlikely to have altered significantly over this period. Since it is the latter which is the only important consid-

eration in translating ferry costs into road distances, it can be claimed that the formula is appropriate for earlier as well as more recent dates.

However, this method of distance measurement does not allow for changes in the quality of road links between different nodes in different years, through for example the construction of motorways. The reason for this was simply that incorporation of such changes would have required far greater expenditure of time and resources than was judged feasible given the shortness of the project. It can be argued, however, that recent road improvements in most Community countries have tended to focus on the major cities and metropolitan regions, such as Paris, Dusseldorf or London; and it is to that extent likely that they will have increased the relative accessibility of central regions to economic activity within the Community more than has been the case with peripheral regions, whose motorway links are often less developed (see the argument and evidence in Keeble, 1976, pp.54-59). The trend revealed by the Cambridge project's economic potential analyses, of a relative decline in peripheral region accessibility between 1965 and 1977 compared with central regions, may thus in fact understate to some extent the actual trend, if allowance could be made for changes in road quality in addition to changes in the regional distribution of economic activity.

### C.3 Tariff Barriers

That tariff barriers do significantly inhibit trade across boundaries between countries is both a classic theoretical expectation and an observed fact. As Daly (1978, p.45) points out for the United Kingdom, empirical evidence shows that

"the effect of tariff reductions on U.K. imports has in the past been significant, accounting for more than 33 per cent of the total increase in imports of semi-manufactures and over 25 per cent of the increase in finished goods for the period 1959 to 1972".

In line with this historic evidence, the phased removal over the period 1973 to 1977 of the previous EEC/UK tariff barrier was accompanied and followed by a substantial shift in the balance and volume of U.K. trade towards its Community partners, especially in manufactured goods. As a proportion of total external trade by value, U.K. exports to the other eight EEC countries rose from 30.2 to 37.9 per cent over the six year period 1972 to 1978, while imports rose from 31.6 to 40.5 per cent.

As with the 1969 Clark, Wilson and Bradley study, the Project Team accepted from the outset the need to incorporate a measure of the barrier effect on the free movement of goods between the regions and countries of western Europe of EEC tariffs. However the Clark, Wilson and Bradley, approach to incorporation of a tariff barrier was totally arbitrary, involving the adoption, with no supporting logic or argument whatever, of a value of US \$210 incurred wherever an international or customs boundary such as that between the EEC and surrounding countries was crossed. Instead, therefore, we used a logic and data similar to those employed in estimating the barrier effect of sea ferry crossings.

Four steps were involved. Firstly, statistics were obtained from the U.K. Customs and Excise and from National Ports Council publications on the average value for customs purposes of a unit container load of goods passing through the two ports of Dover and Felixstowe in 1978. (These two ports are the leading "roll-on roll-off" container ports for trade between the rest of the EEC and the U.K., handling imports and exports valued at over U.K. £12 thousand million in 1978). The average customs value of a unit container load passing through these ports in that year was U.K. £17,335 (indicating in passing that the vast majority of such loads are of high-value manufactured or semi-manufactured goods).

Secondly, an average ad valorem tariff rate of 7 per cent was used to calculate the actual tariff - £1213 - which would on average have been carried on a unit load travelling from these ports to France, Belgium, the Netherlands or West Germany had the pre-1973 EEC common external tariff still been in force. The actual tariffs in force before 1973 have changed very little since, but of course vary widely in rate as between different classes of commodities. However, previous workers have calculated that "the average ad valorem tariff against the U.K. vis-a-vis the old EEC was of the order of 7 per cent" (Ball, 1974, p.55) - a figure which the current and pre-1973 list of EEC common external tariffs suggests is fairly typical of a variety of manufactured products, such as steel, engineering and electrical goods, and footwear.

Thirdly, the estimated EEC tariff was translated into a road distance equivalent using the actual 1978 road transport cost value for a 500 km journey (U.K. £0.54 per km) by a container lorry within the EEC obtained for the similar ferry barrier calculation discussed in section C2. This yielded a distance barrier of 2250km (rounded from 2247), which is a logical value for incorporation via the road distance matrix as a tariff barrier constraint on the ease of trade across the EEC's external boundary for each potential analysis. This constant was therefore added to any shortest path distance between two regional or national nodes whenever the journey involved crossed the then EEC external boundary - with the important exception of the post-enlargement analyses (1973 EUR 9 and 1976). After 1973, all adjacent West European countries were granted "Special" preferential tariff rates vis-a-vis the enlarged EEC, with the exception of Czechoslovakia, East Germany and Yugoslavia. Inspection of the official list of such rates revealed that for virtually all commodities, the "special" post-1973 rate was zero for Greece, Portugal, Austria, Switzerland, Norway, and Sweden. For Spain, the special rates were generally two-fifths of the external rate. In the two post-enlargement analyses, therefore, no tariff distance barrier was added for journeys involving the six zero-rated countries, while the Spanish-EEC barrier was set at 900 km (two-fifths that for 'external' flows involving the three East European countries specified above).

Four comments may be made concerning the tariff barrier calculation. Firstly, although derived from 1978 figures, it can be argued that there is no obvious basis for adjusting the precise distance identified with



respect to earlier years, given the lack of change in the average tariff level before and after 1973. This point could be elaborated in detail if necessary. Secondly, sensitivity analysis using a much lower tariff barrier distance (1250 km) and 1970 GDP data, suggested that in any case the relative ranking and distribution of regional potential values is not significantly changed at all by altering this value. In terms of absolute potential values, only seven regions recorded a change from a lower to the immediately higher class (using 10 classes) when the lower tariff barrier was used, and in relative terms, regional rankings from highest to lowest potential values were virtually identical. Thirdly, the tariff barrier adjustment is concerned only with quantifiable economic barriers to trade whose extent may be estimated in a logical, non-arbitrary way. Clearly, actual trading patterns between countries may also be influenced by certain secondary non-economic considerations, such as cultural differences in taste and consumer preference, language factors, and historic ties (e.g. within the Scandinavian countries or between the U.K. and Portugal). It is argued here that any attempt to incorporate such secondary factors in these analyses would be bound to be arbitrary, and that in any case, increasing economic integration within Western Europe is diminishing their importance quite rapidly over time. Finally, it is worth noting that the tariff barrier identified by the logical procedure adopted here is in fact smaller than that chosen arbitrarily in the Clark, Wilson and Bradley study (US \$210 dollars, or 2900 kms if translated into a distance equivalent using their long-distance rail transport cost rate of 11.6 cents per mile or 7.2 cents per km). The present estimate is thus not only based on a logical procedure incorporating empirical data on the actual movement of goods in the Community, but exerts a somewhat less extreme effect upon computed potential values than that adopted without any justification by the earlier study.

#### C.4 Self-Potential

One last set of problems in operationalising the potential model is that of self-potential, or the contribution to the potential of region  $i$  of its own mass value. This reduces to the problem of measuring an internal transport cost or distance for region  $i$  (that is, distance  $D_{ii}$ ), since a value of zero would give a meaningless infinite value to  $M_i/D_{ii}$ . Different workers have opted for a fixed or variable value. Thus Ray (1965) adopted an arbitrary 5 mile distance for each areal unit, while Clark, Wilson and Bradley (1969) utilised a minimum transport cost of 28 dollars per 10 ton load for each of their 103 European regions. On the other hand, for distance measurement, Rich (1975) argues for the use of the formula

$$D_{ii} = \frac{1}{2} \sqrt{\frac{\text{area of region}}{\pi}}$$

This gives a distance value which is one-half of the radius of a circle of the same area as region  $i$ .

However, this Project has used a constant of 0.333 in the calculations. The adoption of this particular constant, rather than, for example, one of 0.500, is important in that sensitivity analyses carried out by the project team do reveal that the results for certain small highly urbanized EEC regions are changed if the larger distance is used. Thus, with 1970 GDP data, some 16 of the 108 regions recorded a shift of one class interval or more with the larger radius, while two regions recorded a significant fall in their relative rank (West Berlin, from 7th highest to 13th, Bremen from 13th to 21st). However, it is also true that the relative ranking of most of the other 14 regions affected was scarcely changed (e.g. Hamburg, down only from 5th to 6th, Ile de France from 4th to 5th, Dusseldorf no change); while theoretically, as Rich (1980, p.26) argues, the frequent clustering of economic activity in and around the chief metropolitan centre of most officially-defined regions in Europe (e.g. London with regard to South East England, Paris to Ile de France, Brussels to Brabant, Dusseldorf to the wider Dusseldorf region) strongly supports the use of the smaller radius value as the better approximation of reality. (See also Chisholm and O'Sullivan, 1973, p.34.)

ECONOMIC POTENTIAL VALUES (mic EUAs per km)

	*		1965	1970	1973	1973	---
REGION	COUNTRY		EUR6	EUR6	EUR6	EUR9	EUR12
1.	SCHL	BRD	653.90	1093.40	1633.10	1892.30	3119.8
2.	HAMB	BRD	1633.80	2683.70	3931.00	4191.90	6857.9
3.	HANN	BRC	939.20	1554.10	2337.80	2591.00	4224.6
5.	LUNE	BRD	751.30	1239.10	1853.80	2099.30	3428.8
7.	WESE	BRC	979.60	1619.90	2452.30	2734.50	4494.0
9.	BRAU	BRD	841.70	1389.80	2078.00	2327.60	3778.8
11.	BREM	BRC	1257.10	2091.80	3176.40	3436.60	5487.4
12.	DUSS	BRD	1883.70	3141.30	4729.70	5044.70	8084.9
13.	KOLN	BRD	1521.40	2526.10	3744.80	4057.10	6654.4
14.	MUNS	BRD	1185.10	1965.90	2987.50	3278.60	5424.3
15.	DETM	BRD	1063.10	1760.50	2672.80	2954.70	4770.2
16.	ARNS	BRD	1380.90	2294.70	3425.60	3719.60	6026.5
17.	DARM	BRD	1223.70	2023.50	3063.40	3393.90	5505.4
18.	KASS	BRD	843.40	1398.20	2090.40	2363.00	3844.0
19.	KOBL	BRD	1033.50	1699.00	2542.20	2860.30	4669.1
20.	TRIE	BRD	858.10	1460.00	2174.70	2503.80	4085.0
21.	RHEI	BRD	2184.90	3641.70	5556.70	6032.40	9671.5
22.	STUT	BRD	1086.70	1794.90	2725.40	3084.90	4980.1
23.	KARL	BRD	1922.10	3198.50	4944.20	5306.50	8536.3
24.	FREI	BRD	948.10	1542.50	2307.60	2896.60	4676.6
25.	TUBI	BRD	960.50	1580.90	2390.60	2793.60	4517.8
26.	OBBY	BRD	870.60	1438.50	2163.00	2440.90	3979.1
27.	NIED	BRD	692.60	1139.50	1702.70	1955.10	3199.0
28.	OBPF	BRD	606.40	1128.90	1587.40	1938.60	3169.5
29.	OBFR	BRC	710.80	1168.70	1747.90	1979.00	3239.1
30.	MIFR	BRD	838.90	1383.60	2080.00	2340.00	3828.3
31.	UNFR	BRD	850.50	1407.70	2115.10	2400.60	3922.3
32.	SCHW	BRD	816.20	1344.60	2016.40	2282.20	3726.4
33.	SAAR	BRD	991.70	1618.40	2434.60	2783.10	4532.4
34.	BER*	BRD	1492.80	2494.60	3677.60	3865.00	6227.8
35.	ILEF	FRA	1876.40	2904.40	4269.60	4569.60	7348.4
36.	CHAD	FRA	905.00	1434.00	2112.70	2448.20	3989.7
37.	PICA	FRA	954.00	1502.50	2211.40	2555.50	4168.2
38.	HNDR	FRA	925.20	1451.20	2119.40	2453.30	3989.3
39.	BOUR	FRA	754.90	1196.70	1755.40	2059.60	3355.5
40.	NPDC	FRA	1227.90	1925.20	2847.60	3267.00	5311.4
41.	LORK	FRA	922.60	1467.90	2174.90	2557.30	4133.2
42.	ALSA	FRA	1031.80	1666.70	2494.00	2930.50	4746.2
43.	FRCO	FRA	754.50	1217.90	1790.20	2135.80	3490.9
44.	PLOI	FAA	599.20	940.60	1395.50	1610.50	2627.7
45.	BRET	FRA	619.10	979.90	1441.70	1685.40	2734.7
46.	POCH	FRA	571.20	901.20	1309.00	1495.50	2353.7
47.	AQUI	FRA	533.20	846.30	1224.80	1387.90	2213.0
48.	MIPY	FAA	475.70	750.50	1084.00	1235.00	2076.3
49.	LIMO	FRA	567.60	896.50	1299.50	1497.90	2453.9
50.	KHOA	FAA	764.10	1228.90	1768.10	2022.10	3291.6
51.	AUVE	FRA	620.80	981.60	1426.70	1645.70	2675.3
52.	LANG	FRA	530.10	842.10	1210.10	1388.50	2324.1
53.	CDAZ	FRA	610.20	953.50	1352.90	1551.20	2554.5
54.	CORS	FRA	367.40	588.90	820.50	1014.60	1648.2

