COMMISSION OF THE EUROPEAN COMMUNITIES

studies

Non-production activities in UK manufacturing industry

GIONAL POLICY SERIES – 1977

3

The objective of the present study is to discover and delimit the character, functions, organisation and trends in the non-production (NP) activities of the manufacturing sector of the United Kingdom with a view to increasing understanding of the distribution and location of these activities.

The study report has two broad divisions; namely a review of non-production activities followed by an attempt to explain the disparities in their regional distribution.

The main results of the study are as follows:

i) NP workers as a proportion of the total employment trends to decline outwards from London and within regions there tend to be higher levels in those conurbations that are major regional centres;

ii) industrial structure only explains a small part of the excess of NP workers in the South East, but is a more substantial factor in explaining the deficits in Yorkshire/Humberside, and the East and West Midlands. The industrial structure of the North, North West and Scotland is relatively favourable to NPs;

iii) regional variations in the size and nature of single-region corporations are a factor in all deficit regions and are of particular importance in Scotland, the South West, West Midlands and Yorkshire/Humberside;

iv) the general effects of centralisation within muti-region corporations are of greatest importance in explaining the excess NPs in the South East and the deficits in the North, North West and Wales.

The report concludes that, although it is clear that there are considerable regional disparities in the distribution of NPs, the factors involved are not easily amenable to policy measures.

The study is available in English only.

COMMISSION OF THE EUROPEAN COMMUNITIES

Non-production activities in UK manufacturing industry

A report by the School of Social Studies
of the University of East Anglia (Norwich)
to
the U.K. Department of Industry
and
the European Economic Community

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I N T R O D U C T I O N

This study was undertaken at the initiative of the U.K. Deparment of Industry and was carried out by the School of Social Studies of the University of East Anglia (Norwich). It was jointly financed by the U.K. Department of Industry and the Commission of the European Communities within the framework of Article 266 of the general budget of the Commission ("Regional studies at the request of the Member States").

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The present study does not necessarily reflect the views of the Commission of the European Communities on the subject matter of the study nor does it necessarily anticipate the future attitude of the Commission on the topic.

FOREWORD

(i) This report stems from a research project sponsored by the UK Department of Industry and the EEC Commission and carried out at the University of East Anglia (Norwich). The project's terms of reference were : "The discovery and delimitation of the character, functions, organisation and trends in the non-manufacturing activities of the manufacturing sector of the United Kingdom with a view to increasing understanding of the distribution and location of these activities".

(ii) As the terms of reference indicate the non-manufacturing activities of manufacturing industry are an area where little is known in a general sense. Individual businessmen are well acquainted with these activities and many people in central government, local government and the academic world feel that they have a basic knowledge of them, but when it comes to a detailed review of such activities by industry, region or occupation there is no source of general information that is commonly available.

(iii) To obtain such general information the project team collected a considerable amount of unpublished data from the Censuses of Population and Production, Industrial Training Boards, and directories, as well as carrying out four separate surveys of their own. The report therefore contains many tables of data that have been unavailable hitherto. This gives it a rather 'statistical' look, but few of the details of the statistical analysis are presented here, and it is hoped that the report can be understood by the non-statistical layman. In addition, although the 'explanation' of regional disparities in non-production employment is the ultimate objective of the report, individual chapters devote considerable attention to such matters as the factors that determine non-production employment in industries, at branch factories, within head offices, and within corporations; and it provides new information on the distribution of head offices. The report therefore includes not only matters that are of interest to regional economists and planners, or economic geographers, but also includes material of relevance to business and management economists and sociologists.

Outline of the report

(iv) Chapter 1 provides a general review of non-manufacturing activities by industry and by occupation, for 1971, with a less detailed look at trends in these activities over the last fifty years. Chapter 2 then focusses on non-production activities at a regional level, discussing in some detail the regional distribution of non-production workers by occupation. The main objective of the report is then described in Chapter 3, which considers the extent to which the regional differences in the distribution of non-production employment, already shown in Chapter 2, can be explained in terms of the industrial structure of regions. Some reasons for industry variations in the average proportion of total employment taken up by non-production workers are then discussed in Chapter 4.

(v) Chapter 5 attempts to account for the regional disparities in non-production workers in terms of three components; industrial structure, and single and multi-region organisations. The accounting process is carried out using data from the Census of Production and shows that the most important factor is the multi-region organisation. It is hypothesized that the agglomeration and centralisation of non-production workers in such organisations, together with the large number of corporate head offices in the South East, is a major reason for the excess numbers of workers in manufacturing industry who are employed in non-manufacturing activities in the South East, and their relative dearth in the Development Areas.

(vi) Chapters 6, 7 and 8 are devoted to an extended discussion of non-production workers at sites, within organisations and at head offices. This forms the basic material for Chapter 9, which commences by extending the accounting process with estimates of employment in detached corporate head offices and research laboratories, plus estimates of the distribution of non-production workers within sub-corporate multi-region organisations. It then continues by providing reasons for the location of corporate head offices and research laboratories in the South East. Finally, Chapter 10 considers some general implications of the previous chapters, paying particular attention to their relevance for regional policy, and chapter 11 provides a summary of the whole report.

The special surveys undertaken by the research team

(vii) Because of the unknown nature of the subject, the research team had to carry out surveys of their own to establish a data-base and investigate the factors that appear to determine the relative numbers of non-production workers. As these are referred to throughout the text they are described in brief here.

(viii) Site Survey : This was a large-scale postal questionnaire organised by Dr. M.E.C. Sant, one of the consultants to the project, and carried out during the autumn of 1974. It used a detailed questionnaire that covered a variety of topics, the key features being that it was sent to individual production sites, used a sample that matched firms that had recently moved with an equivalent number on non-movers, and asked for the numbers employed in a specified list of ten non-production occupation categories at each site. It resulted in over 1100 usable responses.

(ix) Organisation Survey : The fundamental feature of the Organisation Survey was that it obtained data for whole corporations, or defined subsections of corporations, that operated through a number of production sites in several regions. Its other main features were : (i) in each case there was an interview with a senior executive about the corporation's structure and history, and (ii) the key information sought was the numbers employed at each site in a specified list of 20 non-manufacturing activities (functions or departments), not occupations. It was carried out over the period October 1975 - May 1976 and returns for over 450 sites in some 80 organisations were received. The questionnaire used is reproduced as Appendix A.

(x) Head Office Survey : For the larger corporations this survey also incorporated an interview as well as a questionnaire, but a postal questionnaire alone was used for smaller corporations. The questionnaire was unusual in that it did not specify the departments covered; that is, the respondents were asked to state the numbers employed in each head office department, using their own nomenclature. It was carried out during May - July 1976 and 130 usable returns were received. The questionnaire used is reproduced as Appendix B.

(xi) Research & Development Survey : The combination of interview and postal questionnaire was repeated for the R. & D. Survey, carried out in July - August 1976. This was only small in scale and resulted in just over 30 returns.

The terms used

(xii) Although efforts have been made to remove jargon from the report it does use a number of words in particular ways, partly because it is operating in a new field. Usually these are defined when first introduced, and they are often redefined later. Those most commonly met are collected here for reference.

(xiii) Employment : Total employment in an industry/region/corporation, etc., is divided into the two categories of 'production workers', i.e. those directly involved with production, and 'non-production workers, i.e. those not directly involved with production. These are abbreviated successively to 'P-workers' and 'NP-workers', and 'Ps' and 'NPs'. Production workers are occasionally called 'operatives'. Official statistics are often collected for a group of NP occupations called 'administrative, technical and clerical workers', usually abbreviated to 'ATCs'. 'Non-ATCs' refers to those workers who are not classed as ATCs. ATCs cover a more restricted range of occupations than those included in the definition of NPs normally used in the report (see paragraph 5).

(xiv) Standardised employment : Since large sites, corporations, industries or regions employ more NPs than small ones, NP employment needs to be standardised for the size of the employing unit. This is usually achieved by expressing it as a percentage of total employment in the unit, and calling it either the 'NP proportion', or 'NP%'. For some of the statistical work it was preferable to use the slightly different method of relating the number of non-production workers to the number of production workers, using for this purpose the ratio of NPs to Ps, expressed as the 'NP/P ratio'.

(xv) Sites : A site is a place where some of a firm's employees are located. A normal production site may be called a factory, branch, plant, branch factory or branch plant. If it also includes a head office it is called a 'non-detached head office', or 'NDHO'. A site that is a head office without any production facilities also being located there is called a 'detached head office' or 'DHO', and in general any NP activity that takes place away from a production site is said to be 'detached'. The term 'establishment' is not used except in its technical sense (see paragraphs 176/7).

(xvi) Corporations : Considerable difficulty was experienced because of the various interpretations that may be placed on the words 'companies', 'enterprises', and 'firms'. In this report the word 'corporation' refers to the entire UK operations of an ultimate corporate unit. In this definition the word 'entire' means that the operations of all divisions, subsidiaries, subsidiaries of subsidiaries, branch factories, etc., are included. 'Ultimate' means that the corporation is not owned by any other UK corporation. The definition covers the following situations, among others :

(i) an independent, single-site, company;
(ii) a firm with a corporate NDHO and several branch factories;
(iii) a company with a corporate DHO that controls several subsidiary companies, each of which may have its own NDHO and branch factories;
(iv) a company with a corporate DHO that controls several divisions, each of which may have a divisional DHO and comprise several branch factories;
(v) a company with a corporate DHO that controls a large number of subsidiary companies that are grouped into a smaller number of divisions.

Corporations are divided into the two categories 'single-region' and 'multi-region', according to whether all their sites are located within one region or not.

(xvii) Organisations : An 'organisation' is either a corporation or a distinct multi-site sub-unit of a corporation. Examples of the latter are a major subsidiary company with several branch factories, a division of branch plants, or a division including a number of subsidiary companies. Organisations are also divided into 'single-region' and 'multi-region' categories.

(xviii) Ownership : Ownership refers to the nationality of the corporation's ultimate owners, expressed as 'UK-owned', 'foreign-owned', etc. Ownership presents an inescapable problem in terms of the definitions of a corporation and an organisation discussed above. The entire UK operations of a company that is under foreign ownership is a 'corporation' as far as its UK operations are concerned, but it is an 'organisation' inasmuch as it is a defined multi-site subsection of a foreign corporation's activities. Such corporations are usually called 'subsidiaries of foreign corporations'.

(xix) Structure : A distinction is made between corporations or organisations that operate through a series of subsidiary companies and those that operate through a number of branch factories. The former are called 'subsidiary-type', the latter 'branch-type'.

(xx) Industries, regions and occupations : Industries, regions and occupations are defined and classified according to the Standard Industrial classification (1), the Standard Regions (2), and the Classification of Occupations (3). In one or two cases there are

(1) Standard Industrial Classification, 1968. Central Statistical Office.
(2) c.f. Abstract of Regional Statistics, 1972, Appendices I and II. Central Statistical Office.
(3) Classification of Occupations, 1970. Central Statistical Office.

slight variations from these definitions, particularly in the regional analysis of head offices in Chapter 8.

Acknowledgements

(xxi) The number of responses to the survey carried out by the research team gives an indication of the very large number of people in manufacturing industry who helped us, and to whom we owe thanks. In particular we are indebted to those who were interviewed during the surveys, often spending two hours of their time in a frank discussion about their company. Our experience has led us to believe that the more efficient and successful the company, the more likely it was to respond to our surveys, and the more senior the interviews, the more frank the discussion. In addition we received considerable assistance from staff in the Census of Population, Business Statistics Office, Scottish Council (Development and Industry), Greater London Council, and several of the Industrial Training Boards, in the form of the provision and interpretation of statistics. Our work would have been impossible without this assistance, and we are grateful to them for the speed and efficiency with which they provided us with data. We should also like to thank the many people in academic life to whom we have spoken, and in particular Mr. P.M. Townroe and Dr. M.E.C. Sant, the consultants to the project, who not only offered advice and criticism but were also actively involved in its initial stages.

(xxii) The considerable amount of work involved in the research project was eased by the expertise and industry of the three key people who helped us. Our particular thanks go to Sue Bailey, our research assistant, who processed, programmed and analysed the considerable amount of data that we acquired and provided ideas and constructive criticism that make their impact in several parts of the report. Roger Richards carried out the bulk of the interviewing involved, and wrote a series of very thorough reports on firms. He also, somewhat inadvertently, provided convincing empirical evidence of the difficulties of cross-country travel from East Anglia. Elizabeth Eyre, our secretary, bore with us for two years, typing, arranging interviews and coding data with complete efficiency.

(xxiii) Many other people assisted us at various times with the essential but mundane tasks inseparable from any project of this nature - typing innumerable versions of the same chapter, searching through directories, coding and punching data etc. Among these we would like to thank Beverly Thorpe, Shirley Clutten, Anthea Iverson and Norman Thrower. Without their assistance our work would have been impossible.

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CONTENTS

CHAPTER 1

NON-PRODUCTION ACTIVITIES IN UK MANUFACTURING INDUSTRY

Introduction : the activities concerned

1. Although the objective of manufacturing industry is the production of commodities many people employed in manufacturing are not directly involved in the actual production process. For example, secretaries, clerks, salesmen, drivers and research scientists may be employed by a company that is producing commodities but their jobs are not involved with the physical process of production and they may not work in a building that is concerned with production. In is these 'non-production' workers that are the subject of this report.

2. Non-production workers may be categorised in two ways, either by their occupations, as above, or by the activity carried out by the department in which they work, such as the finance, marketing, personnel or research and development departments of a company. Very often their job title describes their functional activity - marketing manager, personnel clerk, warehouseman, etc. On the other hand some occupations, such as secretaries, typists, clerks, drivers etc., may be found in a wide variety of departments; if you are told that someone is a secretary you will not know, without further questioning, with which functional activity they are associated.

3. In the United Kingdom there are no official statistics of employment by function and the first chapters of this report, which are based on official statistics, are necessarily restricted to an occupational classification. The later chapters, which are about individual sites and corporations and are based partly on the surveys carried out by the research project staff, are concerned largely with functional classifications.

4. The main source of employment data by occupation is the UK Census of Population, 1971. However, the occupational classification available from the detailed census tables is too refined for most purposes because it includes more than 130 individual non-production occupations. In the report these detailed occupations have been amalgamated into the 28 occupation groups listed on the right-hand side of Table 1.1. These in turn are further amalgamated into the 5 major occupational categories given on the left-hand side of Table 1.1.

Table 1.1 Occupational classification used in Chapters 1 - 5 (1)

Managerial & Professional	General managers Sales managers Personnel managers Specialist managers	Other professionals Company secretaries Accountants
Clerical	Typists/secretaries Clerks & cashiers Communication workers (telephonists)	Office machine operators Office supervisors & managers
Scientific & technical	General engineers Instructors/teachers Scientists Laboratory technicians	Computer and other technical workers Methods & planning engineers Draughtsmen
Sales & distribution	Warehousemen Transport workers	Salesmen, commercial travellers Retail sales workers
Service	Cleaners Service (canteen) Protection (guards/ firemen)	Property maintenance & ground staff Medical & social welfare workers

Source : Census of Population, 1971.

(1) The groups are based on the detailed occupational classification used in the Census, which, in turn, is based upon the Classification of Occupations, 1970.

