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SECTORAL AND SPATIAL CHARACTERISTICS OF
EMPLOYMENT IN WEST YORKSHIRE, 1971 - 1981

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CONTENTS

Acknowledgements

Abstract

List of Tables

List of Figures

1. Introduction

- 1.1 Structural changes and the West Yorkshire economy
- 1.2 Theoretical and methodological approaches

2. Data sources, sector categories and zone systems

- 2.1 Sources of employment data
- 2.2 Sectoral classification
- 2.3 Spatial units and boundary changes
- 2.4 Data available from NOMIS

3. Characteristics of employment change in West Yorkshire

- 3.1 Total employment change
- 3.2 Sectoral employment change
- 3.3 Spatial patterns of employment change
- 3.4 Sectoral and spatial employment change at the TTWA level
- 3.5 Spatial and sectoral employment change at the AOA level

4. Patterns of spatial and sectoral concentration in West Yorkshire

- 4.1 Spatial employment concentration by Industrial Order
- 4.2 Sectoral employment concentration by AOA

5. Summary and conclusions

Bibliography

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Abstract

Over 60,000 jobs were lost in West Yorkshire between 1971 and 1981, yet overall net employment decline conceals a variety of patterns of employment change in different sectors and different sub-areas of the county. This paper identifies the sectoral characteristics of change in male and female, full-time and part-time employment, and examines their spatial variation at the Travel to Work Area, and smaller Employment Office Area scale using unpublished data from the Census of Employment. The investigation is extended to measure forms of sectoral and spatial concentration in the county by computing and interpreting sectoral indices of localization, and zonal indices of specialization. The analysis is preceded by a description of the data, and its limitations, and a discussion of alternative methodological approaches in relation to theoretical explanation.

LIST OF TABLES

- | | |
|-----------|--|
| Table 1. | The 1968 Standard Industrial Classification Sectors and Industrial Orders. |
| Table 2. | Total and Percentage Number of Employees Categorized as Unclassified by TTWA in West Yorkshire, 1981. |
| Table 3. | Changes to Travel to Work Areas and Constituent Employment Office Areas in West Yorkshire between 1971 and 1981. |
| Table 4. | Employment change in West Yorkshire Metropolitan County 1971 to 1981. |
| Table 5. | Change in the Sectoral composition of Employment in West Yorkshire, 1959-66 and 1971-81. |
| Table 6. | Male Full-time and Part-time Employment Change by TTWA, 1971 to 1981. |
| Table 7. | Female Full-time and Part-time Employment Change by TTWA, 1971 to 1981. |
| Table 8. | Employment Changes in AOA's across West Yorkshire, 1971 to 1981. |
| Table 9. | Variations in the Structure of Employment Change within Leeds TTWA in 1971 and 1981. |
| Table 10. | Selected Male Location Quotients for Industrial Orders with high Localization Indices, 1971 and 1981. |
| Table 11. | Selected Female Location Quotients for Industrial Orders with high Localization Indices, 1971 and 1981. |
| Table 12. | Female Indices of Specialization for Full-time and Part-time Employment in West Yorkshire, 1971 and 1981. |

LIST OF FIGURES

- Figure 1. The Evolution of Methodological Approaches in the Geography of Employment.
- Figure 2. The Spatial Configuration of TTWA's and AOA's in West Yorkshire, 1981.
- Figure 3. Total Employment in West Yorkshire by Order, 1971 and 1981.
- Figure 4. Percentage Male Full-time and Part-time Employment by Order, 1971 and 1981.
- Figure 5. Percentage Female Full-time and Part-time Employment by Order, 1971 and 1981.
- Figure 6. Percentage Shares of Total Employment by TTWA in 1971.
- Figure 7. Percentage Shares of Total Employment by TTWA in 1981.
- Figure 8. Change in Employment Share by TTWA, between 1971 and 1981.
- Figure 9. TTWA's in West Yorkshire, 1981.
- Figure 10. Percentage Sectoral Employment Change by TTWA, 1971 to 1981.
- Figure 11. Total Indices of Localization by Order in West Yorkshire, 1971 and 1981.
- Figure 12. Male Indices of Localization by Order in West Yorkshire, 1971 and 1981.
- Figure 13. Female Indices of Localization by Order in West Yorkshire, 1971 and 1981.
- Figure 14. Total Indices of Localization and Percentage Employment by Order in 1971.
- Figure 15. Total Indices of Localization and Percentage Employment by Order in 1981.
- Figure 16. A Comparison of Full-time and Part-time Female Employment Localization in West Yorkshire, 1971.
- Figure 17. A Comparison of Full-time and Part-time Female Employment Localization in West Yorkshire, 1981.
- Figure 18. Lorenz Curves for Male Employment by Order in West Yorkshire, 1971 and 1981.

LIST OF FIGURES (Continued)

- Figure 19. Lorenz Curves for Female Employment by Order in West Yorkshire, 1971 and 1981.
- Figure 20. Total Indices of Specialization for AOA's in West Yorkshire, 1971.
- Figure 21. Total Indices of Specialization for AOA's in West Yorkshire, 1981.
- Figure 22. Male Indices of Specialization for AOA's in West Yorkshire, 1971.
- Figure 23. Male Indices of Specialization for AOA's in West Yorkshire, 1981.
- Figure 24. Female Indices of Specialization for AOA's in West Yorkshire, 1971.
- Figure 25. Female Indices of Specialization for AOA's in West Yorkshire, 1981.

1. INTRODUCTION

This paper provides a detailed analysis of male and female employment change in the Metropolitan County of West Yorkshire between 1971 and 1981. It focuses on spatial and sectoral patterns of employment growth and decline in order to demonstrate how structural changes in the economy are reflected in the patterns of employment change observed. Variations in sectoral employment concentration and sub-regional employment specialization are examined and certain factors which characterize the form of spatial and sectoral restructuring in the economy are identified.

1.1 Structural Changes and the West Yorkshire Economy

Nationally, the period since 1971 has been characterized by a marked decline in manufacturing employment, and a shift towards employment in the service sector. Total employment in Britain has fallen between 1971 and 1981, as the net loss in manufacturing industries of 1.9 million jobs has exceeded the net gain in the service industries of 1.6 million jobs. The fall in aggregate demand for employment has occurred at a time when the size of the labour force has increased. In particular more young people have entered the working age groups during the 1970's, because of high birth rates in the late 1950's and early 1960's, and fewer people have left the working age groups through retirement. Increasing participation rates, particularly for married women have further increased the size of the labour supply, with the effect that a surplus of labour has emerged in the economy, resulting in rising levels of unemployment.

National changes in the demand for labour reflect variations in employment growth and decline occurring within different industries and regions of the economy, at different orders of magnitude. In the manufacturing sector for example, although each industry has reduced its employment base, the declines experienced in the metal manufacture and textile industrial orders have been especially precipitous, with national employment in these orders declining by 43% and 45% respectively between 1971 and 1981. (Department of Employment (DOE) Statistics, NOMIS). In the service sector, although

overall employment grew during the decade, certain service industries experienced employment decline; 130,000 jobs were lost in transport and communications, for example, a fall of 8.3%, and employment in public administration and defence decreased by 73,800 or 5% (DOE Statistics, NOMIS).

The differential impact of employment change on the Metropolitan regions has been identified by Fothergill and Gudgin (1979a), who demonstrated that each of the five slowest growing regions in Britain between 1952 and 1979 contained a major conurbation, and that the slowest growing region of all, the North-West, contained two conurbations. By contrast, the fastest growing region, East Anglia, was also the least urbanized. These patterns suggested that employment growth or decline in an area, was associated with its level of urbanization or rurality.

A report commissioned by the Department of the Environment (1976) illustrates how the pattern of employment creation within Metropolitan areas began to change in the 1960's. The population began to decentralize from the metropolitan core areas during the 1950's, although most job growth continued to centre there. During the period 1961-71 however, job formation in the commuting rings surrounding the urban core, began, for the first time, to exceed that created in the core area. Danson, Lever and Malcolm (1980) have demonstrated how subsequently the suburbs began to experience employment loss, as decline spread outwards from the urban core areas during the 1970's.

As one of the six provincial counties defined in 1974 as metropolitan, West Yorkshire has experienced its share of employment change. Traditionally, its employment structure was biased towards the old staple woollen textile industries, located mainly in the West of the county, and the clothing industry, located around Leeds, and in the East. West Yorkshire accounted for 20% of total textile employment in Great Britain in 1971. A substantial proportion of the workforce were also employed in mechanical engineering and mining, and these industries have all been at the forefront of decline. Between 1971 and 1981, total employment in the textile and clothing industrial orders fell by over 50% from 153,000 to 75,400. Over the same period

employment in mechanical engineering decreased by 29% from 66,250 to 47,250, and in mining by 11% from 27,000 to 24,100.

The demise of these industries has had a profound effect on the structure of employment and economic prosperity of West Yorkshire, to the extent that an index compiled by the EEC which measured the intensity of regional problems on the basis of GDP and unemployment rates in the region for the years 1977, 1979 and 1981, found that West Yorkshire was amongst the poorest 25% of regions in the EEC. (West Yorkshire Metropolitan County Council (WYMCC), 1984). Only the growing importance of Leeds and Bradford as commercial service centres has prevented the position of West Yorkshire from being considerably worse. Service sector employment in the county increased by almost 15%, from 402,000 in 1971 to 462,000 in 1981.

Patterns of employment change within the county have not been analysed at a spatially disaggregate scale since Leigh and Smith (1977) described change between 1959 and 1971. Changes in the industrial and employment structure of the county since 1971 have been monitored only at a relatively aggregate scale by the County Planning Department, (WYMCC, 1975-1984). Foley and Green (1985) have studied the employment fortunes of the county within the context of change in Yorkshire and Humberside, and have made some preliminary investigations of redundancies in West Yorkshire between 1975 and 1981 (Foley and Green, unpublished); whilst Hardhill (1982) investigated the components of employment change in the woollen textile industry of West Yorkshire between 1972 and 1976. National studies of trends in particular sectors have also been undertaken, such as the CBI's analysis of trends in textiles and clothing (CBI quarterly, 1977-1981) and NEDO's (1978) analysis of the food and drink industry for example, but these studies incorporate no specifically regional dimension.

Thus, it is the aim of this paper to combine the analysis of spatial and sectoral changes in employment in West Yorkshire, in order to demonstrate the effects of structural changes in the economy

at a reasonably disaggregate scale. Attention is therefore focused on the identification, and then interpretation of patterns of employment change in the county.

A number of methodological issues are inherent in the decision to focus analysis in this way. These are discussed more explicitly in the following section.

1.2 Theoretical and Methodological Approaches

A significant feature of geographical research into regional employment structures in recent years, has been the transferring of emphasis from traditional methodological approaches based on (sound) empirical investigation from which comparative/descriptive analyses of change are derived, to newer approaches which aim to conceptualize and hence explain the processes which underly employment changes observed at a more aggregate level. The emphasis in research has moved away from description and towards explanation; in other words away from approaches based solely on pattern analysis, and towards those which incorporate an investigation of underlying processes. This movement has been summarized in Figure 1.

The main tenet of 'descriptive' methodological approaches is that accurate descriptions of employment change must, necessarily, be the starting point for any investigation which subsequently attempts to explain that change (Fothergill and Gudgin, 1982). Techniques such as shift-share analysis have been adopted (Fothergill and Gudgin, 1979 b) in order to generate a comprehensive picture of employment change, over specific time periods, for clearly defined regions or sub-regions, at given levels of sectoral or industrial disaggregation.

Approaches such as these have lent themselves to criticism for failing to provide detailed insights into the causal mechanisms responsible for the patterns of aggregate change. Other approaches introduced in response to this limitation recognised that aggregate descriptions of employment change were in fact representations of changes occurring at more disaggregate levels, involving for example, the birth, death, expansion or contraction, of an individual firm. Studies which have adopted this type of 'components of change' approach, are however not without limitations (Dicken and Lloyd, 1978; Gudgin 1978), as implicit

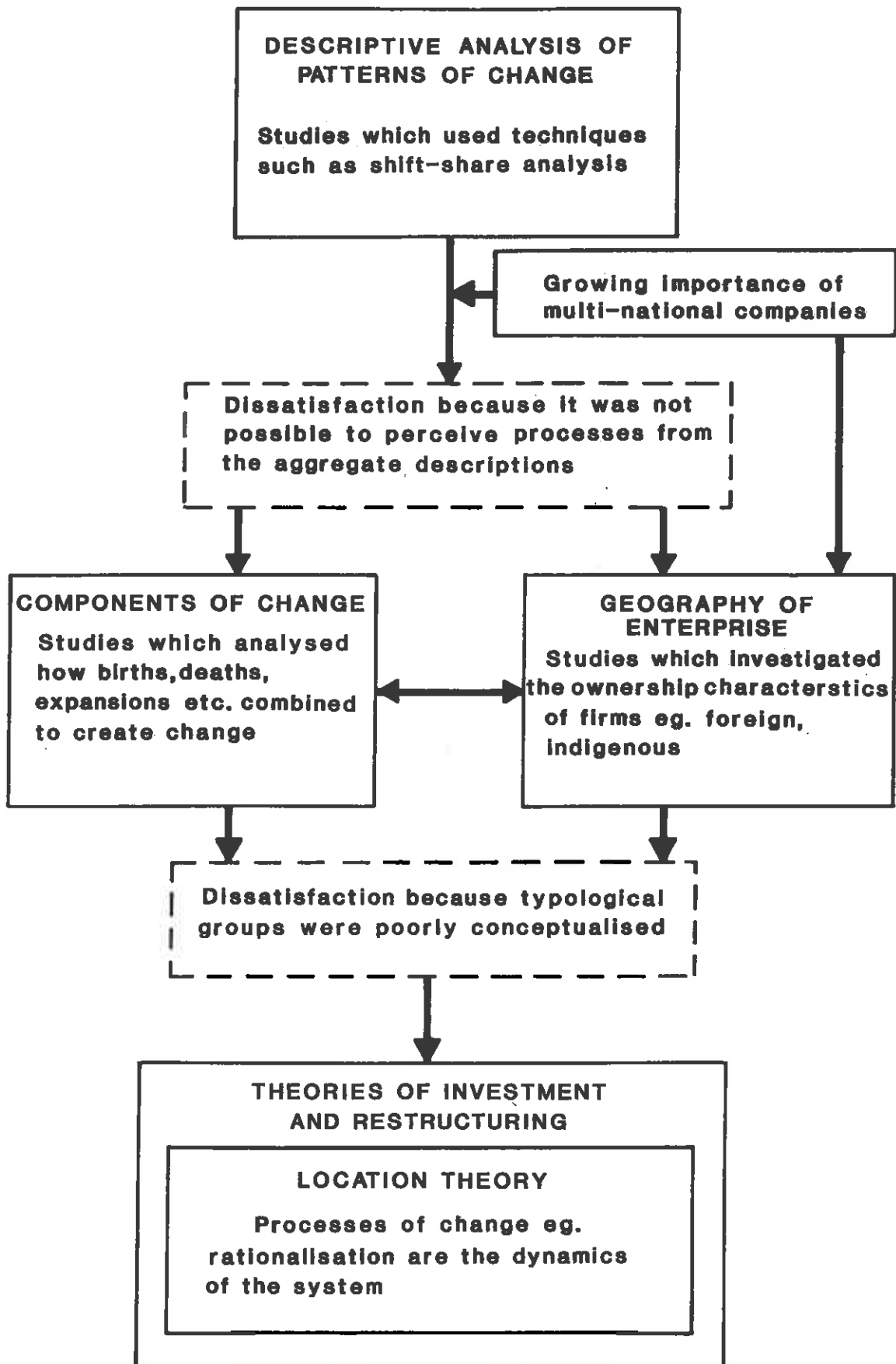


Figure 1. The Evolution of Methodological Approaches in the Geography of Employment

in their methodology is the assumption that if employment decline occurs in an area because several firms have contracted, then each firm has contracted for similar reasons. It has been argued therefore, that other than developing a more sophisticated accounting framework within which components are identified according to the precise nature of change occurring, the approach has allowed only restricted exploration of causality. (Lloyd, 1985).

Methodologies were thus developed to complement and extend the components of change approach, by defining the ownership characteristics of firms so that births, deaths, expansions or contractions could be associated with particular strands of corporate decision making. This enabled the further exposition of causal mechanisms, as the ownership characteristics of firms located in particular areas could be discretely identified, and then related to patterns of employment change. Firth (1975), first identified the theoretical implications of increased foreign ownership for regional development, involving for example, trends towards less local decision-making, increased labour force de-skilling, and a lower commitment to the welfare of local economies. These trends have been further investigated by Watts (1981) and research based on indigenous companies has been undertaken by Lloyd and Dicken (1977).

Studies of this type have been criticised for failing to incorporate detail. Firth (1975) has acknowledged that a full understanding of corporate decision making requires a comprehensive knowledge of the goods and services they produce, their methods of production and competitive market conditions, and an appreciation of corporate goals and objectives. Lloyd (1985) discusses Sayer's (1981) emphasis on the need for theoretical refinement by referring to the 'chaotic conceptions' which have developed along with attempts to define taxonomic groups such as 'externally controlled plants' whose individual members are regarded as having common properties which are themselves poorly conceptualized. In order to avoid mis-conceptions, the object of study, which is often the firm or organization, must be abstracted from its real world situation in a theoretically meaningful way, preventing attempts to separate characteristics which are in fact inseparable to the firm's operations.

The adoption of organizational modes of analysis caused the focus of research interest to move away from traditional location theory and towards investment theory (Lloyd 1985) where it is recognised that, operationally, the decision of where to invest cannot be separated from whether to invest and what to invest in (Massey, 1979). Geography is integral to all investment decisions because the motivation for investment varies between firms and industries, and across time and space. The aim of newer methodologies is therefore to unravel the processes which determine whether an investment decision is made, in order to understand the geographical effects of an investment decision on the patterns of employment change which can be observed.