\* for full region names, see Table 3.5

	REGION	COUNTRY	1965 EUR6	1970 EUR6	1973 EUR6	1973 EUR9	--- EUR12
55.	CLNT	FRA	684.20	1070.30	1581.20	1815.70	2940.1
56.	BNOR	FRA	698.20	1091.70	1596.70	1879.50	3049.4
57.	GRON	NED	768.50	1132.30	1809.30	2061.10	3830.0
58.	FR IE	NED	672.20	1099.20	1643.10	1908.40	3237.5
59.	DREN	NED	731.70	1165.90	1759.70	2011.00	3488.7
60.	UTRE	NED	1106.10	1650.80	2810.70	3149.30	5397.3
61.	NHOL	NED	1134.90	1889.20	2835.80	3163.20	5447.0
62.	ZHOL	NED	1334.30	2237.90	3368.20	3737.50	6391.0
63.	ZEEL	NED	839.40	1383.90	2071.20	2389.80	3993.8
64.	NBRA	NED	1243.40	2070.00	3131.80	3470.30	5836.4
65.	LIMU	NED	1154.50	1889.90	2844.40	3189.50	5366.1
66.	OIJS	NED	977.70	1623.80	2457.80	2748.70	4602.9
67.	GELD	NED	1051.00	1757.70	2653.60	2971.70	4976.3
68.	PIEM	ITA	746.90	1231.80	1678.50	1931.40	3063.7
69.	VAOS	ITA	614.50	991.10	1399.00	1689.30	2696.2
70.	LIGU	ITA	766.20	1221.40	1628.80	1915.30	2999.8
71.	LOMB	ITA	923.20	1534.80	2065.00	2456.90	3843.4
72.	TRAA	ITA	545.70	888.40	1259.60	1520.00	2457.2
73.	VENE	ITA	640.70	1046.30	1438.50	1650.20	2629.2
74.	FRVG	ITA	480.60	787.60	1093.60	1280.10	2049.3
75.	EMRO	ITA	696.40	1120.90	1531.40	1781.30	2847.7
76.	TUSC	ITA	614.40	1001.80	1360.40	1582.70	2518.9
77.	UMBR	ITA	460.10	755.50	1040.70	1224.90	1955.9
78.	MARC	ITA	480.90	783.40	1078.70	1269.10	2024.2
79.	LAZI	ITA	577.80	951.40	1273.00	1436.80	2228.9
80.	CAMP	ITA	506.00	806.80	1097.20	1234.20	1916.1
81.	ABRU	ITA	412.30	671.20	932.20	1095.10	1748.9
82.	MOLI	ITA	366.30	583.40	817.90	958.60	1524.1
83.	PUGL	ITA	370.00	607.50	838.90	962.20	1504.4
84.	BASI	ITA	323.30	522.00	727.50	849.80	1355.2
85.	CALA	ITA	276.50	446.80	618.00	711.00	1134.9
86.	SICI	ITA	295.30	481.90	795.40	895.60	1386.8
87.	SARD	ITA	316.20	515.10	713.40	842.10	1353.8
88.	ANTW	BEL	1309.50	2143.90	3209.90	3575.90	6163.5
89.	LIMB	BEL	1150.00	1894.60	2844.60	3196.90	5421.5
90.	OVLA	BEL	1174.70	1901.30	2827.70	3209.60	5410.7
91.	WVLA	BEL	1032.10	1657.40	2465.70	2843.40	4700.5
92.	BRAB	BEL	1407.90	2256.90	3323.70	3693.30	6350.6
93.	HAIN	BEL	1378.90	2159.50	3191.80	3599.80	5871.3
94.	LIEG	BEL	1044.30	1671.20	2473.30	2804.80	4672.5
95.	LUXE	BEL	921.20	1485.20	2208.10	2552.60	4189.5
96.	NAMU	BEL	937.70	1514.90	2249.80	2593.70	4313.6
97.	GDLU	GDL	938.50	1514.60	2251.50	2597.60	4238.9
98.	NORT	UNK	602.60	817.50	1058.50	1583.20	2486.1
99.	YRKH	UNK	946.30	1247.10	1530.70	2172.80	3410.1
100.	NWES	UNK	1270.20	1661.90	2048.70	2647.90	3994.7
101.	EMID	UNK	926.00	1232.60	1493.60	2126.70	3378.7
102.	WMID	UNK	1045.90	1379.70	1681.50	2318.60	3622.6
103.	EANG	UNK	602.70	825.40	1057.00	1807.10	2881.0
104.	SEAS	UNK	1430.20	1935.60	2360.70	3221.10	4951.8
105.	SWES	UNK	759.90	1023.10	1274.60	1932.70	3099.5
106.	WALE	UNK	661.90	895.50	1125.90	1719.20	2758.3
107.	SCOT	UNK	460.00	632.00	812.50	1232.60	1954.6
108.	NIRE	UNK	353.40	509.70	668.30	1008.80	1614.6
109.	IREL	IRE	343.40	490.50	660.10	1050.20	1686.0
110.	STOR	DAN	634.20	1023.90	1450.60	1993.50	3330.5
111.	OSTO	DAN	333.10	527.00	744.50	1254.20	2305.9
112.	VSTO	DAN	333.70	532.20	775.70	1378.20	2370.1

	REGION	COUNTRY	EUR12
156.	ANDA	ESP	1155.9
157.	ARAG	ESP	1522.2
158.	ASTU	ESP	1365.0
149.	CALN	ESP	1573.4
159.	CALV	ESP	1438.0
160.	CATA	ESP	2127.9
161.	EXTR	ESP	1070.4
162.	GALI	ESP	1108.4
163.	LEON	ESP	1329.6
164.	MURC	ESP	1223.9
165.	VALE	ESP	1635.3
166.	VASC	ESP	1848.6
167.	BALE	ESP	1554.9
168.	NINT	POR	1112.3
169.	NLIT	POR	1223.7
170.	SINT	POR	1030.3
150.	SLIT	POR	1160.1
148.	ATHE	GRE	1300.8
172.	EPIR	GRE	0933.2
201.	THES	GRE	0920.1
173.	MACE	GRE	0922.2
202.	THRA	GRE	0741.9
174.	CRET	GRE	0810.9
171.	PELE	GRE	1099.9
204.	AEGN	GRE	0679.7
207.	MAOR	GRE	0820.3

### C.5 National Potential

As outlined in section 4.11(i), separate potential values were calculated on a national basis for each member country. This approach used the same algorithm as for EEC-wide potentials, but links to nodes outside the country were suppressed, and 1970 regional GDP data was used. Resulting national potential values are listed in the following table.

RANK ORDERING OF 1970 POTENTIAL VALUES FOR EACH COUNTRY

## BELGIUM

092	Brabant	916.2
088	Antwerpen	741.8
090	Oost-Vlaanderen	614.4
093	Hainaut	499.0
091	West-Vlaanderen	484.0
089	Limbourg	426.8
094	Liege	400.2
096	Namur	274.3
095	Luxembourg	178.6

## WEST GERMANY

021	Rheinhessen-Pfalz	2961.7
023	Karlsruhe	2525.2
012	Dusseldorf	2336.3
034	Berlin-West	2103.4
002	Hamburg	2223.8
013	Koln	1768.9
016	Arnsberg	1611.5
011	Bremen	1550.5
017	Darmstadt	1389.8
014	Munster	1251.3
022	Stuttgart	1233.3
015	Detmold	1160.4
003	Hannover	1043.7
025	Tubingen	1014.8
019	Koblenz	1005.5
007	Weser Ems	981.7
026	Oberbayern	938.7
009	Braunschweig	903.1
030	Mittlefranken	880.7
033	Saarland	875.0
031	Unterfranken	862.8
018	Kassel	859.6
032	Schwaben	838.4
005	Luneburg	790.7
029	Oberfranken	694.1
020	Trier	685.6
001	Schleswig-Holstein	676.7
027	Niederbayern	666.9
024	Freiburg	664.9
028	Oberpfalz	655.9

## NETHERLANDS

062	Utrecht	1022.4
061	Noord-Holland	842.7
060	Zuid-Holland	661.7
064	Noord-Brabant	529.3
067	Gelderland	481.6
066	Overijssel	351.6
057	Groningen	312.4
063	Zeeland	278.4
059	Drenthe	256.9
058	Friesland	253.1
065	Limburg	247.8

## DENMARK

110	Storkobenhavn	710.3
112	Vest for Storebaelt	232.9
111	Oost for Storebaelt	213.0

## FRANCE

035	Ile de France	2249.7
040	Nord.Pas-de-Calais	829.2
038	Haute-Normandie	815.5
037	Picardie	744.1
036	Champagne-Ardenne	623.4
050	Rhone-Alpes	605.1
041	Lorraine	563.8
055	Centre	560.8
056	Basse-Normandie	544.2
042	Alsace	519.1
039	Bourgogne	513.9
045	Bretagne	505.2
044	Pays de la Loire	499.8
043	Franche-Comte	478.3
053	P.A. Cote d'Azur	465.1
051	Auvergne	457.0
046	Poitou-Charentes	443.4
047	Aquitaine	415.5
049	Limousin	414.2
052	Languedoc-Rousillon	376.3
048	Midi-Pyrenees	336.8
054	Corse	146.0

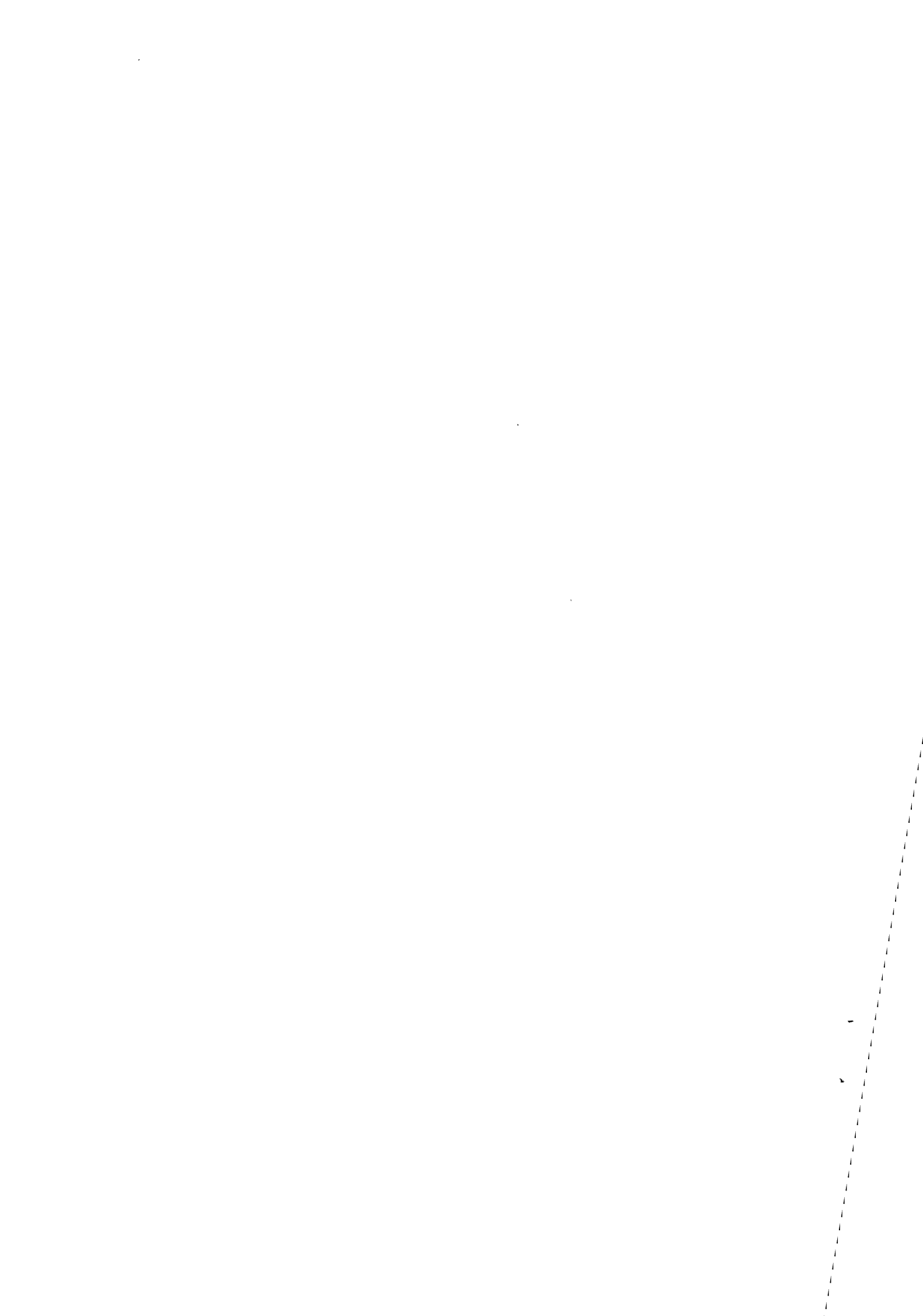
## UNITED KINGDOM

104	South East	1659.9
100	North West	1449.9
102	West Midlands	1163.9
099	Yorks Humberside	1034.0
101	East Midlands	1018.9
105	South West	805.0
106	Wales	679.8
098	North	615.0
103	East Anglia	607.9
107	Scotland	438.3
108	Northern Ireland	299.2

## ITALY

071	Lomardia	983.7
070	Liguria	708.1
068	Piemonte	644.4
075	Emilia Romagna	639.3
079	Lazio	581.7
073	Veneto	564.1
076	Toscana	554.5
080	Campania	479.7
078	Marche	375.0
074	Friuli-Venezia Giulia	363.0
077	Umbria	356.4
069	Valle d'Aosta	343.3
072	Trentino-Alto Adige	317.7
083	Puglia	310.5
081	Abruzzi	301.6
086	Sicilia	260.1
082	Molise	254.1
084	Basilicata	221.4
087	Sardegna	194.2
085	Calabria	189.7





#### APPENDIX D: REGIONAL AND INDUSTRIAL CLASSIFICATION

As noted in section 4.2, for the purposes of analysing the relative performance of different groups of regions, two types of variables were used as a basis for logical and objective classification. These were EEC economic potential as a measure of relative regional accessibility, and the proportion of inhabitants living in larger urban agglomerations together with population density, as measures of level of urbanisation.

In addition, employment figures were classified according to the official Community NACE classification. How these were derived is explained more fully below.

##### D.1 EEC Economic Potential

Appendix C explained how regional economic potential values, expressed in millions of EUA's per km, were calculated using GDP estimates for various years and the shortest road distances between regional centres. For the purposes of grouping regions into categories based on potential, it was decided to use the potential values calculated from 1977 data, as the most logical measure of relative regional accessibility in terms of free movement of goods within the post-1973 enlarged Community. It would seem less logical to use potential values for earlier years, incorporating as they do the tariff barrier between the Six and the Three, given the Study's concern with relative regional centrality and peripherality within the enlarged post-1973 Community, and also the logic of many of the hypotheses evaluated. The latter of course implicitly or explicitly assume that it is relative location within the enlarged Community which may have influenced decisions on the location of productive investment by firms and organisations during the 1970's. (It is interesting to note that the rank order of regions in terms of 1977 potential values is very similar to that of the hypothetical 1973 EUR9 surface, suggesting that the grouping based on 1977 values is substantially robust with respect to earlier years, once allowance has been made for the removal of the tariff barrier).

The grouping of regions by relative location into three categories- central, intermediate and peripheral- as suggested by the Terms of Reference and Programme of Work (Appendix A), was based upon the following three logical criteria. First, that the divisions between central and intermediate, and intermediate and peripheral, categories should if possible be selected so as to fall along particularly steep gradients or 'escarpments' in the mapped EEC potential surface. In practice, this involved utilizing the standard cartographic procedure (see Jenks and Coulson, 1963: Robinson and Sale, 1969) of plotting potential values, ranked from lowest to highest, against cumulated area of the regions involved, in a cumulative frequency graph. Such a graph permits rapid identification of the existence of any such escarpments, as well as of significant gaps in the general frequency distribution of potential values.

The second logical criterion was that central and peripheral regions must always be separated, spatially, by at least one intermediate region. While this criterion is very likely automatically to be satisfied by the nature of potential calculation, and its generation of a relatively continuous surface of accessibility values, it was nonetheless felt sensible to include this constraint on the grouping procedure, again partly because of the logic of the hypotheses to be evaluated.