5. Throughout the report the total numbers employed in non-production activities are called non-production workers and are referred to as NPs, NP-workers etc. Production workers are called Ps, P-workers etc. However, among UK official statistics only the Census of Population can be used to define NPs as widely as in Table 1.1. The other two main official sources of data on non-production activities, the Census of Production and the Department of Employment, only collect figures for an aggregate called 'administrative, technical and clerical workers' (ATCs). This corresponds roughly to the main managerial and professional, clerical, and scientific categories of Table 1.1, plus salesmen and commercial travellers. So NPs include more occupations than ATCs, the difference between them being service workers, such as canteen staff and cleaners, plus warehousemen and transport workers. ATCs are more like 'white-collar' workers than NPs.

6. In general, the larger the industry, region or corporation, the greater will be the number of NPs employed in it. This means that absolute numbers are not a particularly convenient statistic to use for analytic purposes and the number of NPs need to be standardised in some way, so as to take account of the varying size of industries, regions or corporations. The method used here is to standardise by employment, dividing NP employment by total employment and expressing the result as a percentage. For example, in the case of a particular occupation group in one industry the following statistic is calculated and expressed as a percentage :

$$\frac{NP_{ij}}{P_j + NP_j}$$

(NP_{ij} = the numbers employed in NP occupation i in industry j)

(P_j = the total number of production workers employed in industry j)

(NP_j = the total number of non-production workers employed in industry j)

The text refers to such percentages as 'NP proportions'.

The importance of NP workers in UK manufacturing industry

7. The workers involved in non-manufacturing activities are now an important component of total UK manufacturing employment. In 1971 NPs comprised some 34.6 % of total employment in manufacturing industry, compared with an ATC proportion of 25.2 %. This means that in 1971 every two production workers needed rather more than one non-production worker to service, support and organise them, obtain the orders, or sell the products. This shows a much greater dependence upon non-production workers than in the earlier years of this century. As Figure 1.1. shows, the proportion of ATCs has been increasing steadily over the last 50 years, from a mere 10 % in 1924 to nearly 28 % in 1975. So, in 1924 there were almost nine non-ATC workers per ATC; now the figure is down to less than three. There is no reason to believe that the NP proportion has been behaving any differently.

8. Figure 1.1 also conceals an important point. In numerical terms production (non-ATC) workers increased by 1.7 millions between 1924 and the early 1950s, rising from 4.8 million to 6.5 million. Since then their numbers have been in decline and are now down to some 5.2 million. On the other hand non-production workers (ATCs) increased steadily in numbers right until 1970, from half a million in the early 1920s to 2.2 million in 1970. This means that over the last 20 years it has been employment in non-manufacturing activities that has been the growth sector of manufacturing employment, not the employment of those involved in direct production.

The importance of NP workers in individual industries

9. The proportion of NPs in the total employment of individual industries can vary quite considerably from the 34.6 % average for manufacturing industry as a whole. However, the proportions are crucially dependent upon how widely or narrowly the definition of an industry is drawn. Using the rather broad categories of Industrial Orders of the Standard Industrial Classification (1), the NP proportion (2) in 1971 ranged from 50.9 % for chemicals and allied industries to 21.8 % for shipbuilding. On the basis of a narrower classification of industries, the Minimum List Headings (MLHs) of the Standard Industrial Classification, the range of NP proportions widens; from 66.1 % for the printing and publishing of periodicals, down to 10.8 % for miscellaneous wood and cork manufactures. Even the MLHs that make up any particular Industrial Order may show a considerable variation in their NP proportions, although on the whole they tend to cluster around a level that is common to that Order. This variability makes the selection and definition of industries of crucial importance for the analysis and interpretation of NP proportions.

10. Even though the NP proportions vary quite widely by industry they have behaved similarly in that they have all been increasing over time. Figure 1.2 shows that whatever the starting level of the NP proportion in 1951 it was comfortably exceeded by the 1971 level. Moreover on the whole the ranking of industries remained much the same over the period; although individual industries may have overtaken one or two others there are no lines striding across the chart indicating a massive increase in the NP proportion for one industry. On the contrary, there appears to have been some slight reduction in the variability of NP proportions, largely due to industries at the lower end catching up a little with those with higher proportions. This may reflect a 'law of diminishing marginal substitution' - when you've already got a high proportion of NPs, it becomes more difficult to reduce the Ps or substitute an NP for a P, than when you have a low proportion.

The distribution of NP occupations within manufacturing industry

11. To give some idea of the relative importance of individual NP occupations Table 1.2 shows the numbers employed in 1971 for most of the standard 28 occupation groups detailed in Table 1.1. Clerks and cashiers are easily the largest individual occupation group, followed by general managers, typists/secretaries, and warehousemen. The two major categories of more qualified personnel, the scientific group and the managerial group, are of roughly equal size, but even when taken together amount to less than the clerical group.

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(1) Standard Industrial Classification, 1968. Central Statistical Office.

(2) For definition of the terms used see the Foreword, paragraphs (xiii)-(xx).

Table 1.2. Numbers employed in non-production occupations in manufacturing industry, Great Britain, 1971.

Occupation groups and categories	Numbers employed	Percentage of total employment in manufacturing industry
General managers	264,720	3.25
Sales managers	79,000	0.97
Personnel managers	12,680	0.16
Specialist managers	64,830	0.80
Other professional workers	16,750	0.21
Accountants & company secretaries	32,920	0.40
Total : Managerial & professional	470,900	5.79
Typists/secretaries	229,230	2.82
Clerks & cashiers	623,280	7.66
Communication workers (telephonists)	27,930	0.34
Office machine operators	68,740	0.84
Office supervisors & managers	21,940	0.27
Total : Clerical	971,120	11.93
General engineers	123,180	1.51
Scientists	52,520	0.65
Technicians	139,040	1.71
Methods & planning engineers	42,020	0.52
Instructors/teachers	15,990	0.20
Draughtsmen	102,730	1.26
Total : Scientific & technical	475,480	5.85
Warehousemen	240,680	2.96
Transport workers	162,910	2.00
Salesmen etc.	169,380	2.08
Total : Sales and distribution	572,970	7.04
Cleaners	56,740	0.70
Service workers (canteen)	85,830	1.05
Property maintenance & ground staff	116,500	1.43
Medical & social welfare workers	13,070	0.16
Total : Service	272,140	3.34
Workers specific to certain industries	55,930	0.69
Total : Non-production workers	2,818,540	34.64
Total employment in manufacturing industry	8,135,790	100.00

Source : Census of Population, 1971.

12. In general terms the distribution of NP occupations in UK manufacturing industry is not dissimilar to that of other industrialised countries (Table 1.3). In the early 1960s the three main differences between the UK and the other industrialised countries were that, for the UK, the proportion of service workers was considerably higher, the proportion of sales workers somewhat lower, and the proportion of educationally qualified professional and technical workers rather lower, than those of other countries. Some of the implications of these differences have been commented upon elsewhere (1). In Table 1.2 they may be indicated by the relatively small numbers in such specialised occupations as sales and personnel managers, and scientists.

Table 1.3 International comparisons of NP occupations in manufacturing industry.

Occupations	per cent of total employment in manufacturing				
	France	West Germany	Japan	United States	U.K.
	1962	1960	1960	1960	1961
Professional & technical workers	5.5	5.1	1.8	7.4	5.6
Administrators & managers	4.8	2.2	4.0	5.0	3.8
Clerical workers	9.1	9.6	11.1	12.1	11.5
Sales workers	2.2	2.3	3.1	3.8	2.1
Service workers	1.5	1.8	1.1	1.5	2.5
Total	23.1	21.0	21.1	29.8	25.5
Adjusted figures *)					
Professional & technical workers	2.7	3.7	1.6	6.5	3.0

Source : M. Zymelman : Productivity, Skills and Education in Manufacturing Industries in "Planning for Advanced Skills and Technologies", Industrial Planning and Programming Series No. 3 United Nations, 1969.

*) These figures have been 'adjusted' for levels of education. That is, if people claimed to be professional and technical workers but lacked the necessary educational qualifications they have not been included.

(1) e.g. Chapter 7 of "Britains Economic Prospects" ed. R.E. Caves. Allen & Unwin Ltd. 1968.

NP occupations within individual industries

13. Differences in the proportion of particular NP occupation groups are the main reason for variations in overall NP proportions in individual industries (Table 1.4). For industries such as food and drink, sales and distribution workers are of considerable importance and this helps to explain the overall NP proportion. In the case of coal and oil products, chemicals, and the engineering and vehicle industries, scientific and technical workers are well represented. On the other hand, the scientific occupations are conspicuously absent from leather and fur, clothing, footwear,and timber and furniture.

14. The last row of Table 1.4 provides a summary statistic, the coefficient of variation (1), to show the extent to which occupation categories vary between industries; the larger the coefficient of variation, the greater the variability of the NP occupation proportions between industries. Of the five occupation categories, managers and professional workers, and clerical workers, show the least variation between industries, while scientific and technical workers are the category with the greatest variation. The variation in the proportions of the sales and distribution category is crucially affected by the very large proportions found in the food and drink industries. Without these two industries the coefficient of variation is reduced to 0.26, and sales and distribution workers have as stable a proportion as managers or clerical workers. Reference to more detailed occupation x industry tables shows that the major cause of the large proportion of distribution workers in the food industry is the high proportion of salesmen (7.3 %) and, to a much less extent, transport workers (4.5 %). On the other hand it is mainly the transport workers (14.1 %) who account for the very high proportion of NPs in the drink industry.

Changes in the importance of NP occupations over time

15. Figures 1.1 and 1.2 showed that NP proportions have been increasing steadily for at least twenty years, both in individual industries and for manufacturing industry as a whole. Assessing the extent to which this is also true for individual occupation categories is difficult because it demands consistency in the definitions of both industries and occupation categories. However, Table 1.5 seems to show that although all the occupation categories have been increasing in importance over the time-periods considered, only in the case of professional staff can it be said that the growth in the NP proportion remains strong in recent years. The NP proportions of managers and clerical staff appear to have slowed down their growth rate in recent years, particularly so in the case of clerical staff. The NP proportion of road goods vehicle drivers has almost stabilised, and those of warehousemen and storekeepers, and sales staff, appear to have fallen off in the later five or ten years.

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(1) Defined as the ratio of the standard deviation of a set of numbers to its mean.

Table 1.4 Numbers employed in NP occupations by industry : GB manufacturing industry, 1971

Industry	Managerial & professional	Clerical	Scientific & technical	Sales & distribution	Service	Total NPs(1)	
	Percentage of total industry employment						Nos.
Food	5.91	11.21	2.47	15.14	3.89	38.7	216050
Drink	7.80	16.07	2.51	22.35	6.38	55.1	79190
Tobacco	4.46	18.64	4.73	7.98	5.48	41.3	15280
Coal & oil products	7.67	15.24	11.02	8.31	6.32	48.6	28630
Chemicals	8.20	16.39	12.49	9.77	4.97	52.3	239740
Ferrous metal manuf.	3.66	10.42	5.18	4.84	5.12	29.2	122100
Non-ferrous metal manuf.	5.83	11.44	5.58	5.13	4.08	32.0	42630
Mechanical engineering	6.62	13.24	8.71	6.07	2.85	37.5	422220
Instrument engineering	6.78	15.09	9.79	5.86	2.18	39.9	58010
Electrical engineering	5.48	13.69	11.65	5.34	2.96	39.3	331710
Shipbuilding	2.89	6.74	6.27	3.51	3.26	22.7	40880
Vehicles	3.56	11.33	8.62	5.48	2.69	31.7	250360
Metal goods n.e.s.	6.08	10.68	3.47	5.48	2.66	28.4	166260
Textiles	5.27	8.38	2.25	5.80	3.22	25.1	148610
Leather, fur	7.32	7.65	0.92	5.31	2.03	23.2	12260
Clothing	4.78	6.41	0.47	4.08	2.20	23.5	88010
Footwear	3.81	7.54	0.94	4.52	1.67	18.5	17720
Bricks, pottery, etc.	5.71	10.85	3.67	8.27	6.44	35.0	106920
Timber & furniture	6.22	8.96	0.98	6.27	2.37	25.0	75530
Paper, printing, publ.	7.24	16.88	1.85	8.18	2.69	41.5	254200
Other manufacturing	7.12	11.25	3.47	6.83	2.80	31.5	102230
Total manufacturing	5.79	11.93	5.85	7.04	3.34	34.6	2818540
Coefficient of variation	0.25	0.29	0.72	0.55	0.40	0.28	0.80

Source : Census of Population, 1971.

(1) The total figures include those 'specific to particular industries', mainly journalists and pressers (in the clothing industry).

Table 1.5 Trends in certain occupations in GB manufacturing industry, 1921 - 1971

Occupation groups	Percent. of total employment						Nos. employed in thousands 1971
	1921	1931	1951	1961	1966	1971	
Managers	N/A	N/A	2.7	2.4	2.6	3.2	264.7
Professional staff (incl. scientists)	N/A	N/A	3.2	5.5	6.1	7.1	574.4
Clerical & secretarial staff	4.8	5.6	9.2	11.0	11.3	11.6	943.5
Warehousemen & storekeepers	N/A	N/A	2.4	3.2	3.3	3.0	240.7
Road goods vehicles drivers	N/A	N/A	1.2	1.5	1.6	1.7	135.4
Sales staff	N/A	N/A	1.8	2.1	2.3	2.1	169.4

Source : Censuses of Population for 1951, 1961, 1966 and 1971.
Manpower Studies No. 7 : Growth in Office Employment, Department of Employment.

N.B. There are differences both in the definition of occupations and the scope of manufacturing industry between any pair of dates.

16. Data problems preclude a detailed discussion of changes in the relative importance of NP occupation groups in individual industries over time, but work carried out both on Census of Population data and the Department of Employment annual enquiry into occupations in the engineering industries (1) tend to show that the general trends of Table 1.5 are also true for any particular industry. There are also some indications of a general narrowing of the range of NP proportions between industries, due mainly to industries with high proportions of NPs reducing, or slowing down the growth in, the proportion of employment accounted for by the clerical and secretarial category, in addition to the reductions in the relative importance of warehousemen and storekeepers that are common to most industries. Moreover, for engineering industries it appears that the proportional importance of draughtsmen is also declining. It is possible that all these trends are partly attributable to the diffusion of computers, starting with their introduction in industries of a scientific nature dominated by large companies.

The relationship between NPs, Ps, output and capital

17. There are some signs in Figures 1.1 and 1.2, plus Table 1.5, that although the overall NP proportion in manufacturing industry is still increasing, its rate of increase has declined in recent years so that it appears to be approaching some level of stability. On the other hand, since some individual industry NP proportions are at present double the overall manufacturing average of 34.6 %, and treble those of other industries, there is clearly scope for further increase in the overall proportion.

(1) Department of Employment Gazettes : March or April issues of recent years.

18. Trying to assess whether the overall NP proportion is stabilising in the short-term is difficult because it depends on the numbers of P-workers, and the two different types of workers have been treated rather differently by industry in the past. Economic texts often claim that 'management' (to which might be added scientists, professional staff and clerical staff) is treated as a fixed cost, whereas production workers are a variable cost. It follows that if for some reason output falls, Ps may be made redundant fairly quickly, but NPs retained until an upswing gets under way. In the past the NP proportion has, therefore, increased during periods of low output and been low during periods of boom.

19. This is shown in Figure 1.3. The scales in this chart have been adjusted to make the lines come close together and the direct relationship between the ATC proportion and output is immediately apparent. However, the early period, 1948-1958 doesn't fit all that well, and something also seems to have happened during the most recent years. Statistical analysis based on the simple relationship between the ATC proportion and output over the whole period shows that the ATC proportion in 1972-74 was lower by some 0.6 - 0.9 percentage points than might have been expected on the basis of past experience.