This approach emphasises the need to conceptualize the dynamics of change within a flexible theoretical framework, in order to identify the relations of production over space, for example between different sectors of the economy and the whole economic system. Massey and Meegan (1982), in their investigation of structural change in the manufacturing sectors over the period 1973-1978, distinguished three options through which the production process could be re-organized: intensification, rationalization and technical change. The relations of production which dictated the adoption of a particular form of re-organization varied according to the internal organization of the firm, the structure of the industry within which firms competed, and the functioning of the wider economic environment. The relative importance of each re-organization strategy has varied with time, and Massey and Meegan suggest that since 1978, the predominant modes of re-organization have been intensification and rationalization, since world-wide recession has necessitated the removal of excess capacity through plant closure, whilst technical change has enabled industrialists to intensify production methods, thereby employing less labour to generate the same output.

Methodologies which emphasize process analysis tend to concentrate on the investigation of change in particular sectors or industries in the economy, such as the electrical engineering industry, or the iron castings and paper industries, the outwear and footwear industries, and the fletton brick industry (Massey and Meegan, 1952). The methods adopted enable the processes behind the patterns to be discretely explained, although because the analyses tend to focus on aspects of change within particular industries or sectors, they lack the comprehensiveness of comparative/descriptive approaches, such as those advocated by Fothergill and Gudgin (1979a, 1982, 1983).

Ideally, research into changing employment should combine these approaches by providing a detailed picture of employment change in an area, and then explaining this change by reference to the processes of investment and re-structuring in operation. As there has been no thorough analysis of employment change in West Yorkshire since the early 1970's, this paper adopts a descriptive approach, which develops a comprehensive picture of employment change, identifying its most important aspects, and highlighting the existence of any anomalies. This will provide the context for the investigation of processes operating in key industries in the economy. This research strategy has the advantage of providing details which indicate the relative importance of employment growth or decline in particular industries or regions of the economy, which then focusses attention on issues for further enquiry.

Comprehensive data on employment change is collected by the Department of Employment, and the next section therefore discusses the characteristics and problems associated with the Census of Employment when it is used to analyse employment change at the local level.

2. DATA SOURCES, SECTOR CATEGORIES AND ZONE SYSTEMS

2.1 Sources of Employment Data

The primary sources of employment data in the U.K. are the Census of Employment, the Labour Force Survey, and the Census of Population. The Annual Census of Employment (ACE), undertaken by the Department of Employment collects data according to workplace, whereas the annual Labour Force Survey (LFS) and the decadal Census of Population provide data which is primarily residence based, although Special Workplace Statistics (SWS) are available from a 10% sample of respondents to the 1981 Census of Population. Other sources of data collected by non-governmental organizations and hence not encumbered with confidentiality restrictions include the Market Location Directory, produced by Market Location Limited, and the Dun and Bradstreet U.K. Market Facts File. The use of the latter data sets for industrial research, and for the establishment of industrial data banks, has increased in recent years (Foley and Green, unpublished; Mason, 1981), although several problems are associated with their use. (Foley, 1983). Firstly, they are produced essentially for use by commercial organizations, and hence may be

difficult or expensive to access; secondly, the employment statistics are only available grouped by employment size bands, (ie an establishment may be recorded as employing between 0 and 50 people) whereas the Censuses of Employment record the absolute numbers in employment, and thirdly, although both sources give dates on which their data is compiled, actual collection dates vary widely as on-going survey techniques are used.

The Census of Employment, which is based on a compulsory and detailed survey of all paypoints with at least three employees registered for PAYE schemes with the Inland Revenue, is regarded as the most comprehensive source of local employment information in Britain, despite Forster's (1981) misgivings that actual paypoint coverage of only 80-90% is realistically achievable. Establishments with less than three employees are only enumerated every three years, but they are included in the ACE records by simply re-entering the details gained about them when they were last enumerated at a full census.

Employers are required to provide details of the business which their companies conduct, as well as information on their male and female employees according to whether they work on a full-time or part-time basis. No distinction is made for the self-employed, although they are included in the Census if the firm is registered with the Inland Revenue. This establishment level information forms the confidential Employment Register I (ERI) returns, which are then aggregated to ERII returns for publication. A Census of Employment was taken annually from 1971 to 1978, and in 1981 and 1984, although only in 1973, 1976 and 1981 were paypoints with less than three employees included. The workplace-based nature of the Census means that it is a count of jobs rather than people working and in theory the same person can be counted more than once. On the other hand, certain categories of workers are not included such as those in the Armed Forces, and those working at home. Furthermore, establishments are excluded from the Census if no employees are registered with the Inland Revenue despite the fact that there may be several employees working only a few hours each week.

One advantage of using data from the ACE is that it is possible to maintain a relatively high level of consistency when comparing employment between June 1971 and September 1981. This is in part a function of the compulsory nature of the Survey, but it also reflects the flexibility of the National On-line Manpower Information System (NOMIS)

which automatically adjusts the data if changes occur in the spatial framework to which establishment level information is aggregated.

There are, however, certain features of the Censuses conducted in 1971 and 1981 which disrupt strict comparisons. Enumeration methods adopted in 1981 may have produced results which are inaccurate for the highly volatile small firms sector. Goddard and Coombes (1983) argue that in 1981, as only 10% of new employees, 10% of employers who employed fewer than ten people, and 5% of those reported as having no employees, were included in the census, the likelihood of discrepancies occurring is quite high. Problems also arise when attempting to compare employment change between 1971 and 1981, because of modifications to the industrial classification system used, and the definition of spatial units. Although it would be improper not to recognise the anomalies and limitations of the data set, it should also be understood that these imperfections are only likely to be of significance at the margin, and are not likely to obscure the important characteristics of change.

2.2 Sectoral Classification

Employers enumerated in the Census of Employment are coded on the basis of their activity descriptions, in accordance with the Standard Industrial Classification (SIC) in use at the time of the Census. In 1971, firms were classified according to the SIC adopted in 1968, which contained 27 industrial orders (Table 1) and 181 Minimum List Headings.

The 1968 system has been used to classify employment data for 1981, although a revised SIC was introduced in 1980 to provide a more accurate reflection of the nature of British industry. Since 1981, the census data has been coded by the 1980 system only, thus preventing direct comparison of 1971 and 1984 ACE data.

The dual classification system adopted by the Department of Employment in 1981 means that change at the sectoral level between 1971 and 1981 can only be monitored using the 1968 classification system. However, by 1981, an additional "unclassified" industrial order had been added to the original 27. This order was introduced in 1973, and included

TABLE 1. THE 1968 STANDARD INDUSTRIAL CLASSIFICATION:
SECTORS AND INDUSTRIAL ORDERS

SECTOR	INDUSTRIAL ORDER	MLH	DESCRIPTION
PRIMARY 1	1	001-003	Agriculture, forestry, fishing
	2	101-109	Mining and Quarrying
	3	211-240	Food, drink and tobacco
	4	261-263	Coal and petroleum products
	5	271-279	Chemical and allied industries
	6	311-323	Metal manufacture
	7	331-349	Mechanical engineering
	8	351-354	Instrument engineering
	9	361-369	Electrical engineering
MANUFACTURING 2	10	371-372	Shipbuilding
	11	380-385	Vehicles
	12	390-399	Metal goods not elsewhere specified
	13	411-429	Textiles
	14	431-433	Leather, leather goods, fur
	15	441-450	Clothing and footwear
	16	461-469	Bricks, pottery, glass, cement
	17	471-479	Timber, furniture
	18	481-489	Paper, printing, publishing
CONSTRUCTION 3	19	491-499	Other manufacture
	20	500	Construction
	21	601-603	Gas, electricity, water
	22	701-709	Transport and communication
SERVICES 4	23	810-832	Distributive trades
	24	860-866	Insurance, Banking etc.
	25	871-879	Professional and scientific services
	26	881-889	Miscellaneous services
	27	901-906	Public Administration and defence

SOURCE: HMSO (1968)

ex-members of HM Forces, those with no previous employment, and those for whom the Department of Employment could offer no satisfactory alternative classification. It was created in recognition of the fact that sufficient resources were no longer available to follow up queries relating to the activity descriptions given by the firms enumerated. Thus, when the activity description given was insufficient to allocate employers to one of the existing 27 categories, the 28th category was used.

The emergence of an extra industrial order creates problems when attempting to compare 1971-81 change directly across industrial groups. The comparison of indices of concentration, for example, depends on using exactly the same number of industrial orders and zones in 1971 and 1981. In West Yorkshire a total of 2412 people, representing 0.3% of all employees were coded as 'unclassified' in 1981 (Table 2). The majority, 56%, worked in the Leeds Travel to Work Area (TTWA). Within Leeds, the largest proportion occurred in the Yeadon Employment Office Area, where, for no apparent reason, 787 employees were recorded as unclassified. A further 18% and 15% of unclassified employees were located in the Huddersfield and Bradford TTWA's respectively.

It is possible to adjust the 1981 data for consistency with 1971 by allocating those in category 28 on a pro-rata basis across existing groups, however this procedure is unsatisfactory for three reasons. Firstly, it distributes employees into categories which in their original form were correct, and thereby introduces errors into the data set; secondly, owing to the small numbers employed in some sectors, when pro rata allocations are rounded to the nearest whole number, a significant number of employees are not accounted for; and thirdly, any method of allocation essentially attempts to duplicate a procedure which the Department of Employment could not themselves undertake, despite having additional information.

An alternative strategy is to ignore those categorised as unclassified in 1981, which enables accurate comparison across industrial groups, but leaves 2412 employees unaccounted for. In view of the problems associated with the pro rata method it has been decided to ignore those in the 28th category in 1981. This incidentally is the approach adopted within NOMIS, the information system discussed in section 2.4.

TABLE 2. TOTAL AND PERCENTAGE NUMBER OF EMPLOYEES CATEGORISED AS
UNCLASSIFIED BY TRAVEL TO WORK AREA IN WEST YORKSHIRE, 1981

TTWA	TOTAL	%	MALE	%	FEMALE	%
HALIFAX	73	0.11	50	0.13	23	0.08
TODMORDEN	20	0.28	14	0.38	6	0.18
LEEDS	1360	0.45	859	0.49	501	0.39
KEIGHLEY	22	0.08	12	0.08	10	0.09
WAKEFIELD	69	0.1	41	0.11	28	0.1
HUDDERSFIELD	369	0.51	165	0.37	204	0.7
DEWSBURY	41	0.07	29	0.08	12	0.05
BRADFORD	442	0.31	228	0.29	214	0.34
CASTLEFORD	16	0.03	8	0.02	8	0.04
WEST YORKSHIRE	2412	0.3	1406	0.3	1006	0.3

SOURCE: DOE Statistics (NOMIS)

One final consideration is that when employment change is measured across industrial categories at the local level, some errors may occur because employees were allocated to the wrong industrial category at earlier censuses (Goddard and Coombes, 1983). The existence of this problem should be recognised although it is not possible to gauge its extent.

2.3 Spatial Units and Boundary Changes

At the local level, Census of Employment data is processed at four different spatial scales by the Department of Employment; the individual establishment, the Local Employment Office Area (EOA), the Amalgamated Office Area (AOA), and the Travel to Work Area (TTWA). Information on individual establishments (ERI data) is confidential, and is only available in aggregated form at EOA level (ERII data) although even then some confidentiality restrictions apply. As EOA's are essentially designated for Department of Employment administrative purposes, they are subject to periodic changes in definition which makes them unsuitable as a spatial framework for time series analysis. The consistency in the definition of spatial units which is required to undertake time series analysis is achieved by conflating EOA's into AOA's, which are essentially areas which have subsumed within their boundaries changes in the spatial configuration of EOA's. AOA's are generally large enough to mask information relating to particular establishments upon which confidentiality restrictions will apply. TTWA's are then defined on the basis of aggregated AOAs, and are the smallest spatial units for which published data is available.

TTWA's are important in the analysis of employment dynamics because they are intended to represent self-contained local labour markets within which the relationship between the demand and supply of labour can be effectively assessed. The procedure through which TTWA's are delimited is outlined in Smart (1974), and more recently, in the Department of Employment Gazette (1983). Practical difficulties associated with the use of TTWA data are discussed in Coombes and Openshaw (1982).

The boundaries of several EOA's and TTWA's in West Yorkshire, have been re-defined between 1971 and 1981. The details of change are summarised in Table 3, and the boundaries and codes for the spatial units adopted in this study are illustrated in Figure 2. The configuration of AOA boundaries in 1981 has been designed specifically to overcome changes

in EOA boundaries between 1971 and 1981. So for example, the creation of Hunslet EOA from within Leeds AOA in June 1977 has been accommodated by amalgamating the Leeds and Hunslet EOA's within the boundary of Leeds AOA in 1981. Thus AOA's are developed which are spatially consistent between 1971 and 1981, and which are then aggregated to correspond with the nine TTWA's officially defined in 1981. The boundaries of some TTWA's coincide with AOA boundaries, for example, Todmorden and Keighley, whereas other TTWA's contain several AOA's, for example Leeds and Halifax.

These aggregation procedures provide a two-tier system of consistent spatial units, however, one further source of inaccuracy associated with the use of EOA data should be recognized. In both 1971 and 1981 enumerated establishments were allocated to EOA's on the basis of their post-coded address. In 1971 however if enumerated establishments did not fit neatly into the existing EOA boundaries additional post-code digits were introduced to improve the allocation procedure. In 1981, no such 'refining' procedures were adopted, (Goddard and Coombes, 1983), and as a result discrepancies have been found to exist between the EOA's as defined on the ground, and the territory to which the statistics refer (Coombes, 1981). Aggregation of data to AOA's and TTWA's does not necessarily remove these inaccuracies.

2.4 Data available from NOMIS

The Department of Employment's National On-line Manpower Information System (NOMIS), which was developed at the University of Durham for use primarily by the MSC's Regional Manpower Intelligence Units, provides a wide selection of information on the structure of employment and unemployment at the local level (Gillespie and Owen, 1983).

Part of the rationale for the development of NOMIS was to facilitate time series comparison at a variety of different spatial scales. This is achieved by aggregating EOA data into AOA's, as discussed in Section 2.3, and storing the data in this form within the system. The information system is regularly updated as new data becomes available and existing data is adjusted following boundary re-definition.

The data available from NOMIS allows us to examine the characteristics of change between 1971 and 1981 in male and female, full-time

TABLE 3. CHANGES TO TRAVEL-TO-WORK AREAS AND CONSTITUENT EMPLOYMENT OFFICE AREAS IN WEST YORKSHIRE BETWEEN 1971 AND 1981

TTWA's and constituent EOA's, June 1971	EOA and TTWA boundary changes occurring between June 1971, Sept. 1981	TTWA's and constituent AOA's, September 1981	Map key
<u>BRIGHOUSE TTWA</u> containing <u>Brighouse</u> EOA	Unchanged EOA, became part of HALIFAX TTWA in June 1978.	<u>HALIFAX TTWA</u> containing Halifax AOA	1a
<u>HALIFAX TTWA</u> Halifax, Sowerby Bridge EOA's	Elland EOA created from part of Sowerby Bridge Merged with BRIGHOUSE TTWA (above)	Elland AOA Sowerby Bridge AOA Brighouse AOA	1b 1c 1d
<u>HEBDEN BRIDGE TTWA</u> Hebden Bridge EOA	Merged with Todmorden, then disbanded		
<u>TODMORDEN TTWA</u> Todmorden EOA	Remains a single office area, although enlarged Merged with LEEDS TTWA, June 1978	<u>TODMORDEN TTWA</u> Todmorden AOA	2
<u>YEADON TTWA</u> Yeadon, Otley EOA's			
<u>LEEDS TTWA</u> Leeds, Horsforth, Morley, Rothwell, Seacroft, Stanningley EOA's	Stanningley renamed Bramley, December 1976. Hunslet EOA created from part of Leeds EOA, June 1977 Merged with YEADON and WETHERBY TTWA's June 1978. Crossgates formed out of part of Seacroft, February 1981	<u>LEEDS TTWA</u> Leeds & Hunslet AOA Horsforth AOA Morley AOA Rothwell AOA Seacroft & Crossgates AOA Bramley AOA Yeadon AOA	3a 3b 3c 3d 3e 3f 3g

TABLE 3. (Continued)

<u>WETHERBY TTWA</u> Wetherby EOA	Merged with LEEDS TTWA (above)	Otley AOA Wetherby AOA	3h 3i
<u>KEIGHLEY TTWA</u> Keighley EOA	Remains a single office area	<u>KEIGHLEY TTWA</u>	4
<u>HEMSWORTH TTWA</u> Hemsworth, South Kirkby EOA's	South Kirkby renamed South Elmsall in July 1975 Merged with WAKEFIELD TTWA in June 1978		
<u>WAKEFIELD TTWA</u> Wakefield EOA	Acquired HEMSWORTH TTWA (above)	<u>WAKEFIELD TTWA</u> Wakefield AOA Hemsworth AOA South Elmsall AOA	5a 5b 5c
<u>HUDDERSFIELD TTWA</u> Huddersfield EOA's	Remained a single office area	<u>HUDDERSFIELD TTWA</u> Huddersfield AOA	6
<u>DEWSBURY TTWA</u> Dewsbury, Batley, Spen Valley EOA's	Remained the same	<u>DEWSBURY TTWA</u> Dewsbury AOA Batley AOA Spen Valley AOA	7a 7b 7c
<u>BRADFORD TTWA</u> Bradford, Shipley EOA's	Bingley EOA created out of part of Shipley EOA, January 1978.	<u>BRADFORD TTWA</u> Bradford AOA Shipley AOA	8a 8b
<u>CASTLEFORD TTWA</u> Castleford, Normanton Pontefract, Knottingley EOA's	Unchanged	<u>CASTLEFORD TTWA</u> Castleford AOA Normanton AOA Pontefract AOA Knottingley AOA	9a 9b 9c 9d

Source: WYMCC (unpublished)