The third criterion was that if possible, the three groups of regions should be approximately equal in size (e.g. with 108 regions, approximately 36 in each). This criterion not only ensures that each locational sample is the largest possible size for statistical analysis, thus minimizing the possibility of random variations due solely to small samples being influenced by one or two aberrant cases, but also reflects the fact that different significant breaks were available for selection, some defining smaller rather than larger groups. Given this, it was felt that it would not be unreasonable to select escarpments and breaks in the continuum which gave reasonably-equal sized groups, provided of course that these breaks were reasonably clear ones.

In practice, use of these three criteria proved to be a very satisfactory basis for defining the three groups of regions. Cumulative area and ordinary frequency graphs of the 1977 potential values clearly revealed the presence of a significant escarpment at the 4400 million

EUAs per kilometre level (45.5% of the maximum). As table 3.5, which plots these potential values in rank order, shows, this escarpment involved a very substantial break in the series of no less than 180.0 mio EUAs per km, separating the values for Namur and Weser-Ems. No larger break occurred anywhere below this level in the group of regions thus defined as intermediate. However, this gap was preferred to a similar-sized break higher in the rank order - 184.1 mio EUAs per km, at the 4900 mio EUAs per km level, between the South East and Detmold (see table 3.5) - on the third criterion set out above, since adoption of this alternative escarpment would have yielded only a relatively small group of 'central' regions, with most regions being lumped together as 'intermediate'.

Similarly, a substantial gap (76.5 million EUAs per km) and clear escarpment at the 2800 mio EUAs per km level (29.0% of the maximum) between Wales and Emilia Romagna was selected as the most logical division between peripheral and intermediate regions. Again, this was the largest gap in the series for some twenty places running up the ranked list (see table 3.5). However, in this case, a possible though smaller gap at the 3000 mio EUAs per km level was rejected on the basis of the second criterion, in that this would have yielded two cases of central/peripheral adjacency (East Anglia/South East England, and Centre/Ile de France). Similarly, another possible gap at 2600 mio EUAs per km was ruled out on the third criterion.

The resultant three groups of regions thus comprised 35 'central' regions of relatively high potential and accessibility, 33 'peripheral' regions of relatively low potential and accessibility, and 40 'intermediate' regions (see table after section D2). Central regions are to be found in five different member countries, although the largest concentration, not surprisingly, is in West Germany (17) and to a lesser extent the Netherlands and Belgium (7 each). Peripheral regions are also to be found in five different countries, the largest numbers being in Italy (16) and France (10). Only Ireland, a single (peripheral) region in an EEC context, is not represented amongst the countries in which are to be found at least one intermediate region. Overall, the grouping resulting from logical and objective partitioning of the 1977 economic potential values yields in each case a pattern of regions which is remarkably consistent with widely-held perceptions of 'peripherality' and 'centrality' within the EEC.

Nonetheless, it was judged desirable to conduct sensitivity tests of the results calculated for this preferred grouping, using appreciably narrower definitions of 'central' and 'peripheral' regions as given by the 4900 and 2600 mio EUAs per km gaps referred to above. On this restricted definition, centre and periphery comprised only the top 25 and bottom 25 regions in the list given in table 3.5. Compared with the preferred study definition, these narrowly-defined groups thus excluded such regions as Koblenz, West-Vlaanderen and Detmold from the central category, and Wales, Bretagne and Auvergne from the peripheral. Results on both definitions for three key analyses, of regional structural and differential employment shifts, trends in regional manufacturing structures, and changes in youth unemployment rates, are given in the tables at the end of this section.

Comparison of these results shows clearly that the marked differences between central and peripheral regions identified by the study hold just as strongly if centre and periphery are defined more narrowly. Indeed, in most cases, differences increase. In other words, the study's findings are robust and not sensitive to quite substantial changes in definition of central and peripheral regions. This of course reflects inter alia the magnitude of the differences identified between these two groups. Thus the shift-share table shows that the percentage shifts recorded by central regions change only slightly when the different definition is used, while the basic pattern of percentage peripheral region shifts is also unaltered. If anything, differences widen. In the manufacturing structure case, centre-periphery differences with regard to mean 1973 and 1979 indices increase appreciably with adoption of the restricted definition, while the opposing direction of trends in the structural index is not changed. Lastly, the centre-periphery gap between 1975 and 1979 youth unemployment rates is also actually widened slightly by use of the restricted definition, with change rates remaining substantially greater in the periphery. On the evidence of these tests, it is clear that the study's findings on the marked differences in performance, evolution and structure between central and peripheral regions are not sensitive to quite large changes in definition of these categories.

Two minor modifications to the selected study groupings had however to be made before they could be used for analysis of the data presented in Chapter 4. Since the Labour Force Survey and other official Community regional statistics do not provide a regional breakdown for Danmark, and combine figures for Provence-Alpes-Cote d'Azur and Corse, it was decided to treat both these as single peripheral regions. This was based on a weighted averaging of the 1977 calculated potential values for their regional components. It should be noted that this does however mean that data for one region (Storkobenhavn) clearly identified as intermediate by its potential value is perforce included in overall calculations for the periphery. To that extent, average and median statistics for the Northern periphery subgroup, which in fact only includes six regions, may be weighted unfairly towards intermediate region values, compared with results for the French and Italian peripheries. This should be borne in mind when considering differences in the results for the three peripheral region subgroups.

The tables included after section D2 list regions in each EEC potential group, both separately and as a cross-tabulation against their classification by urbanisation category.

Aggregate Regional Employment Shifts, 1973-1979 (see table 4.15)

<u>Study Definition</u>	TOTAL SHIFT (OOO's)	% OF 1973 EMPLOYMENT	STRUC- TURAL SHIFT (OOO's)	% OF 1973 EMPLOYMENT	DIFFER- ENTIAL SHIFT (OOO's)	% OF 1973 EMPLOYMENT
Central Regions (35)	-1,061.0	-2.79	+539.5	+1.42	-1,600.5	-4.21
Peripheral Regions (31)	+568.5	+2.20	+285.9	-1.11	+854.4	+3.31
<u>Restricted Definition</u>						
Central Regions (25)	-886.5	-2.74	+617.2	+1.90	-1,503.7	-4.64
Peripheral Regions (25)	+635.2	+3.08	-180.6	-0.87	+815.8	+3.95

Regional Trends in Manufacturing Structure, 1973-1979 (see table 4.26)

	<u>Study Definition</u>			<u>Restricted Definition</u>			
	MEAN		CHANGE RATE 1973-79	MEAN		CHANGE RATE 1973-79	
	NACE 3/4 1973	RATIOS 1979		NACE 3/4 1973	RATIOS 1979		
Central (35)	1.131	1.264	1.152	Central (25)	1.227	1.333	1.110
Peripheral (29)	0.599	0.567	0.954	Peripheral (24)	0.535	0.536	0.984

Regional Youth Unemployment Rates, 1975-1979 (see table 4.40)

	<u>Study Definition</u>			<u>Restricted Definition</u>			
	MEAN		CHANGE RATE 1975-79	MEAN		CHANGE RATE 1975-79	
	1975 %	1979 %		1975 %	1979 %		
Central (35)	6.0	7.1	+17.3	Central (25)	6.4	7.3	+15.8
Peripheral (28)	12.9	19.9	+53.8	Peripheral (22)	14.3	21.9	+35.4

## D.2 Urbanisation Category

The precise logical definition of the term "urban" has long been a matter of technical and academic debate, while actual published figures of "urban population" more often reflect a variety of administrative, political and historic definitions than a common functional or even morphological status. The choice of any one data-series to represent "urbanisation" levels is thus to some extent arbitrary and approximate, but because there are many theoretical and practical reasons for expecting the urban status of a region to have an effect on, and be related to, its economic structure, the Project team felt this dimension should be included in the analysis, and a choice of measure should thus be made.

Two variables were chosen and graphed against each other. On the vertical axis was plotted the proportion of each region's 1971 population which resided in agglomerated settlements of over 100,000 people.<sup>1</sup> On the horizontal axis was put the 1971 population density (in thousands of inhabitants per square kilometre, obtained from "Regional Statistics"). It was found that when values for the level II regions were plotted, three reasonably clear, downward-sloping discontinuities in the pattern of observations could be identified. These were used to divide the regions into four groups which were then labelled according to their degree of "urbanisation", thus:

"Highly Urbanised":	21 Regions
"Urbanised ":	23 Regions
"Less Urbanised":	32 Regions
"Rural":	29 Regions
<hr/>	
Total EEC 9	105 Regions

The names of regions in each group are listed in one of the following tables, while another provides a cross-tabulation against grouping by EEC regional location.

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<sup>1</sup> Numbers in such settlements were taken from Hall P. and Hay D., "European Urban Systems: Definition and Measurement of Urban Areas", A Report to the Commission, October 1979, Appendix 1, p. 91. This study carefully defined and measured the 1971 population of urban agglomerations of 100,000 inhabitants or more on the basis of a common, detailed and consistent morphological definition applied to settlements in each member country. These values were then related to 1971 regional population totals derived from 'Regional Statistics'.



## CENTRAL REGIONS

002 Hamburg  
007 Weser Ems  
011 Bremen  
012 Dusseldorf  
013 Koln  
014 Munster  
015 Detmold  
016 Arnsberg  
017 Darmstadt  
019 Koblenz  
021 Rheinhessen-Pfalz  
022 Stuttgart  
023 Karlsruhe  
024 Freiburg  
025 Tübingen  
033 Saarland  
034 Berlin-West  
035 Ile-de-France  
040 Nord-Pas-de-Calais  
042 Alsace  
060 Utrecht  
061 Noord-Holland  
062 Zuid-Holland  
064 Noord-Brabant  
065 Limburg  
066 Overijssel  
067 Gelderland  
088 Antwerpen  
089 Limbourg  
090 Oost Vlaanderen  
091 West Vlaanderen  
092 Brabant  
093 Hainaut  
094 Liege  
104 South East

## PERIPHERAL REGIONS

044 Pays de la Loire  
045 Bretagne  
046 Poitou-Charentes  
047 Aquitaine  
048 Midi-Pyrenees  
049 Limousin  
051 Auvergne  
052 Languedoc-Roussillon  
053 P.A. Cote d'Azur  
054 Corse  
069 Valle d'Aosta  
072 Trentino-Alto Adige  
073 Veneto  
074 Friuli-Venezia Giulia  
076 Toscana  
077 Umbria  
078 Marche  
079 Lazio  
080 Campania  
081 Abruzzi  
082 Molise  
083 Puglia  
084 Basilicata  
085 Calabria  
086 Sicilia  
087 Sardegna  
098 North  
106 Wales  
107 Scotland  
108 Northern Ireland  
109 Ireland  
111 Ost for Storebaelt  
112 Vest for Storebaelt

## INTERMEDIATE REGIONS

001 Schleswig-Holstein	
003 Hannover	097 Luxembourg G.D.
005 Luneburg	
009 Braunschweig	099 Yorks Humberside
018 Kassel	100 North West
020 Trier	101 East Midlands
026 Oberbayern	102 West Midlands
027 Niederbayern	103 East Anglia
028 Oberpfalz	105 South West
029 Oberfranken	
030 Mittelfranken	110 Storkobenhavn
031 Unterfranken	
032 Schwaben	
036 Champagne-Ardenne	
037 Picardie	
038 Haute-Normandie	
039 Bourgogne	
041 Lorraine	
043 Franche-Comte	
050 Rhone-Alpes	
055 Centre	
056 Basse-Normandie	
057 Groningen	
058 Friesland	
059 Drenthe	
063 Zeeland	
068 Piemonte	
070 Liguria	
071 Lombardia	
075 Emilia Romagna	
095 Luxembourg	
096 Namur	

URBANISATION CATEGORY

## HIGHLY URBANISED

002 Hamburg  
 011 Bremen  
 012 Dusseldorf  
 013 Koln  
 016 Arnsberg  
 034 West Berlin  
 035 Ile-de-France  
 040 Nord-Pas-de-Calais  
 060 Utrecht  
 064 Noord-Holland  
 062 Zuid-Holland  
 088 Antwerpen  
 092 Brabant  
 104 South East  
 030 Mittelfranken  
 070 Liguria  
 099 Yorkshire-Humberside  
 100 North West  
 102 West Midlands  
 079 Lazio  
 205 Provence-Alpes-Cote d'Azur-Corse

## URBANISED

017 Darmstadt  
 022 Stuttgart  
 023 Karlsruhe  
 042 Alsace  
 064 Noord-Brabant  
 067 Gelderland  
 009 Braunschweig-Hildesheim  
 026 Oberbayern  
 038 Haute-Normandie  
 050 Rhone-Alpes  
 057 Groningen  
 068 Piemonte  
 071 Lombardia  
 075 Emilia Romagna  
 044 Pays de la Loire  
 047 Aquitaine  
 074 Friuli-Venezia Giulia  
 076 Toscana  
 077 Umbria  
 080 Campania  
 086 Sicilia  
 098 North  
 107 Scotland

URBANISATION CATEGORY

## LESS URBANISED

007 Weser Ems  
 014 Munster  
 015 Detmold  
 021 Rheinhessen-Pfalz  
 033 Saarland  
 065 Limburg  
 066 Overijssel  
 089 Limbourg  
 090 Oost Vlaanderen  
 091 West Vlaanderen  
 093 Hainaut  
 094 Liege  
 001 Schleswig-Holstein  
 003 Hannover  
 020 Trier  
 036 Champagne-Ardenne  
 041 Lorraine  
 043 Franche-Comte  
 101 East Midlands  
 103 East Anglia  
 105 South West  
 045 Bretagne  
 048 Midi-Pyrenees  
 049 Limousin  
 052 Languedoc-Roussillon  
 073 Veneto  
 083 Puglia  
 087 Sardinia  
 106 Wales  
 108 Northern Ireland  
 109 Ireland  
 206 Danmark

## RURAL

019 Koblenz  
 024 Freiburg  
 025 Tubingen  
 005 Luneburg  
 018 Kassel  
 027 Niederbayern  
 028 Oberpfalz  
 029 Oberfranken  
 031 Unterfranken  
 032 Schwaben  
 037 Picardie  
 039 Bourgogne  
 055 Centre  
 056 Basse-Normandie  
 058 Friesland  
 059 Drenthe  
 063 Zeeland  
 095 Luxembourg  
 096 Namur  
 097 Luxembourg GD  
 046 Poitou-Charentes  
 051 Auvergne  
 069 Valle d'Aosta  
 072 Trentino-Alto Adige  
 078 Marche  
 081 Abruzzi  
 082 Molise  
 084 Basilicata  
 085 Calabria

HIGHLY URBANISED

URBANISED

LESS URBANISED

RURAL

CENTRAL

Hamburg  
Bremen  
Dusseldorf  
Koln  
Arnsberg  
West Berlin  
Ile-de-France  
Nord-Pas-de-Calais  
Utrecht  
Noord-Holland  
Zuid-Holland  
Antwerpen  
Brabant  
South East

Darmstadt  
Stuttgart  
Karlsruhe  
Alsace  
Noord-Brabant  
Gelderland

Weser Ems  
Munster  
Detmold  
Rheinessen-Pfalz  
Saarland  
Limburg  
Overijssel  
Limbourg  
Oost Vlaanderen  
West Vlaanderen  
Hainaut  
Liege

Koblenz  
Freiburg  
Tubingen

EEC REGIONAL LOCALIZATION

INTERMEDIATE

Mittelfranken  
Liguria  
Yorkshire-Humberside  
North West  
West Midlands  
Storkobenhavn

Braunschweig-Hildesheim  
Oberbayern  
Haute-Normandie  
Rhone-Alpes  
Groningen  
Piemonte  
Lombardia  
Emilia Romagna

Schleswig-Holstein  
Hannover  
Trier  
Champagne-Ardenne  
Lorraine  
Franche-Comte  
East Midlands  
East Anglia  
South West

Luneburg  
Kassel  
Niederbayern  
Oberpfalz  
Oberfranken  
Unterfranken  
Schwaben  
Picardie  
Bourgogne  
Centre  
Basse-Normandie  
Friesland  
Drenthe  
Zeeland  
Luxembourg  
Namur  
Luxembourg G D

PERIPHERAL

Lazio  
Provence-Alpes-Cote  
d'Azur-Corse

Pays de la Loire  
Aquitaine  
Friuli-Venezia Giulia  
Toscana  
Umbria  
Campania  
Sicilia  
North  
Scotland

Bretagne  
Midi-Pyrenees  
Limousin  
Languedoc-Roussillon  
Veneto  
Puglia  
Sardinia  
Wales  
Northern Ireland  
Ireland  
Vest for Storebaelt

Poitou-Charentes  
Auvergne  
Valle d'Aosta  
Trentino-Alto Adige  
Marche  
Abruzzi  
Molise  
Basilicata  
Calabria  
Ost for Storebaelt

\*

\*Danmark as a single region would occur here.