20. A more sophisticated approach throws some light on the way in which the relationships between ATCs, non-ATCs and output have altered over the period 1959-73. Generally speaking one must expect the numbers of production workers to be related to the level of output, so that changes in output lead to consequential changes in their numbers, but these changes will not be one-for-one, nor will they occur all at once. If output increases by 10 % there is no reason to expect the numbers of production workers to increase by 10 % because technological change and increasing investment should increase their productivity, measured by output per P-worker.

21. From the left-hand half of Figure 1.4 it can be seen that the productivity of production workers did not increase at a constant rate over the five business cycles that comprise the period 1951-73. In each of the five cycles output grew at about 3 % per annum but during the first two cycles this growth in output was accompanied by small increases in the numbers of production workers, whereas for the last three cycles the increased output was accompanied by successively larger reductions in the number of non-ATCs. So production-worker productivity increased during each cycle and has accelerated over the last twenty years.

22. The relationship between NPs and output is much weaker than that between Ps and output. Firstly, athough some non-manufacturing activities, such as quality control, wage payments, transport etc., are fairly tightly tied to output, quite a number of NP activities, such as sales marketing, R & D, company secretaries etc., are not. Changes in output could not be expected to alter the numbers employed in the latter group to any great extent. Secondly, a high proportion of NP workers have 'staff' status and possess particular skills, so that in the past they were retained in a downswing and not laid off, unless the outlook was very grim and the financial situation extremely stringent. Finally, the demand for some NPs may depend upon changes in government legislation or practice, such as the introduction of tachometers of the Health and Safety at Work Act;

new legislation on pensions, credit control or drivers hours; or the operations of the Price Commission. All these recent events lead to increased NP employment (1). The total impact of all these factors is such that one would not expect to find a particularly strong correlation between changes in the number of NPs and changes in output.

23. In addition, new technology and additions to the stock of capital have different effects on NPs compared with Ps. For Ps the effect of new capital is almost always to increase in some way their productivity, measured as output per production worker, but for NPs such capital may mean only an increase in the output to sell, or more buildings to maintain. The effect of new capital applied to Ps is therefore to add to the demand for NPs. When new capital is applied directly to NP activities it may be possible to reduce their numbers, but it may also generate new demands for their services, just as the construction of a new motorway generates additional traffic. For example, the invention of the telephone or typewriter generates additional communication or discussion; the introduction of the pocket calculator or computer increases the quantity of statistical analysis performed. There is therefore no a priori reason to expect aggregate investment to have a marked effect on the productivity of NPs, measured by output per NP-worker.

24. The right-hand half of Figure 1.4 shows that NP productivity accelerated markedly over the period 1951-73. In the first cycle NPs increased in numbers by nearly 5 % per annum for a 3 % per annum growth in output; that is, their productivity declined. For the three middle periods, with a similar output growth, their numbers only increased by 2 - 2 1/2 % per annum, implying a small increase in productivity. Yet for the most recent business cycle of 1969-73 their numbers actually declined although output grew at an average rate of 3 % per annum, so that their productivity increased by more than 3 % per annum. Over the whole period 1951-73 the growth rate in the productivity of ATCs increased from ~2 1/2 % per annum to just over 3 % per annum.

25. The relatively low ATC proportion in 1972-74, remarked on in paragraph 19, can therefore be interpreted as the result of a marked increase in NP productivity compared with production-worker productivity, although the rate of increase in NP productivity still remained below that of P-workers. This marked increase may have been due to the increased use of computers having a delayed effect on employment (2), or to a change in employers attitudes towards NPs. In any case it is clear that the relationship between NPs and Ps has been changing in the 1970s and although one must expect the NP proportion to continue to rise in the future, it is likely to do so more slowly than has been the case over the last twenty years.

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(1) For example, see page 58 of "The effects of the price code" by R. Evoly in National Institute Economic Review, August 1976.

(2) It is generally thought that the introduction of computers increases employment initially and may only lead to reductions in employment after a delay of several years. See P. Stoneman, "The effect of computers on the demand for labour", Economic Journal, September 1975.

Summary

26. Employment in non-manufacturing activities in individual manufacturing industries has been increasing in proportional importance for most of this century and it now accounts for over one third of total employment in manufacturing industry. Individual industries vary in their dependence on NPs, those of a scientific or technical nature, or those dependent upon sales, transport and distribution workers, being more likely to have high NP proportions. The increase in NP proportions, and the recent slowing down in their rate of increase, may be due to a more rapid increase in the growth rate of NP productivity in the post-war period, compared with the growth rate of production workers productivity, although the growth rate of NP productivity remains below that of production workers. A major reason for the recent increase in the growth-rate of NP productivity may be the introduction of computers, and it is this that may be responsible for a tendency towards stabilisation in the proportion of total employment represented by clerical and secretarial workers, and reductions in the proportions accounted for by warehousemen and storekeepers,and draughtsmen.

CHAPTER 2

THE REGIONAL DISTRIBUTION OF NON-PRODUCTION WORKERS

27. The main objective of this report is the description of the regional distribution of non-manufacturing activities in the United Kingdom together with an explanation of that distribution. The first part of this objective is carried out in this chapter, the rest of the report serving as an attempt at the second part.

General features of the regional distribution of NPs in 1971

28. The regional distribution of non-production workers is summarised in Table 2.1, which, like Tables 1.2 and 1.4, is based upon the UK Census of Population, 1971, and uses the occupational categories common to those tables. The areas used in Table 2 and throughout this report are the Standard Regions of the United Kingdom or parts thereof (1). Sometimes regions are divided into their conurbations and the remainder of the region. In the case of the South East the latter is divided into two areas. Northern Ireland is excluded throughout because the detailed tables of both the Census of Population and the Census of Production are restricted to Great Britain.

29. Care must be taken in the interpretation of Table 2.1. NP proportions (2) vary considerably between industries (Table 1.4 and paragraph 13) and it is common knowledge that individual industries are concentrated in particular areas of the country. For example, textiles are important in the North West and Yorkshire and Humberside, engineering and metal goods in the West Midlands, shipbuilding on Tyneside etc. Consequently, the industrial composition of each area plays a considerable role in determining the regional proportions of NPs.

30. Nevertheless it is unlikely that industrial composition can provide an explanation for the dominant feature of the table - the extent to which the NP proportion in the Greater London area (45.7 %) and the Outer Metropolitan Area (OMA) (41.9 %) exceeds that for all other regions. Without these two regions the average regional NP proportion is 31.85 % (with a low coefficient of variation of 0.07). Thus the NP proportion in the Greater London area is almost half as much again as that for the rest of the country and, excluding the Greater London area and the OMA, there is relatively little variation between the overall NP proportions in the other parts of the country.

31. There are two other main features of Table 2.1. Firstly, the overall dominance of London is also indicated by the way NP proportions tend to decline with distance from Greater London. After the OMA the areas with the next highest NP proportions are those lying closest to London. These areas (Other South East, South West and East Anglia) each have an NP proportion of over 33 %, close to the national average. Beyond the

(1) c.f. Abstract of Regional Statistics, 1972, Appendices I and II. Central Statistical Office.

(2) For definitions of the terms used see the Foreword, paragraphs (xiii) - (xx).

Table 2.1 Numbers employed in NP occupations by area : GB manufacturing industry, 1971

Area	Managerial & professional	Clerical	Scientific & technical	Sales & distribution	Service	Total NPs (1)	
	Percentage of total employment in manufacturing industry						Nos.
Tyneside conurbation	4.30	10.78	5.64	6.63	3.77	32.0	44450
Other North	3.85	8.99	5.63	5.96	3.84	28.9	93060
W. Yorkshire conurbation	5.60	10.24	3.45	7.05	3.22	30.3	109820
Other Yorkshire & Humberside	4.71	10.62	4.51	6.94	3.94	31.1	136760
Merseyside conurbation	4.85	11.20	4.96	6.75	3.71	31.8	59770
S.E. Lancs. conurbation	5.63	11.27	5.51	6.93	3.57	33.7	162940
Other North West	4.70	9.79	6.09	6.11	3.63	30.7	164180
East Midlands	5.01	10.33	5.03	6.64	2.90	30.4	184060
Birmingham conurbation	5.51	11.22	4.85	6.35	3.27	31.4	200590
Other West Midlands	4.97	11.05	6.27	6.60	3.18	32.3	154020
East Anglia	5.79	11.82	5.20	7.48	2.94	33.8	68090
Greater London	9.27	17.28	6.27	7.92	3.23	45.7	499950
Outer Metropolitan Area	7.13	14.59	9.09	7.39	3.18	41.9	313370
Other South East	6.22	12.18	6.82	7.85	2.74	36.5	165030
South West	5.48	11.62	7.20	7.77	3.03	35.6	149760
Wales	3.84	9.15	4.96	6.49	4.02	28.9	97500
Clydeside conurbation	4.59	11.82	5.27	7.55	3.66	33.7	95460
Other Scotland	4.20	9.39	4.31	7.10	3.50	29.2	119730
Great Britain	5.79	11.93	5.85	7.04	3.34	34.6	2818540
Coefficient of variation : all regions	0.23	0.17	0.21	0.08	0.11	0.13	0.64
Coefficient of variation : all regions other than Greater London and Outer Metropolitan Area	0.13	0.09	0.17	0.08	0.11	0.07	0.35

Source : Census of Population, 1971.

(1) Total figures include 'those specific to particular industries', mainly journalists and pressers (in the clothing industry).

southern areas the other regions (except Wales) all have NP proportions of 32 %, some three percentage points below the national average. Wales, Other North and Other Scotland have the lowest proportions of all, around 29 %. In this respect NP proportions share a tendency that is repeated by a wide variety of other indicators of economic performance or welfare.

32. A further systematic element in the disparities in NP proportions lies in the differences between conurbations and non-conurbations. For the three occupation categories that largely make up ATC employment (1) the major conurbation in each region (2) has on average an ATC proportion two percentage points higher than the non-conurbations. This substantiates the general hypothesis that administrative and distributive functions gravitate to major regional or national centres for ease of communications and for the contact linkages with business services, government departments and other organisations which are also concentrated there (3).

33. Birmingham occupies an anomalous position in this respect which fits its known tendency for service employment generally (outside manufacturing) to fall below the normal relationship between service employment and city size. It seems that Birmingham fails to act as a regional focus to the same extent as other major cities. West Yorkshire, as will be seen later, reverts to the normal situation of having more NPs than its surrounding hinterland after allowance is made for its unfavourable industrial structure.

Changes in regional disparities over time

34. Although data for the same regions and occupations as those in Table 2.1 is not available over time, Table 2.2 shows that over the period 1963-1971 ATC proportions have increased in all regions. But, unlike the experience of industries over time pointed out in paragraph 8, those regions that started out with a high proportion of ATCS in 1963 seem to have increased their lead. This is particularly the case for the South East and the South West, as can be seen in Figure 2.1. Further investigation shows that these changes have occurred despite varied experience with growth in the actual numbers of ATCs and it seems probable that the existing disparities in regional ATC or NP proportions have been increasing for at least the last decade. In particular, the South East and South West have been pulling further ahead, whilst the North and West Midlands have dropped even further behind.

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(1) Managerial and professional, clerical, and scientific and technical workers. c.f. paragraph 5 and Table 1.1.

(2) Taking the South East Lancashire conurbation (Manchester) to be the relevant conurbation for the North West and counting Merseyside as a non-conurbation.

(3) Goddard J.B. (1973) Office Location and Linkages. A study of Communications and Spatial Patterns in Central London. Progress in Planning Vol. 1.

Table 2.2 Changes in ATC proportions, by region : 1963-1971

Region	Percentage of total employment in manufacturing industry		Increase in % points
	1963	1971	1963-1971
North	22.7	24.6	1.9
Yorkshire & Humberside	19.6	22.7	3.1
East Midlands	20.8	24.1	3.3
East Anglia	23.6	26.6	3.0
South East	27.3	31.1	3.8
South West	25.9	29.4	3.5
North West	22.7	25.6	2.9
West Midlands	22.3	23.9	1.6
Wales	21.7	24.3	2.6
Scotland	20.9	23.9	3.0
Great Britain	23.4	26.4	3.0

Source : Census of Production : 1963, 1971.

The regional distribution of individual occupations

35. Table 2.3 reproduces the information on the regional distribution of NPs that is given in Table 2.1, but uses as an indicator the ratio of the NP proportion for an individual occupation category at a regional level to its NP proportion at a national level. For example, the NP proportion for the managerial and professional category in Other North is 3.85 %, whereas the national proportion is 5.79 % (Table 2.1). The ratio 3.85/5.79 = 0.66, and this shows that the managerial and professional category in the Other North area are proportionately represented to only 66 % of the extent that they are in the country as a whole. Ratios greater than 1 indicate that the occupation category is over-represented in an area.

36. The use of these indicators makes it easier to assess the extent to which a particular region is above or below the NP averages for Great Britain in just one, several, or all occupation categories. On the whole, Table 2.3 shows that variations in individual occupation categories are consistent within regions. Of the ten full regions (underlined in the table) two are completely consistent in that all occupation categories are below the GB average (West Midlands and East Midlands), and five are almost consistent in that four out of the five occupation categories are either below the GB average (North, Yorkshire & Humberside, North West and Wales) or, in the case of the South East, above it. In these cases it is always the service worker category that is the odd man out, being under-represented in the South East and over-represented in the other four regions.

37. The paragraphs that follow consider each occupation category in detail. They are based on Tables 2.1 and 2.3, together with similar tables for each of the twenty-eight occupation groups detailed in Table 1.1.

Table 2.3 Regional differences in NP proportions by occupation, 1971

Region/area	Managerial & professional	Clerical	Scientific & technical	Sales & distribution	Service	Total NPs (1)
	Regional percentage as a proportion of GB percentage					
North	0.69	0.79	0.96	0.88	1.15	0.86
Tyneside conurbation	0.75	0.90	0.96	0.94	1.13	0.92
Other North	0.66	0.75	0.96	0.85	1.15	0.83
Yorkshire & Humberside	0.86	0.88	0.64	0.99	1.08	0.89
W. Yorks conurbation	0.96	0.86	0.50	1.00	0.96	0.87
Other Yorkshire/ Humberside	0.81	0.89	0.77	0.99	1.88	0.90
East Midlands	0.87	0.87	0.86	0.94	0.87	0.88
East Anglia	1.00	0.99	0.89	1.06	0.88	0.97
South East	1.38	1.30	1.35	1.10	0.94	1.23
Greater London	1.60	1.45	1.07	1.13	0.97	1.32
Outer Metropolitan Area	1.23	1.22	1.55	1.05	0.95	1.21
Other South East	1.07	1.02	1.17	1.12	0.82	1.05
South West	0.95	0.97	1.23	1.10	0.91	1.00
North West	0.85	0.88	0.97	0.92	1.09	0.93
S.E. Lancs conurbation	0.96	0.94	0.94	0.98	1.07	0.97
Merseyside conurbation	0.85	0.94	0.85	0.96	1.11	0.92
Other North West	0.81	0.82	1.04	0.87	1.09	0.89
West Midlands	0.92	0.94	0.93	0.92	0.97	0.92
Birmingham conurbation	0.95	0.94	0.83	0.90	0.98	0.91
Other West Midlands	0.86	0.93	1.07	0.94	0.95	0.93
Wales	0.66	0.77	0.85	0.92	1.20	0.83
Scotland	0.75	0.87	0.80	1.03	0.07	0.90
Clydeside conurbation	0.79	0.99	0.90	1.07	1.10	0.97
Other Scotland	0.73	0.79	0.74	1.01	1.05	0.84
Great Britain average %	5.79	11.93	5.85	7.04	3.34	34.64

Source : Census of Population, 1971.