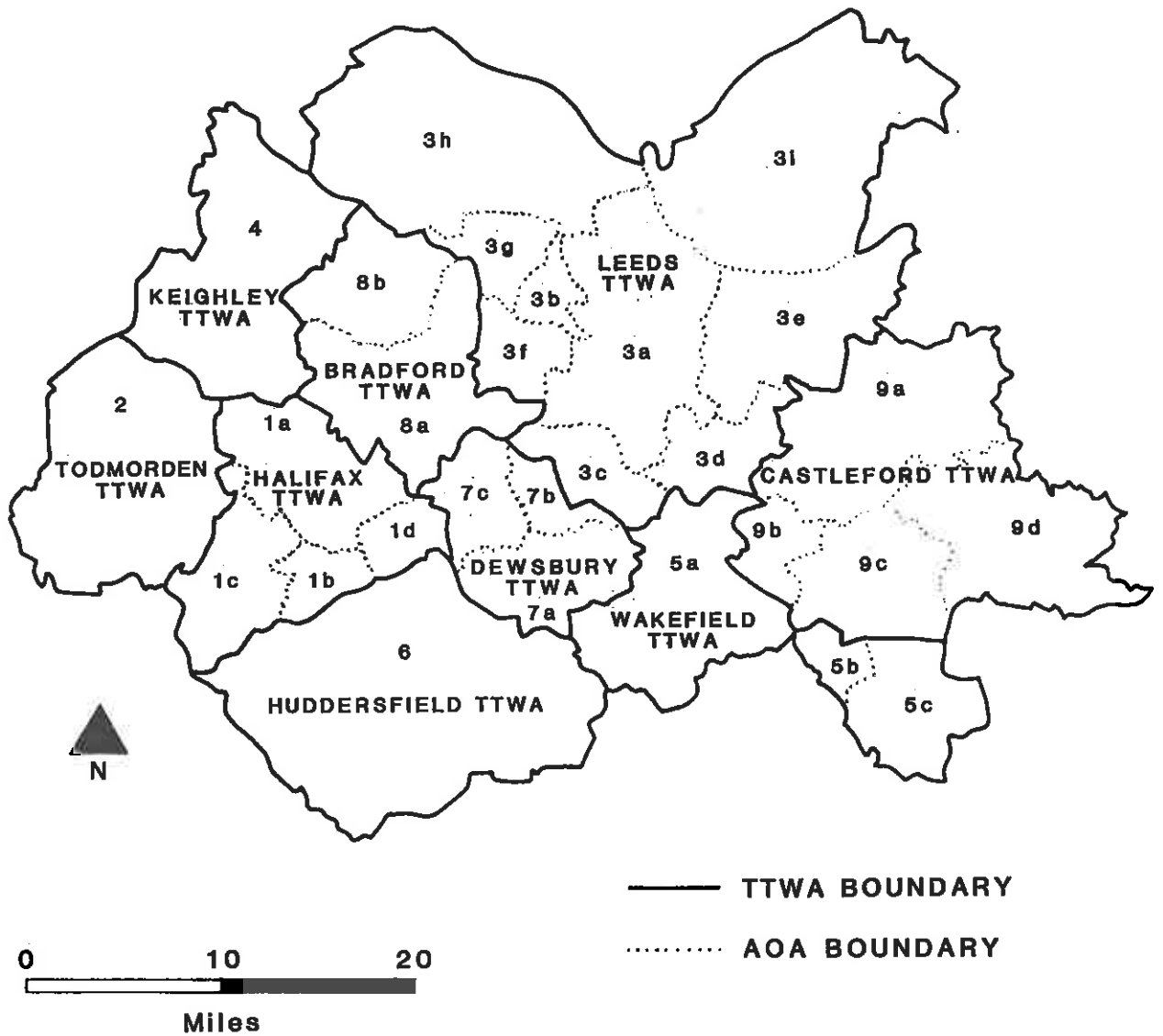


Figure 2 The Spatial Configuration of TTWA's and AOA's in West Yorkshire, 1981.

and part-time employment in the TTWA's and AOA's which constitute West Yorkshire. The results of this analysis are reported in the remainder of the paper, beginning with the examination of absolute and relative changes in employment by sector between 1971 and 1981, and analysis of the pattern of employment growth or decline, for each level of the spatial hierarchy. Section 4 then describes changes in the characteristics of sectoral and spatial employment concentration in the economy, using computed indices of localisation and specialisation, location quotients and Lorenz curves (Stillwell and Palmer, 1986). Conclusions are summarized in the final section of the paper.

3. CHARACTERISTICS OF EMPLOYMENT CHANGE IN WEST YORKSHIRE

3.1 Total Employment Change

Total employment in the county declined by just over 7%, from nearly 859 thousand in 1971 to less than 799 thousand in 1981, (Table 4) compared with a fall in total employment in Great Britain of 2.5%. The majority of jobs lost in West Yorkshire have been full-time positions, as male full-time employment fell by nearly 13%, and female full-time employment by almost 11%. However, these losses have occurred at a time of expansion in part-time employment, which is defined to include those persons working less than thirty hours per week. An additional 28 thousand part-time jobs have been created. The rise in female part-time employment of 23.6% has been sufficient to offset the full-time jobs lost, generating a small net increase of 1.4% in female employment over the decade. In contrast, the growth in male part-time employment has been so slight that the magnitude of total male employment decline has not been significantly affected.

These aggregate statistics of change in West Yorkshire between 1971 and 1981 demonstrate the extent to which male employment in particular has declined, and indicate the shift in emphasis from full-time to part-time employment for women.

3.2 Sectoral Employment Change

The net loss of over 60 thousand jobs in West Yorkshire between 1971 and 1981 conceals a wide variety of experience across the broad sector categories, and between the 27 SIC industrial orders defined in 1968 (Table 1). In 1971, the sectoral distribution of employment showed

TABLE 4. EMPLOYMENT CHANGE IN WEST YORKSHIRE METROPOLITAN COUNTY,
1971 to 1981

Employees in Employment	1971	1981	Absolute Change 1971-1981	% Change 1971-1981
TOTAL	858991	798480	-60511	-7.04
Total full-time	718427	629915	-88512	-12.3
Total part-time	140564	168565	+28001	+19.9
MALE	526429	461161	-65268	-12.4
Male full-time	503635	438185	-65450	-12.9
Male part-time	22794	22976	+ 182	+ 0.8
FEMALE	332562	337319	+ 4757	+ 1.4
Female full-time	214792	191730	-23062	-10.7
Female part-time	117770	145589	+27819	+23.6

Source: DOE statistics (NOMIS)

manufacturing and services almost equal in percentage terms (Table 5, column (e)) with employment in the primary and construction sectors both less than 5%. The pattern of change during the 1970's was dominated by the expansion of the service sector's share of total employment, at the expense of manufacturing, so that by 1981 (Table 5, column (f)), 58% of jobs in West Yorkshire were in services, and only 34% in manufacturing.

It would be useful to examine this transformation in the light of previous trends, but precise time series comparison is invalidated by changes in boundary and sector definition. Previous research based on 26 Employment Exchange Areas within a West Yorkshire study area (Smith and Leigh, 1977) provides some indication of the sectoral breakdown of employment in 1959 and 1966 (Table 5, columns (b)-(d)). Although data for the earlier period is not directly comparable with that for 1971-1981, it does indicate that in the late 1950's the economy was dominated by manufacturing industry, whose share of total employment was 52%. By 1966 the manufacturing share had declined by 2.5%, whilst the service sector share had risen to 40%. In other words, the relative shift in the shares of employment between manufacturing and services, which had already begun to occur in the early 1960's, gathered pace in the 1970's.

The shift in the sectoral distribution of employment is confirmed by the pattern of absolute employment change (figure 3). Only two industrial orders in the manufacturing sector (order 3: food, drink and tobacco, and order 8: instrument engineering) did not experience employment decline between 1971 and 1981, and only two orders in the service sector (order 21: gas, electricity and water, and order 22: transport and communications) failed to show an increase in the absolute number of jobs during the period.

Where the decline in employment in the manufacturing sector as a whole totalled 117 thousand jobs, certain industrial orders experienced more significant change than others. The most dramatic employment loss occurred in textiles (order 13) where a total of almost 115 thousand in 1971 was reduced by more than half (59 thousand) by 1981. Consequently by 1981, textiles had lost its 1971 status as the industrial order in which most people in West Yorkshire were employed. Amongst the other declining manufacturing industries, mechanical engineering (order 7)

TABLE 5. CHANGE IN THE SECTORAL COMPOSITION OF EMPLOYMENT IN WEST YORKSHIRE 1959-66 AND 1971-81

SECTOR (a)	1959 % (b)	1966 % (c)	Change 1959-66 (d)	1971 % (e)	1981 % (f)	Change 1971-81 (g)
PRIMARY	5.4	4.0	-1.4	3.7	3.5	-0.2
MANUFACTURING	51.7	49.2	-2.5	44.9	33.7	-11.2
CONSTRUCTION	5.1	6.9	+1.8	4.6	4.9	+ 0.3
SERVICES	37.8	39.9	+2.1	46.8	57.9	+11.1
TOTAL	100	100	0	100	100	0

- Notes: (1) Figures for 1959 and 1966 have been obtained from Smith and Leigh (1977) and refer to West Yorkshire study area whose boundaries were defined on the basis of 26 Employment Exchange areas.
- (2) Figures for 1971 and 1981 have been obtained from DOE statistics (NOMIS), and refer to West Yorkshire Metropolitan County as defined in 1974.

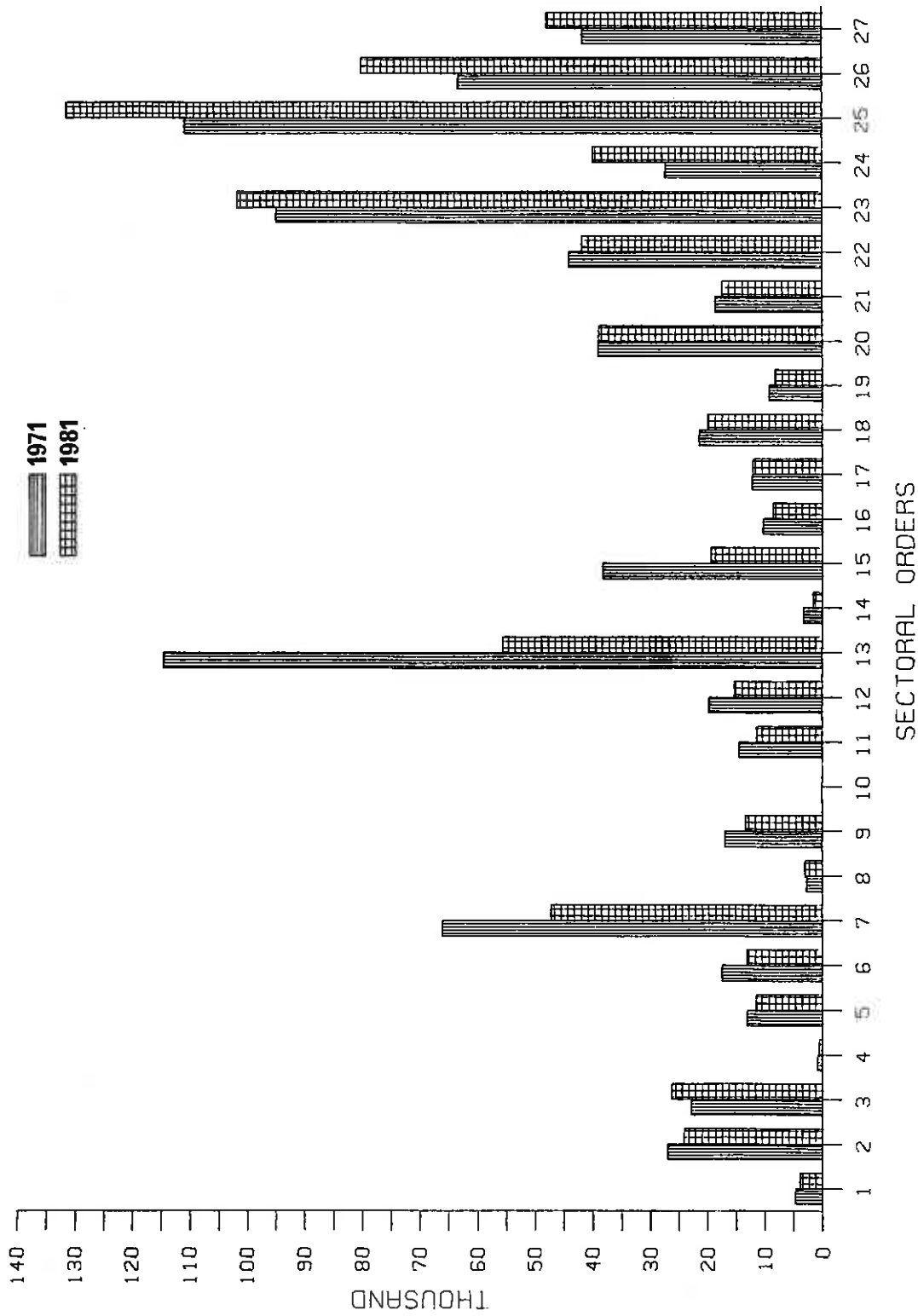


Figure 3. Total Employment in West Yorkshire by Order, 1971 and 1981

and clothing and footwear (order 15) both lost nearly 19 thousand jobs each, representing falls of 29% and 49% respectively. Metal manufacture (order 6) lost 4,300 jobs, a drop of 25%, and electrical engineering (order 9) lost a further 3,600, or 21% of its 1971 total. In contrast to the depressing picture of decline in the manufacturing sector, employment in most of the service industries has shown significant growth, with the effect that the contribution made by this sector to total employment increased by 11.1% (just over 60 thousand) between 1971 and 1981. Growth has been particularly marked in the professional services (order 25), where an additional 21 thousand jobs have been created, making it the largest employer in West Yorkshire in 1981. Miscellaneous service employment (order 26), grew by 17 thousand (27%) during the period, whilst insurance and banking (order 24) increased by 13 thousand (46%), and employment in the distributive trades (order 23) by almost 7 thousand (7%).

Total employment in the primary sector decreased by 11% (from 318 thousand to 281 thousand), whilst in the construction sector, total employment fell by less than 1% (from 39156 to 39056).

To what extent are these changes related to the changes observed earlier in the male and female, full-time and part-time structure of the Metropolitan County? Histograms can be used to compare the percentage of male employment (Figure 4) and female employment (Figure 5) in each industrial order of the economy, which distinguish between the proportions employed full-time and part-time in each industrial order. Overall the balance of male employment change between 1971 and 1981 has led to a more even distribution of employment across the industrial orders, with part-time employment increasing slightly over the decade from 3% of the total to 4%. In 1971, male employment in manufacturing was concentrated primarily in the mechanical engineering (order 7) and textile (order 13) industries, which experienced dramatic falls in employment of 28% and 47% respectively during the 1970's. The majority of the decline in both industries occurred in full-time employment, only 250 (1.4%) of the 17,250 jobs lost in mechanical engineering were part-time, and in textiles a total of 31,800 jobs were shed, 2000 (6.3%) of which were part-time. Indeed throughout the whole of the manufacturing sector, only 2% (2737) of male employment loss was part-time between 1971 and 1981. Total male service employment increased by 5% over the decade, however the utilities (order 21) and transport and communication (order 22) registered employment declines of 11% (1,800) and 10% (3,600) respectively. The majority of service employment change again involved full-

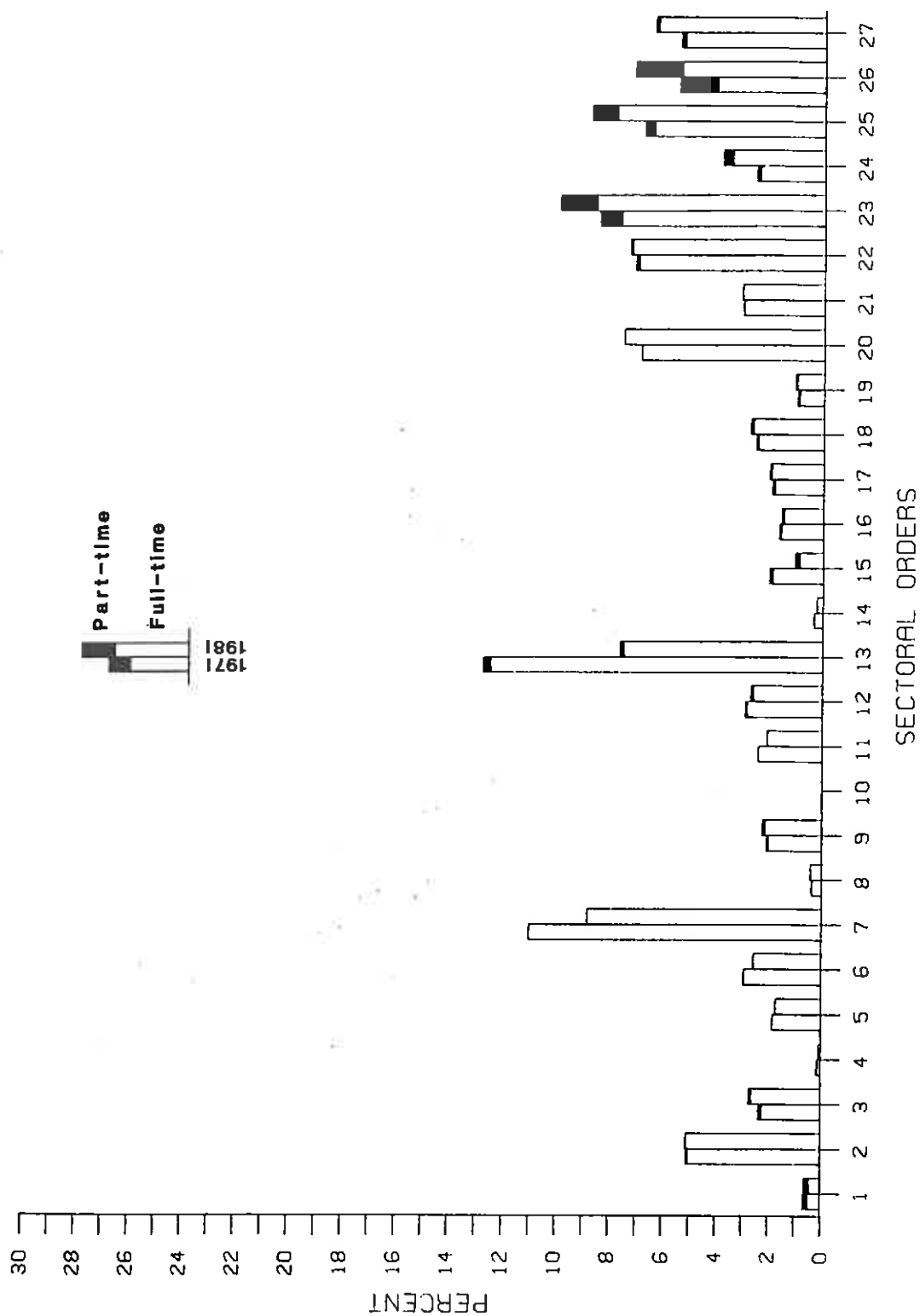


Figure 4. Percentage Male Full-time and Part-time Employment by Order, 1971 and 1981.