### D.3 Employment Classification

In analysing Labour Force Survey employment data, as recorded in 'Regional Statistics' and unpublished tables, the project had no alternative than to use the broad sectoral (industrial) grouping provided by the 11-sector official NACE classification system. The particular industries falling in each section are listed in the following table. It should be noted that separate figures were available for category 91 and for category 9 excluding 91.

The services group as a whole (NACE's 6, 7, 8, 91, and the rest of 9) was also sub-divided into "producer services" (= NACE7 + NACE8) and "consumer services" (= NACE6 + NACE91 + NACE9) reflecting a difference between the services dealing with industry, and those supplying final consumer demand. The ratio between these two groups was labelled the "Services Structure Index". A further sub-total of NACE2, NACE3 and NACE4 was labelled "Manufacturing". The ratio between NACE3 ("metal manufacture; mechanical, electrical and instrument engineering") and NACE4 ("food, textiles, leather, paper, rubber, other") is intended to reflect the degree of modernity in a region's manufacturing industry, and has been labelled the "Manufacturing Structure Index".

**SUMMARY TABLE OF DIVISIONS  
AND CLASSES OF THE N.A.C.E.**

256

- 0. AGRICULTURE, HUNTING, FORESTRY AND FISHING
  - 01 Agriculture and hunting
  - 02 Forestry
  - 03 Fishing
- 1. ENERGY AND WATER
  - 11 Extraction and briquetting of solid fuels
  - 12 Coke ovens
  - 13 Extraction of petroleum and natural gas
  - 14 Mineral oil refining
  - 15 Nuclear fuels industry
  - 16 Production and distribution of electricity, gas, steam and hot water
  - 17 Water supply: collection, purification and distribution of water
- 2. EXTRACTION AND PROCESSING OF NON-ENERGY-PRODUCING MINERALS AND DERIVED PRODUCTS; CHEMICAL INDUSTRY
  - 21 Extraction and preparation of metalliferous ores
  - 22 Production and preliminary processing of metals
  - 23 Extraction of minerals other than metalliferous and energy-producing minerals; peat extraction
  - 24 Manufacture of non-metallic mineral products
  - 25 Chemical industry
  - 26 Man-made fibres industry
- 3. METAL MANUFACTURE; MECHANICAL, ELECTRICAL AND INSTRUMENT ENGINEERING
  - 31 Manufacture of metal articles (except for mechanical, electrical and instrument engineering and vehicles)
  - 32 Mechanical engineering
  - 33 Manufacture of office machinery and data processing machinery
  - 34 Electrical engineering
  - 35 Manufacture of motor vehicles and of motor vehicle parts and accessories
  - 36 Manufacture of other means of transport
  - 37 Instrument engineering
- 4. OTHER MANUFACTURING INDUSTRIES
  - 41/42 Food, drink and tobacco industry
  - 43 Textile industry
  - 44 Leather and leather goods industry (except footwear and clothing)
  - 45 Footwear and clothing industry
  - 46 Timber and wooden furniture industries
  - 47 Manufacture of paper and paper products; printing and publishing
  - 48 Processing of rubber and plastics
  - 49 Other manufacturing industries
- 5. BUILDING AND CIVIL ENGINEERING
  - 50 Building and civil engineering
- 6. DISTRIBUTIVE TRADES, HOTELS, CATERING, REPAIRS
  - 61 Wholesale distribution (except dealing in scrap and waste materials)
  - 62 Dealing in scrap and waste materials
  - 63 Agents
  - 64/65 Retail distribution
  - 66 Hotels and catering
  - 67 Repair of consumer goods and vehicles
- 7. TRANSPORT AND COMMUNICATION
  - 71 Railways
  - 72 Other land transport (urban transport, road transport etc.)
  - 73 Inland water transport
  - 74 Sea transport and coasting shipping
  - 75 Air transport
  - 76 Supporting services to transport
  - 77 Travel agents, freight brokers and other agents facilitating the transport of passengers or goods; storage and warehousing
  - 79 Communication
- 8. BANKING AND FINANCE, INSURANCE, BUSINESS SERVICES, RENTING
  - 81 Banking and finance
  - 82 Insurance except for compulsory social insurance
  - 83 Activities auxiliary to banking and finance and insurance; real estate transactions (except letting of real estate by the owner), business services
  - 84 Renting, leasing and hiring of movables
  - 85 Letting of real estate by the owner
- 9. OTHER SERVICES
  - 91 Public administration, National defence and compulsory social security
  - 92 Sanitary services and administration of cemeteries
  - 93 Education
  - 94 Research and development
  - 95 Medical and other health services; veterinary services
  - 96 Other services provided to the general public
  - 97 Recreational services and other cultural services
  - 98 Personal services
  - 99 Domestic services
  - 00 Diplomatic representation, international organizations and allied armed forces

Source: "General Industrial Classification of Economic Activities within the European Communities", Eurostat, 1970.

APPENDIX E: THEIL ENTROPY INDICESForm of the Index

The Theil Entropy Index compares actual regional shares of a single variable with expected regional shares for the same variable. The formula yields an index which describes the degree of relative concentration in only a few regions of a given phenomenon, as that is distributed across a larger total set of regions, at a particular point in time. Comparison of indices for different years provides a measure of whether the phenomenon is tending to become more concentrated in those regions which already possess the largest volumes of the phenomenon, or more dispersed because of relative gains by regions with formerly only small volumes.

The Theil Entropy Index possesses an important advantage, compared with other standard inequality indices: namely the property of decomposition, into 'between-set' and 'within-set' components, which sum by simple addition to the total inequality value. In the EEC case, this permits simultaneous estimation of trends within the regions of each member country, and of the Community as a whole, as well as of the contribution of between-country and within-country variations to the total Community inequality index. This advantage renders it markedly more useful for present purposes than other less flexible or cruder measures of inequality such as the Gini coefficient (Theil, 1967, p123), the coefficient of variation, mean square deviation,  $R^2$ , Florence's coefficient of geographic association, and so on (see Molle, 1978).

The particular form of the Index used in this study follows the original Theil (1967, p.95) methodology, and is the version in which regional shares in a single variable (e.g. population) are compared with expected equal regional shares of that same variable (Keeble, 1976, pp 25-29). Thus in a 100-region case with population as the single variable, each region would be expected to account for 1% of the total population of the whole area. Total spatial equality, present when actual shares are identical with these equal shares, yields an inequality index of zero, but the more actual shares deviate from this 'equal-share' position, because various regions have larger and smaller than equal shares,



the higher the resultant  $I_{(y)}$  index.

Maximum spatial inequality occurs when the whole phenomenon is concentrated in only one region, the remainder having zero shares, and is given by  $\log N$ , where  $N$  is the number of regions.

As such, this formulation differs in one important respect from that used by Molle (1978) and SOEC (1978). The latter studies measure the overall difference in regional shares across the EEC between two separate variables, such as GDP and population: a low value for the resultant index then indicates a close similarity between the shares of regions with respect to the two different variables compared, with a high value indicating a marked difference. The version used here however, can provide, if measured for two or more points in time, a measure of changes in the relative distribution of the phenomenon concerned between big and small regions. An increasing index, as found for example for tertiary industry by Martin (1972) in his study of employment inequality within East Anglia in the 1960s, indicates that the phenomenon is becoming increasingly spatially concentrated in already large regions or areas. Conversely, a declining index, as with manufacturing industry in the Martin study, indicates relative dispersion with smaller regions increasing their shares at the expense of larger ones. The index does not, of course, directly measure locational trends in terms of centrality or peripherality (although in many countries, the largest regions also tend to be more 'central', in potential terms).

### Data Considerations

Level II regional employment data are available from two sources: one set, supplied by Mr. Steinle is harmonised over the period 1970-77, and refers to total employment; the other is published by Eurostat for the years 1973, 1975, and 1977 and is disaggregated employment data based on the Labour Force Survey.

However, both sets of data seem to use a rather unfortunate definition of employment. Rather than being restricted purely to 'persons in employment' both the Labour Force Survey and the harmonised statistics include self-employed persons and family workers (e.g. see Eurostat's "Regional Statistics" 1978, Table 15, and p.55). Since the proportion of self employed persons varies considerably from one country to another, and the numbers of family workers are not even recorded by all countries, (see table below) this will have a bearing on the results of the Theil analyses.

Table 15.

Selected Employment Statistics (from Eurostat's Regional Statistics, 1975)

	<u>Self Employed</u>		<u>*Family Workers</u>	
Community Country with:				
Largest proportion	Italy	(21.2%)	Italy	(5.8%)
Smallest proportion	U.K.	(8.7%)	Nederlands	(1.9%)

\*No data is recorded in this category for the U.K.

In addition, LFS data is based on private households only; the population living in varieties of "collective households", and most significantly, "workers hostels" were not included. Though Eurostat estimates only 3% of the total population escaped enumeration (see Regional Statistics, 1978, p.55) it is almost certain that such households are not evenly distributed, and that this aspect could be another source of distortion in the analyses.

## Results

Results of the Theil analyses are shown on Graphs 1 to 25 , and the most important findings (for total resident population, employment, industry including manufacturing, consumer and producer services) are given below.

### Population (Graphs 1-5)

Trends for the EEC as a whole are plotted on Graph 1 which shows a clear overall picture. Despite some fluctuation, the regional distribution of population was relatively stable from 1961 to 1969, but during the 1970s the value of the Theil index fell. The 1970s then was a period of population dispersion so that the population share of the 'larger' countries became progressively smaller year by year. Separate results for between-country and within-country components confirm that the overall trend is mainly due to relative shifts from one country to another. Interestingly, the within-country component indicates a tendency towards concentration of population during the 1960s, changing in the 1970s, with a static and eventually declining index by 1977.

When the population analyses are examined more closely on a country by country basis, the most interesting contrasts are not between 'central' and 'peripheral' countries. Instead it is noticeable that at the within-country level there are some similarities between large countries (for example comparing France, Italy and Germany) and that dispersion of population is most striking in the United Kingdom and Netherlands, where strong regional policies have operated. At the between-country scale it is again the trends in the largest countries (for example, comparing the United Kingdom and Germany), rather than centrality or peripherality per se, which are the most striking.

Total Employment (Based on Harmonised Data, Graphs 6-10)

Whereas EUR9 population showed a tendency towards dispersion during the 1970s, total regional employment tended to concentrate. This was quite a marked tendency with the total inequality index rising. The rise in the value of the index was entirely due to a rise in the between-country component, rather than the within-country measure which actually declined throughout the entire period. It might be supposed that during these years, particularly during the recession from 1973 onwards, this concentration would occur most markedly in 'central' countries: in fact when the between-country results for individual countries are examined it is contrasts in scale once again (for example compare France, United Kingdom and Italy versus The Netherlands and Belgium) rather than centrality or peripherality, which are most striking. At the within-country scale dispersion of employment was the clear trend, except in Italy - again an interesting result in so far as there was a general recession from 1973 onwards.