(1) Total figures include 'those specific to particular industries', mainly journalists and pressers (in the clothing industry).

Managerial and professional occupations

38. The managerial and professional occupations have a more uneven distribution across regions than any other NP occupation group. London's dominance is much more marked for managers than other occupations while the low NP areas, particularly the non-conurbation areas in the more peripheral regions, have more deficiencies in managers than in other occupations. These differences are weaker in the principal conurbations and in areas flanking London and the South East, so that there is a considerable contrast between conurbations (again excluding Merseyside) and their hinterlands. Conurbations have on average 16 % more managers than their hinterlands, but only 5 % more of other NPs.

39. From more detailed tables it can be seen that London's pre-eminence is greatest among sales managers, 'other' professionals, accountants and company secretaries; occupations which also tend to be concentrated in the conurbations rather than the hinterlands. For this group the northern conurbations have somewhat lower levels than Birmingham, although the Manchester conurbation emerges, as with the other managerial occupations, above the general trend of declining proportions outwards from London. The other three managerial occupations, i.e. general managers, specialist managers and personnel managers, all have closer links to the day-to-day running of companies and hence to production sites. As a result their geographical distribution show less marked concentrations in London and the conurbations, although the concentrations are still greater than for most non-managerial occupations. A particular reason for general managers being associated with production sites is that they tend to be associated with small firms and their geographic distribution reflects this.

Clerical workers

40. Clerical workers can be associated with the managerial, sales and technical occupations and they are spread across regions in a manner closely resembling that of NP workers as a whole. As a result, the geographical pattern of the NP proportion for clerical workers has the usual tendency to decline with increasing distance from London, while conurbations generally have higher proportions than their hinterlands.

41. A more detailed examination of individual clerical occupations should reveal distinct differences in regional patterns, since typists are most closely connected with managers, a highly concentrated group,while clerks and machine operators are associated with scientific and sales staff who are less regionally concentrated. More detailed tables than those reproduced here show that this is the case. Typists, and the (small) communication workers category, have highly concentrated distributions closely resembling those of the managerial occupations. The dominance of London is extreme in both cases, while the major conurbations in each region have higher employment levels than their hinterlands. Clerks and office machine operators on the other hand, together comprising one in twelve of all employment in manufacturing, have spatial distributions with less extreme contrasts; the distributions, especially in the case of clerks, are very close to that of all NP workers. The last occupation group, office managers is geographically intermediate between the two types of clerical occupation considered above, with a strong decline in NP proportions outwards from London.

Scientific and technical workers

42. Scientific and technical workers include three principal groups : scientists and laboratory technicians; engineers and engineering assistants; draughtsmen. In another sense they can be subdivided into research workers (including most scientists and laboratory technicians but only about half of the engineers), production engineers, and draughtsmen. Unlike managerial and clerical workers each of these groups is markedly more important in some industries than in others and as a consequence industrial structure plays an important part in the regional spread of their employment.

43. Table 2.1 reflects this in that the two regions with the greatest employment in the less technological industries, such as textiles and clothing, are worse placed in technical employment than for all NP workers. In these regions, Yorkshire and Humberside and the East Midlands, scientific and technical workers comprise four and five per cent of employment compared with a GB average of almost six per cent. Regions with little employment in the textile industry and more employment in metal making and metal using trades have relatively large numbers of technical workers, although peripheral regions such as the North and Wales still remain below average. The overall consequence is that the regional distribution has less of a north-south contrast and more of the northern areas are close to the national average, although always on the lower side of it. However, a significant amount of the general north-south pattern does remain in that the region with the highest NP percentage in this occupation category is still the South East.

44. The major difference between this occupation category and the others lies in the relative employment levels of conurbations and hinterlands. In every case (except Scotland) the hinterlands have higher proportions than the conurbations. This is most clearly seen within the South East; London is little above the GB average but the Outer Metropolitan Area has almost one in ten of all its manufacturing employment in this category. With the single exception of managers in London, the figure for scientific and technical employment in the OMA is the highest in Table 2.1. Similar sharp differences within the North West and West Midlands strengthen the impression that some process is at work acting to locate this group of occupations outside the conurbations, although this is not the case in Scotland. The apparent preference for less urban locations is also noticeable in the case of the South West, which, with over seven per cent of all manufacturing employment in this category, has the second highest figure of any region.

45. A review of the more detailed occupation classification indicates that it is research workers who are located principally in non-conurbation areas. These research workers are normally scientists but may also be engineers, particularly in regions with important engineering industries. This explains the situation in the West Midlands, where the conurbation/ hinterland difference occurs for engineers rather than scientists. The two categories of technicians are also probably dominated by research technicians, and again a strong bias towards non-conurbation areas is found. However the remaining occupations in this cateogry have little connection with research and development and for the most part their geographical distributions are unlike the occupations considered above.

Production engineers tend to be concentrated in conurbations rather than elsewhere, except in the West Midlands, although particularly high NP proportions are observed in the OMA and the South West. In each case industrial structure is probably an important factor. Draughtsmen have a very similar distribution, with conurbations having higher proportionate levels of employment in the north, and hinterlands in the south.

Sales and distribution workers

46. The geographical pattern for this occupation category is much more uniform than that of those discussed so far, although retaining the usual decline in proportions outwards from London. As sales and distribution workers are numerically quite a large occupation category this regional uniformity does much to damp down the larger disparities in other occupations, but the equalising effect is almost purely numerical since workers in this category are predominantly manual workers with rates of pay below the average for male NP workers (1).

47. In detail the geographical distributions are of two types. Transport workers and warehousemen share a distribution in which employment proportions vary relatively little between regions and in which the South East region is only slightly above average, although warehousemen are generally more important in the conurbations and transport workers in the hinterlands. On the other hand the distribution of salesmen has much more marked regional differences than that of distribution workers as a whole (2). London has about the same relative levels for salesmen as for all NP workers, but the regions and sub-regions around London have higher levels of salesmen. The corollary of this is a lower level in most other areas, except Scotland.

Service workers

48. The term 'service workers' refers to those manual occupations concerned with the maintenance of buildings and grounds, security, cleaning and canteens. Table 2.1 shows that, unlike any other category, the levels of employment of service workers rises from south to north, but the magnitude of the figures is such that the overall variability between areas is not great. The range from 18 % below the GB average to 20 % above it is marginally greater than that of sales and distribution workers, but much smaller than that of the other three occupation categories. This small range, allied with the relatively small numbers involved (3.3 % of total employment), means that service workers makes only a small impact on the dominant south-north pattern of declining NP proportions. The reversal of pattern is partly continued in the conurbation-hinterland differences. Although London has significantly more service workers than 'Other South East', in all of the other cases the hinterlands either have higher levels or else the difference is slight.

(1) Almost 80 % are transport workers or warehousemen and the relevant managers are excluded.

(2) This interpretation is based on the census figures as they stand. From surveys carried out by the research team it is known that entire sales forces may be nominally on the books of a head office although the individuals rarely appear there, often working from home.

49. The higher employment levels in the more peripheral areas is most pronounced in the case of cleaners, of whom the southern regions have only about 70 % of the GB average proportion whereas the proportion rises to 36 % above the GB level in Tyneside, Other Yorkshire and Other Scotland. There is little evidence of systematic differences between conurbations and hinterlands. On the other hand canteen and related staffs have a different distribution in which conurbations have generally higher levels than hinterlands (Birmingham once again being an exception), with London and the OMA having the highest levels. Other than the pre-eminence of London itself there is no systematic decline in proportions outwards from London.

Summary

50. The geographical distribution of NP workers varies in two major ways. Firstly their proportion of total employment tends to decline outwards from London. Secondly, within regions there tend to be higher levels in those conurbations that are major regional centres. These aggregate patterns result from the distribution of individual occupations. The dominant element in the high NP levels of London and their decline outwards from London is undoubtedly the group of occupations involved in general administration, including managers, (non-technical) professional workers, typists and communication workers. Sales managers, accountants and 'other professionals' are the occupations most concentrated within conurbations with differences between regions being much less sharp for the remaining occupations. Salesmen and the related clerical occupations (clerks plus office machine operators) are spread in a manner similar to NP workers as a whole, while scientific and other technical workers are distributed with a less marked north-south contrast. However, within this category engineers have high proportions in the south, and for the category as a whole the area with the highest levels is not London but the Outer Metropolitan Area.

51. The remaining categories, distribution and service workers, are distributed relatively uniformly across regions, but service workers are contrary to all others in having higher NP proportions in the north than in the south. This geographical pattern emphasises the extent to which the higher executive occupations are concentrated in and around London while manual occupations have uniform or 'reversed' distributions.

CHAPTER 3

INDUSTRIAL STRUCTURE AS A DETERMINANT OF REGIONAL DISPARITIES IN NON-PRODUCTION WORKERS

52. Table 1.4 showed that industries vary markedly both in their overall proportions of NPs and in their occupational composition. It is therefore highly probable that the geographical distribution of industries will have a large influence on both the distribution of NP employment as a whole, and on the distribution of individual NP occupations. This chapter assesses the extent to which the varied industrial structure of each region contributes to the regional disparities in NPs reviewed in Chapter 2, and considers the way in which NPs are over- or under-represented in each region after taking account of its industrial structure.

53. The method used to carry out this exercise is the conventional one of calculating the 'expected' number of NP workers in a region, given the actual industrial structure of that region. This 'expected' quantity is the number of NPs that would be employed in a region if each industry in that region had the national average proportion of NP workers. The expected number of NPs is then compared with two quantities, the 'actual' number of NPs in the region, and the number of NPs that the region would have if it not only had the national NP proportions in each industry but also had the national industrial structure.

54. There are therefore three separate figures being used :

A. 'Actual' NPs : the actual number of NPs in a region, given the actual industrial structure of the region and its actual NP proportions for each industry.

B. 'Expected' NPs : the number of NPs that a region would have with its actual industrial structure but with national NP proportions in each industry.

C. 'National' NPs : the number of NPs that a region would have if it had both the national industrial structure and each industry had national NP proportions.

55. For any region the overall difference A - C can be divided into the two effects (A-B) + (B-C). The second of these, (B-C) or 'expected' minus 'national', can be taken to represent the effect of industrial structure on the numbers of NPs in the region. This is because both B and C assume that NPs are present in the national average proportions, but whereas B assumes that the actual regional industrial structure is present, C assumes that the region has the national industrial structure. The first effect, A-B or 'actual' minus 'expected', is then called the 'residual'. Since both A and B take the actual industrial structure to be given, the difference between the two lies in A accepting that the region's industries have their actual NP proportions, whereas B assumes that they have the national average NP proportions. (A-B) can therefore be said to be a measure of the extent to which NPs are over- or under-represented in a

region, given its industrial structure. In the text, over-representation, when (A-B) is positive, is sometimes called an 'excess', whereas under-representation, with (A-B) negative, is referred to as a 'deficit'.

56. Several questions arise about the use of this statistical procedure. Why should a region be 'expected' to have the national average NP proportions? Exactly how should the NP proportions (1) be measured? Are there any problems in interpreting the results of the exercise? Are there any alternative ways of carrying out the exercise? These questions are considered in paragraphs 57-60.

57. The answer to the first question is that 'expected' in this context does not have its usual connotation in English of something that 'ought' to be. The expected value is a statistical construct used as a norm or standard against which to compare the region's actual NPs (A), and the 'national' NPs (C). It seems appropriate to use national NP proportions and the actual industrial structure for this purpose because it can be claimed that within any one industry each factory will have common elements of production and administration and therefore NP workers connected with that industry might be expected to be present at each factory in the national average proportions.

58. So far in this report NPs have always been expressed as a percentage of total employment (2), so the answer to the second question in paragraph 56 seems to be pre-determined. However, for the calculation of expected values NP proportions in this form are not entirely suitable and an alternative measure, the ratio of NPs to Ps, is used. For regions with high NP/P ratios using this second approach produces results for the total difference (A-C) that are larger than those that would arise using the previous NP proportion related to total employment. For example, on the basis of the NP/P approach the South East region actually has 283,000 more jobs than it would have had if it had the national industrial structure and its industries had national NP/P ratios, compared with only 184,700 more jobs if the calculation is carried out using national NP proportions. Similarly, regions with 'deficits' due to their low NP/P ratios compared with the national average, will have larger numerical deficits using the preferred NP/P method than if NP proportions were used.

59. This type of statistical exercise is a simple form of the 'shift-share' technique used by regional economists (3), and like that technique it is possible to carry it out in a number of different ways based on a variety of assumptions. For example, it is possible to calculate, as an alternative to B, an expected value based upon the regions actual NP proportions but the national industrial structure (the opposite of B). If this is called B', then (A-B') would measure the effects of industrial structure, whilst (B'-C) would become the residual. This approach would produce different results from those reproduced here. The rationale for the method actually employed is simply that it appears to be more appropriate in the particular circumstances.

(1) For definitions of the terms used see the Foreword, paragraphs (xiii)-(xx).
(2) c.f. Foreword, paragraph (xiv) and paragraph 5 of Chapter 1.
(3) i.e. the 'national' figure C is greater than the 'actual' figure A, so that A-C is negative.

60. Clearly a major problem of the actual/expected technique is that the results achieved depend upon the method employed. In addition, and also as in shift-share analysis (1), they also depend upon the degree of industrial disaggregation employed. In practice, the availability of data indicated that the analysis should be carried out on the basis of the Industrial Orders of the Standard Industrial Classification, but a side-exercise seemed to indicate that if the more detailed Minimum List Heading industries had been used the results would not have been substantially different from those reproduced here.

61. The net result of these variations is that the calculation of expected values can only be considered as a statistical exercise, carried out on a basis that appears to be logical. There are alternative methods of carrying out such an exercise, and they will give different results in terms of the total differences between the actual and national figures, and in the way that those differences are divided between the industrial structure effects and those due to the under- or over-representation of NPs after industrial structure has been taken into account. However, it is unlikely that the overall balance between the latter two effects will be substantially affected by the use of alternative methods, although there are clear reasons for thinking that alternative methods would produce fairly large variations in the total difference.

Results : all NP workers

62. Table 3.1 gives, for each region and sub-region, actual, expected and national employment, together with the 'residual' (actual-expected), and the effects of industrial structure (expected-national). These statistics are expressed graphically in Figure 3.1, which is based upon actual and expected NP/P ratios. In this figure and in all similar cases, the blunt end of the arrow represents the 'expected' NP/P ratio, and the sharp end the 'actual' NP/P ratio. The difference between the two is the 'residual', as in Table 3.1. The length of the arrow represents the extent to which NPs are over- or under-represented in a region, given its industrial structure. When the arrow is pointing downwards the residual is called negative, there is said to be a 'deficit', and NPs are under-represented. The effects of industrial structure are shown in the diagrams by the difference between the blunt ends of the arrows (expected values), and the GB average. There is no horizontal scale, the regions being arranged in order of their distance from London.