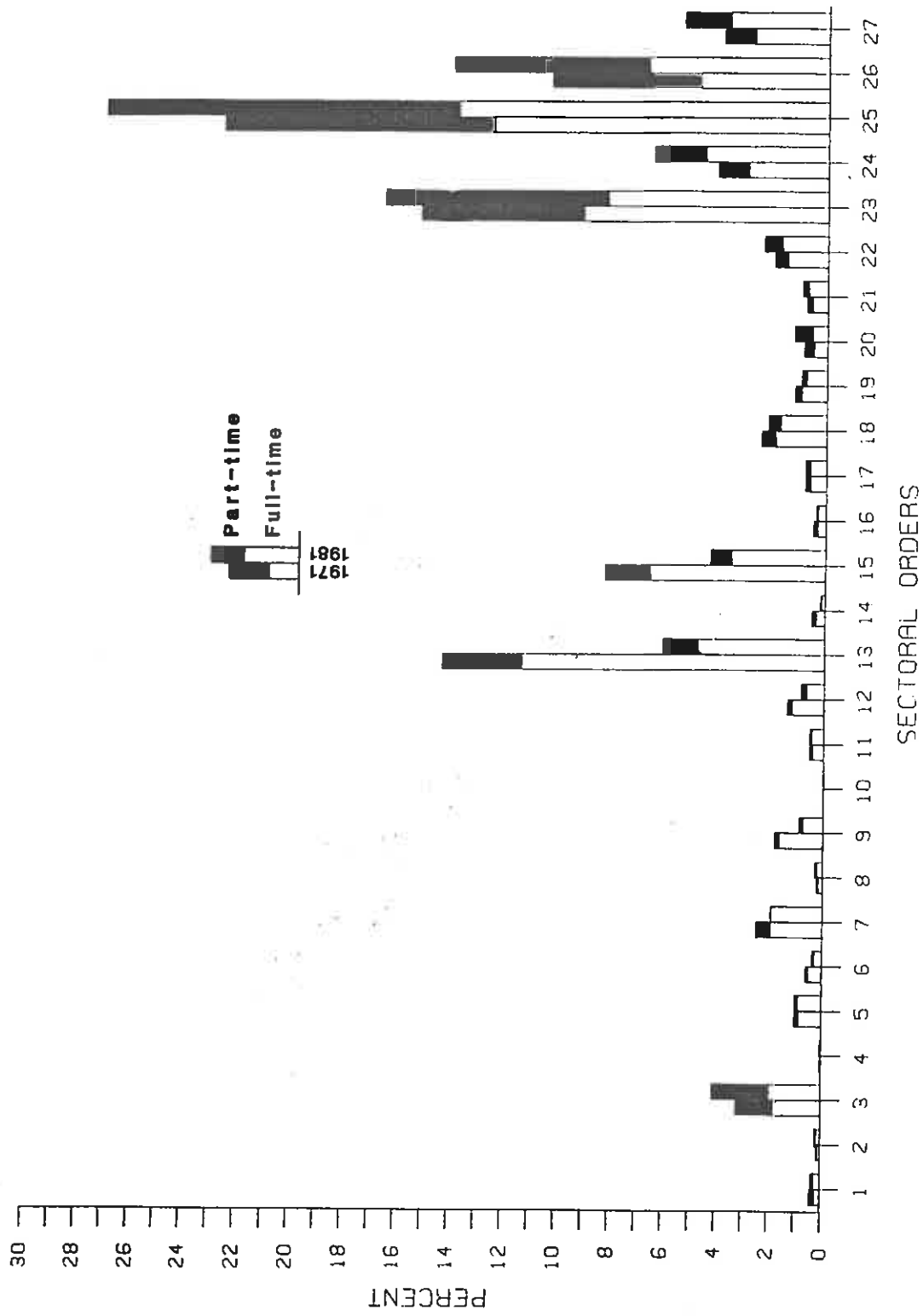


Figure 5. Percentage Female Full-time and Part-time Employment by Order, 1971 and 1981.

time work, but 2772 part-time jobs were created, representing 36.6% of the total employment increase.

Female employment in the manufacturing sector in West Yorkshire decreased by 46,500 (36%) between 1971 and 1981. Decline was dominated by job loss in the textile industry (27,000), and to a lesser extent by the clothing industry (13,000). In both, most of the jobs lost were full-time, although 20.6% of the jobs shed in textiles were part-time and 27.3% in clothing, significantly more than for males. Employment growth in the manufacturing sector occurred primarily in the food industry (order 3), as 3,100 jobs were created, the majority of which, 73.4% were part-time.

Most female employment however was concentrated in the service sector, with percentage employment in both the distributive trades (order 23) and professional and scientific services (order 25) exceeding employment in the textile industry. Over the decade total female service sector employment grew by almost 50,000 (25.3%), so that by 1981, it accounted for 73% of employment amongst women of which 49% was part-time. The importance of part-time service industry employment for women is underlined by the fact that every service industry experienced growth in female employment between 1971 and 1981, which was primarily accounted for by the growth in part-time labour. In the distributive trades for example, full-time employment declined by 1,700 (6%), but this was more than offset by a growth in part-time employment of almost 7000, generating an increase in the overall number of women employed.

3.3 Spatial Patterns of Employment Change

The TTWA's of Leeds and Bradford dominate employment in West Yorkshire, together accounting for 56% of total employment in 1971 and 55% in 1981 (Figures 6 and 7) whereas the more rural TTWA's of Todmorden and Keighley each contained less than 4% of employment in 1971 and 1981. Spatial variations in the pattern of employment change within the county are illustrated in Figure 8 demonstrating that the TTWA's of Huddersfield and Todmorden, and to a lesser extent, Bradford, have incurred the largest percentage decreases in employment share between 1971 and 1981, whilst the shares of total employment in Wakefield and Castleford have increased quite significantly. Keighley also expanded its employment base, relative to the rest of the county, whilst the proportion of total employment in other TTWA's remained

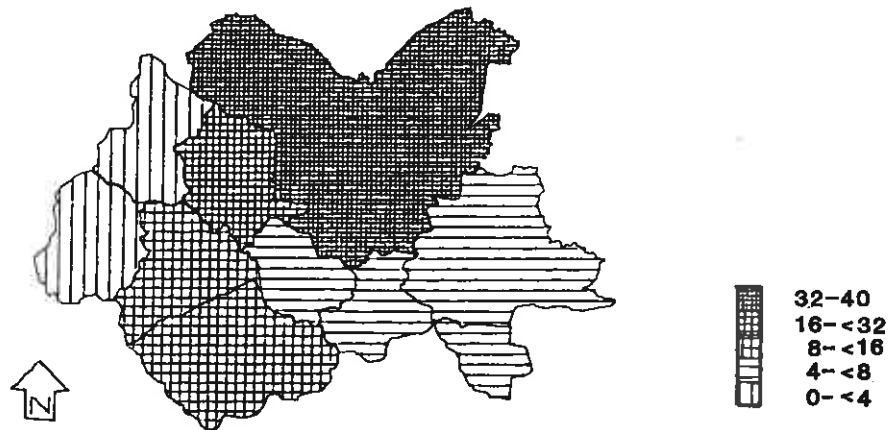


Figure 6. Percentage Shares of Total Employment by TTWA, 1971.

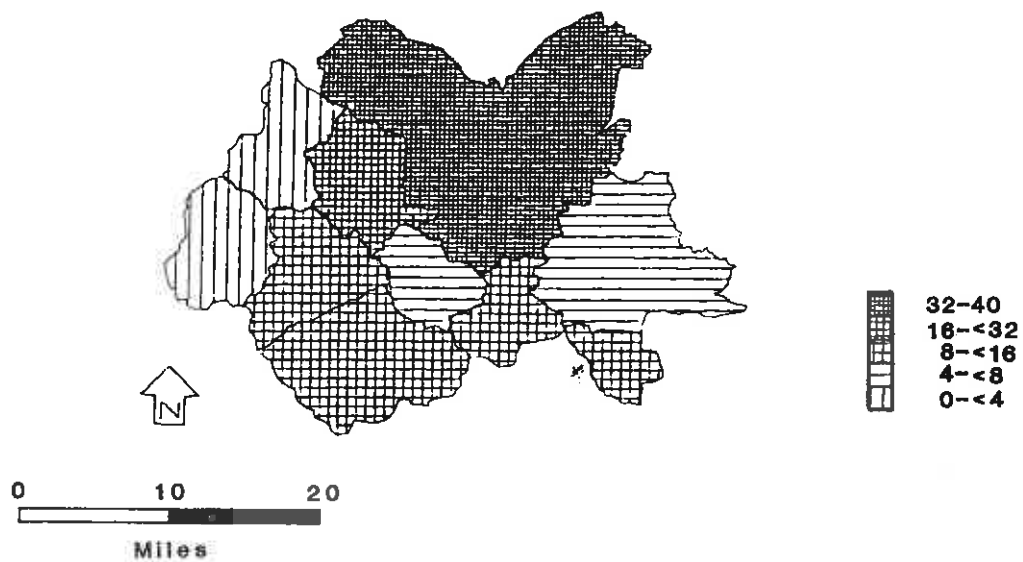


Figure 7. Percentage Shares of Total Employment by TTWA, 1981.

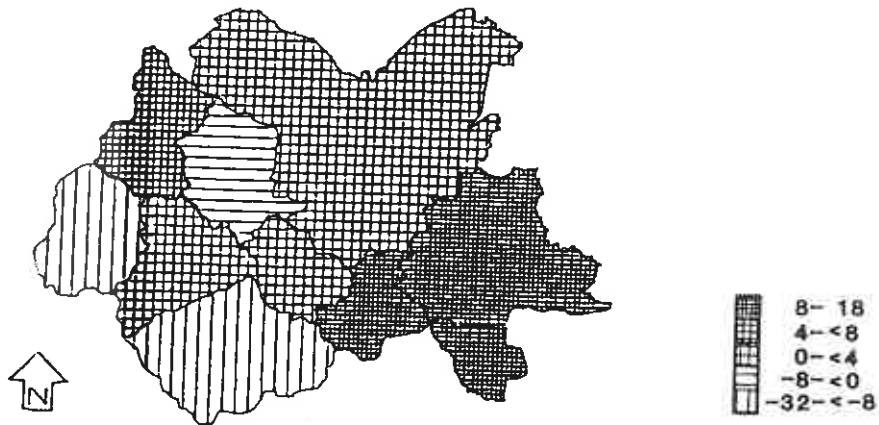


Figure 8. Change in Employment Share by TTWA, between 1971 and 1981.

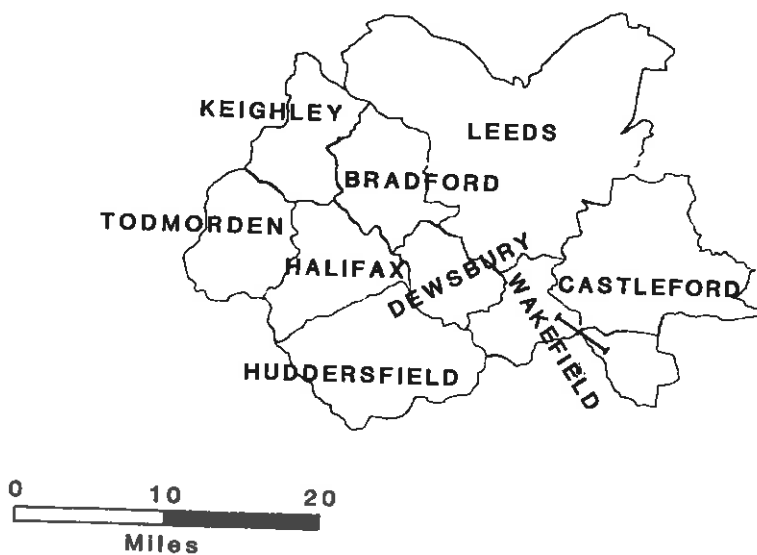


Figure 9. TTWA's in West Yorkshire, 1981.

fairly stable, or increased slightly.

Inherent in the spatial patterns of total employment change described above are variations in male and female employment in both full-time and part-time work. Full-time male employment decreased in every TTWA between 1971 and 1981 (Table 6). In relative terms, the greatest declines occurred in the Huddersfield and Todmorden TTWA's, although most absolute job loss took place in the Leeds and Bradford TTWA's. Employment loss in the Leeds TTWA over the decade was in fact greater than the losses in the Halifax, Wakefield, Huddersfield, Keighley and Todmorden TTWA's combined.

Changes in male part-time employment have been less consistent, as four of the TTWA's lost part-time jobs, notably Huddersfield and Todmorden, whilst four increased part-time employment. Castleford and Wakefield TTWA's for example, increased part-time employment by 23% and 25% respectively, which, as the numbers employed full-time in these areas fell only slightly, suggests that the male employment base is relatively stable.

The overall decline in female full-time employment has not been evenly distributed across the region (Table 7). Leeds, Bradford and Huddersfield TTWA's all experienced heavy employment losses, whilst employment grew in the Castleford and Wakefield TTWA's. Absolute employment gains in these areas however only totalled 876, which represents less than 10% of the full-time employment lost in the Leeds TTWA alone. Female part-time employment grew in all TTWA's except Todmorden and Huddersfield, where declines of -17% (251), and -1% (109) were registered. The largest absolute increase in part-time employment occurred in Leeds TTWA, where just over 9,000 jobs were created, but, as with male part-time jobs, Castleford (73%) and Wakefield (47%) experienced the largest percentage increases.

3.4 Sectoral and Spatial Employment Change at the TTWA level

Having described the sectoral and broad spatial patterns of employment change in West Yorkshire separately in the previous section, it is appropriate at this point to examine how sectoral employment has varied within TTWA's between 1971 and 1981.

In the primary sector, every TTWA experienced employment declines

TABLE 6. MALE FULL-TIME AND PART-TIME EMPLOYMENT CHANGE BY TTWA, 1971 TO 1981

TTWA	Full-time			Part-time		
	1971	1981	Change 1971-1981	% Change 1971-1981	1971	Change 1971-1981
Halifax	41585	36100	- 5485	-13.2	1747	-105
Todmorden	5123	3423	- 1700	-33.2	346	-117
Leeds	187537	164322	-23215	-12.4	8873	+346
Keighley	15225	13661	- 1564	-10.3	690	+175
Wakefield	37225	36493	- 732	- 2.0	1292	+318
Huddersfield	53874	41805	-12069	-22.4	2765	-619
Dewsbury	37935	32791	- 5144	-13.6	1506	+ 34
Bradford	89796	74681	-15115	-16.8	4693	- 51
Castleford	35335	34909	- 426	- 1.2	882	+201
Total	503635	438185	-65450	-13.0	22794	+182
						+ 0.8

Source: DOE statistics (NOMIS)

TABLE 7. FEMALE FULL-TIME AND PART-TIME EMPLOYMENT CHANGE BY TTWA, 1971 TO 1981

TTWA	Full-time				Part-time			
	1971	1981	Change 1971-1981	% Change 1971-1981	1971	1981	Change 1971-1981	% Change 1971-1981
Halifax	16803	15708	- 1095	- 6.5	10827	12535	+ 1708	+15.6
Todmorden	2788	2187	- 601	-21.6	1486	1235	- 251	-16.9
Leeds	82164	72666	- 9498	-11.6	45256	54651	+ 9395	+20.8
Keighley	7091	6793	- 298	- 4.2	4001	4947	+ 946	+23.6
Wakefield	15514	15871	+ 357	+ 2.3	8309	12203	+ 3894	+46.9
Huddersfield	21625	16896	- 4729	-21.9	11055	10946	- 109	- 1.0
Dewsbury	14955	13467	- 1488	- 9.9	8464	11782	+ 3318	+39.2
Bradford	42722	36493	- 6229	-14.6	22313	26783	+ 4470	+20.1
Castleford	11130	11649	+ 519	+ 4.6	6059	10507	+ 4448	+73.4
TOTAL	214792	191730	-23062	-10.7	117770	145589	+27819	+23.6

Source: DOE statistics (NOMIS)

between 1971 and 1981 (Figure 10). The largest relative losses occurred in the Dewsbury TTWA (-65%) whilst the Castleford (-7%) and Wakefield TTWA (-6%) incurred the smallest losses. Manufacturing sector employment also decreased in every TTWA, however the magnitude of decline varied quite significantly. For example, in Castleford, total manufacturing employment decreased by only one person, whilst in Huddersfield TTWA, which experienced the largest relative decline, manufacturing employment fell by almost 21,000 (41%). Most absolute decline occurred in the Leeds TTWA, where 41,200 (33%) manufacturing jobs were lost. In the construction sector, employment increased in the Bradford, Castleford and Dewsbury TTWA's only.

By contrast, service sector employment grew in all the TTWA's except Todmorden. In absolute terms, service sector growth was concentrated in the Leeds and Bradford TTWA's (almost 20,000 and 11,000 respectively), but most relative growth occurred in the AOA's of Keighley (+45%), Castleford (+22%), Wakefield (+22%) and Halifax (+21%). In most of the TTWA's in West Yorkshire, service employment was the only growth sector between 1971 and 1981.