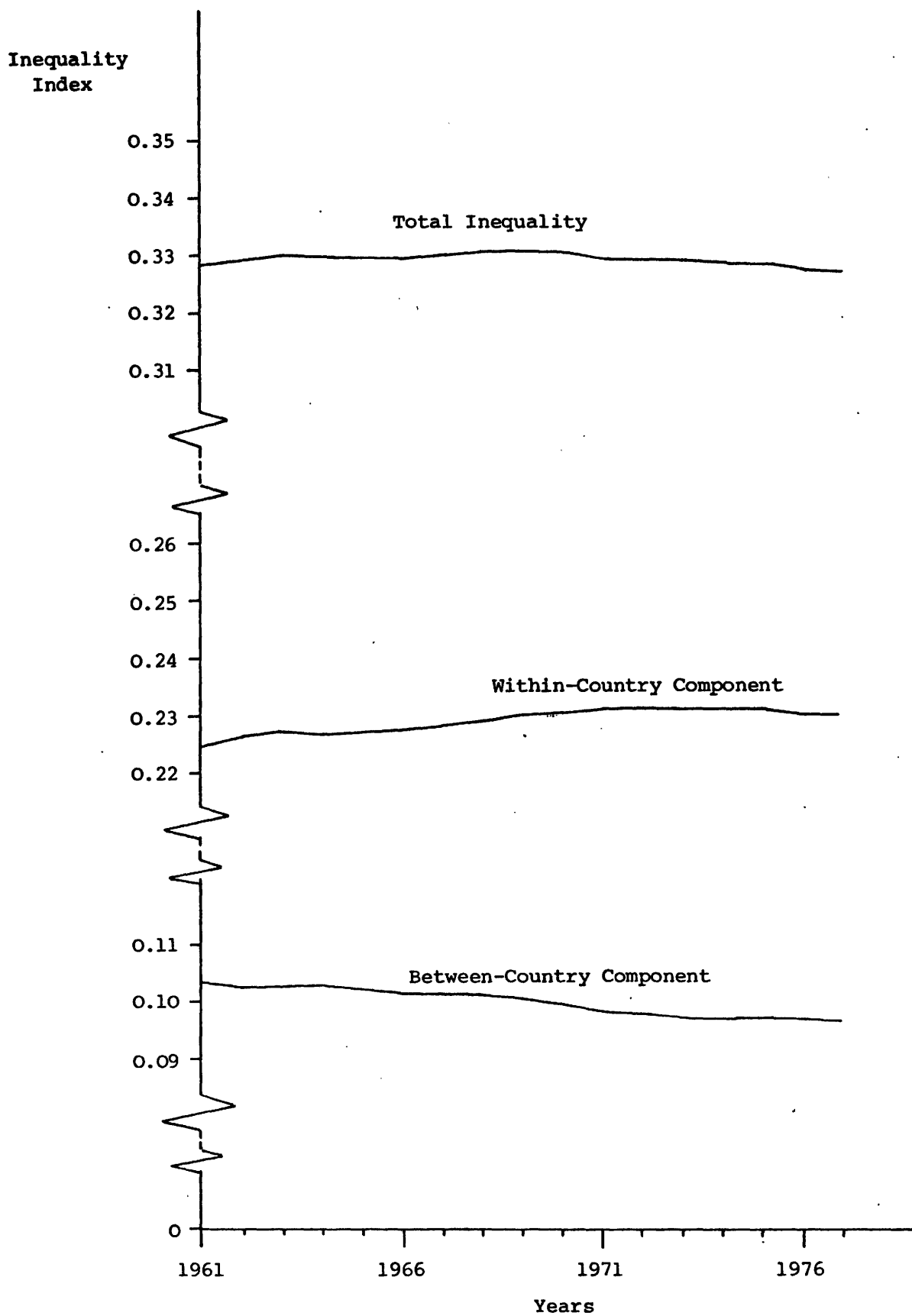
Employment by Sector (Graphs 11-25)

Graphs 7-15, for Industry, Consumer Services, and Producer Services, are based on Labour Force Survey data, but since this is only available for 1973, 1975 and 1977 the results must, of course, be regarded as extremely tentative.

For Industry as a whole the most obvious feature of the graphs is a dip in the value of the inequality index coinciding with the trough of recession in 1975. More interestingly the within-country results may suggest that the response to recession was stronger, in terms of both effect and recovery, in Italy and the United Kingdom which are generally regarded as having relatively weak economies. The graph of within-country inequality on the other hand is much more stable in the case of 'central' countries.

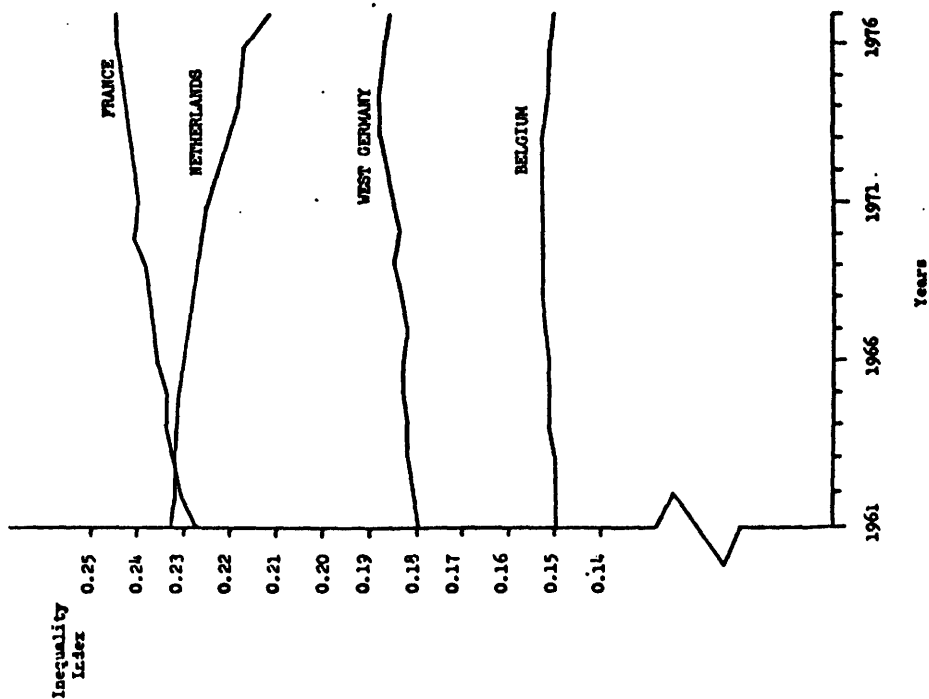
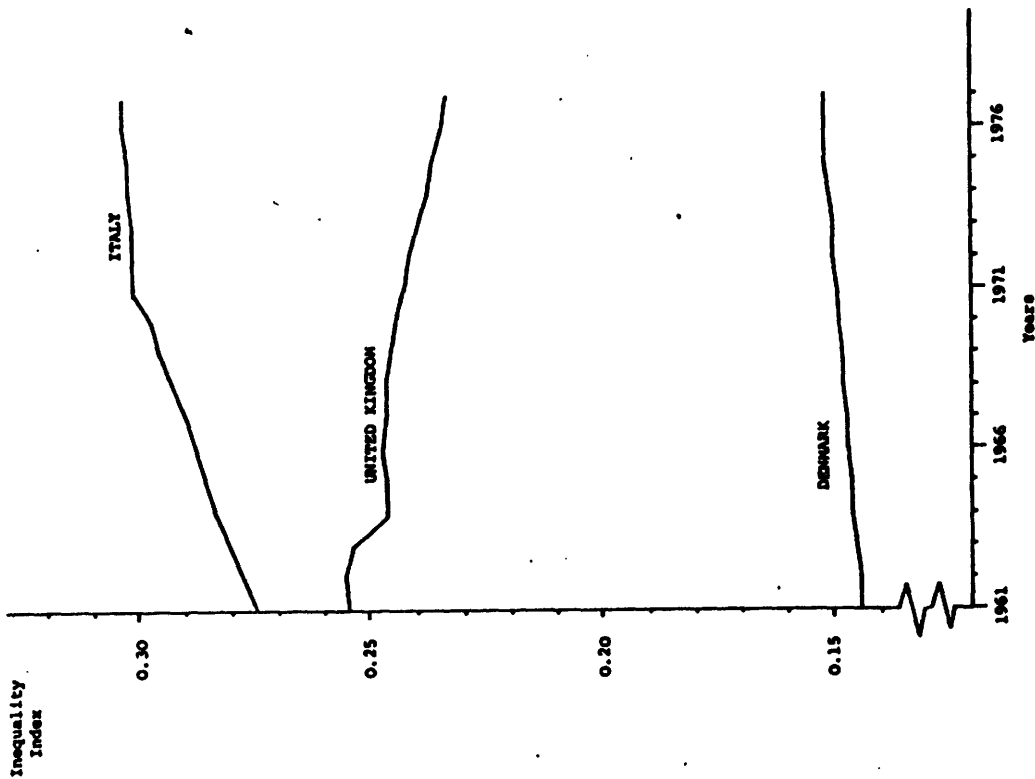
For services the most interesting feature of the graphs is the clear trend towards within-country dispersion of employment. This trend tends to mirror and confirm the results which were obtained for population,

especially from 1975 onwards. This trend is clear for both consumer and producer services, though in the latter case the graph dips only after 1975. The total inequality index for both types of services is strongly influenced by the between-country component. Services do appear to provide an interesting contrast between central and peripheral countries. In Germany, for example, the general trend was for a fall in the Theil Index, but in Italy the opposite was true; similarly, France showed some signs of concentration of service employment up to 1975, but there was quite noticeable decline by 1977; the United Kingdom shows an exactly opposite trend.