63. Considering first the impact of industrial structure, Table 3.1 (and Figure 3.1) show that three groups of area have favourable industrial structures. These are the three southern regions (South East, East Anglia and South West), the two most northerly regions (North and Scotland), and finally, Merseyside and Other North West. The remainder of the industrial north plus the Midlands all have unfavourable structures for NP employment, with the worst industrial mixes occurring in the East Midlands and the West Yorkshire conurbation. Both of these latter areas

(1) See Bishop, K.C. and Simpson, C.E., "Components of Change Analysis : Problems of Alternative Approaches to Industrial Structure", in Regional Studies, Vol. 6, pp 59-68, 1972, and the references therein.

Table 3.1 An initial division of regional disparities in non-production employment, GB, 1971 (1)

thousands

Region/area	Actual employment 1	Expected employment 2	National employment 3	Residual employment (1-2) = 4	Industrial structure effect (2-3) = 5
North	137.6	178.5	171.5	-40.9	+7.0
Tyneside conurbation	44.5	50.4	50.1	-5.9	+0.3
Other North	93.1	128.1	121.1	-35.0	+6.7
Yorkshire & Humberside	246.8	274.0	295.0	-27.2	-21.0
W. Yorks. conurbation	109.9	118.1	134.1	-8.2	-16.0
Other Yorkshire/Humberside	136.9	155.9	160.9	-19.0	-5.0
East Midlands	184.5	200.5	223.4	-16.0	-22.9
East Anglia	68.1	74.7	70.8	-6.6	+3.9
South East	981.6	739.6	698.6	+242.0	+41.0
Greater London	502.4	333.6	315.1	+168.8	+18.5
Outer Metropolitan Area	341.1	249.4	230.8	+64.7	+18.6
Other South East	314.1	156.6	152.7	+8.5	+3.9
South West	149.9	145.8	144.0	+4.1	+1.8
North West	387.4	442.2	435.1	-54.8	+7.1
S.E. Lancs conurbation	163.4	167.0	170.4	-3.6	-3.4
Merseyside conurbation	59.8	74.7	68.2	-14.9	+6.5
Other North West	164.2	200.5	196.5	-36.3	+4.0
West Midlands	354.9	383.6	403.8	-28.7	-20.2
Birmingham conurbation	200.8	217.6	232.5	-16.8	-14.9
Other West Midlands	154.1	166.0	171.3	-11.9	-5.3
Wales	97.5	125.2	127.3	-27.7	-2.1
Scotland	215.5	259.7	254.2	-44.2	+5.5
Clydeside conurbation	95.7	100.1	99.8	-4.4	+0.3
Other Scotland	119.8	159.6	154.4	-39.8	+5.2
Great Britain	2823.8	2823.8	2823.7	0	0

Source : Census of Population, 1971.

(1) The terms used in this table are explained in paragraph 53. The 'actual' figures differ slightly from those in Table 2.1 because they include an allowance for employment in detached head offices 'not allocable elsewhere' that are assumed to belong to manufacturing industry.

have large textile and clothing industries, employing few NPs. The other major feature is that in all cases conurbations have relatively less favourable industrial structures for NPs than their adjacent hinterlands (1).

64. The two regions with above average NP/P ratios, the South East and the South West, both have industrial structures that are favourable for NPs - in Figure 3.1 the blunt ends of the arrows are above the GB average. This contributes to their overall advantage in NPs but the effect of industrial structure accounts for only a small part of the additional NP employment in both regions, although it nevertheless amounts to almost 43,000 jobs. Within the South East the OMA can be seen to possess the most favourable structure. The remaining areas with favourable industrial structures for NPs, such as East Anglia or Merseyside, all have actual NP/P ratios that are below the GB average. In each case the industrial structure ameliorates a position which would otherwise have been worse, and in the cases of Merseyside and Other North, much worse than the GB average.

65. Considering now the extent to which NPs are over- or under-represented after taking into account the effects of industrial structure (measured by the length and directions of the arrows in Figure 3.1) in only four areas in two regions can NPs be said to be over-represented. In two cases this only involves small amounts (Other South East and South West), with large 'excesses' being confined to Greater London and the Outer Metropolitan Area, which are the only parts of the country to have NP/P ratios significantly greater than those expected on the basis of their industrial structures. The additional jobs accounted for in this way amount to 246,100 for all four areas (Table 3.1) with London and the OMA accounting for 95 % of this total. The situation is thus one in which London and OMA have a large excess above expected levels, while for almost all the rest of the country NPs are under-represented by an equal magnitude in total.

66. Among the areas beyond the Outer Metropolitan Area in which NPs are under-represented three types of area may be distinguished :

(i) conurbations (excluding Merseyside);
(ii) non-conurbation areas that are not Development Areas;
(iii) Development Areas outside conurbations (2);

For these groups the number of jobs involved as net deficits are 38,900, 77,200 and 117,400 respectively.

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(1) Merseyside is still being counted as a non-conurbation.
(2) Included in (ii) are Other South East, South West, East Anglia, East Midlands, Other West Midlands, Other North West and Other Yorkshire and Humberside. (iii) includes Wales, Merseyside, Other North and Other Scotland.

67. Within the group of conurbations (paragraph 66 (i)) the S.E. Lancashire conurbation (Manchester) has a particularly small deficit (Figure 3.1), showing that NPs are only marginally under-represented there. Clydeside has the next smallest deficit, whereas that for Tyneside is relatively large.

    There may be several factors at work here, such as the size of the conurbation and its distance from other major centres. Thus Merseyside loses NPs by being close to Manchester, as does Birmingham by being too near to London. Tyneside, on the other hand, is the smallest conurbation and presumably cannot offer the benefits of aggregation required by NPs.

68. The extent to which NPs are under-represented, given the industrial structure of each region, worsens markedly with increasing distance from London when the non-conurbation areas outside the Development Areas are considered (paragraph 66 (ii)). The one clear exception to this trend is East Anglia, which has a smaller deficit than the Midland areas, although it is still larger proportionately than those of the northern areas. The greatest under-representation of NPs, after allowing for industrial structure, is shown by the four areas within the Development Areas outside the conurbations (paragraph 66 (iii)). In three of these cases the under-representation results in actual NP/P ratios that are furthest below the GB average, despite relatively favourable industrial structures. The fourth case, Merseyside, has an actual NP/P ratio more in line with the non-development areas outside the south because it has the country's most favourable industrial structure. Within this group of four areas it can be seen that the two lying closest to London have smaller deficits than the two further north.

69. These points can be summarised in a brief area by area account. London and the OMA have favourable industrial structures for NPs but their high actual NP/P ratios are mostly due to NPs being over-represented beyond this. East Anglia and the South West also have favourable industrial structures. In the latter case this is magnified, but only slightly, by a tendency to over-representation, while in East Anglia the industrial structure is fully offset by NPs being under-represented. The belt of areas including the Midlands, northern England (but not North East), and Wales, mostly have unfavourable industrial structures, and in all cases NPs are under-represented in addition. Finally,the North-East and Scotland have, in all four areas, a favourable industrial structure for NPs combined with under-representation of them. The extent of this under-representation in the two hinterland areas result in them having Britain's worst NP/P ratios, along with Wales.

Actual and expected employment in occupation groups in the South East

70. It is possible to disaggregate the actual and expected figures for each region into their occupation groups and consider every region in terms of its occupations. This is only carried out (in Table 3.2) for the

South East region (1). Subsequent sections of the report look at individual occupation categories and it is possible to use these to piece together the picture for other regions.

71. For the South East the total difference between the actual and national figures amounts to over 280,000 jobs, of which 40,000 are due to the region's favourable industrial structure and 240,000 to NPs being over-represented beyond that. Much the largest occupation category involved is the clerical one, accounting for 40 % of both the industrial structure effect and the residual over-representation. Scientific and technical workers are similar to clerical workers in that they also account for a fixed proportion (18 %) of the two effects distinguished.

72. This is not the case for the other categories. The managerial and professional class account for 17 % of the industrial structure effect, almost exactly pro rata with their relative importance in manufacturing industry, but this rises to 25 % for their residual over-representation. Sales and distribution show a similar increase between the two factors, but in each case they are well below their overall importance in manufacturing. Nearly one quarter of the industrial structure effect is attributable to the miscellaneous category, who are mainly journalists and other workers in publishing and printing, whereas a relative lack of industries employing service workers reduces the overall size of the total industrial structure effect. Neither of the latter two categories contribute much to the residual over-representation of NPs, which is attributable largely to managerial and professional workers and scientific and technical workers, together with their dependent occupation categories of clerical and secretarial workers.

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(1) The figures in Table 3.2 differ from those in Table 3.1 because they omit estimates for some head office employment (MLH 866). The occupation groups include a miscellaneous category of 'occupations specific to an industry' including journalists and editors, beauticians (in the toilet preparations and pharmaceuticals industries) and pressers (in the clothing industry).

Table 3.2 Excess NP employment in the South East region, 1971 (1)

Occupation category	Total difference (actual-national)		Industrial structure effect		Residual	
	No.	% of total	No.	% of total	No.	% of total
Managerial and professional	66,308	23.6	6,974	16.7	59,334	24.8
Clerical	112,913	40.2	16,897	40.5	96,016	40.1
Scientific and technical	49,685	17.7	7,488	18.0	42,197	17.6
Sales & distribution	35,536	12.6	3,537	8.5	31,999	13.4
Service	4,052	1.4	-3,005	-7.2	7,057	2.9
Miscellaneous	12,542	4.5	9,813	23.5	2,729	1.1
Total	281,036	100 %	41,704	100 %	239,332	100 %

Source : Census of Population, 1971.

73. Each of the following five sections is based on a figure similar to Figure 3.1. The interpretation of each figure, and the terminology used, follows that of paragraph 62.

Actual and expected employment : managerial and professional workers (Figure 3.2)

74. Figure 3.2 shows that the effect of industrial structure on regional variations in the proportions of managerial and professional workers is slight. The blunt ends of the arrows are all close to the GB average and all regions have industrial mixes which would lead to a ratio of managers to operatives of between 8 and 9.5 to a hundred. This is because industries vary only slightly in their managerial proportions (2), and regional variations in industrial composition count for little. The differences in expected ratios that do exist tend to favour all areas except those in a belt across the country from Wales to Yorkshire, omitting the North West.

75. By far the greatest amount of geographical variation in NP/P ratios for this group derives from their over-representation after industrial structure is taken into account. This is much the greatest for London and the OMA, while large deficits indicating under-representation are concentrated in northern England and Wales. In each region the

(1) See footnote to para. 70.
(2) cf Table 1.4.

conurbations are more favourable for the managerial and professional category than their hinterlands, although the differences decrease quite markedly northwards. More detailed information on individual occupation groups shows that the largest amounts of over or under-representation occur for sales managers, accountants, and other professionals, whereas general managers, company secretaries, personnel and other specialist managers are rather more evenly spread.

76. These patterns for the more detailed occupations can be easily explained. The large positive residuals for sales managers in London and the OMA, representing their over-representation beyond the levels indicated by the industrial structure of those regions, occurs because of the strategic importance of these areas as a meeting place for buyers and sellers, both home based and foreign. These sales managers may not be in head offices but in separate detached sales offices. This geographic pattern also goes some way towards explaining the under-representation of sales managers in areas where the size of market is limited - Wales, Other Scotland, Other North. Accountants and other professionals are also more dominantly head office occupations than are other occupations, and they are therefore concentrated in the South East, which has the greatest concentration of head offices.

77. On the other hand the extent of the over or under representation of general managers is probably much influenced by the local importance of small firms. The conurbations in Yorkshire, the North West and West Midlands tend to have little under-representation or even have over-representation in this occupation group, and these are areas that have particular concentrations of industries such as textiles or mechanical engineering including large numbers of small firms run by general managers. Similarly, specialist managers are likely to be at production sites and not concentrated to an excess in the South East.

Actual and expected employment : clerical workers (Figure 3.3)

78. Figure 3.3 shows that industrial structure has a larger influence on the distribution of clerical workers than it had for managers and other professionals; that is, the blunt end of the arrows are rather more scattered around the average line. Since the NP proportion of managers is less varied than that of clerical workers, both by industry and by region (1), and clerical workers are an occupation group that is dependent upon other occupations, the variations in the clerical workers must be due to variations in the sales and distribution, and scientific and technical workers groups.

79. The regions with unfavourable industrial structures for clerical workers are once again concentrated in the belt from South Wales to Yorkshire while the areas in the south and the north, plus Scotland, have favourable industrial compositions. The area that really stands out is Merseyside, presumably because of its relatively high proportions of sales and distribution workers whose activity demands some clerical support. The industrial composition of the East Midlands and West Yorkshire, with the dominance of the textile and clothing industries, leads to low employment levels for managers and scientific and technical workers, and this is

(1) cf Tables 1.4 and 2.1, and Figure 3.2.

reflected in the very low expected levels for clerical workers, of whom secretarial workers are a major component.

80. After taking industrial structure into account, the pattern of over and under-representation is once again dominated by the large excesses in London and the OMA, and by under-representation throughout the Development Areas. In all regions, clerical workers in conurbations are less under-represented than in their hinterlands. These patterns reflect a similar state of affairs in both the managerial and the sales and distribution categories.

81. A more detailed examination of clerical occupations emphasises the difference between secretaries/typists and communication workers, and clerks and office machine operators. The former have large variations in the differences between actual employment and expected employment, greatly to the advantage of London and the OMA, and reflecting the distribution of managers. As clerks depend not only upon managers but also upon scientists and salesmen etc., their geographical distribution tends to follow the pattern of these occupations and be considerably less varied overall than that of typists.

Actual and expected employment : scientific and technical workers (Figure 3.4)

82. The actual distribution of scientific and technical workers is unique in that it is the hinterlands that have higher employment proportions than the conurbations, contrary to the normal position, and it is the OMA that has the highest proportion, not the GLC area. Figure 3.4 can be used to assess the extent to which this is due to industrial structure rather than other 'residual' factors.

83. Comparison of Figure 3.4 with Figures 3.2 or 3.3 shows that variations in the expected NP/P ratios due to industrial structure are indeed much larger than is the case with the previous two occupation groups. The industrial structures of Other North, Tyneside and Merseyside, are most favourable for these scientific occupations; those of the East Midlands, West Yorkshire, Other Yorkshire/Humberside, and Other Scotland less favourable. These patterns follow the geographical distribution of the high-technology industries, particularly chemicals. On the whole hinterlands have more favourable industrial structures than their conurbations, although this is not the case for the West Midlands and Scotland. This feature may again be due to the particular requirements of the chemical industry - often not a welcome neighbour in a conurbation.

84. The most striking feature of Figure 3.4 is the overwhelming dominance of the over-representation of this group in the OMA, amounting to over 23,000 jobs even when industrial structure is taken into account. Apart from this the extent of over or under-representation is relatively even, although usually that for a hinterland is equal to or greater than that of the relevant conurbation, except for the West Midlands. Thus although hinterlands tend to have better industrial structures for scientific and technical workers, they also tend to have them under-represented in those areas to a greater extent, and this may nullify the structural effect. The South West region is of particular interest in that it has a large

excess of scientific workers, given its industrial structure, and this is the first occasion of such an excess appearing, other than in the South East.

85. A review of the individual scientific and technical occupations shows that the major advantage of the OMA and other areas in the South East and South West lies in the research occupations : scientists, general engineers and technicians. Production engineers and draughtsmen also tend to be over-represented in these areas, but for these occupations the advantage is only half as large. Several other areas outside the south have 'excesses' for draughtsmen, including Tyneside and Clydeside, the two conurbations most noted for shipbuilding and heavy engineering.