3.5 Spatial and Sectoral Employment Change at the AOA level

A significant amount of variation exists in the characteristics of employment change within TTWA's in West Yorkshire between 1971 and 1981, details of which are presented in Table 8. Analysis at the AOA level in Halifax for example reveals that all of the 2% increase in total female employment recorded for the TTWA over the decade, actually occurred within the Halifax AOA. In Leeds TTWA, the 7.2% decrease in total employment conceals an enormous amount of diversity between AOA's ranging from a decrease in employment of 51% in Rothwell AOA, to a 63% gain in Seacroft AOA. In Dewsbury TTWA, aggregate employment decline of 5.2% actually reflects employment loss within Spen Valley AOA, whilst in contrast, the overall buoyancy of employment within Castleford TTWA (+8.9%), masks quite a severe male employment decline in Normanton AOA (-37%).

The pattern of male and female employment change at AOA level indicates the strength of expansion or contraction in the local economy. For the majority of AOA's trends in male and female employment change have been in the same direction, but in eight areas (Halifax, Morley,

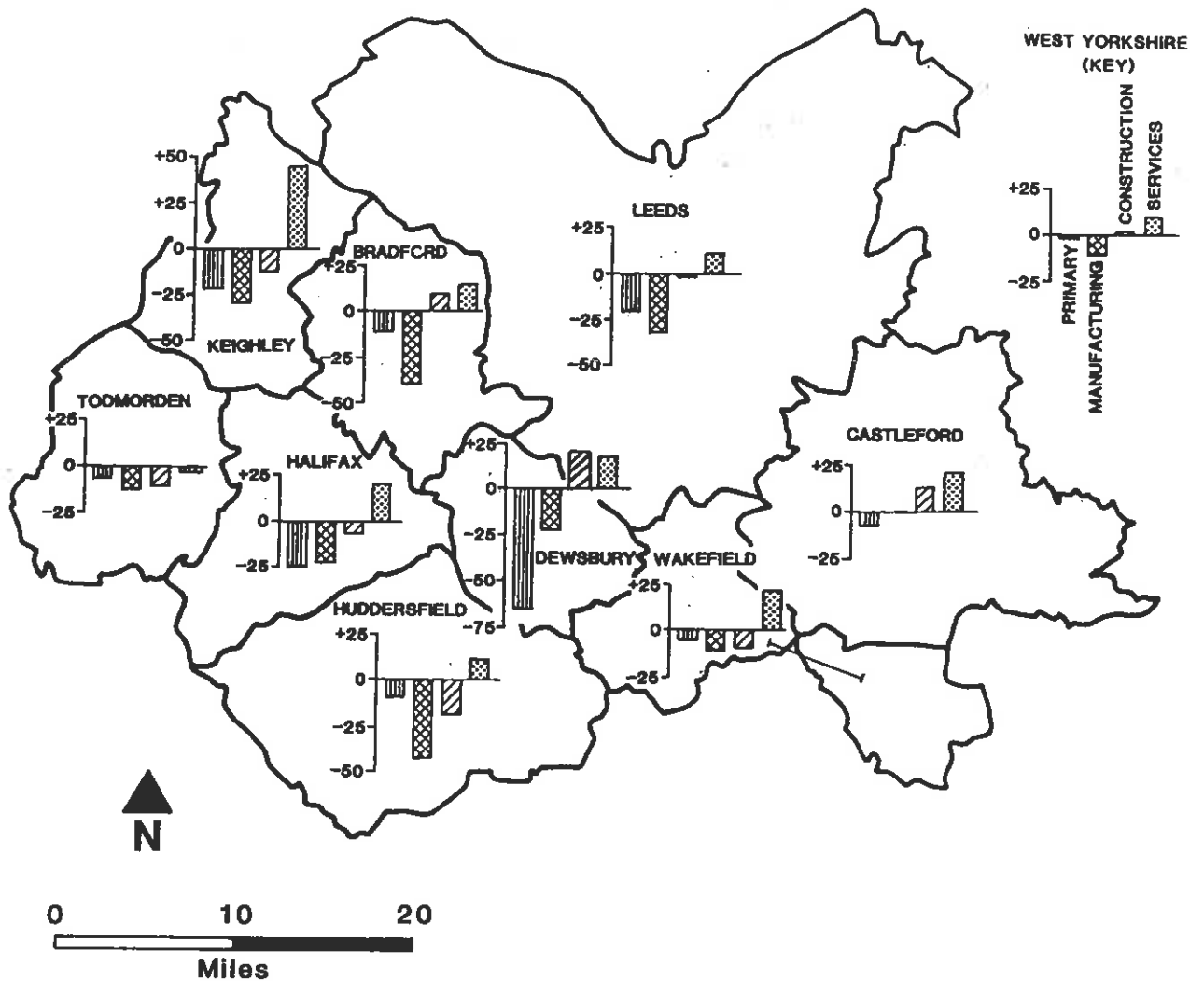


Figure 10. Percentage Sectoral Employment Change by TTWA, 1971 to 1981.

TABLE 8. EMPLOYMENT CHANGES IN AOA'S ACROSS WEST YORKSHIRE, 1971 to 1981

AOA/TTWA	TOTAL				MALE				FEMALE				FEMALE PART-TIME			
	1971	1981	% change		1971	1981	% change		1971	1981	% change		1971	1981	% change	
Halifax AOA	44214	44113	- 0.2		25609	23678	- 8		18605	20435	+10		7777	9303	+20	
Elland AOA	8182	6843	16		5494	4665	-15		2688	2178	-19		794	870	+10	
Sowerby AOA	7614	5705	-25		5021	3500	-30		2593	2205	-15		794	864	+ 9	
Brighouse AOA	10952	9324	-15		7208	5899	-18		3744	3425	- 9		1462	1498	+ 2	
HALIFAX TTWA	70962	65985	- 7		43332	37742	-13		27630	28243	+ 2		10827	12535	+16	
Leeds AOA	222603	196275	-12		131367	112282	-15		91236	83993	- 8		31096	33728	+ 8	
Horsforth AOA	10080	12445	+24		6167	7195	+17		3913	5250	+34		1489	2677	+80	
Morley AOA	14497	15108	+ 4		9354	9373	- 0.2		5143	5735	+12		1908	2588	+36	
Rothwell AOA	13594	6710	-51		10252	4088	-60		3342	2622	-22		1229	1342	+ 9	
Seacroft AOA	12182	19823	+63		7252	11219	+55		4930	8604	+75		1943	4413	+127	
Bramley AOA	19892	16675	-16		12949	9983	-30		6943	6692	- 4		2570	3018	+17	
Yeadon AOA	11561	10851	- 6		7419	7178	- 3		4142	3673	-11		1574	1614	+ 3	
Otley AOA	12659	14219	+12		7463	7242	- 3		5196	6977	+34		2444	3744	+53	
Wetherby AOA	6762	8752	+29		4187	4981	+19		2575	3771	+46		1003	1527	+52	
LEEDS TTWA	323830	300858	- 7		196410	173541	-12		127420	127317	- 0.1		45256	54651	+21	
Wakefield AOA	51866	55030	+ 6		31718	31127	- 2		20148	23903	+19		6980	10172	+46	
Hemsworth AOA	2242	2624	+17		791	862	+ 9		1451	1762	+21		598	916	+53	
S. Elmsall AOA	8232	8523	+ 4		6008	6114	+ 2		2224	2409	+ 8		731	1115	+53	
WAKEFIELD TTWA	62340	66177	+ 6		38517	38103	- 1		23823	28074	+18		8309	12203	+47	

TABLE 8. (Continued)

AOA/TTWA	TOTAL				MALE				FEMALE				FEMALE PART-TIME			
	1971	1981	% change		1971	1981	% change		1971	1981	% change		1971	1981	% change	
Dewsbury AOA	28992	29379	+ 1		18176	16253	-11		10816	13126	+21		3663	6240	+70	
Batley	11030	12250	+11		5735	6793	+18		5295	5457	+ 3		2222	2580	+16	
Spen V. AOA	22838	17951	-21		15530	11285	-27		7308	6666	- 8		2579	2962	+15	
DEWSBURY TTWA	62860	59580	- 5		39441	34331	-13		23419	25249	+ 8		8464	11782	+39	
Bradford AOA	139512	124967	-10		82145	69720	-15		57367	55247	- 4		19657	22813	+16	
Shipley AOA	20012	17632	-12		12344	9603	-22		7668	8029	+ 5		2656	3970	+49	
BRADFORD TTWA	159524	142599	-11		94489	79323	-16		65035	63276	- 3		22313	26783	+20	
Castleford AOA	21070	24172	+15		14575	15424	+ 6		6495	8748	+35		2394	4269	+78	
Normanton AOA	4705	3773	-20		3086	1931	-37		1619	1842	+14		728	944	+30	
Pontefract AOA	15960	17753	+11		9341	8803	- 6		6619	8950	+35		2351	4267	+81	
Knottingley AOA	11671	12450	+ 7		9215	9834	+ 7		2456	2616	+ 7		586	1027	+75	
CASTLEFORD TTWA	53406	58148	+ 9		36217	35992	- 1		17189	22156	+29		6059	10507	+73	

Source: DOE Statistics (NOMIS)

Otley, Wakefield, Dewsbury, Shipley, Normanton and Pontefract) interesting anomalies are revealed as female employment has increased, whilst male employment has decreased, indicating that, even within the same AOA, differentials exist in the rates of male and female employment growth and decline. Variations in full-time and part-time female employment change also exist, as part-time female employment has increased in all AOA's, even if total male and female employment has been in decline. It should be noted however, that in Todmorden and Huddersfield, which are single office TTWA's, female part-time employment fell by 17% and 1% respectively. Increases in female part-time and full-time employment have been particularly marked in Horsforth (+80%) Seacroft (+127%) Pontefract (+81%) and Knottingley (+92%) AOA's, further emphasizing the growth in part-time work, and demonstrating that growth has been spatially differentiated.

The evidence also implies that a centre-periphery dichotomy exists in the pattern of male and female employment change within TTWA's in the county. In the Leeds TTWA for example, male and female employment has increased in the outer-metropolitan AOA's of Horsforth, Otley and Wetherby, and also in Seacroft. The peripheral Hemsworth and South Elmsall AOA's, within Wakefield TTWA gained employment, as did the AOA's of Castleford and Knottingley within Castleford TTWA, and Batley AOA which forms part of the Wakefield TTWA.

Analysis at the AOA level therefore reveals the extent of diversity in the characteristics of employment change within the county, which prompts many questions. Why, for instance has female employment, particularly part-time employment, grown in the Halifax AOA, when employment in the surrounding AOA's has contracted? Why have both male and female employment in the Seacroft AOA grown so rapidly, whilst employment in neighbouring Rothwell has been reduced, and why has male employment fared so badly in the Normanton AOA, whilst female employment has grown both in the Normanton area, and throughout the whole Castleford TTWA?

These questions can be further explored by a thorough investigation of sectoral employment structures within AOA's and such exploration, although beyond the scope of this initial investigation, will form the basis of subsequent work. Here, for exemplification only, three AOA's have been chosen from within the very diverse Leeds TTWA to illustrate

the dominant growth and decline industrial orders (Table 9). It is recognized that many of the conclusions drawn at this stage are specific to the AOA's chosen and may not be typical.

In each AOA, decline in the clothing and footwear industry (order 15) was either the primary or secondary source of employment loss, indicating that some similarities exist in the employment structure of the 3 selected AOA's. However, differences in sectoral employment change are more common. Leeds AOA for instance experienced dramatic declines in clothing and footwear, and mechanical engineering (order 7) employment, whilst in Seacroft AOA, mechanical engineering was the fastest growing sector (this is despite the fact that a 29% decline occurred in this sector in the county as a whole). In Rothwell AOA, male employment decline in metal manufacture (order 6), previously the largest employer, and bricks and pottery (order 16) is set against growth in timber (order 17), and coal (order 4) although both manufacturing orders have declined overall in West Yorkshire by 39% and 7% respectively. Service sector growth in Rothwell, was only important for female labour. The peculiar combination of growing and declining industries within AOA's, begins therefore to explain the patterns of employment change which have been observed, thus highlighting the need to perform further spatially and sectorally disaggregated analyses.

It is also important to investigate how patterns of sectoral and spatial employment concentration have evolved over the decade. The next section therefore describes how the employment changes already identified have affected industrial localization and zonal specialization at the AOA scale.

TABLE 9. VARIATIONS IN THE STRUCTURE OF EMPLOYMENT CHANGE WITHIN LEEDS TTWA IN 1971 AND 1981

AOA	Declining Sectors	Absolute Change	% Change	Expanding Sectors	Absolute Change	% Change
LEEDS AND HUNSLIFY	TOTAL	-16204	-68%	Insurance	+6404	+ 52%
				Public Admin.	+2213	+ 19%
	MALE	- 4363	-34%	Insurance	+2489	+ 40%
		- 5108	-65%	Public Admin.	+ 800	+ 9%
	FEMALE	- 4002	-35%	Insurance	+3915	+ 65%
		-11096	-67%	Public Admin.	+1413	+ 45%
ROTHWELL	TOTAL	- 3647	-98%	Distributive Tr.	+ 267	+ 73%
		- 957	-83%	Miscellaneous Servs.	+ 210	+ 37%
	MALE	- 3212	-98%	Timber, furniture	+ 99	+319%
		- 933	-84%	Coal	+ 87	+102%
	FEMALE	- 435	-99%	Distributive Tr.	+ 252	+156%
		- 310	-98%	Miscellaneous Servs.	+ 169	+ 54%
SEACROFT	TOTAL	- 588	-88%	Mechanical Eng.	+1885	+122%
		- 357	-91%	Professional Servs.	+1780	+ 94%
	MALE	- 305	-97%	Mechanical Eng.	+1672	+113%
		- 215	-99%	Construction	+ 735	+187%
	FEMALE	- 283	-79%	Professional servs.	+1354	+104%
		- 142	-82%	Miscellaneous servs.	+1251	+160%

Source: DOE statistics (NOMIS)

4. PATTERNS OF SPATIAL AND SECTORAL CONCENTRATION IN WEST YORKSHIRE

4.1 Spatial Employment Concentration by Industrial Order

Indices of localization may be used to investigate the degree to which the spatial distribution of employment in any one sector or industrial order, varies from the spatial distribution of total employment across all sectors or industrial orders in West Yorkshire. Hence, for any order k , the index C^k may be expressed formally as:-

$$C^k = 50 \sum_{i=1}^n \left| \frac{E_i^k}{E_*^k} - \frac{E_i^*}{E_*^*} \right| \quad (1)$$

where E_i^k is the employment in order k in zone i , and E_*^* is the employment in all orders in all zones (n). The zones are AOA's in this analysis. If employment in order k is concentrated in one zone, the index would equal 100 representing maximum localization. Alternatively if employment in order k is spread evenly across all AOA's the index equals zero as minimum localization occurs.

Localization indices computed for total employment in 1971 and 1981 (Figure 11) show significant variations between industrial orders. In both years spatial concentration was most evident in shipbuilding (order 10), and mining (order 2), whereas employment in the professional and scientific services order (25) and miscellaneous services (order 26) was most evenly distributed across AOA's in West Yorkshire. Although there are variations in the level of concentration within broad sectoral categories, it is nevertheless apparent that service sector employment is less spatially concentrated than employment in the primary, manufacturing and construction industries. The histograms in figures 12 and 13 contrast markedly with the absolute and percentage distributions of employment by industrial order which were illustrated earlier in Figures 3, 4 and 5.

The evidence therefore appears to support an inverse relationship between the value of the index of localization, and the percentage share of employment in a particular industrial order, such that, the greater the share of employment in that order, the lower the index of localization. In the service sector for example, which accounted for 47% of total employment in West Yorkshire in 1971 and 58% in 1981, localization indices

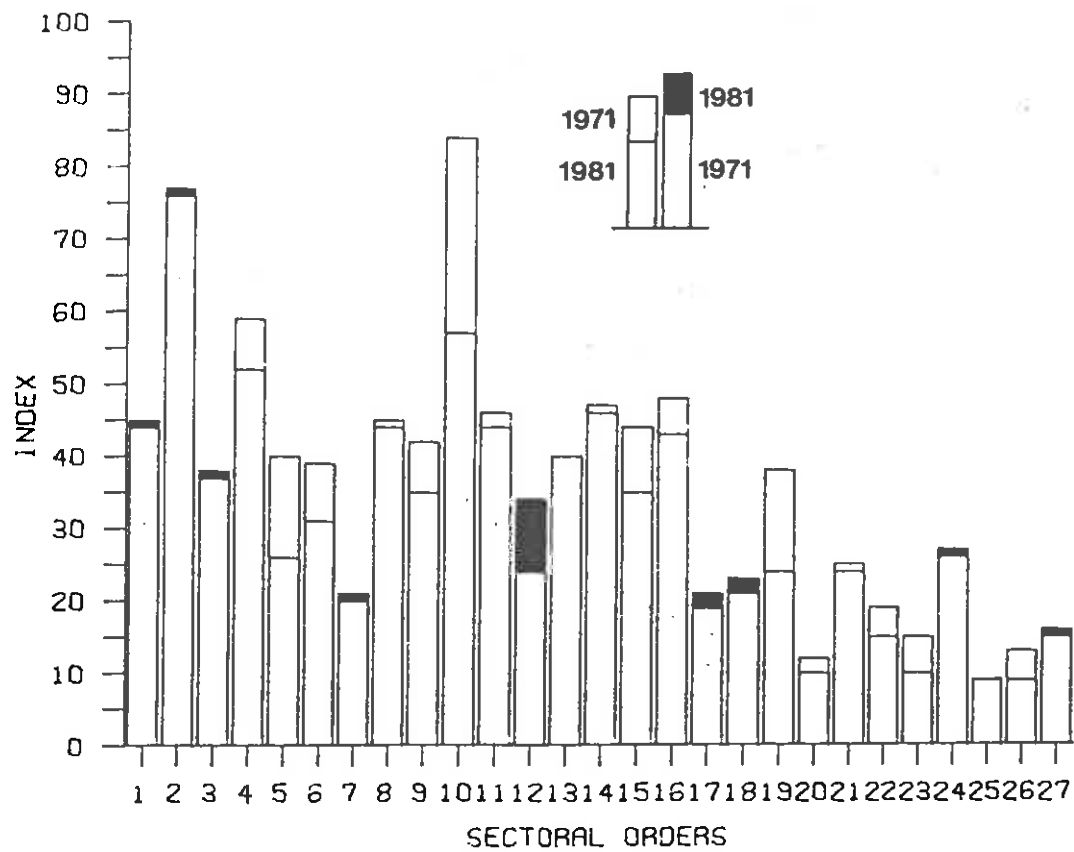


Figure 11. Total Indices of Localization by Order in West Yorkshire, 1971 and 1981.

were less than twenty for all orders except the utilities and insurance (orders 21 and 24), and in the manufacturing sector, mechanical engineering (order 7) which was the second largest employer in 1971 and 1981, was also the least spatially concentrated (with index values of 19.7 in 1971 and 21.1 in 1981). Scattergrams plotting total percentage employment against the value of localization in the 27 industrial orders in 1971 and 1981 are illustrated in Figures 14 and 15. The computed correlation coefficient of - 0.495 in 1971 and - 0.65 in 1981, suggests that an inverse relationship does exist between the two variables, and if the two industrial orders with the largest residuals, mining and shipbuilding, are excluded from the calculations, the calculations the co-efficient increases to - 0.61 in 1971 and - 0.754 in 1981.