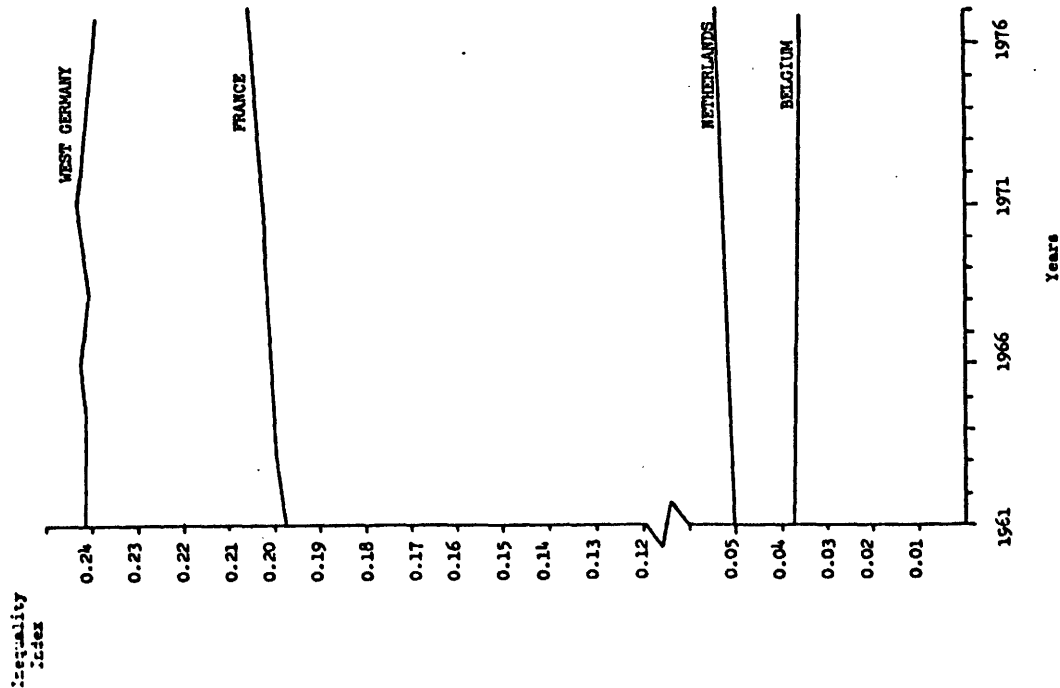
2. Population

Within-country Inequality: France, Netherlands, West Germany, Belgium



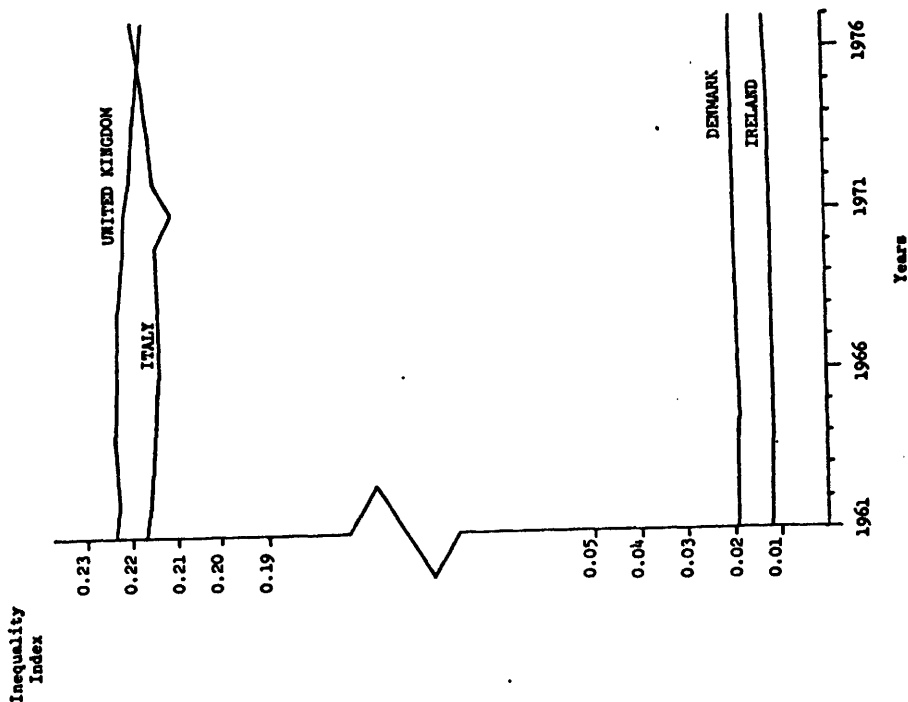
4. Population

Between-country Inequality: France, Netherlands, West Germany, Belgium

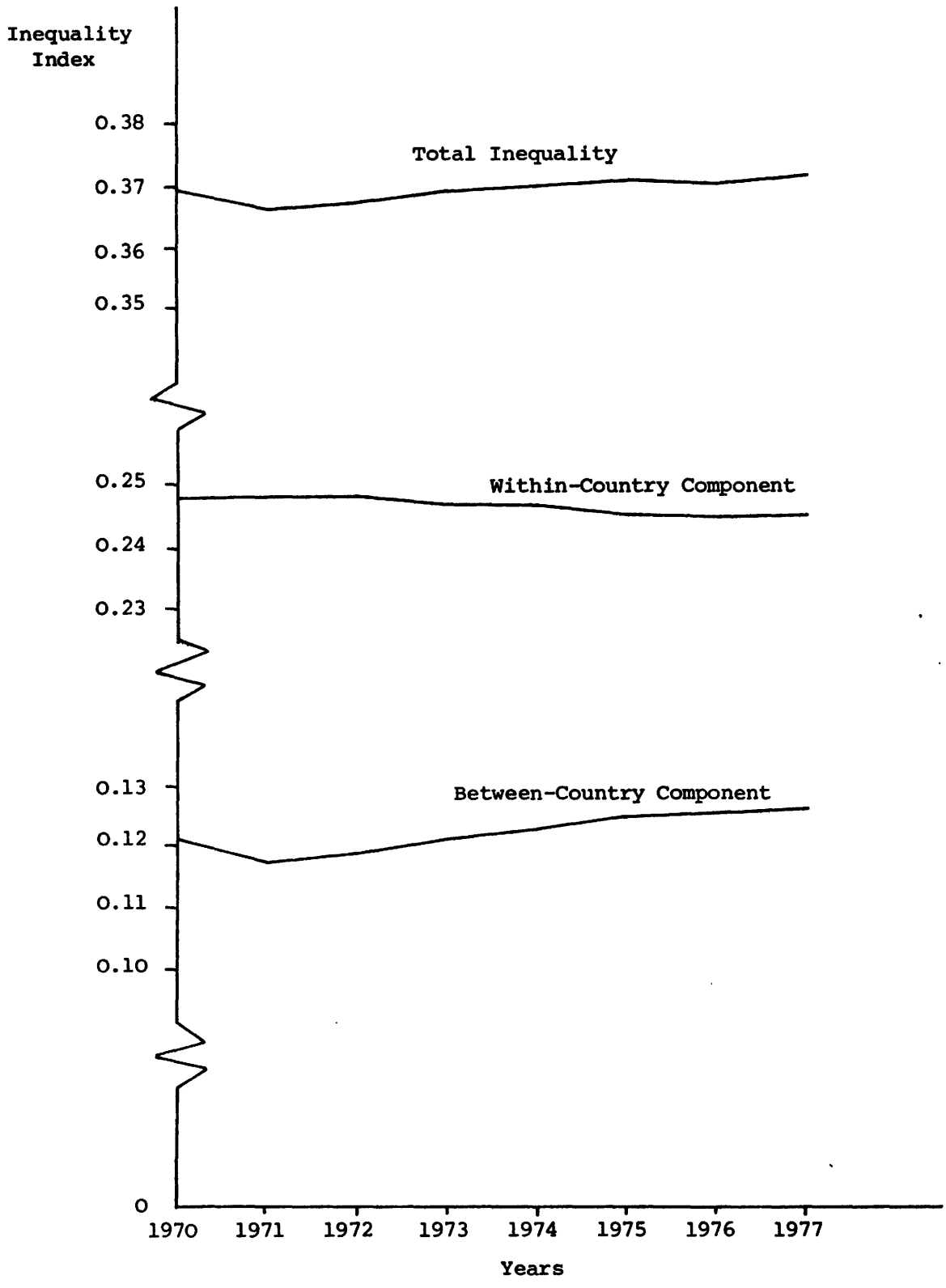


5. Population

Between-country Inequality: Italy, U.K., Denmark

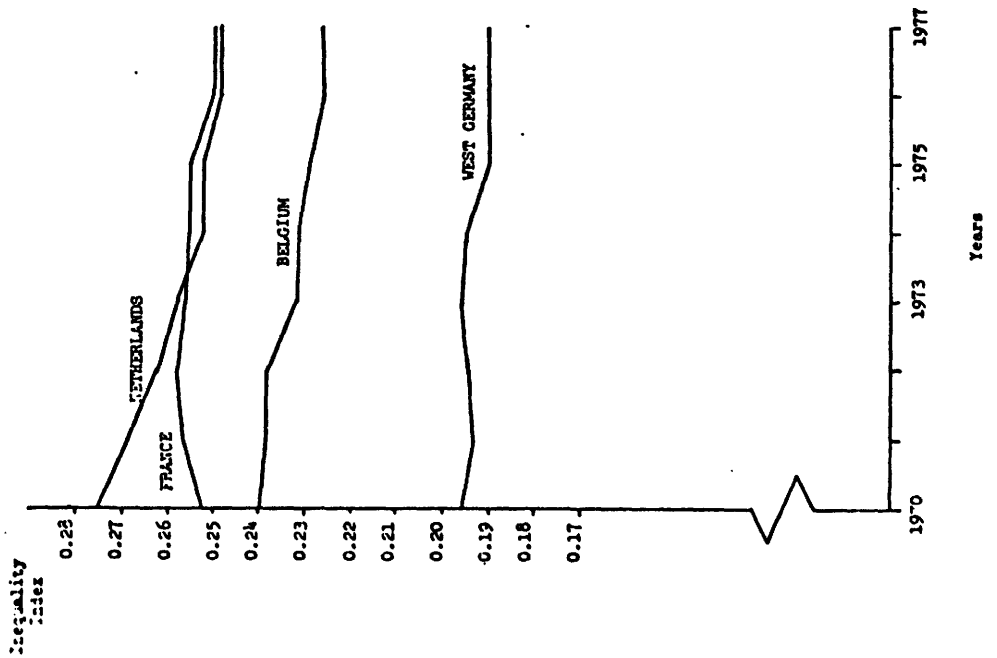






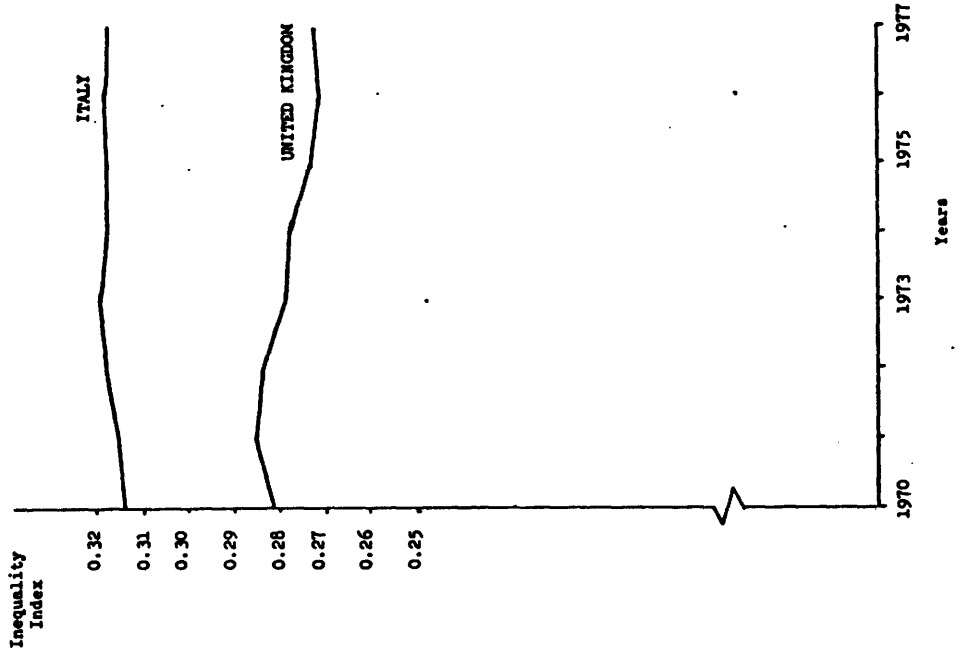
7. Employment

Within-country Inequality: France, Netherlands, West Germany, Belgium

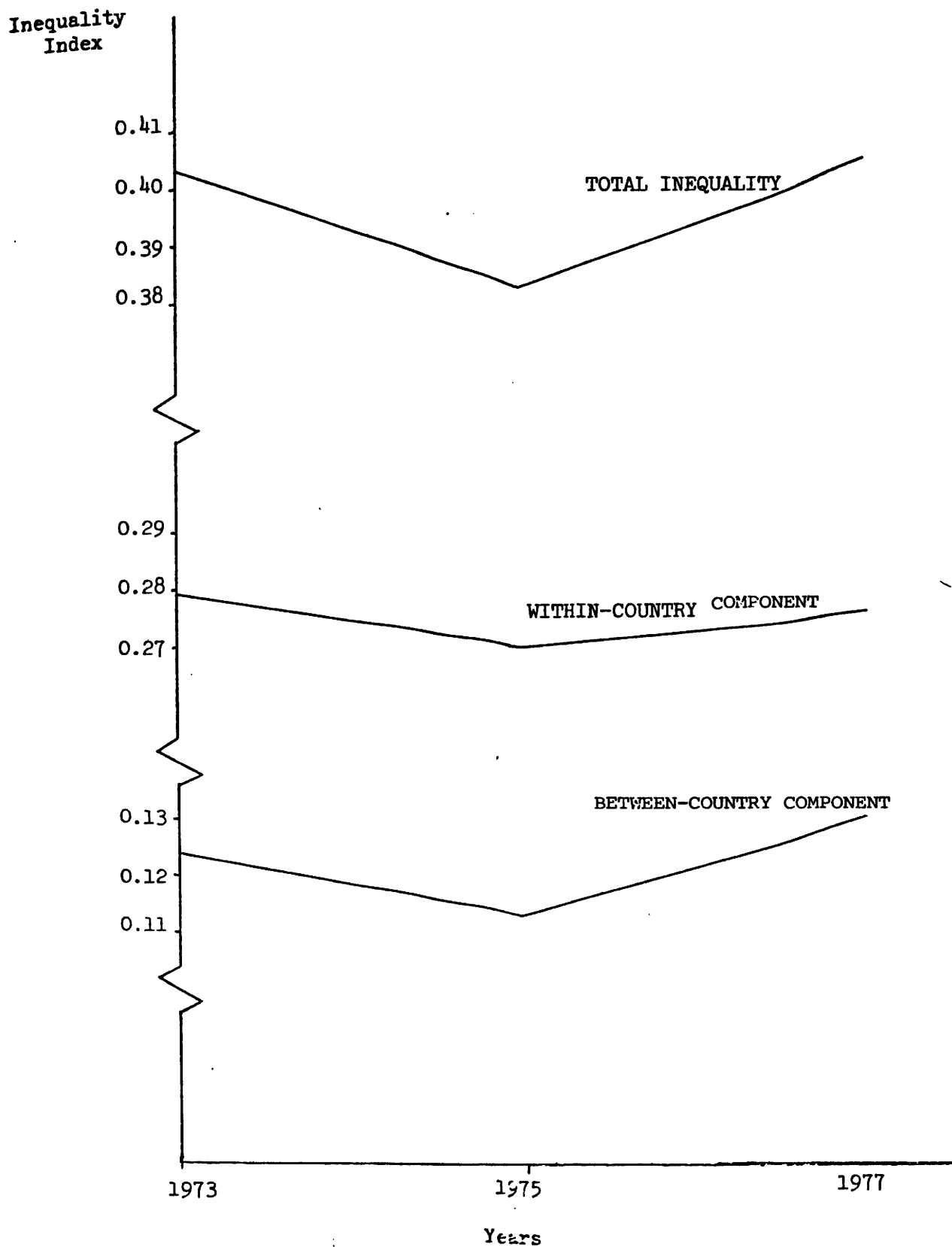


8. Employment

Within-country Inequality: Italy, U.K.