Actual and expected employment : sales and distribution workers (Figure 3.5)

86. The effects of industrial structure appear greater in Figure 3.5 than is in fact the case because this figure has a larger scale than previous ones. Nevertheless it is clear that three regions, East Anglia, Merseyside and Other Scotland, have extremely favourable industrial structures for sales and distribution workers whilst quite a number of other areas also have favourable structures, including the South West, Other North West, Other Yorkshire and Humberside and Other North, but excluding four conurbations.

87. These somewhat unusual patterns of favourable industrial structure are due to the concentration of sales and distribution workers in the food and drink industries. These industries tend to be located in rural areas producing milk and vegetables, the whisky distilling areas, and major grain and food importing ports. Since these are the production locations the expected values, which are based on figures of production workers, are high for these areas. But sales and distribution workers are market-oriented and the markets for the food and drink industries are in the conurbations well away from the production sites. So actual figures are relatively low in the rural areas whereas the expected figures are relatively high. In Figure 3.5 this results in large, downward-pointing, arrows, showing extensive under-representation of sales and distribution workers. In this respect this occupation category provides an interesting example of how the use of expected values may be misleading - there is no reason at all to expect a man selling butter to supermarkets to be located at a creamery in Somerset.

88. On the other hand areas without major food and drink industries, such as the Birmingham and S.E. Lancashire conurbations, or the East Midlands, typically have unfavourable industrial structures but about average proportions of sales and distribution workers. The relative over-representation of this category in West Yorkshire is probably a reflection of the large numbers of small firms there, whereas their massive over-representation in the South East is due to the size of its market and its status as a centre of physical communications, which acts as a magnetic attraction not only for salesmen but also for transport workers and warehousemen.

Actual and expected employment : service workers (Figure 3.6)

89. The small vertical scale of Figure 3.6 indicates that there is relatively little variation in NP/P ratios for service workers, but the little there is is contrary to the patterns for all other occupation categories. The industrial structure of southern England is unfavourable for such workers - the blunt ends of the arrows are below the GB average - whilst northern England other than the S.E. Lancashire conurbation and West Yorkshire has a favourable industrial structure. The effect of the over or under-representation of service workers beyond the industrial structure is then to raise London and OMA back above the average. For regions north of the Midlands, service workers are either over-represented, bringing the S.E. Lancashire conurbation above the GB average, or insufficiently under-represented as to counteract the favourable industrial structures (1).

90. The second clear element in the pattern of expected values is the consistently lower values observed for conurbations when compared with their hinterlands. Despite this the relative effect of over or under-representation is to alter the ranking of the actual NP/P ratios, except for West Yorkshire. Thus industrial structure and the relative size of over or under-representation are inversely correlated - they move in opposite directions - between conurbations and hinterlands. This is principally because service workers (largely in canteens) and cleaners are concentrated in conurbations, whereas rural areas are less likely to provide the canteens and have the office blocks that might be associated with these occupations. For protection workers (2), over-representation after taking industrial structure into account, is ranked in an interesting way :

Clydeside	+ 56 %
Merseyside	+ 35.7 %
Other North West	+ 20.3 %
GLC	+ 16.7 %
Other Scotland	+ 11.7 %
Tyneside	+ 7.8 %

Actual and expected employment : summary

91. The areas can be grouped as below : -

(a) The effects of industrial structure

(i) Southern areas

London and the OMA have generally better industrial structures for NPs than the surrounding areas.

(ii) East Midlands, Birmingham and West Yorkshire

These areas have the worst industrial structure for virtually all NP occupational categories.

(1) Except for Other Scotland
(2) Firemen, security officers and works police, guards.

(iii) Other West Midlands, Other Yorkshire, Wales, S.E. Lancashire, Tyneside and Clydeside conurbations

Intermediate industrial structures which are close to the GB average for almost all NP occupation groups, although usually below rather than above average for managagerial, clerical and sales and distribution workers.

(b) Over or under-representation after taking industrial structure into account

(i) London and the OMA

Considerable over-representation of all occupation categories. London has more over-representation than the OMA except for scientific and technical workers. The advantage held by these two areas is much larger in the ATC occupation groups than in the other groups.

(ii) Other conurbations

General under-representation of NPs, except for service occupations, but this is small in magnitude, and in particular the under-representation is smaller than that occurring in the hinterlands. The under-representation is less favourable for the ATC occupation groups than for the other groups.

(iii) Non-conurbation areas in the south and Midlands, plus Other Yorkshire

Over or under-representation is generally small in this group but it worsens with increasing distance from London. The Other South East has over-representation except in the service occupations. The South West region has a mixed result, the managerial, clerical and service groups being under-represented. The remaining areas either have small effects or are close to the GB average.

(iv) Non-conurbation development areas, plus Other North West

All NP occupation categories are well under-represented, after taking account of industrial structure, except for service workers which are only marginally so. These features are particularly the case for Other North and Other Scotland.

92. Even after allowing for industrial structure the overall pattern of over or under-representation remains that of London and its surrounding areas having high levels of NP employment while the non-conurbation areas in the north and Wales have low levels. Other areas are intermediate. When the effects of industrial structure are added, the excesses of the south and deficits of the north remain but the position of the Midlands and Yorkshire-Humberside is made worse.

CHAPTER 4

THE CAUSES OF INDUSTRIAL VARIATIONS IN THE RELATIVE NUMBER OF NON-PRODUCTION WORKERS

93. In Chapter 3 the effects of industrial structure on regional variations in NP proportions were investigated using a technique based on average NP/P ratios for Great Britain. But Table 1.4 and the discussion in paragraphs 13/14 showed clearly that NP proportions, and hence NP/P ratios, vary quite widely between industries. It therefore seems proper to step back and examine the causes of these variations before continuing the regional analysis in later chapters.

94. Table 4.1 is an extension of Table 1.4 of Chapter 1 and presents NP proportions for 11 occupation groups by 21 industries plus manufacturing industry, with a coefficient of variation for each occupation group. As in Table 1.4 two broad patterns can be seen. The first is that industries with large proportions of NP workers tend to have large proportions in most of the individual occupation groups. The second major feature is the wide disparities between NP proportions in different industries, shown by the large coefficients of variation. This is particularly the case for the sales and distribution occupations and the technical occupations. On the other hand the variation in NP proportions for managers, warehousemen, typists, clerical workers and service workers is very much less marked.

95. 'Explanations' of these varying proportions and relationships come readily to mind. The proportions of scientists and technicians are high in those industries that carry out a great deal of scientific research, whilst the proportions of engineers and draughtsmen are greatest in the engineering industries. Equally, the high proportions of transport workers in the food, drink, coal and oil products, and bricks, pottery and cement industries are probably due either to the nature of the products involved - low value, high volume or weight - or to institutional features such as a large number of retail outlets to be served. However, some of these 'explanations' are only of a first-order nature, that is, they only provide the direct reason - the prevalence of R & D - rather than providing second-order explanations - the reasons for R & D being important in only a few industries. Moreover it is not easy to find intuitive explanations for all the variations, such as the high proportion of sales workers in chemicals, or the low proportion of professional workers in shipbuilding.

96. The objective of this chapter is the explanation of these variations in the distribution of NP workers by industry. The 'explanation' offered is based on two hypotheses :

I. For some NP occupations, the main factors involved in explaining variations in their proportionate importance in various industries are a set of industry characteristics such as the quantity of capital per head in the industry, or the nature of its markets. Such occupations are said to be 'directly' dependent upon these industry characteristics. For example, the proportion of scientists in an industry's total employment probably depends upon its R & D expenditure.

Table 4.1 Employment in eleven NP occupation groups by industry, Great Britain, 1971

percentage of total employment

	Managers (MAN)	Professional workers n.e.c. (PRO)	Typists/ secretaries (TYP)	Clerical workers (CLK)	Scientists & technicians (SCI)	Engineers & draughtsmen (ENG)	Computer & other technical workers (TECH)	Sales workers (SAL)	Warehousemen (WHS)	Transport workers (TRN)	Service workers (SER)	Total NPs (1) (ALL)	Total number of NPs (1) (ALL)
Food	4.29	0.12	1.90	9.31	1.33	0.65	0.49	8.75	3.33	4.55	3.98	38.7	216050
Drink	5.46	0.72	3.15	12.92	1.23	0.71	0.58	6.34	3.50	14.13	6.38	55.1	79190
Tobacco	3.14	0.27	3.24	15.40	2.46	1.11	1.16	4.73	3.30	1.00	5.48	41.3	15280
Coal & oil products	6.08	0.56	4.11	11.13	4.92	4.00	2.10	2.61	1.92	4.82	6.32	48.6	28630
Chemicals	5.72	0.48	4.56	11.83	7.70	2.87	1.92	6.02	3.28	2.48	4.97	52.3	239740
Ferrous metal manuf.	3.16	0.11	2.22	8.20	1.75	2.23	1.19	0.89	2.15	2.18	5.12	29.2	122100
Non-ferrous metal man.	4.86	0.11	2.67	8.77	2.09	2.47	1.02	1.87	2.59	1.52	4.08	32.0	42630
Mechanical engineering	5.40	0.15	3.52	9.72	0.49	6.87	1.35	3.04	3.01	1.09	2.85	37.5	422220
Instrument engineering	5.22	0.15	4.06	11.03	1.17	7.17	1.45	3.59	2.84	0.85	2.18	39.9	58010
Electrical engineering	4.26	0.20	3.16	10.53	0.87	8.25	2.53	2.59	3.00	0.78	2.96	39.3	331710
Shipbuilding	2.64	0.04	1.32	5.42	0.26	4.60	1.40	0.40	1.73	1.59	3.26	22.7	40880
Vehicles	3.03	0.11	2.25	9.08	0.75	6.00	1.88	0.99	3.58	1.33	2.69	31.7	250360
Metal goods n.e.c.	5.16	0.09	2.76	7.92	0.59	2.44	0.45	2.01	2.86	1.44	2.66	28.4	166260
Textiles	4.24	0.34	1.79	6.59	0.95	0.67	0.62	1.87	3.62	1.00	3.22	25.1	148610
Leather, fur	6.47	0.17	2.29	5.36	0.48	0.25	0.19	2.00	2.52	1.46	2.03	23.2	12260
Clothing	4.24	0.05	1.29	5.12	0.04	0.29	0.15	1.80	2.12	0.64	2.20	23.5	88010
Footwear	3.04	0.46	1.33	6.21	0.14	0.47	0.34	1.38	2.82	0.64	1.67	18.5	17720
Bricks, pottery etc.	4.48	0.27	2.63	8.22	1.33	1.76	0.58	2.33	2.21	4.69	6.44	35.0	106920
Timber & furniture	5.18	0.23	2.34	6.62	0.07	0.75	0.16	2.55	1.57	2.96	2.37	25.0	75530
Paper, printing, publ.	5.68	0.31	4.19	12.69	0.50	0.83	0.52	4.25	3.22	1.97	2.69	41.5	254200
Other manufacturing	5.52	0.18	2.95	8.30	1.19	1.57	0.71	3.37	3.46	1.42	2.80	31.5	102230
Total manufacturing	4.61	0.21	2.82	9.11	1.24	3.49	1.12	3.05	2.96	2.00	3.34	34.6	2818540
Coefficient of variation	0.23	0.70	0.34	0.29	1.18	0.90	0.67	0.64	0.22	1.13	0.40	0.28	0.80

Source : Census of Population, 1971.

(1) see note 1 to table 1.4.

II. On the other hand, for some NP occupations the main factors involved in explaining variations in their proportionate importance in various industries are the numbers employed in other NP occupations. This implies that ultimately they depend upon industry characteristics as in I above, but the connection is indirect, through other NP occupations, rather than direct as in I. For example, the proportion of typists in an industry's total employment may be governed by the relative numbers of managers, which may in turn depend upon specific industry characteristics.

97. Occupational structures are rarely quite as simple as portrayed by the two hypotheses above. To start with one must recognise that the proportionate importance of any particular NP occupation group may involve elements from both hypotheses. The number of clerks may depend upon an industry characteristic, such as selling in small batches and hence requiring a relatively high clerical input (Hypothesis I), but it may also be dictated by the number of specialist managers who require clerical assistance (Hypothesis II). Moreover, spurious relationships may appear if two occupation groups are related to the same industry characteristic. If the NP proportions of both sales workers and transport workers are governed by the proportion of total sales sold to retail shops, then these two groups may appear to operate according to Hypothesis II, instead of being independent cases of Hypothesis I.

98. Actual NP proportions are the result of a complex and interlocking set of relationships between industry characteristics and other occupations. The number of such characteristics and relationships may be large and the task of completely unravelling the system would be extremely difficult. In the sections that follow only the clearest statistical results are presented. They are based upon a statistical analysis using the NP occupation proportions in 1971 in some 120 Minimum List Heading industries (1). The sections first consider independent tests of the first hypothesis (paragraphs 99-109), then review independent tests of the second hypothesis (paragraphs 110-120), and finally examine the results of allowing both hypotheses to stand together (paragraphs 121-128).

Tests of hypothesis I : that the numbers in given NP occupations depend upon industry characteristic

99. A large number of industry characteristics may govern the proportion of NP workers and the choice of appropriate ones for investigation necessary has to be made on the basis of a priori hypotheses about the strength of different factors, and the availability of appropriate statistics at the level of the Minimum List Heading industry. In the event the analysis was based on a set of industry characteristics that included :

Productivity (PROD). This was defined as output per production worker, where output is measured as net output. The hypothesis being tested is that the greater the productivity of the production workers in an industry, the greater is the proportionate importance of NP workers in the total employment of that industry.

(1) For definitions of the terms used see the Foreword, paragraphs (xiii) - (xx).

Capital Intensity (CAP). This variable was defined as capital per P-worker. It is likely that the greater the investment in plant and machinery per production worker, the greater will be the relative numbers of NPs who are involved in maintenance, quality control, R & D, security and safety etc. CAP is related to PROD above because there is empirical evidence that in general output per production worker is dependent upon capital per production worker.

Labour costs (LAB). It is assumed that the greater the proportion of net output that is allocated to labour costs (wages and salaries), rather than returns to capital, the lower the capital intensity of the industry and hence its labour productivity. Since labour productivity can be considered to vary directly with NP proportions (c.f. PROD above), LAB is likely to vary inversely with PROD (and CAP). Labour costs are however subject to modifying influences, such as the degree of labour skill or unionisation in an industry, and these make LAB sufficiently different from CAP and PROD as to warrant its inclusion in the analysis.

Consumption (CON) and exports (EXP). One possible hypothesis is that the nature of the markets served by each industry determines in part the nature of its sales effort, and hence the NP proportions for clerks, salesmen, managers, etc. Two market concepts are included in the analysis; the proportion of sales going to consumption, and the proportion of sales exported.

R & D Expenditure (R & D). In a sense this is almost a tautology - those industries spending most on R & D are likely to employ the greatest numbers of scientists and technicians. However there does not appear to be any completely independent variable that is a good predictor of R & D, and this particular variable was taken so that something at least could be said about the technical occupations.

Communications (TEL). This variable was defined on postage and communications per unit of net output. The hypothesis is simply that some industries require a greater amount of effort put into communications, either internally or externally, than others, and this will throw up a greater need for managers, typists, etc. The type of industry in question could be those involved heavily in contracts with customers, by selling to them, servicing the equipment they have bought, or providing spare parts.

Plant size (SIZ). This was defined as the average size of establishment in the industry. The impact of the size of establishment on NP proportions can be explained in several ways. For example, an economist would talk of increasing or decreasing economies of scale in the use of NPs, whereas a sociologist would refer to the increasing administrative complexity of large organisations. Size, therefore, is important, but its effect could be in various directions.