Localization indices for male employment (Figure 12) are greatest in mining (order 2), coal and petroleum products (order 4), shipbuilding (order 10), and leather goods (order 14); all had index values above 45 in both 1971 and 1981. In addition, localization in textiles (order 13) and clothing (order 15) is important because of the substantial numbers employed in these orders in West Yorkshire. Localization indices alone however, do not reveal the areas in which localized industries concentrate, so in order to add a spatial dimension, location quotients have been calculated to measure the proportion of total employment in an AOA which is in order k, relative to the proportion of total employment in West Yorkshire which is in that order. Thus a location quotient can be defined, for employment in order k, and in AOA i as:-

$$LQ_{i1}^k = \left[\frac{\frac{E_i^k}{E_i^*}}{\frac{E_*^k}{E_*^*}} \right] \quad (2)$$

this measures the extent to which employment in order k in AOA i, is more or less concentrated than is total employment. If the location quotient is greater than one, then employment in that industrial order is more concentrated in the AOA, than employment in that industrial order is in the economy as a whole.

Location quotients for the industrial orders with the highest localization indices are presented in Table 10. Employment in the mining, and coal products industrial orders was localized in the south east of the country, particularly in the AOA's within the Castleford TTWA,

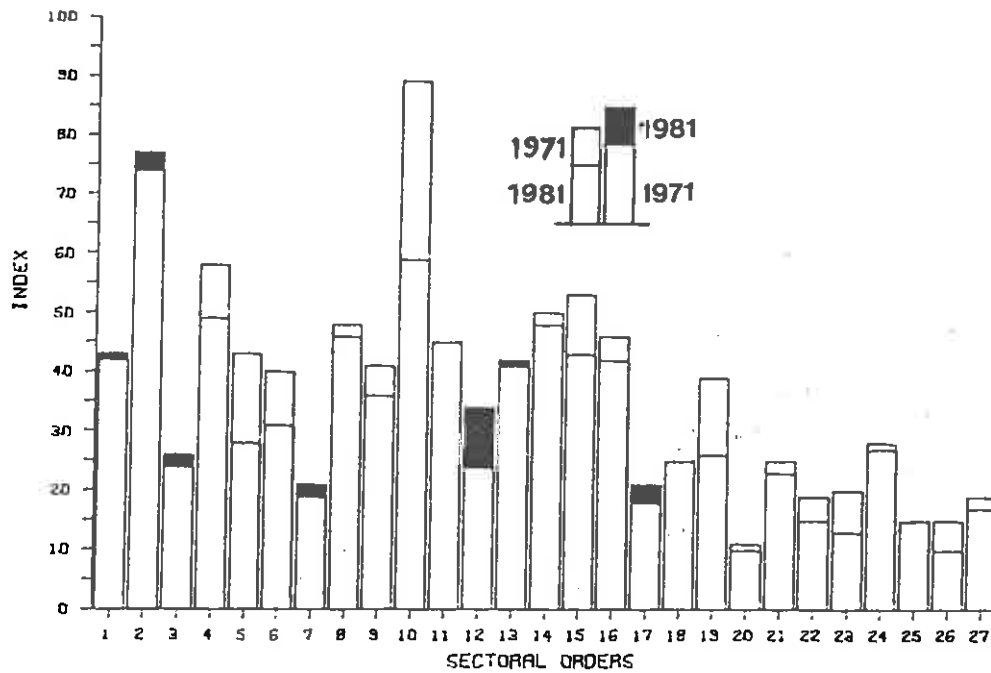


Figure 12. Male Indices of Localization by Order in West Yorkshire, 1971 and 1981.

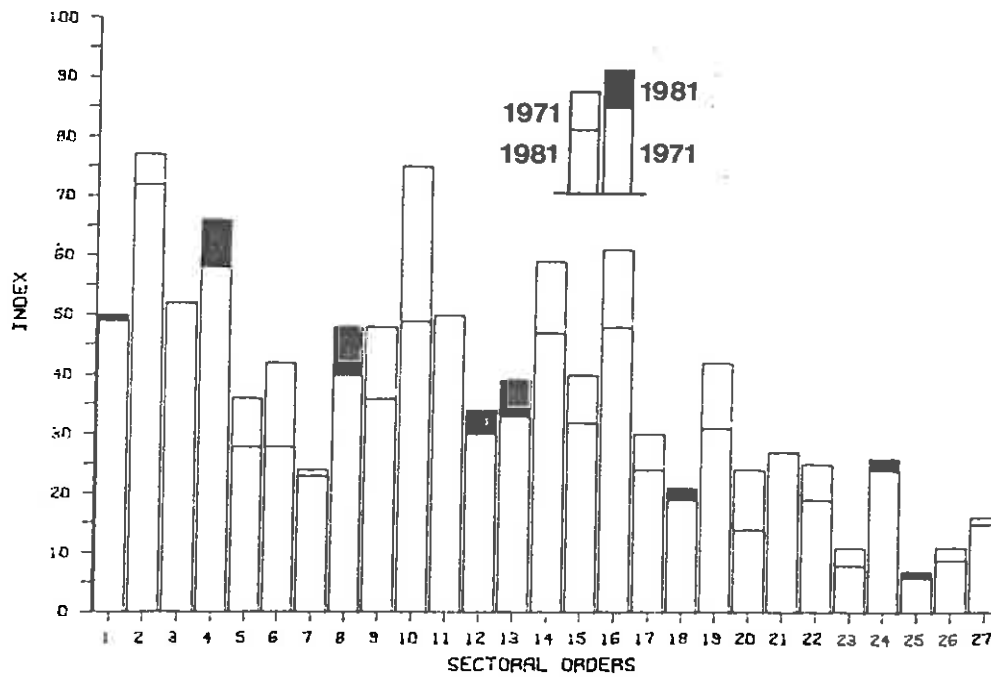


Figure 13. Female Indices of Localization by Order in West Yorkshire, 1971 and 1981.

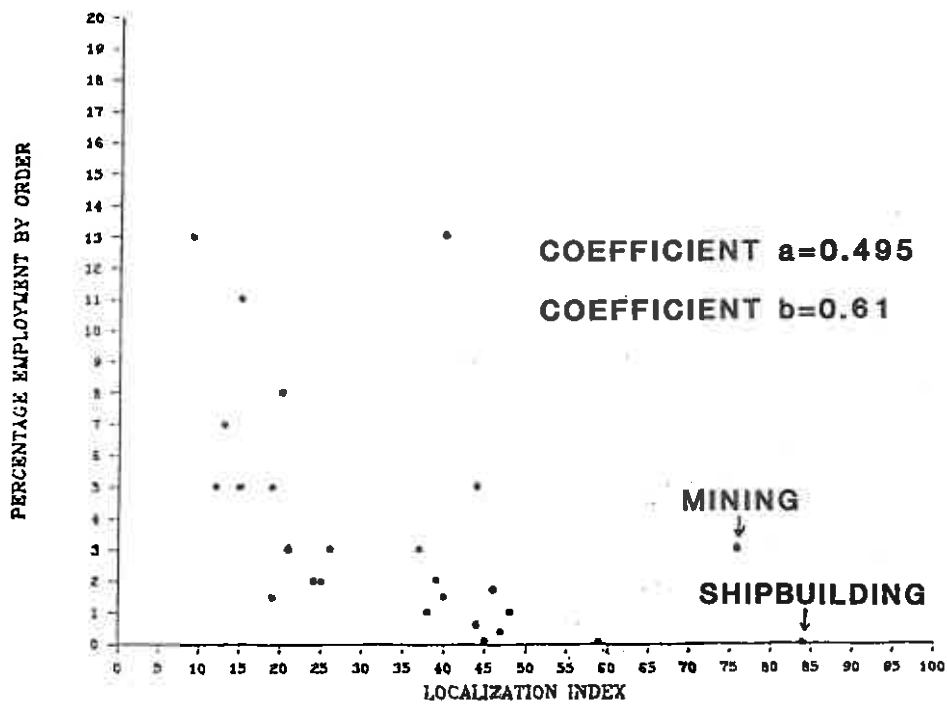


Figure 14. Total Indices of Localization and Percentage Employment by Order in 1971.

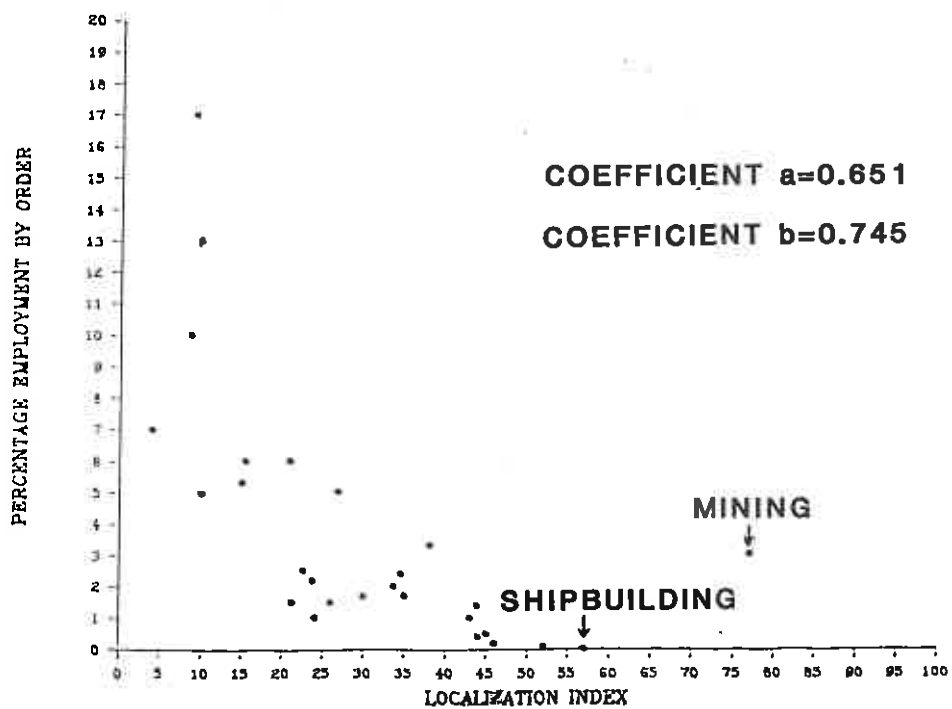


Figure 15. Total Indices of Localization and Percentage Employment by Order in 1981.

TABLE 10. SELECTED MALE LOCATION QUOTIENTS FOR INDUSTRIAL ORDERS
WITH HIGH LOCALIZATION INDICES, 1971 AND 1981

Industrial Order	AOA	1971		1981	
		LQ.	No. Employed	LQ.	No. Employed
Mining	South Elmsall	15.0	4565	13.6	4220
	Normanton	12.4	1939	0.0	0
	Castleford	9.4	6940	8.8	6920
Coal and Petroleum products	Castleford	14.5	316	0.0	0
	Rothwell	5.6	267	40.3	172
	Brighouse	4.8	52	6.8	42
Shipbuilding	Knottingley	29.2	70	10.4	20
	Rothwell	18.4	49	0.0	0
Leather goods	Keighley	6.3	348	1.1	37
	Todmorden	3.5	67	4.2	37
Textiles	Sowerby	3.8	2408	3.7	980
	Elland	3.0	2095	2.7	978
	Brighouse	2.7	2474	2.1	959
Clothing	Todmorden	3.2	356	5.6	217
	Leeds	2.9	7873	2.3	2765
	Seacroft	2.1	313	0.1	8

(Normanton and Castleford), and in South Elmsall, which is part of the Wakefield TTWA. In Normanton AOA however, pit closures over the decade reduced employment, and hence the location quotient, to zero in 1981, and in Castleford AOA, the closure of coke foundries, as world demand slumped, caused employment to fall to zero.

Shipbuilding employment was localized in the AOA's of Knottingley and Rothwell, although total employment was only 152 in 1971 and 104 in 1981. Male employment in the leather industry was concentrated in the rural AOA's of Keighley and Todmorden, and textile employment in a zone to the south-west of the country incorporating the Sowerby Bridge, Elland and Brighouse AOA's in particular. Localization in the clothing industry was again important in Todmorden, but also in the Leeds and Seacroft AOA's.

It is interesting to examine the relationship between changes in the spatial concentration of male employment and male employment change in different industrial orders. Localization remained unchanged in three orders, that is, vehicles (order 11), paper (order 18) and professional services (order 25); increased in six orders, and decreased in the remaining eighteen orders. The orders which increased localization were agriculture (order 1) mining (order 2), mechanical engineering (order 7), metal goods N.E.S. (order 12), textiles (order 13) and timber (order 17) and in each case some job loss occurred. Employment changes associated with decreasing localization indices however are less consistent; of the 18 industrial orders which became less spatially concentrated, twelve experienced job losses, and six employment gains between 1971 and 1981. Changing localization does not therefore appear to be related simply to changes in the levels of employment in any industrial order. However, further analysis reveals that of the eight industrial orders with localization indices greater than 40 in 1971, (mining, chemicals, instrument engineering, electrical engineering, shipbuilding, leather, clothing and bricks), seven lost employment, and only instrument engineering registered a gain of 0.87%. In contrast, of the eight orders with localization indices less than 20 in 1971 (food, construction, gas and electricity, transport, distribution, insurance, miscellaneous and public administration), five gained employment.

Evidence of a relationship between the level of localization in

1971, and changes in employment between 1971 and 1981 has important implications, as the impact of job loss is likely to be more significant if the industrial order is spatially concentrated. Industries in which employment growth has occurred have been more dispersed, and consequently spatial variations in the impact of job gains have been less significant than variations in the impact of job loss.

The overall impact of employment change will also depend on the relative magnitude of losses or gains. Male employment losses in the seven orders which had localization indices above 40 in 1971 totalled 13,500 jobs, whilst in the industries which increased employment and had low initial localization indices, employment gains equalled 11,300. Given the pattern of spatial employment concentration, changes of this magnitude had important effects upon the balanced distribution of job losses and gains in West Yorkshire.

Female employment concentration (Figure 13) resembles the male pattern to the extent that the female index of localization in 1971, is greater than 45 in the same industries which have been identified for males, but, in addition, female localization is high in food (order 3), electrical engineering (order 9) vehicles (order 11) and bricks (order 16). Since less than 0.4% of employment was in agriculture (order 1), mining (order 2), coal (order 4), and shipbuilding (order 10) in both 1971 and 1981, the impact of their localization is marginal in contrast to localization in textiles, which had an index of 33 in 1971, and clothing (order 15) with an index of 40, and which together employed 27% of the female workforce in West Yorkshire in 1971. Spatial concentrations of female employment in the industrial orders with high localization indices can be identified (Table 11). Location quotients reveal that employment in the food industry is concentrated in the Batley, Halifax and Pontefract AOA's whilst female employment in electrical engineering is localized in a sub-region to the east of Leeds, which includes the Shipley, Bramley and Yeadon AOA's. The main centres of female employment in the vehicle industry have changed between 1971 and 1981. In 1971, employment was localized in the Dewsbury, Horsforth and Morley AOA's, whereas by 1981 the focus had shifted towards the Todmorden and Yeadon AOA's. In absolute terms,

TABLE 11. SELECTED FEMALE LOCATION QUOTIENTS FOR INDUSTRIAL ORDERS WITH HIGH LOCALIZATION INDICES IN 1971 AND 1981

Industrial Order	AOA	1971		1981	
		LQ.	No. Employed	LQ.	No. Employed
Food	Batley	5.7	977	6.5	1444
	Halifax	5.7	3388	5.1	4288
	Pontefract	5.0	1055	4.6	1681
Electrical Eng.	Shipley	5.8	810	1.2	88
	Yeadon	4.9	370	7.6	250
	Bramley	2.4	303	1.6	97
Vehicles	Dewsbury	7.2	414	3.9	273
	Horsforth	6.7	140	0.1	4
	Todmorden	0	0	14.8	270
	Morley	6.6	181	0.6	17
	Yeadon	5.5	120	12.7	248
Leather	Keighley	12.7	697	0.3	5
	Todmorden	3.5	74	10.3	60
	Otley	3.3	85	2.9	34
Bricks	Knottingley	63.4	721	45.5	406
	Castleford	3.6	107	2.4	78
	Rothwell	3.0	47	2.3	23
Textiles	Elland	3.9	1506	3.9	512
	Sowerby	3.6	1346	3.5	468
	Spen Valley	2.3	2449	2.9	1192
Clothing	Normanton	3.7	499	3.7	293
	Todmorden	3.3	1163	3.8	557
	Leeds	2.2	16636	1.5	5540

female vehicle industry employment in Todmorden has risen from zero in 1971 to 270 in 1981 and in Yeadon from 120 to 250, whilst employment in Horsforth fell from 140 to 4, and in Morley from 180 to 17.