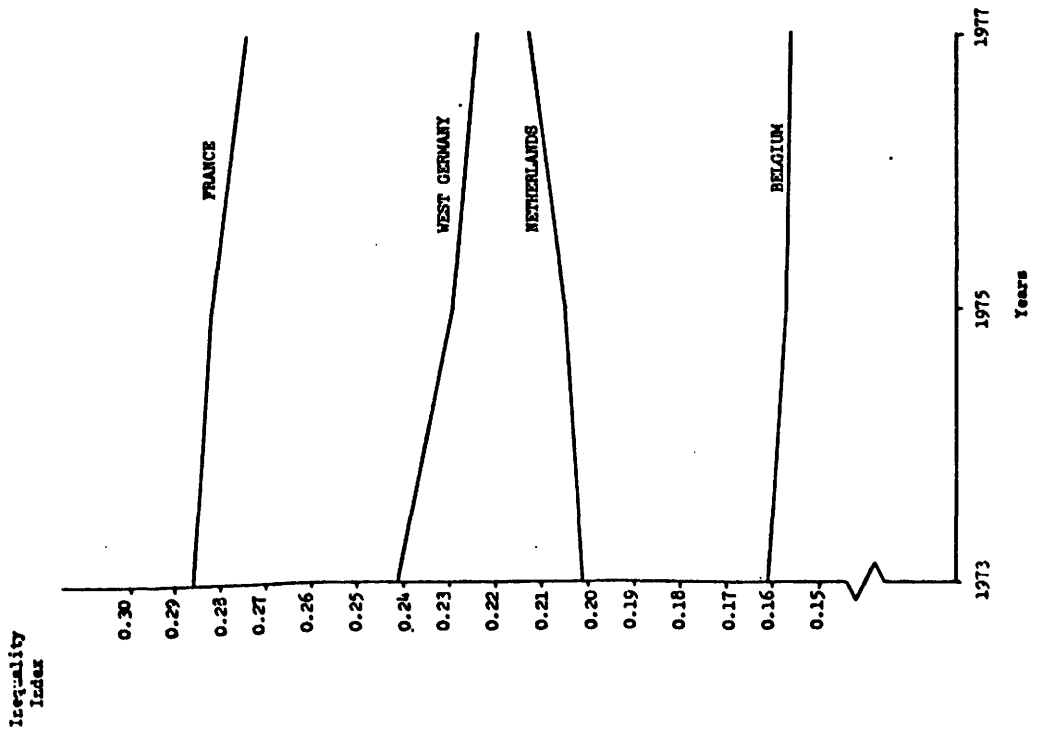




11. EUR 9 Industry: Total Regional Inequality

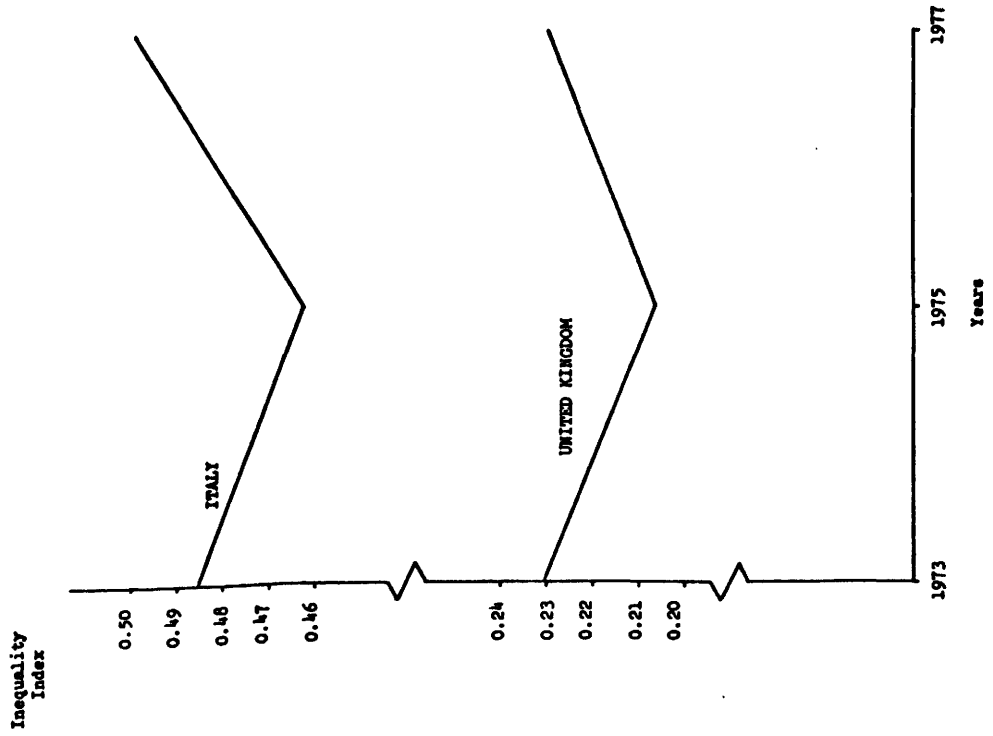
12. Industry

Within-country Inequality: France  
Netherlands, West Germany, Belgium



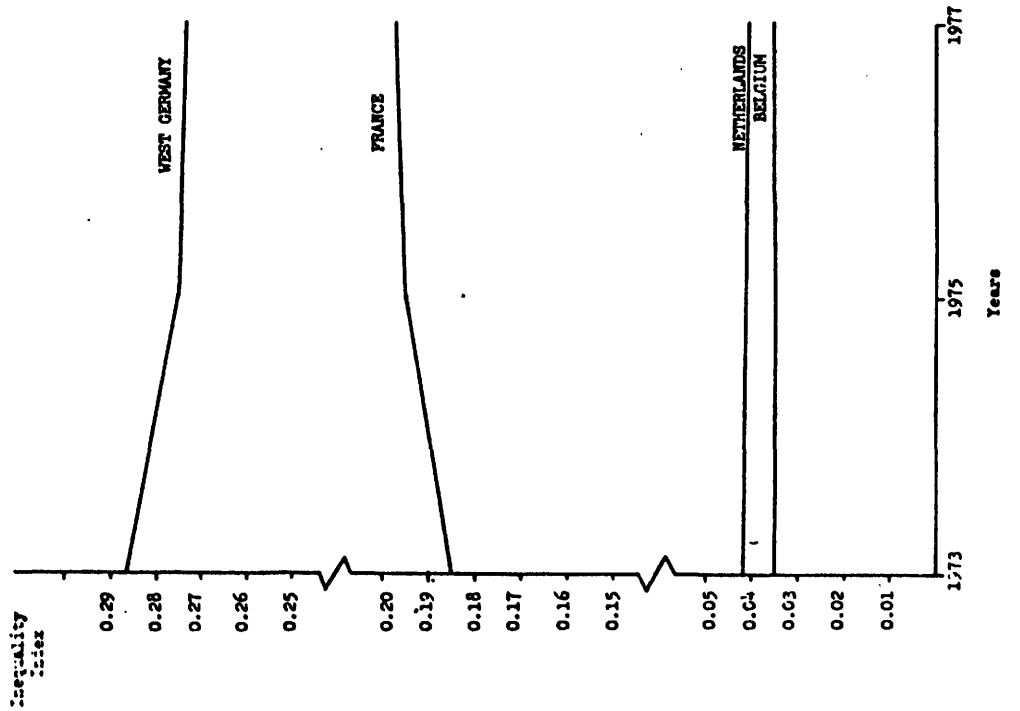
13. Industry

Within-country Inequality: U.K., Italy



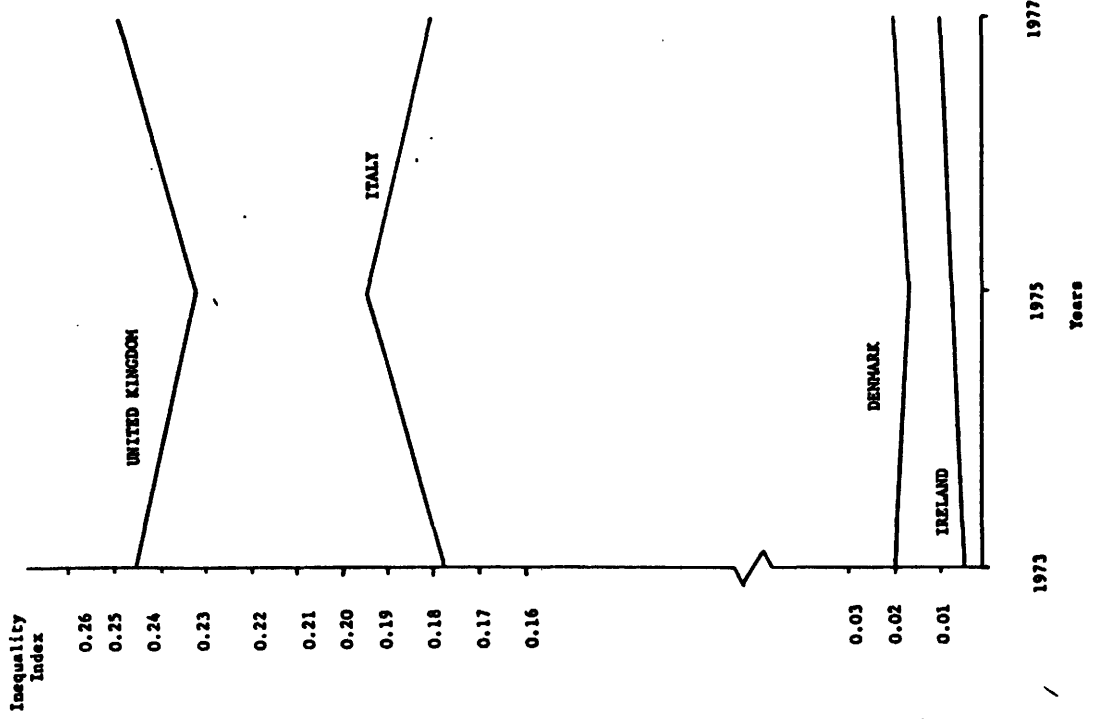
14. Industry

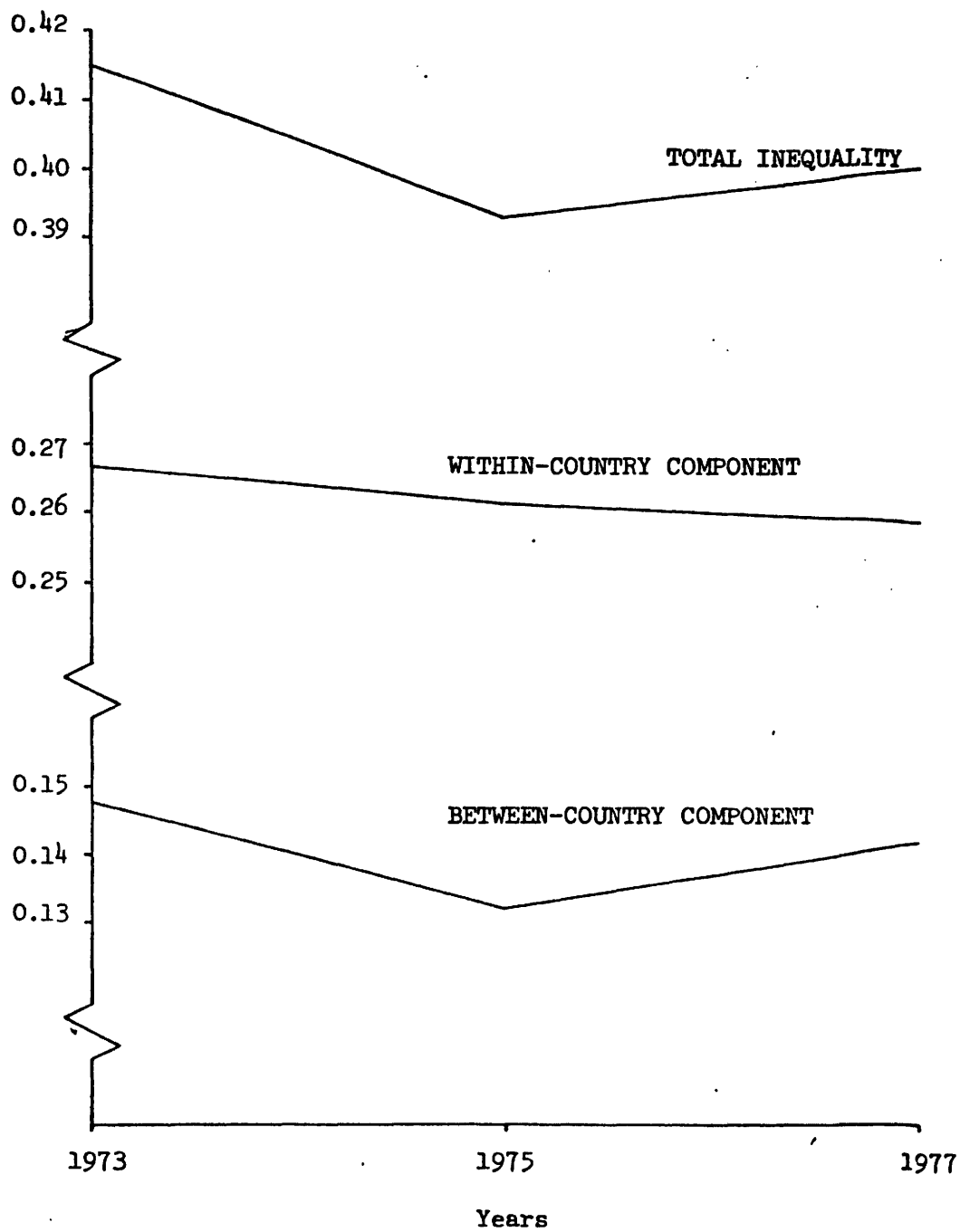
Between-country Inequality: France  
Netherlands, West Germany, Belgium



15. Industry

Within-country Inequality: U.K.  
Italy, Denmark

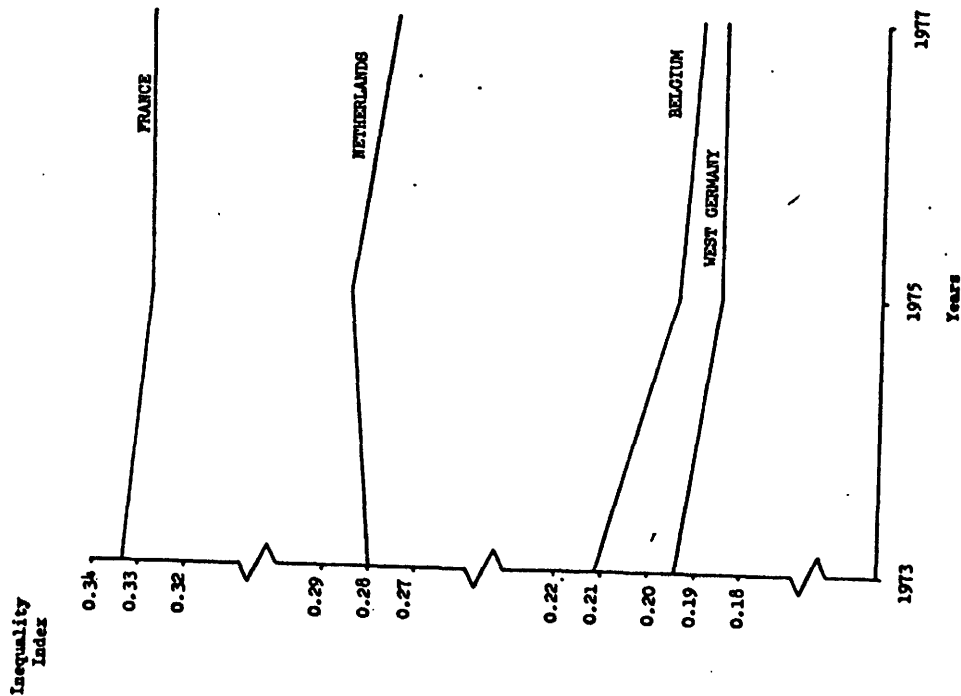


16. EUR 9 Consumer Services: Total Regional InequalityInequality  
Index

17. Consumer Services

Within-country Inequality: France

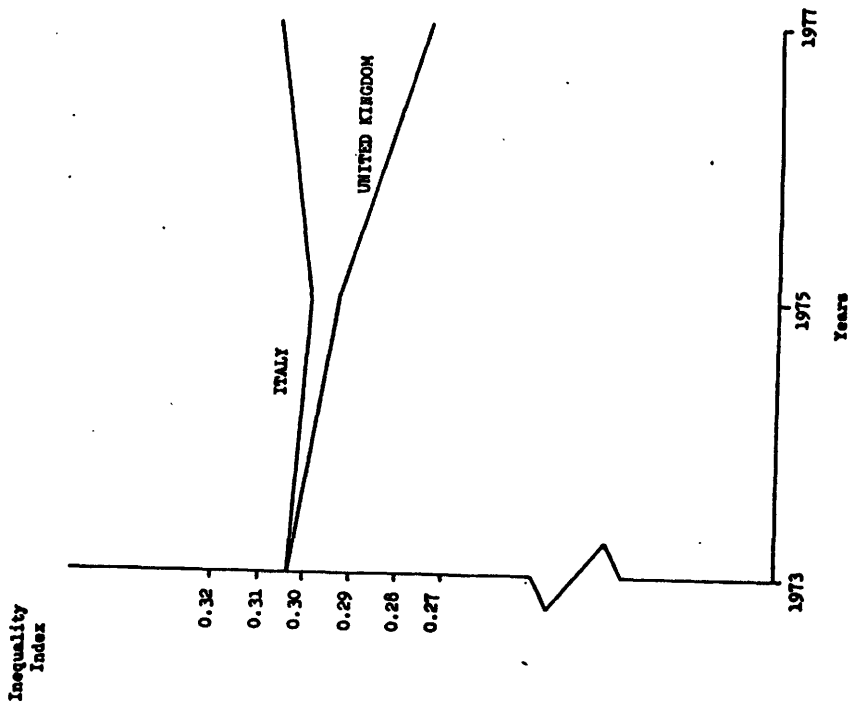
Netherlands, West Germany, Belgium



18. Consumer Services

Within-country Inequality:

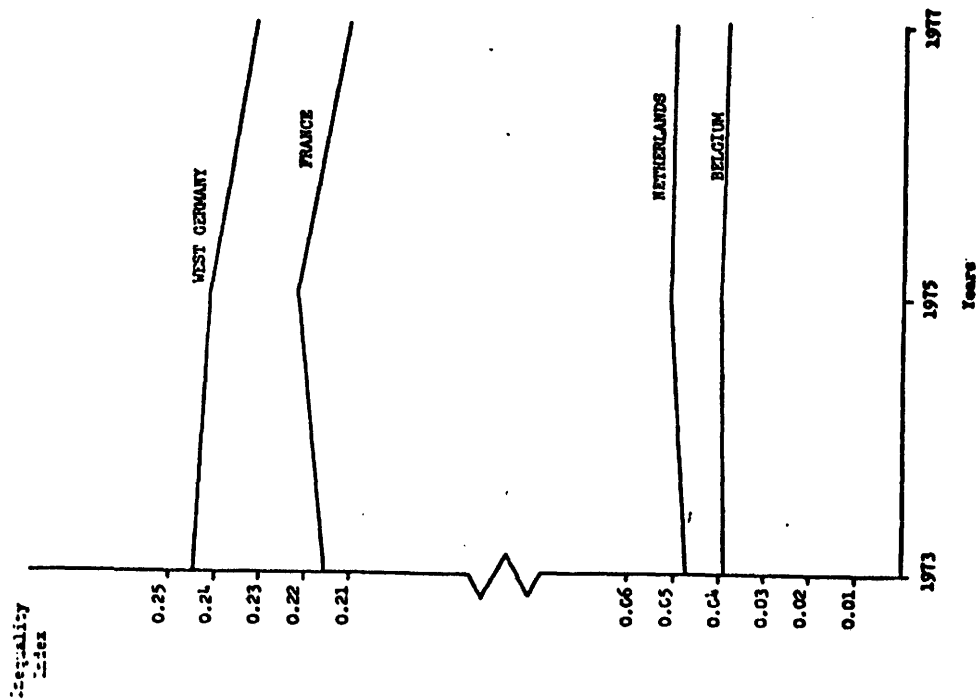
Italy, U.K.