Other variables. A number of other variables were included in the statistical analysis for each occupation but since none of them proved to be of general significance they are not included here. Mention is made of them in the text when they are of importance.

100. Appropriate values for the industry characteristics were used as independent variables in a multiple regression analysis, using the NP occupation proportions of Table 4.1 as dependent variables, but with the analysis extended to cover some 120 Minimum List Heading industries. The most significant of the relationships found between the individual NP occupations and the industry characteristics are summarised in Table 4.2 although the text below occasionally refers to less significant relationships, not included in the table. The table gives Beta coefficients, which are statistical coefficients that allow comparisons of the relative importance of the independent variables to be made, especially in cases where, as here, the variables are measured in different units. The occupations are divided into four roughly similar groups and the industry variables are divided into four pairs that approximate to a productivity factor, a size factor, a market factor, and a technological factor. The final column, giving the Coefficient of Determination, represents the proportion of the total variation in the NP proportions in the 120 industries that can be 'explained' by the fitted equation.

101. Taking this last column first it can be seen that the greatest success in terms of 'explanation' is for the technical pair of occupations, which are largely dependent upon R & D and capital intensity. Since the Coefficient of Determination is around 0.70 for these occupation groups only some 30 % of their variation between industries is left to be explained by industry factors not included in the analysis, or by their dependence upon other NP occupations. On the other hand the industry characteristics included in the analysis only account for 26 % of the variations in the NP proportion of professional workers and warehousemen. The other occupation groups are in an intermediate position, with about one half of their inter-industry variations being explained by the industry characteristics used.

102. Managers. The proportion of an industry's total employment classed as managers is inversely related to its average size of plant, since the Beta coefficient on SIZ is negative. Therefore the larger the plant size, the lower the proportion of managers is likely to be. This appears to be a clear economy of scale effect. Managers are also directly related to productivity (net output per operative) probably because of the increased overall complexity of the administrative process in high productivity industries. Finally, industries that spend more on communications are also likely to employ a larger proportion of managers, although the direction of cause and effect cannot be specified in this case.

103. Professional workers n.e.c. The productivity of Ps is also the predominant factor in the explanation of the NP proportion of professional workers. However, none of the other industry characteristics are of importance and the regression equation that was fitted only 'explained' 26 % of the industry variations in the extent to which professional workers comprise part of total employment. This poor result may arise because the occupations concerned - solicitors, surveyors, architects, economists etc.- are those whose services may be brought in by smaller companies, or that may be used only by companies in particular industries such as building products firms. If this is the case NP proportions may vary for no reason connected with the industry characteristics used in the regression analysis, but depend more upon institutional features within each industry.

Table 4.2 Summary of the most important relationships between NP occupation proportions and independent industry variables

Occupation	'Productivity' PROD	LAB	'Size' TEL	SIZ	'Markets' EXP	CON	'Technology' R&D	CAP	Coefficient of Determination(1)
Managers	0.55		0.35	-0.61					0.59
Professional workers n.e.c.	0.56								0.26
Sales workers		-0.40	0.19						0.61
Warehousemen		-0.41	0.36	0.25	0.18				0.26
Transport workers	0.55				-0.36		-0.26		0.54
Service workers	0.39		-0.15					0.24	0.56
Engineers & draughtsmen						-0.30	0.30		0.77
Scientists & technicians							0.37	0.50	0.69

Source : Census of Population 1971, Census of Production, 1971, Input-Output Tables for the UK, 1971.

(1) Based on a wider set of industry variables than those listed in the table. See paragraphs 97/8.

104. Sales workers. Here again a productivity measure, in terms of labour costs, is the predominant factor. In addition advertising expenditure and the amount of merchanting undertaken by an industry are of some importance (1), representing either the intensity of the sales effort or the additional quantity of goods to be sold. Expenditure on communications also appear to be relevant, though this may again represent an effect rather than a cause. The coefficient of determination, at 0.61, implies that a high proportion of the industry variations in the NP proportions of sales workers is explained by the industry characteristics used.

105. Warehousemen. Productivity in the form of labour costs, together with expenditure on communications, are the predominant explanatory variables, but the average size of establishments is also of importance, as is the extent of export sales. However, even though four of the eight industry characteristics have some relevance only some 26 % of the variation in the proportions of warehousemen can be accounted for. This relative failure arises because :

(i) the industry characteristics fail to include anything relating to the levels of stocks;

(ii) warehousing is heavily dependent upon institutional factors. For example in the food industry some firms run their own distribution

(1) These two industry characteristics are included under the 'Other variables' category in paragraph 97.

networks, others work through wholesalers or other middle-men. None of the industrial characteristics used can account for such variations.

106. Transport workers. Here again productivity appears as an important explanatory factor. The negative relationship with exports could be the result of companies with a high proportion of exports using outside contractors, or being sited near their export ports. It is more likely that exports are commodities of high value and low weight, requiring relatively few transport workers. High value and low weight are also accepted features of technologically advanced products and these characteristics may explain the negative relationship between the NP proportions for transport workers and expenditure on R & D shown in Table 4.2.

107. Service workers. Service workers include both canteen and medical staff, who may be thought of as servicing other personnel; and ground staff, property maintenance workers, cleaners and security workers, who may be thought of as servicing capital. The relationship between the NP proportions for service workers, capital per P-workers, and productivity per P-worker, is therefore of no surprise, but the implied relationship with expenditure on communications is puzzling.

108. Engineers and draughtsmen. The most successful result of the regression analysis based on industry characteristics is its ability to account for the industry variations in the NP proportions of engineers and draughtsmen. These variations are largely the result of technical factors, such as expenditure on R & D. The proportion of sales that is represented by consumer markets is inversely correlated with the NP proportions for engineers, reflecting the lower engineering input into such commodities as foodstuffs and furniture.

109. Scientists and technicians. Here again expenditure on R & D and capital per P-worker provides an explanation for a high proportion of the variations in the NP occupation proportion.

Tests of hypothesis II : that numbers in given NP occupations depend upon the numbers in other NP occupation groups

110. This section is solely concerned with evidence for relationships between NP occupations. In an individual organisation or office it is easy to find examples of these relationships. For example, the numbers of secretaries depend upon the number of executives. But the analysis in this chapter is based upon NP proportions in industries, not individual sites or organisations, and it does not follow that relationships intuitively obvious in a particular office will also be true between different industries. This necessitates the use of statistical methods, leaving the intuitive and subjective approach based upon the observation of individual sites to act as supporting empirical evidence.

111. As a first approach the NP proportions of one of the eleven occupation groups of Table 2.1, but in 120 MLH industries, were related to the equivalent NP proportions of a second occupation group and the correlation coefficient was calculated from the 120 pairs of NP proportions. In principle the correlation coefficient measures the strength of the relationship between two variables. If there is a tendency for high NP proportions of managers tend to be associated with high NP proportions of clerks, it will be around +0.6 to +0.9. If the opposite is true, that high proportions of managers tend to be associated with low proportions of clerks, then the correlation coefficient will be around -0.6 to -0.9.

112. All the correlation coefficients for the 55 pairs of occupation groups that can be obtained from the 11 occupation groups concerned have been calculated but Table 4.3 is restricted to those found to be statistically significant, together with those between each occupation group's proportion and the total NP proportion. Each figure gives the correlation coefficient between the occupations in the relevant row and column. To look at the succession of correlation coefficients between one occupation group and each of the other occupations it is necessary to look along the row until the diagonal is met, and then turn down the column.

Table 4.3 Intercorrelations between occupation groups (1)

	MAN	PRO	TYP	CLK	SCI	ENG	TEC	SAL	WHS	TRN	SER
MAN	1.00										
PRO	0.35	1.00									
TYP	0.56	0.38	1.00								
CLK	0.28	0.39	0.78	1.00							
SCI	0.23	0.30	0.47	0.37	1.00						
ENG			0.34	0.34		1.00					
TEC		0.25	0.34	0.40	0.25	0.65	1.00				
SAL	0.33		0.39	0.50	0.26			1.00			
WHS			0.29	0.45				0.24	1.00		
TRN		0.25		0.28	0.22	-0.22		0.41		1.00	
SER		0.30		0.30	0.52					0.48	1.00
ALL	0.44	0.43	0.78	0.87	0.59	0.35	0.47	0.62	0.32	0.50	0.45

Source : Census of Population, 1971.

Note : Values shown are significant at the one per cent level (with 118 degrees of freedom). Other values are omitted.

(1) This table uses the shorthand notation for occupation groups shown in Table 4.1.

113. The table may be interpreted in two ways; firstly, by looking at the size of the individual coefficients, secondly, by looking for the number of times any particular NP occupation group is significantly correlated with other occupation groups. In terms of size the main relationships, with the correlation coefficient (r), are : -

(i)	clerical workers with all NPs,	r = 0.87;
(ii)	typists/secretaries with all NPs,	r = 0.78;
(iii)	typists/secretaries with clerical workers,	r = 0.78;
(iv)	engineers and draughtsmen with computer and other technical workers,	r = 0.65;
(v)	sales workers with all NPs,	r = 0.62;
(vi)	scientists and technicians with all NPs,	r = 0.59;
(vii)	typists/secretaries with managers,	r = 0.56;
(viii)	scientists and technicians with service workers,	r = 0.52;
(ix)	transport workers with all NPs,	r = 0.50;
(x)	sales workers with clerical workers.	r = 0.50.

114. The interpretation of these relationships needs to be made with care; the existence of a statistical correlation is not necessarily an indication of a causal relationship. However it is intuitively satisfactory that typists and clerks are associated largely with the total NP proportion, with each other, and, in the case of typists, with managers. The latter may be deemed to be an example of hypothesis II; the number of typists depends upon the number of managers. The correlation between computer and other technical workers, and engineers and draughtsmen is probably also causal. The most surprising result is that between scientists and technicians, and service workers. This may be due to the scientists and technicians being associated with considerable capital equipment and special conditions that need maintenance and cleaning, and produce safety and security problems. In this case the correlation between the two occupation groups is the result of their mutual dependence upon an industry characteristic and not a consequence of any relationship between them.

115. Using the second approach of paragraph 113 the list below orders the occupation groups according to the number of times their correlation coefficients with other groups exceeds 0.34.

CLK	6	PRO	3	MAN	2	WHS	1
TYP	5	SCI	3	TEC	2	ENG	1
		SAL	3	TRN	2		
				SER	2		

Both clerical workers and typists/secretaries are strongly dependent upon the proportions in other NP occupation groups, with typists/secretaries being particularly dependent upon the numbers of managers and, to a lesser extent, scientists and technicians. On the other hand warehousemen, and engineers and draughtsmen, are not closely linked to any other occupation group. The seven occupation groups in the middle have certain links with other occupation groups, but these are not marked and very often are the reverse of the links with clerical workers and typists/ secretaries. Abstracting from the clerical/typist links, the only strong links remaining that have not been identified in paragraph 113 are those between professional workers and managers, and sales workers and transport workers.

116. It needs to be recognised that the previous analysis is deficient in that it only considers relationships between two NP occupation groups at a time. To bring out the relationships between one group and several other NP occupation groups simultaneously it is again necessary to use multiple regression analysis. On this basis the following results were obtained.

117. Typists/secretaries. The NP proportion of typists/secretaries is related largely to the NP proportions of managers, sales workers, professional workers, engineers and scientists, and some 65 % of the variation in the typists proportion can be explained in this way. Of the individual categories the 'other professional workers' were least important. Somewhat surprisingly, the NP proportions of sales workers and engineers and scientists are more important than those of managers when it comes to explaining industry variations in the NP proportions of typists/secretaries.

118. Clerical workers. The NP proportion of clerical workers is like that of typists/secretaries in that it is related to a similar set of occupations - managers, engineers, scientists, sales workers - and this is one reason why the correlation coefficient between the two occupation groups clerical workers and typists/secretaries is so high (cf. Table 4.3 where $r = 0.78$). In addition, clerical workers are related to both transport workers and warehousemen. The implication is that clerical workers are dependent upon three types of other occupations; the sales/stores/transport distribution sector; the engineering/scientific sector, and the managerial sector.

119. Computer and other technical workers. The NP proportion of computer and other technical workers is largely dependent upon those of engineers and draughtsmen, with no other occupation group being of great significance.

120. Managers. In this case multiple regression analysis proves to be unfruitful, showing that the NP proportion for managers depend upon those of salesmen, scientists, engineers and transport workers to only a limited extent, these occupations only accounting for less than 20 % of the total variation in the proportion of managers. It seems that managers are best considered as dependent upon industry characteristics, rather than upon other NP occupations.

Testing hypotheses I and II simultaneously

121. When considering the first hypothesis, in paragraphs 94-109 (that NP proportions depend upon a set of industry characteristics) it appeared that this was a relatively satisfactory way of explaining the NP proportions of engineers and draughtsmen, scientists and technicians, sales workers, managers, service workers and transport workers. It failed to cope satisfactorily with professional workers n.e.c. (not elsewhere classified) and warehousemen. The second hypothesis, that NP proportions for some occupations depend upon the proportions of other NP workers, was also fairly satisfactory in explaining the proportionate importance in total employment of dependent occupations such as typists/secretaries, clerical workers, and computer and other technical workers.

122. This leaves warehousemen and professional workers n.e.c. as the two occupation groups for which no satisfactory explanation has been found. It also leaves open to question the extent to which a combination of hypothesis I and II may explain the NP proportions for any other occupation group. This question has also been tackled using multiple regression methods, the most interesting results of which are reviewed in the following paragraphs. It should be noted that warehousemen and professional workers n.e.c. remain as the groups for whom statistical analysis at the industry level provides no reliable explanation.

123. Managers. In paragraph 102 the NP proportions of managers were shown to be dependent upon industry characteristics, whilst paragraph 120 indicated that they were only partially dependent upon other occupations. Analysis on the basis of both hypotheses somewhat increases the relative importance of other occupations, the most important occupation groups being computer and other technical workers,sales workers, professional workers and scientists. The most important industry characteristics are the average size of plant, productivity per P-worker, and expenditure on communications.

124. This result is satisfactory in that each of the seven variables are fairly distinct, and it is realistic in that everything is included. The task of managers is to manage, and you need more of them the more you increase the sales effort; indulge in R & D; emoloy professional workers, computer and other technical workers and scientists; the greater is operative productivity; and the more the expenditure on communications that is incurred. But for many of these relationships the causal connection is obscure. It is possible that industries may indulge in R & D, computer and other technical workers, and professional workers, simply because they employ a proportionately high number of managers, rather than need the managers to administer these activities and staff. The only variable that provides a clear causal relationship isthe average size of establishment; the larger the average establishment size in an industry, the smaller the proportion of managers in total employment in that industry.

125. Typists/secretaries. Although the NP proportion of typists/secretaries seems likely to depend largely upon the NP proportions of other occupations, the inclusion of industry characteristics appears to show that productivity, communications and the type of market also exert strong effects. In this case the meaning of the statistical relationship is unclear. Typists/secretaries are essentially a dependent occupation group and one must assume that the industry characteristics are working through other occupation groups.

126. Clerical workers. This occupation group is similar to typists/ secretaries but the inclusion of both industry characteristics and other occupation groups only serves to highlight the dependence of their proportionate size on industry characteristics. This is largely because the occupation groups with whom they are related - sales workers, computer and other technical workers, scientists, warehousemen and transport workers - are those directly related to the industry characteristics of markets and technology. The industry characteristics picked up directly by the equation are again those related to the volume of production (productivity and communications), with establishment size also playing a role.