The main areas of localization for female employment in the leather industry in 1971 include the AOA's of Keighley, Todmorden and Otley, whilst female employment in the brick industrial order is concentrated in Knottingley, and to a lesser extent in Castleford and Rothwell, areas associated with high male localization in mining, coal and shipbuilding. In the textile industry female employment is localized in the same south western sub-region of the county as male employment, emphasizing the strength of the 'textile-zone', whilst female clothing employment is more concentrated in the Normanton and Todmorden areas, and also Leeds AOA.

Between 1971 and 1981, female localization increased in nine industrial orders, four of which also experienced increases in male employment localization, ie. agriculture, mechanical engineering, metal goods NES and textiles, and five others ie, coal, instrument engineering, paper, insurance and professional services. Localization remained the same in three orders, food, vehicles (despite re-location) and gas and electricity, and decreased in the remaining fifteen industrial orders.

As with male localization and employment change, no simple relationship can be observed between changes in female localization indices, and employment losses or gains; increased localization has been associated with job loss in five industrial orders, and job gain in four, whilst decreased localization has occurred in seven industrial orders which have expanded their employment base. There is however a connection between the degree of localization in 1971 and employment change. Of the five industrial orders which in 1971 had localization indices greater than 45, and which subsequently experienced decreased localization, four lost jobs totalling 4,350 (electrical engineering, shipbuilding, leather and bricks). When job losses in textiles and clothing are added to this, localized employment decline rises to 44,650. By contrast, if localization in 1971 was less than 20, then decreased localization was associated with employment gains in transport (22),

distribution (23), miscellaneous services (26) and public administration (27), which totalled 39,500. Within the economy of West Yorkshire as a whole therefore, spatially concentrated female employment losses are being compensated for by spatially dispersed employment gains, which are of a similar order of magnitude. Some industrial orders in which growth is occurring are also becoming more localized such as insurance and professional services for example, where 10,200 jobs have been created between 1971 and 1981.

Because of the growing importance of part-time employment amongst females, it is worth investigating how indices of localization for part-time employment vary from indices for full-time employment (Figures 16 and 17). Although localization decreased for both categories of worker over the decade, indices of localization were higher, in the majority of industrial orders, for females working full-time than part-time. Several industries can however be identified in which part-time employment has been more localized than full-time employment in both 1971 and 1981, food (order 3), textiles (order 13), clothing (order 15), other manufacturing (order 19), insurance (order 24), and public administration (order 27), three of which have also been important growth industries, food, insurance and public administration.

The extent to which employment in the West Yorkshire economy as a whole became more or less sectorally concentrated between 1971 and 1981 can be summarized using Lorenz curves, which depict how the cumulative percentage distribution of employment varies by industrial order across West Yorkshire. If the distribution is perfectly even, that is, all industrial activities make an equal percentage contribution to the total, then the plot adopts a 45° line to both axes. The amount by which the curve is displaced from the 45° line therefore provides a measure of sectoral concentration. Tress scores (Tress, 1938) can then be calculated to provide a numerical measure of the curves displacement by summing the cumulative percentages of employment in West Yorkshire. If, for example, all employment was concentrated in one industrial order out of twenty-seven, then the first cumulative total, and each subsequent total, would be 100. The overall Tress score would then equal 2,700 representing the least possible diversity. Alternatively, the greatest possible diversity would occur when each of the twenty seven industrial orders engaged the same number of people, that is $100/27$ or 3.7, which when added cumulatively gives a Tress score of 1419.

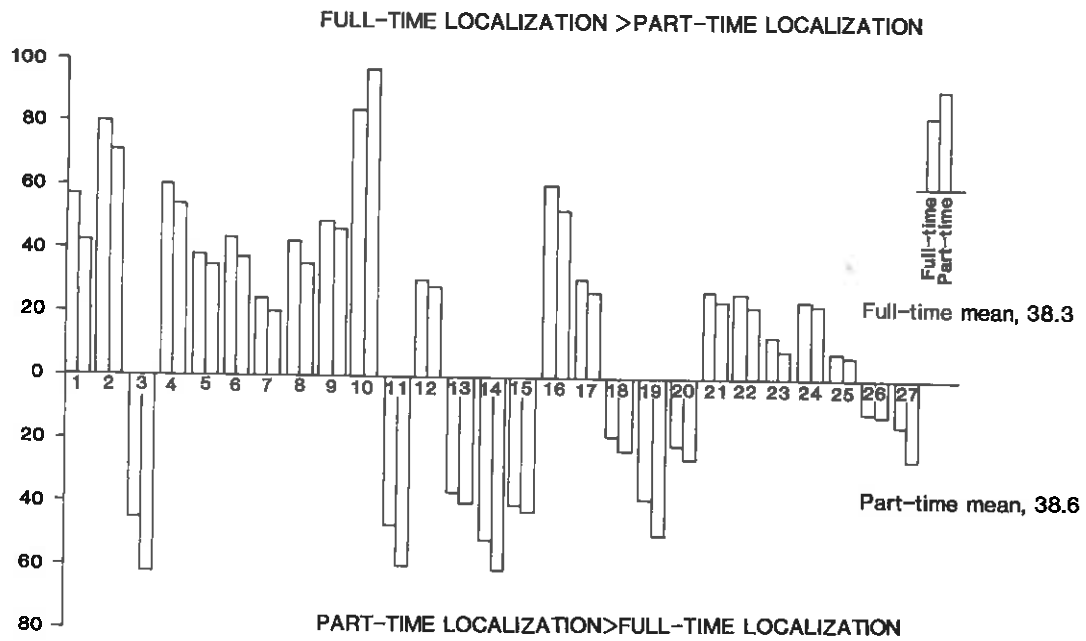


Figure 16. A comparison of Full-time and Part-time Female Employment Localization in West Yorkshire, 1971.

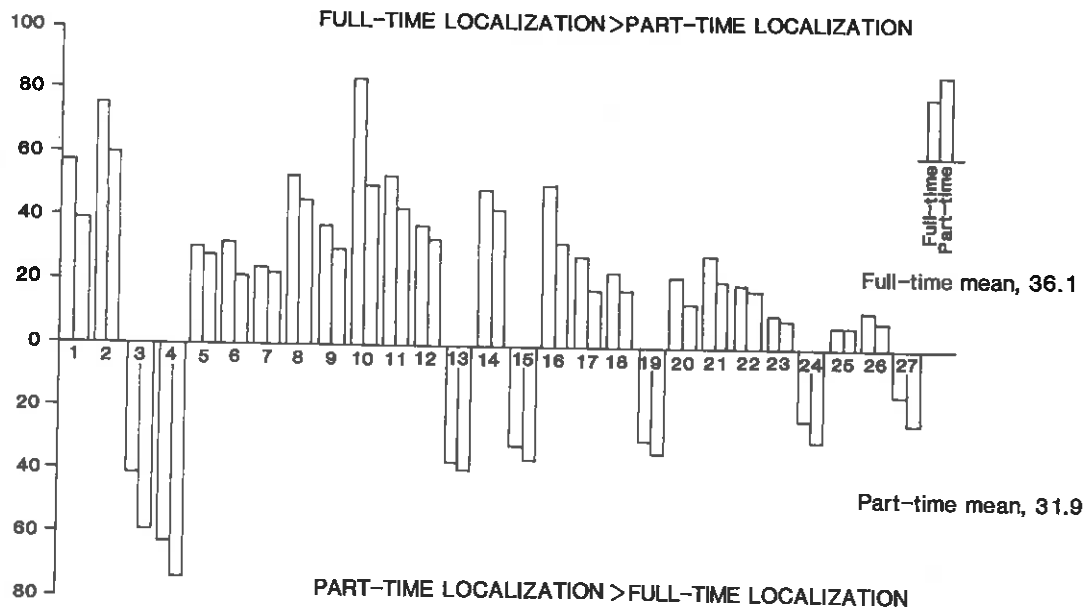


Figure 17. A Comparison of Full-time and Part-time Female Employment Localization in West Yorkshire, 1981.

Male employment in West Yorkshire has become less sectorally concentrated between 1971 and 1981 (Figure 18), which is revealed by a decline in the Tress Score from 2026 to 2010. The ranking of industrial orders indicates how the relative importance of various industries has changed over the decade, and shows that textiles (order 13) has been displaced by distribution (order 23), as the dominant employment category. The overall structure of female employment however, has become less diversified between 1971 and 1981 as employment has concentrated in the professional services (order 25) and distribution (order 23), (Figure 19). In 1971, 38% of female employment was in these two orders, yet by 1981, these sectors accounted for almost 44% of female employment. Changing employment concentration is reflected in an increase in the Tress score from 2309 in 1971 to 2329 in 1981. A comparison of the shape of the Lorenz curves in Figures 18 and 19 underlines the extent to which total female employment shows sectoral concentration relative to total male employment.

In the final section of this analysis variations in the sectoral concentration of employment in different AOA's are considered.

4.2 Sectoral Employment Concentration by AOA

The index of specialization, complements the index of localization, by measuring the degree to which the sectoral distribution of employment in one AOA differs from the sectoral distribution of employment in all AOA's in West Yorkshire. Thus for any zone, i , the index C_i , may be expressed as:-

$$C_i = 50.0 \sum_{k=1}^m \left| \frac{E_i^*}{E_i^*} - \frac{E_k^*}{E_k^*} \right| \quad (3)$$

where m is the total number of sectors. The index must fall within the range of zero to one hundred indicating maximum to minimum specialization for each zone in the economy, which, when analysed over time reveals the tendency for the employment structure of different AOA's to either diversify or specialize.

In 1971, West Yorkshire had two, fairly distinct, zones of special-

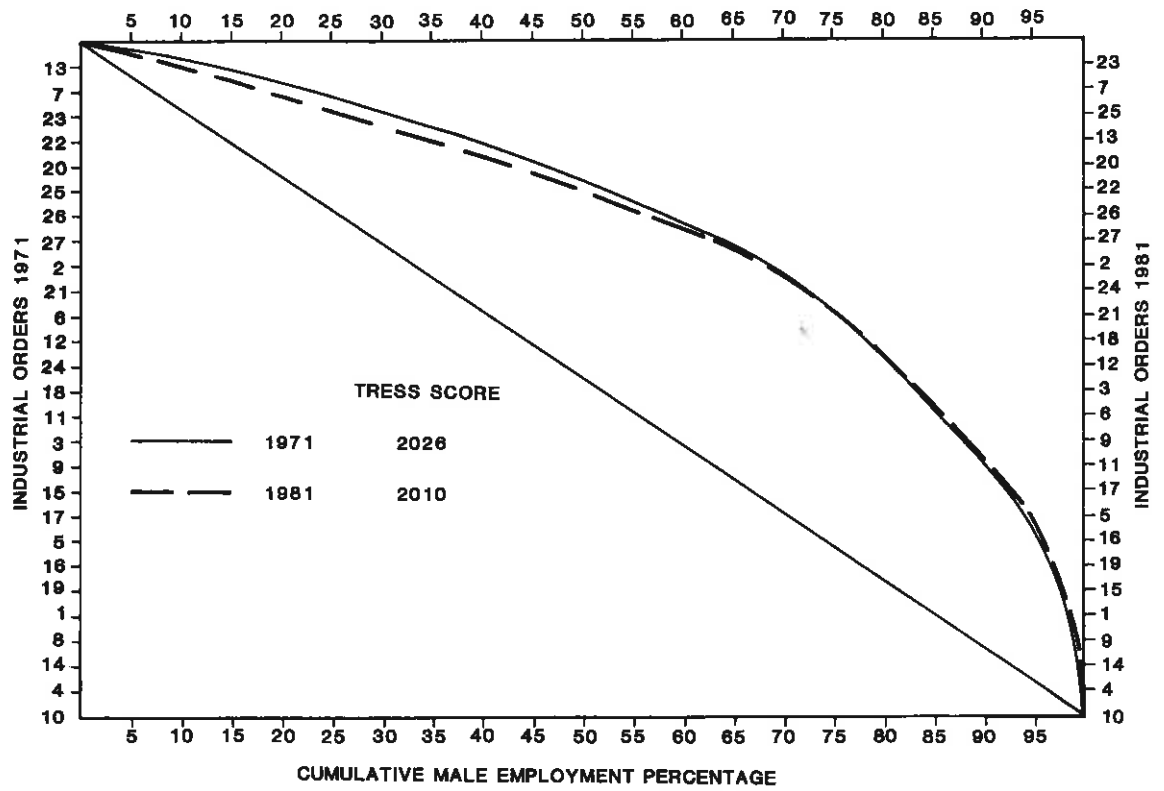


Figure 18. Lorenz Curves for Male Employment by Order in West Yorkshire, 1971 and 1981.

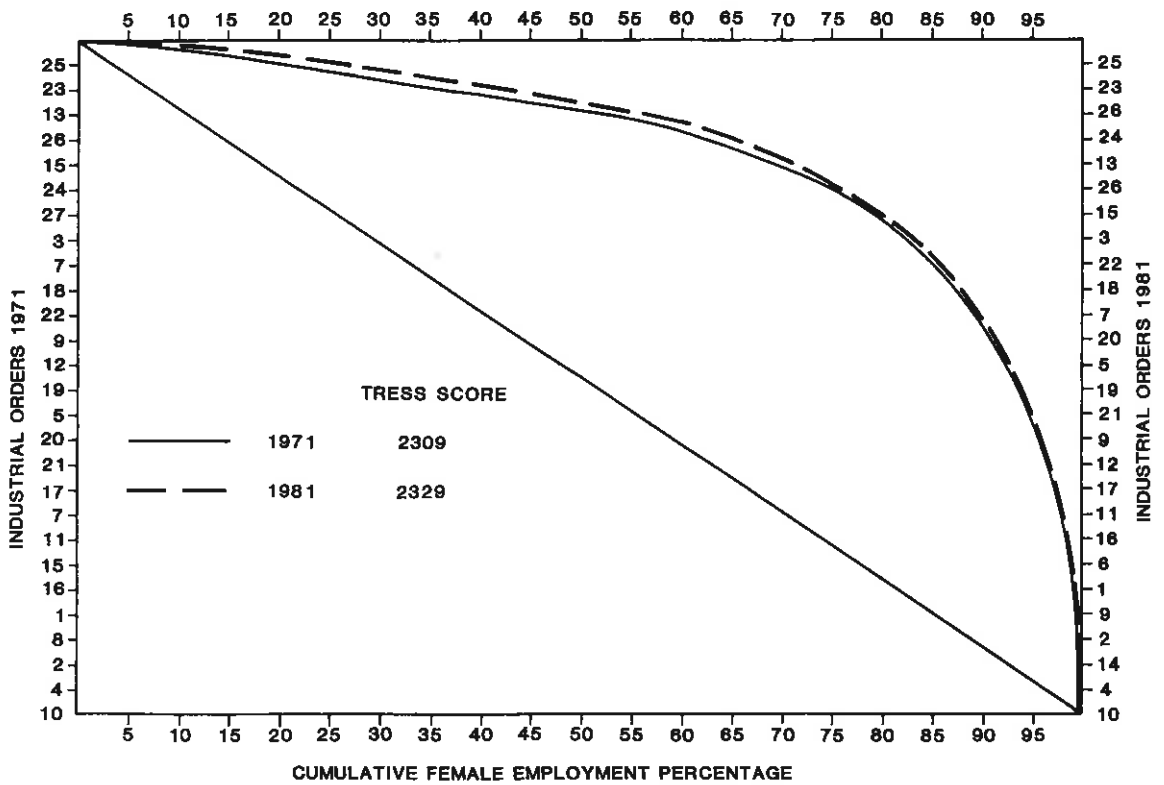


Figure 19. Lorenz Curves for Female Employment by Order in West Yorkshire, 1971 and 1981.

ization (Figure 20). Firstly, there was a zone in the south east of the county embracing the Castleford, Knottingley, Normanton, South Elmsall and Hemsworth AOA's, which were earlier shown to be associated with coal-mining (Section 4.1). All had specialization indices greater than 40 in 1971. Secondly, there was a slightly less specialized region, running between Spen Valley AOA and Todmorden AOA in the west, which broadly corresponded to the old 'textile zone'. Rothwell AOA also had a high index of specialization (52), reflecting its ties with the coal, shipbuilding and metal manufacturing industries, and the Otley and Wetherby AOA's, which are located to the north-west and north-east of Leeds respectively, both had specialization indices of 38, and were associated primarily with agricultural employment; Otley AOA accounted for 8% of total agricultural employment, and had a location quotient of 5.3, whilst Wetherby accounted for 9%, with a location quotient of 11.0. Additionally, 5% of total paper industry employment, (order 18) was contained within Otley (location quotient, 3.5) and 11% of instrument engineering employment (order 9) in Wetherby (location quotient, 10.6).

The lowest indices of specialization (between 10 and 20) occurred in the Bradford, Halifax and Dewsbury AOA's. In the Leeds AOA, however, the index of specialization was 23, in 1971 as the area was still quite heavily reliant on the clothing industry (order 15), with 64% of total clothing industry employment or 25,000 people located in Leeds. Only distribution and professional services employed more people in Leeds in 1971.