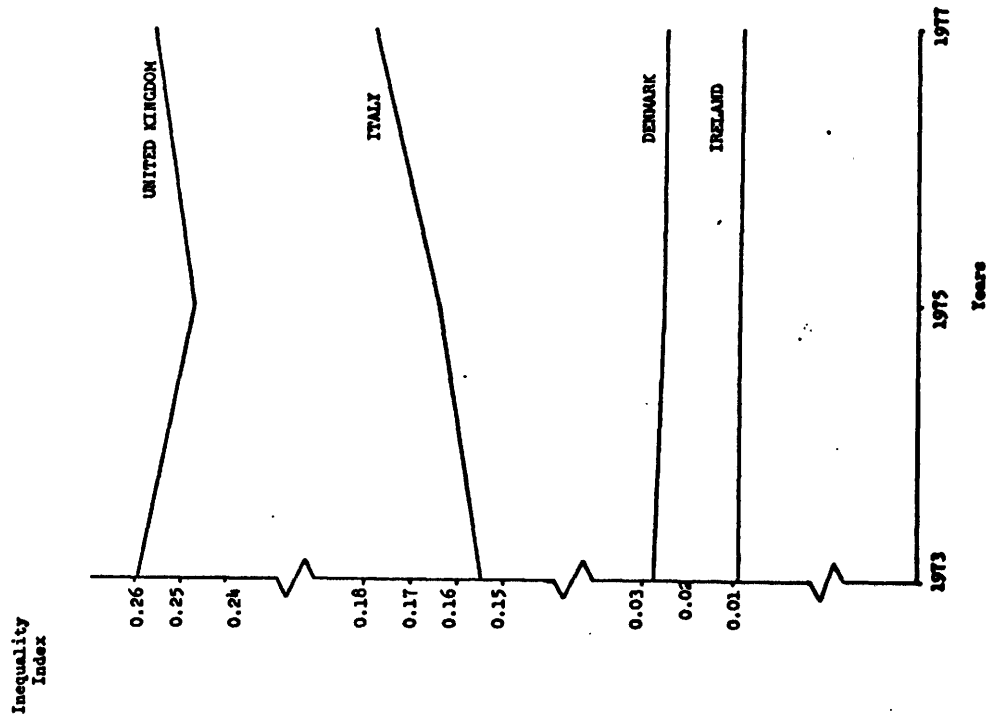
19. Consumer Services

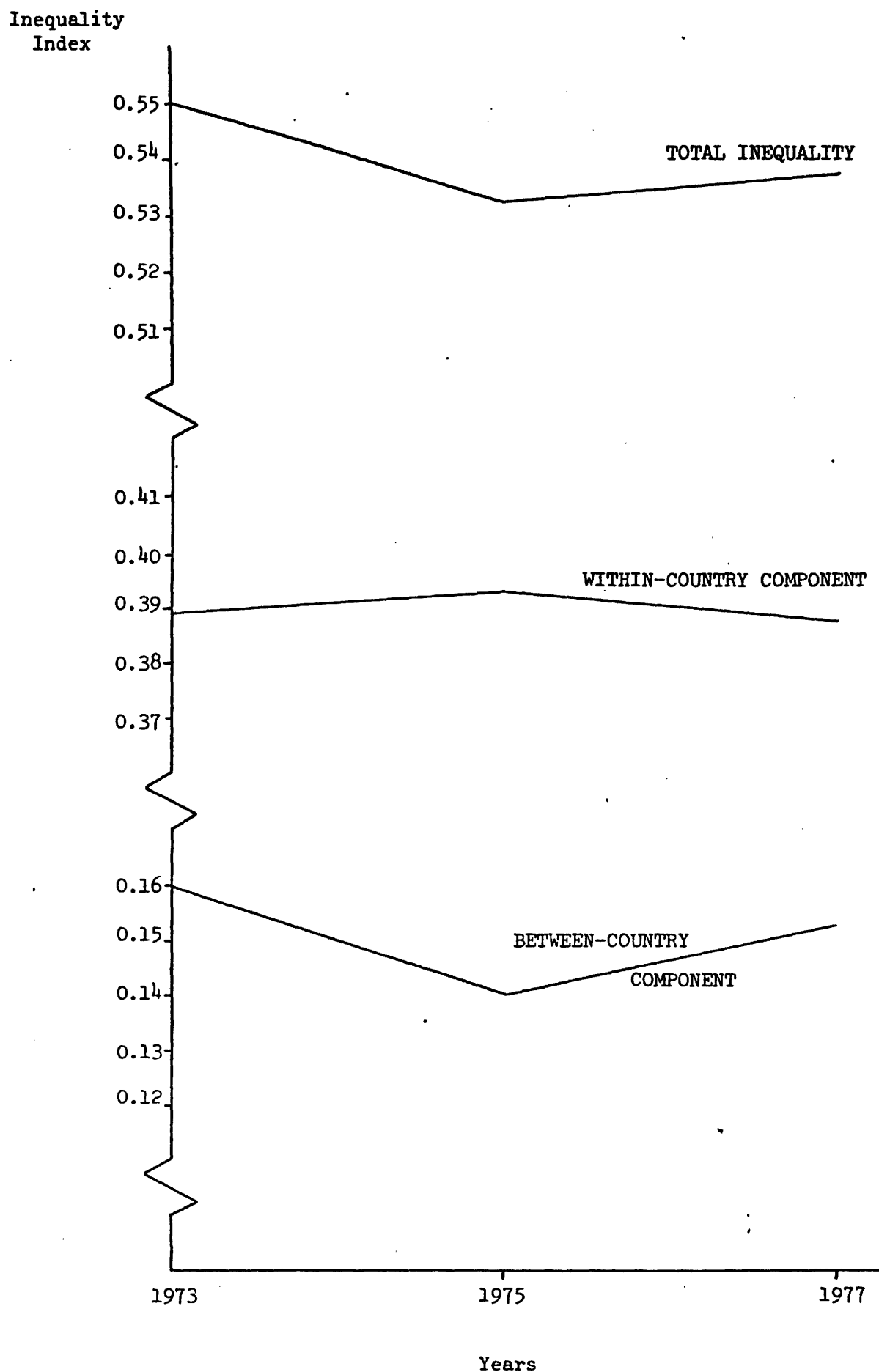
Between-country Inequality: France  
Netherlands, West Germany, Belgium



20. Consumer Services

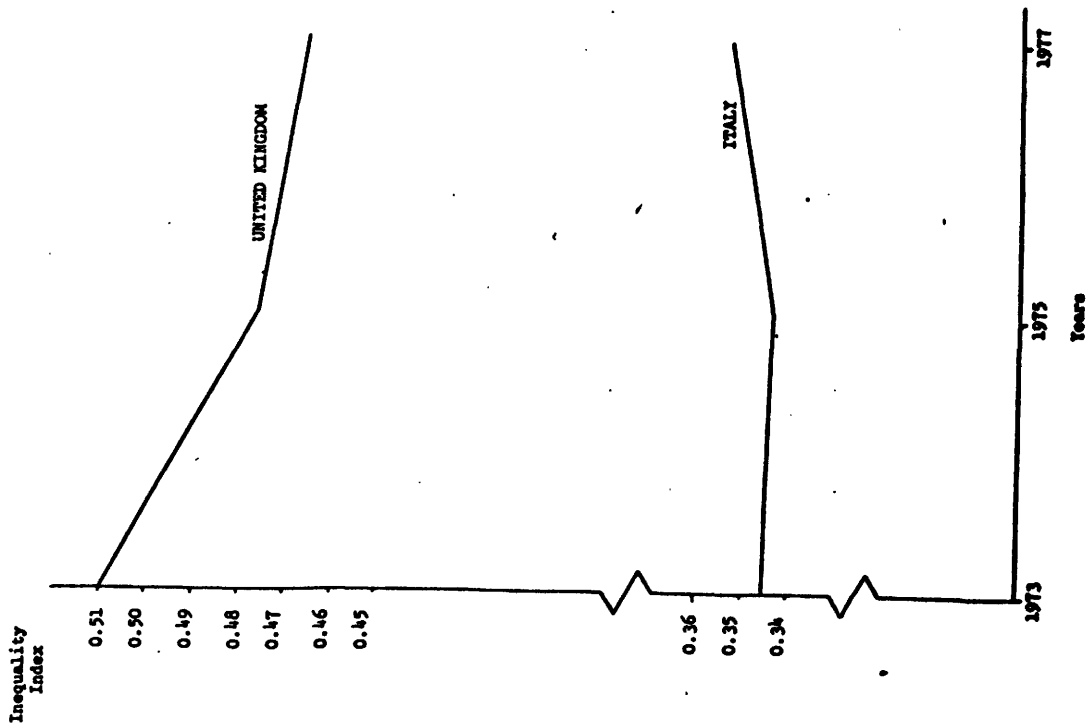
Between-country Inequality: U.K.  
Italy, Denmark, Ireland



21. EUR 9 Producer Services: Total Regional Inequality

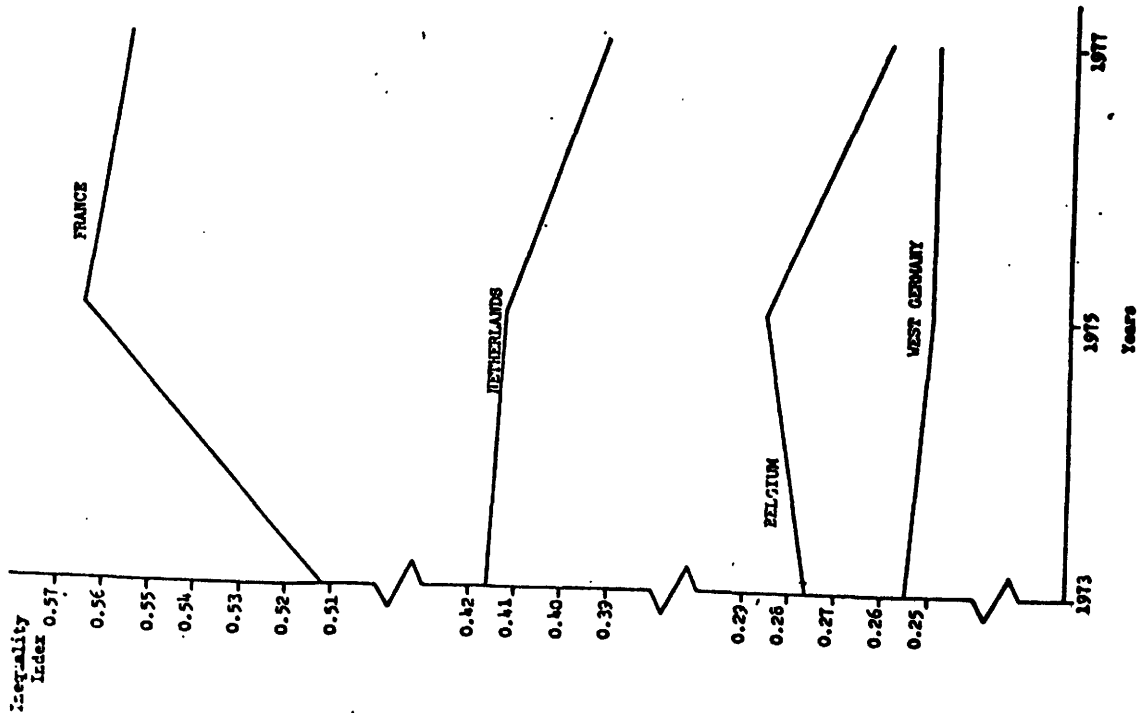
22. Producer Services

Within-country Inequality: U.K.  
Italy



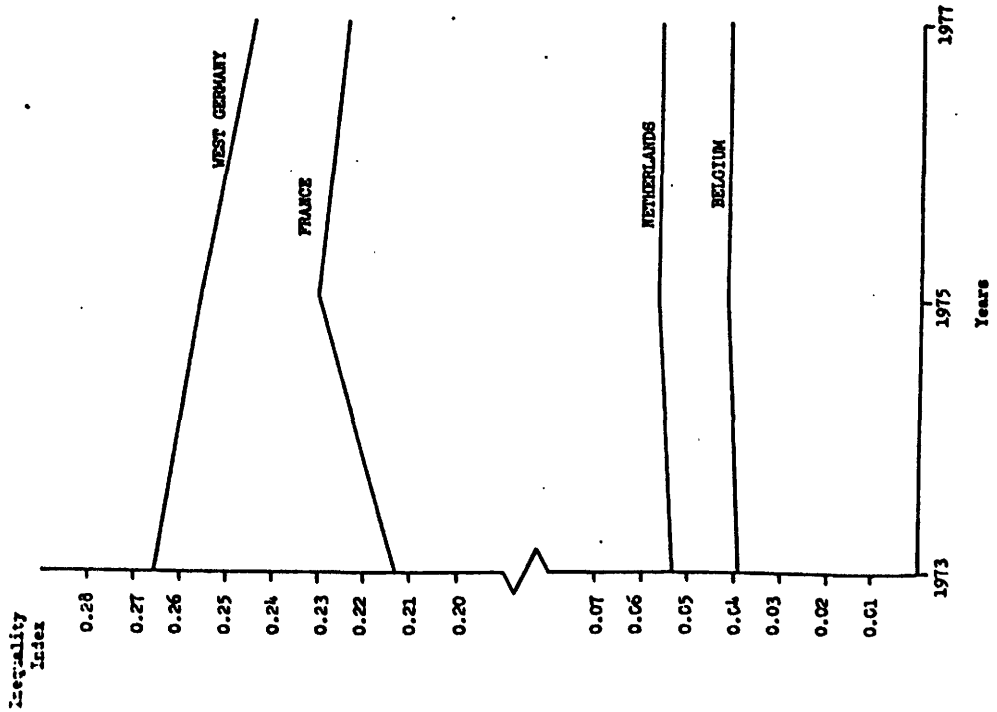
23. Producer Services

Within-country Inequality: France  
Netherlands, West Germany, Belgium



24. Producer Services

Between-country Component: France, Netherlands, West Germany, Belgium



25. Producer Services

Between-country Inequality: U.K. Italy, Denmark, Ireland