By 1981, the average index of specialization in the AOA's which comprised the coal-mining zone had fallen from 51 to 46.2. Similarly, in the textile zone, the average index fell from 38 to 32 suggesting that as employment in the coal-mining and textile industries contracted, their local economies diversified. Specialization in fact decreased in all the AOA's with the exception of Halifax for which the index increased from 19 to 20 between 1971 and 1981. However, the reduced levels of specialization shown in Figure 21 may not, necessarily, imply a more favourable employment structure. Comparing the Wakefield and Shipley AOA's for example, reveals that in Wakefield, the index of

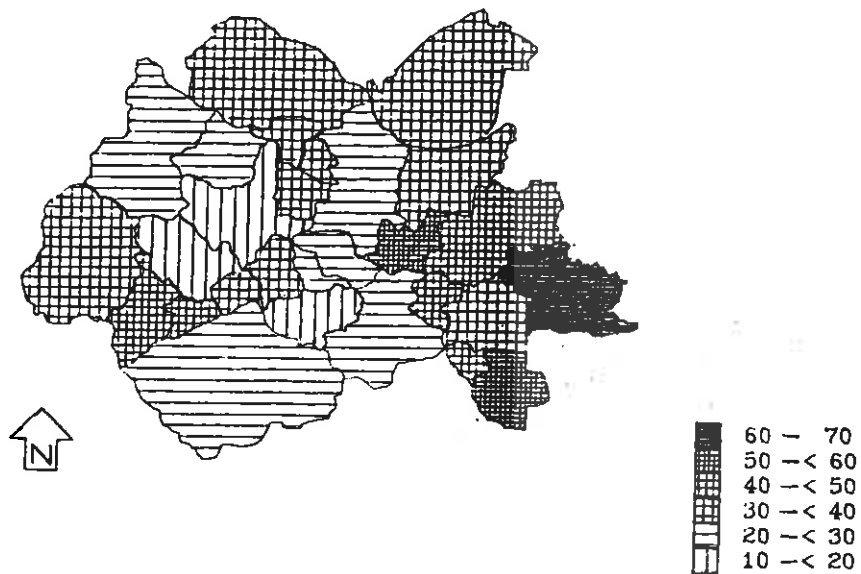


Figure 20. Total Indices of Specialization for AOA's in West Yorkshire, 1971.

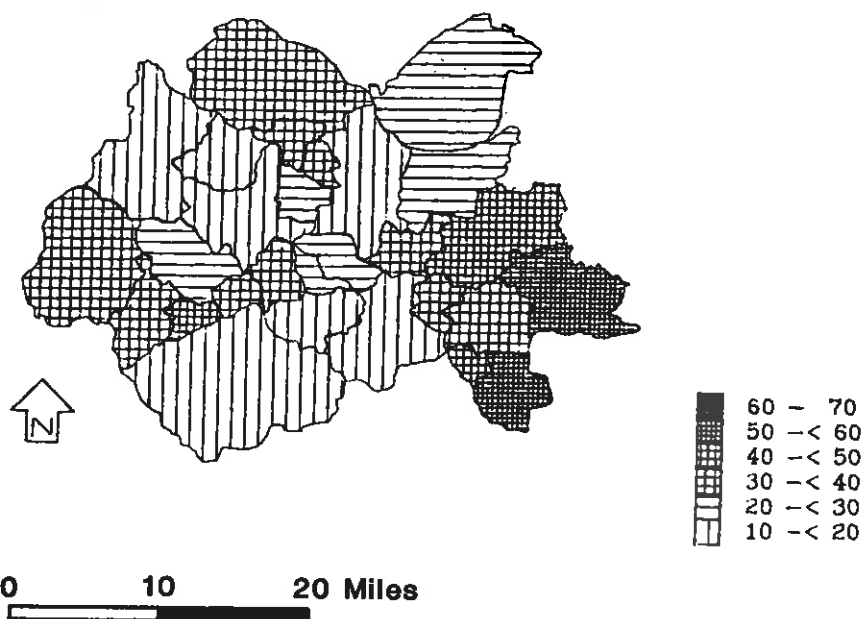


Figure 21. Total Indices of Specialization for AOA's in West Yorkshire, 1981.

specialization decreased from 21 to 13, as the areas reliance on mining and mechanical engineering employment decreased, but this was accompanied by substantial growth in the service sector. In the Shipley AOA however, apparent diversification in the economy, as the index of specialization fell from 25 to 18, reflects employment losses in mechanical engineering and textiles, which have been only partially compensated for by service sector growth. Thus, in Wakefield AOA decreased specialization has been associated with a more favourable industrial structure, as its share of growing industries has increased, whilst in Shipley net job losses have occurred.

Male indices of specialization in West Yorkshire (Figures 22 and 23) were, on average, higher than female indices (Figures 24 and 25) in both 1971 (average male index 40 and female 33), and 1981 (male, 30 female 24). Male specialization was particularly intense in the main coal-mining zone, and neighbouring Rothwell AOA, although specialization is clearly demonstrated in the textile zone also. These zones also formed the areas of highest female specialization, along with the outlying AOA's of Wetherby and Otley in 1971. Zones of specialization were much less distinct for females by 1981, implying that female employment has diversified in almost all of the AOA's in the county. Only the Halifax and South Elmsall AOA's increased specialization between 1971 and 1981, from 20 to 21 in the case of Halifax, and from 21 to 31 in South Elmsall. A comparison of full-time and part-time employment specialization amongst females is presented in Table 12, demonstrating that indices of specialization for part-time employment are lower than indices for full-time employment in 25 of the 28 AOA's in West Yorkshire. As one might expect from previous results, this differential indicates that sectorally specialized employment structures are more common for female full-time employment than part-time employment. Further research is required to establish why the AOA's of Halifax and Batley in both 1971 and 1981, and South Elmsall in 1971 only, do not conform to the norm.

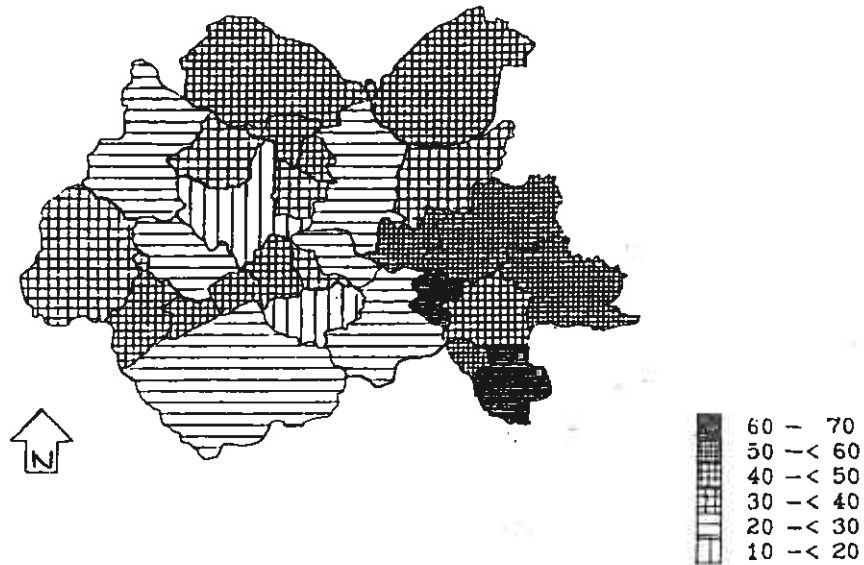


Figure 22. Male Indices of Specialization for AOA's in West Yorkshire, 1971.

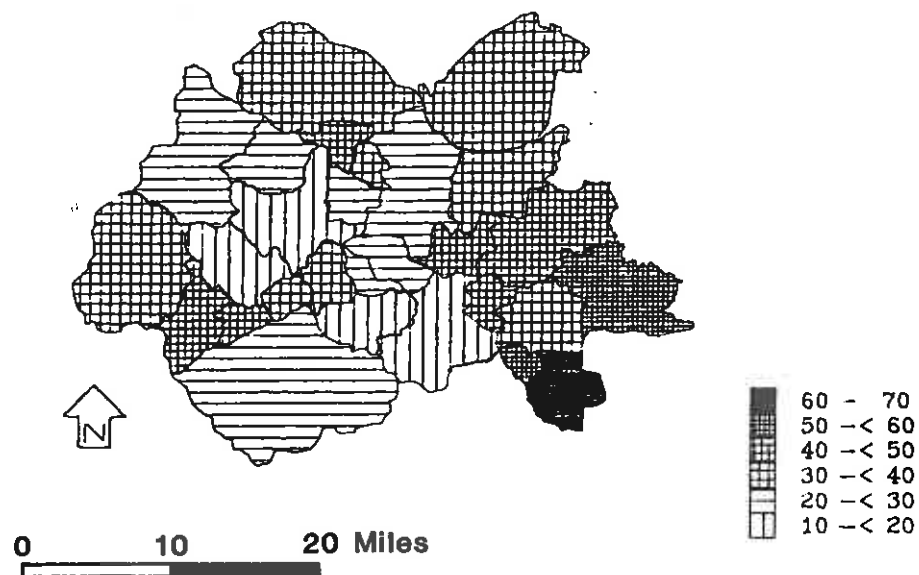


Figure 23. Male Indices of Specialization for AOA's in West Yorkshire, 1981.

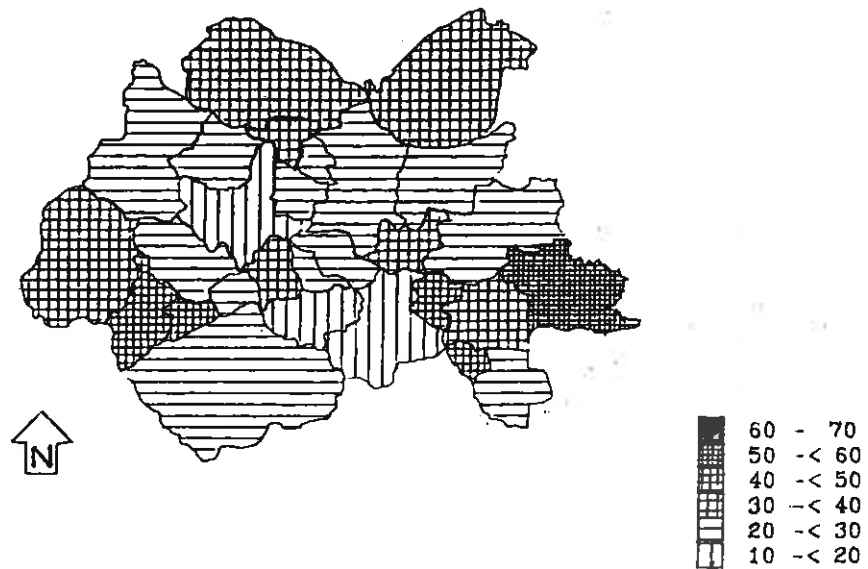


Figure 24. Female Indices of Specialization for AOA's in West Yorkshire, 1971.

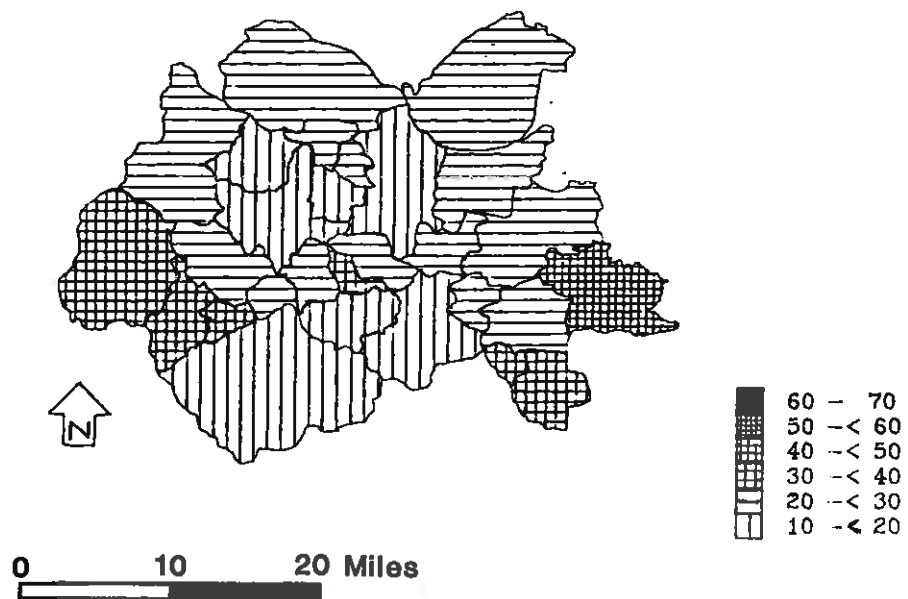


Figure 25. Female Indices of Specialization for AOA's in West Yorkshire, 1981.

TABLE 12. FEMALE INDICES OF SPECIALIZATION FOR FULL-TIME AND PART-TIME EMPLOYMENT IN WEST YORKSHIRE, 1971 AND 1981

TTWA	AOA	1971		1981	
		Full-time	Part-time	Full-time	Part-time
Halifax	Halifax	17.9	23.7	20.4	23.4
	Elland	52.4	35.3	41.6	27.9
	Sowerby Bridge	50.3	30.8	40.0	21.7
	Brighouse	35.5	23.8	32.7	21.9
Todmorden	[Todmorden	39.1	26.1	39.2	19.9
Leeds	Leeds and Hunslet	22.4	19.0	15.1	11.9
	Horsforth	32.9	19.1	30.1	19.2
	Morley	33.1	22.4	29.0	20.6
	Rothwell	47.4	32.7	29.0	22.3
	Seacroft	28.8	25.5	29.0	17.8
	Bramley	32.6	22.3	22.6	15.1
	Yeadon	37.6	24.4	38.1	16.8
	Otley	43.9	22.1	34.3	26.6
	Wetherby	37.1	30.0	30.1	14.0
Keighley	[Keighley	28.9	25.2	22.3	19.7
Wakefield	Wakefield	19.4	17.0	12.3	8.1
	Hemsworth	46.1	33.3	38.1	32.1
	South Elmsall	31.2	33.1	39.5	25.5
Huddersfield	[Huddersfield	25.2	15.5	17.1	14.9
Dewsbury	Dewsbury	18.0	13.7	17.9	10.6
	Batley	26.7	33.1	32.1	34.6
	Spen Valley	34.1	29.4	27.1	23.5
Bradford	Bradford	15.3	11.9	12.8	12.1
	Shipley	27.4	12.4	18.1	16.0
Castleford	Castleford	33.1	23.3	34.1	20.7
	Normanton	45.4	32.8	38.7	23.2
	Pontefract	36.5	23.6	26.5	22.3
	Knottingley	69.1	36.9	51.6	28.2

5. SUMMARY AND CONCLUSIONS

Over the decade 1971 to 1981, the transition from an emphasis on manufacturing to service employment in West Yorkshire, which had already begun by 1959, gathered further momentum. This occurred at the same time as the aggregate demand for labour declined, resulting in a fall in total employment of over 60,000. The decade was also characterized by changes in the form of male and female, full-time and part-time employment demanded. In combination, these changes have had a significant influence on the sectoral and spatial distribution of employment in the economy.

Most male employment decline has occurred in the manufacturing sector where between 1971 and 1981 70,500 jobs have been lost, the vast majority of which were full-time positions. The greatest employment declines took place in the textile and mechanical engineering industries, whilst only food and instrument engineering increased male employment. Employment gains in the service industries could only partially compensate for manufacturing employment decline, particularly as one-third of service growth was in part-time work. Most of the growth occurred in professional and scientific services, insurance and banking and miscellaneous services, whilst two service industries, the utilities, and transport and communication incurred losses.

Although variations do exist in the spatial structure of male employment change within the county, the overall extent of decline is emphasized by the fact that every TTWA experienced a decrease in male full-time employment. The Leeds and Bradford TTWA's were the most severely affected, although Todmorden TTWA and Huddersfield TTWA experienced the highest relative losses. Some growth did occur in male part-time work, notably in the Wakefield and Castleford TTWA's although this was only slight.

Growth in female part-time work has been a dominant feature of change in West Yorkshire. Between 1971 and 1981 total female employment increased by 5,000, as part-time employment rose by 28,000, and full-time employment contracted by 23,000. As with male employment, female employment loss was concentrated in the textile and clothing industries, where although the majority of job loss was associated with full-time positions, significantly more part-time jobs were lost amongst females than males. However most of the increase in female

employment took place in the service sector, as almost 50,000 new jobs were created, 70% of which were part-time. Every service industry employed more part-time labour, despite declines in full-time employment in the distributive trades.

Female employment declined in all the TTWA's except Wakefield and Castleford; these areas also experienced the greatest relative increases in part-time employment, although in absolute terms most part-time jobs were created in Leeds TTWA.

Differences in the characteristics of male and female employment change become more apparent when analysis is conducted at a more disaggregate spatial scale which demonstrates that in certain AOA's female employment has grown whilst male employment has decreased. As the reverse of this situation does not occur, we can conclude that the industrial structure of one third of the AOA's in the county, favours growth in female rather than male labour. Further analysis reveals contrasts in female full-time and part-time work, as part-time work grew in every AOA, even if full-time work decreased.

Evidence at an AOA level also indicates that a spatial dichotomy in employment change exists as the central Metropolitan areas of the county have generally lost male and female full-time employment, whilst peripheral areas have gained employment.

The effects which sectoral and spatial employment changes in the county have on the balance of job loss or gain, were investigated using indices of localization and specialization. The results suggest that a significant proportion of male job loss occurred in highly localized industries, whilst job growth was associated with more dispersed industries. This created a situation in which locally displaced labour, had to compete for a share of new jobs which were more dispersed. A similar situation occurred for female labour, but as female employment was increasing overall, spatially concentrated employment losses were compensated for by dispersed employment gains. Localization was generally lower for female part-time than full-time employment, although in the food, textiles, clothing and public admin-

istration industries, part-time localization was higher indicating the importance of part-time female labour in these industries. A further effect of changes in the economy has been a decrease in male sectoral concentration between 1971 and 1981, and an increase in female concentration, primarily because female employment has grown rapidly in the professional service and distribution industries.

Sectoral employment specialization decreased in every TTWA in the county between 1971 and 1981, but average male specialization remained higher than the average for females. Indices of specialization for part-time employment are generally lower than for full-time employment, indicating that the industrial structure of an AOA usually has less influence on the employment of full-time labour than part-time.

The results presented in this paper demonstrate that considerable change has occurred in the sectoral and spatial employment structure of the West Yorkshire economy between 1971 and 1981. The analysis has served to highlight several features of change, and to raise a number of questions which merit further consideration. For example, why have the TTWA's of Wakefield and Castleford performed better than the other TTWA's, and why have some AOA's experienced increased in female employment, whilst male employment has decreased? Why in most industrial orders have the indices of localization for female part-time employment been lower than the indices for full-time employment, and why should the expanding food and public administration industries be exceptions? Finally why is female part-time specialization lower in most AOA's than full-time specialization, with the exception of Halifax and Batley.

These and other interesting research questions have been raised during the course of this study, emphasizing the need for more detailed investigation of the characteristics of employment change in West Yorkshire.

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