Table 4.4 Summary of relationships between NP occupation groups, industry characteristics, and other NP occupation groups

NP occupation groups	Industry characteristics				NP occupation groups										
	Average size of establishment	Productivity	Nature of markets	Technology	SCI	ENG	TRN	WHS	SAL	PRO	TEC	SER	MAN	CLR	TYP
Scientists & technicians (SCI)	X			XXX											
Engineers & draughtsmen (ENG)	XX		XX	XXX											
Transport workers (TRN)		XXX	XX												
Warehousemen (WHS)	X	XX	X												
Sales workers (SAL)		XX													
Professional workers (PRO)		XXX													
Computer & other technicians (TEC)	XXX			X		XXX				X					
Service workers (SER)	XX		X	X	XX		XXX		XX						
Managers (MAN)	XXX	XXX			X	X			X	X					
Clerical workers (CLR)	X				X	XX	X	XX	XX						
Typists and secretaries (TYP)						XX			XX	X			XX		

Source : Census of Population, 1971. Census of Production, 1971. Input-Output Tables for the UK, 1971.

Key : the more crosses, the stronger the relationship.

127. Service workers. Although service workers appear to be related, via capital intensity and scientific workers, to a technological factor, they are also related to sales workers and transport workers, indicating a distribution link for which no intuitive explanation is apparent. They remain a somewhat mysterious category.

128. Computer and other technical workers. As one might expect, this group is closely associated with engineers and research, although the NP proportions of professional workers are also important, as is the average size of establishment.

Summary

129. This chapter has tried to establish the factors that determine why the NP proportion for any given NP occupation group varies between industries. It is based upon two principal hypotheses - that NP proportions may depend upon (i) individual industry characteristics, (ii) the proportions of other NP occupations in an industry. There is also the possibility that both hypotheses may be valid for any particular occupation group.

130. The results of testing these hypotheses are summarised subjectively in Table 4.4. There are six occupation groups that appear to be largely dependent upon industry characteristics. These are the groups confined to the top left-hand corner of the table : scientists and technicians, engineers and draughtsmen, transport workers, warehousemen, sales workers, and professional workers n.e.c. Of these the first two groups are largely dependent upon technological factors, such as expenditure on R & D, and capital per P-worker; the next three occupation groups are largely correlated with productivity and the type of markets served by the industry; the last category is professional workers, for which the analysis is relatively unsuccessful.

131. There follow three occupation groups - computer and other technicians, service workers and managers - that appear to be not only dependent upon industry characteristics, but for whom the NP proportions of other occupation groups are also of some significance. For these groups the most important industry characteristic appears to be the average size of establishment in the industry. Finally, there are two occupation groups, clerical workers and typists/secretaries, that are best considered as being occupations whose relative size, as a proportion of total industrial employment, is governed by the extent to which other NP occupation groups are represented in an industry's labour force.

CHAPTER 5

ACCOUNTING FOR REGIONAL VARIATIONS IN NPs

The importance of industrial structure

132. The aim of this chapter is to present a formal outline of the approach used in this report to account for regional variations in NP employment. The outline is brief but forms an important link between the previous chapters and those that follow. The theme of regional variations was introduced in Chapter 2, where the actual regional distributions of NPs were described. Chapter 3 then attempted to measure the importance of industrial structure in contributing to the regional disparities in NP employment. In Table 5.1 the effects of industrial structure are considered in three ways; in terms of the actual numbers of jobs, related to the overall regional disparity in NPs in each region, and related to the expected number of NPs in each region.

Table 5.1 The importance of industrial structure in accounting for regional disparities in NP employment in Great Britain, 1971.

Region	Total excess or deficit(1) (thousands)	Effect of industrial structure		
		Absolute numbers(2) (thousands)	As a per cent. of the total excess or deficit(3)	As a per cent. of expected NP(4)
	1	2	3	4
South East	+ 283.0	+ 41.0	+ 14.5	5.5
South West	+ 5.9	+ 1.8	+ 30.5	1.2
West Midlands	- 48.9	- 20.2	+ 41.3	5.3
East Midlands	- 38.9	- 22.9	+ 58.9	11.4
East Anglia	- 2.7	+ 3.9	-144.4	5.2
Yorkshire and Humberside	- 47.2	- 21.0	+ 44.5	7.7
North West	- 47.7	+ 7.1	- 14.9	1.6
Scotland	- 38.7	+ 5.5	- 14.2	2.1
Wales	- 29.8	- 2.1	+ 7.0	1.7
North	- 33.1	+ 7.0	- 20.6	3.9

Source : Census of Population, 1971.

1) 'Actual' minus 'national' employment in Table 3.1.
2) 'Expected' minus 'national' employment, i.e. column 5 of Table 3.1.
3) Column 2 divided by column 1. A positive value in column 3 indicates that the effect of industrial structure acts in the same direction as the total disparity of column 1. A negative value indicates that the industrial structure acts in a contrary direction.
4) Column 2 divided by column 2 of Table 3.1.

133. There are three regions in which industrial structure plays an important role relative to the overall deficit or excess in NPs. Of these three, Yorkshire and Humberside and the East Midlands are Britain's major textile producing regions, whereas the West Midlands is heavily dominated by mechanical engineering and vehicle industries with below average NP proportions. In the South West the effect of industrial structure is reasonably large in proportional terms but, as with East Anglia, the absolute magnitudes are very small. In all other regions industrial structure plays little or no role in accounting for the employment disparities in proportional terms, although in the South East the absolute number of jobs involved is fairly large (41,000). Because of the small relative importance of the effect of industrial structure in virtually all regions, except the Midlands and Yorkshire & Humberside, the residual employment, after taking structure into account, is almost as large as or, in some cases, larger than the total excess or deficit indicated in Table 5.1. This residual is equivalent to 'actual' minus 'expected' numbers. It is given in column 4 of Table 3.1 and is also reproduced in column 1 of Table 5.2 below (1).

134. The industrial structure factor has been singled out at this early stage in the discussion because as far as is known it is the only structural factor of any real importance. In this context the term structural is taken to refer to some broad characteristic of industry in the regions, such as the mix of products, relative size structures of factories, or the processes of production (e.g. mass production). The important common factor in each case is that these structural factors are relatively static in the short or medium term and there is little scope for devising policies that may ameliorate the problems caused by these factors, other than in the long term.

The size of non-structural regional disparities in NPs

135. The remaining 'residual' variations in NP employment, after taking account of industrial structure, are reproduced in Tables 5.2 and 5.3 in a form that is more convenient than that used in Chapter 3. In both tables the regions are grouped into three categories according to the relative extent by which actual employment exceeds that expected on the basis of their actual industrial structure. The South East and South West regions have more NP employment than expected, as noted in Chapter 3, although the degree of excess in the South East far exceeds that of the South West. An intermediate category, including most of the rest of England, has an NP employment deficit amounting to between an eighth and a twelfth of the expected employment. Those regions which are wholly Development Areas constitute the final category, having a deficit close to twenty per cent. in each case.

(1) For definitions of the terms 'actual', 'expected' and 'national', and the division of the difference between the actual and national figures into an industrial structure effect and a residual see paragraphs 54 and 55.

Table 5.2 Residual variations in NP employment by region, 1971

Region	Actual - Expected (1) (thousands) 1	Column 1 as a per cent. of expected NPs (2) 2
South East	+ 242.0	+ 32.7
South West	+ 4.1	+ 2.8
West Midlands	- 28.7	- 7.5
East Midlands	- 16.0	- 8.0
East Anglia	- 6.6	- 8.8
Yorkshire and Humberside	- 27.2	- 9.9
North West	- 54.8	- 12.4
Scotland	- 44.2	- 17.0
Wales	- 27.7	- 22.1
North	- 40.9	- 22.9

Source : Census of Population, 1971.

1) Column 4 of Table 3.1.

2) $\frac{\text{(Actual - Expected)}}{\text{Expected}}$ x 100, or column 1 as a per cent. of expected numbers (column 2 of Table 3.1).

136. The percentage residuals for the individual occupation categories are described in Table 5.3, from which two points are immediately apparent. Firstly, the proportional disparities are greatest in the managerial and professional, and clerical, occupation categories, and they are least in the sales and distribution workers, and service worker categories. Secondly, the ordering of the regions based on the percentage disparities in total NP employment, given in Table 5.2, is closely reflected by that of the managerial and professional workers, and the clerical workers. In the scientific and technical worker category the South West has much more similarity to the South East than it has in other occupations, whereas Yorkshire and Humberside joins the development regions with the larger proportional deficits. Except for the clear dominance of the South East, Table 5.3 shows less systematic patterns in the cases of sales and distribution workers and service workers.

137. Although the percentage excesses and deficits used in Tables 5.1 to 5.3 are a useful way of indicating the importance of the effects of industrial structure and the residual, most of this report is more concerned with the absolute magnitudes given in column 2 of Table 5.1 and column 1 of Table 5.2. The aim of the report is to demonstrate how individual factors contribute to the overall excess or deficit in terms of the numbers of jobs. The relative importance of each factor will only be considered in passing.

Table 5.3 'Residual' variations (1) in NPs by region and occupation category, 1971

Region	Managerial and professional	Clerical	Scientific and technical	Sales and distribution	Service
South East	+ 48.1	+ 37.3	+ 32.7	+ 22.0	+ 11.0
South West	- 4.4	- 3.5	+ 26.8	+ 9.7	- 2.9
West Midlands	- 6.4	- 7.4	- 14.1	- 2.7	- 6.4
East Midlands	- 12.6	- 9.9	- 2.3	- 1.8	- 13.2
East Anglia	- 5.0	- 6.5	- 11.5	- 10.0	- 13.8
Yorkshire and Humberside	- 13.2	- 10.1	- 21.5	- 3.3	- 0.2
North West	- 16.9	- 14.9	- 8.0	- 13.7	+ 3.0
Scotland	- 29.5	- 17.9	- 18.6	- 12.1	- 4.4
Wales	- 35.8	- 28.7	- 26.5	- 7.7	- 0.3
North	- 36.6	- 26.7	- 22.1	- 18.9	- 3.7

Source : Census of Population, 1971.

1) ((Actual - Expected)/(Expected)) x 100, or the percentage by which actual NPs in a given occupation category in a region differ from the number of NPs expected, taking industrial composition into account.

The role of single and multi-region organisations

138. The remaining non-structural factors that dominate most of the rest of this report, and that are considered to account for the residual disparities in NPs, are connected with the organisation of industry in two senses. The first sense is that of the internal structure of corporations and organisations (1), involving such considerations as the location of head offices and the status of factories in the hierarchy of corporate control. The second sense is that of productivity, which was shown in Chapter 4 to be correlated with NP proportions in industries. Although productivity is an important factor which distinguishes individual industries and is therefore intimately bound up with industrial structure, future discussions in this text only consider productivity variations that are independent of industry differences, or, in other words, productivity variations between factories in the same industry.

139. It seems that the internal structure of corporations and organisations is a much more important influence on NP proportions than is productivity and one particular structural aspect is taken to be fundamental to the approach of this study. This is the separation of those organisations or corporations that control sites in only one region from those whose sites straddle two or more regions. This division is a fundamental one simply because multi-region corporations or organisations have the option of concentrating their NP employees between regions in a way that does not

(1) For definitions of the terms used see paragraphs (xiii) - (xx) in the Foreword.

reflect the regional distribution of their production workers. A common practice, for example, is to locate some NP-workers away from any production site in 'detached' head offices or research and development laboratories. Single-region corporations or organisations on the other hand cannot concentrate NPs in such a way as to create regional disparities, because by definition all of their employment remains within a single region.

140. In this study attention if normally focussed on organisations, which are defined as either whole corporations (if these are relatively small) or the largest sub-unit of a large corporation, such as a division or large subsidiary company. Single-region organisations are therefore defined as being either corporations with all their sites located in one region, or divisions or subsidiary companies of a large corporation which have all their sites in one region. Multi-region organisations are also whole corporations, divisions or subsidiary companies, but in this case the organisation has sites in two or more regions.

141. Focussing attention on organisations rather than corporations appears to be somewhat artificial at first sight, but on reflection seems to be one of the few meaningful ways to unravel the effects of the huge corporations whose complexity is frequently much greater than might initially be imagined. Multi-region corporations include virtually all the country's largest corporations from ICI (Imperial Chemical Industries Limited) and GEC (General Electric Company Limited) down to those of a relatively modest size. Within most of these corporations, and especially the larger ones, there is usually more than one level of corporate control. Very large corporations commonly have three levels. The highest is the corporate level wherein NPs serve (or direct) the corporation as a whole rather than any defined part of it. The next level down typically consists of divisions of branch plants or small subsidiary companies, and within these divisions there will be some staff whose function is directed at the whole division rather than any part of it. Large subsidiary companies, such as Birds Eye Foods within Unilever Limited or Wiggins Teape within B.A.T. Industries Limited may be thought of as being equivalent to divisions. Finally there may be subsidiaries of subsidiaries or subsidiaries within divisions, and once again some staff will have company-wide responsibilities at that level.

142. The significant aspect of this hierarchical arrangement is that regional disparities in NPs relative to the distribution of operatives can arise at all levels in the hierarchy. As an example, a corporation may have detached head offices at all levels in the hierarchy, i.e. there will be a DHO at the corporate level, a detached divisional head office, and DHOs for subsidiary companies within divisions. Any attempt to analyse regional disparities is thus immediately forced to take sub-corporate organisations into account. The disparities identified in each organisation are mutually exclusive and non-overlapping, although they may in principle be summed to obtain a total disparity for the whole corporation.

143. In this study corporate functions and staff, and the regional disparities that they generate, are dealt with in a separate chapter on corporate head offices and research and development laboratories (Chapter 8). Disparities arising from sub-corporate (multi-regional) organisations are considered separately (Chapter 7). The strategy can be summarised as follows :

Total residual disparities in NP employment	Single-region organisations	Corporate level(DHOs and research laboratories)
	Multi-region organisations	Sub-corporate level

144. The total disparities have been disaggregated into these components because it is hypothesised that different types of factor will cause regional disparities in each case. Notice that, for each component, allowance is made for regional differences in industrial structure. This is because variations in industrial structure would otherwise cloud the interpretation put upon the disparities produced by each component. The sum of the separate industrial effects is the total effect of industrial structure already discussed in Chapter 3 and in the opening paragraphs of this chapter.

Data for single-region and multi-region organisations

145. Having outlined in principle the approach to be used, the final problem lies in the measurement of the effects of the various components. There is no published data which gives NP employment in single and multi-region organisations, but the research team were fortunate in obtaining unpublished figures compiled by the Business Statistics for their internal use (1). These allow the nearest approximation to single- and multi-region organisation figures that is likely to be made available in the foreseeable future. This data relates to ATCs, not NPs, and is drawn from the returns made by companies to the Business Statistics Office for the Census of Production. Although the BSO prefers separate returns to be made for each site, multi-plant firms often send in returns which account for several sites. In 1971 such multi-site returns accounted for half of all employment in manufacturing and, in particular, multi-site returns that straddled two or more regions accounted for about 40 % of total employment (2)

146. The BSO data can therefore be used to identify two categories of respondents :

(i) multi-site returns for plants located in two or more regions - these are equated with multi-region organisations in what follows;

(ii) single-site returns and multi-site returns for plants located in only one region - these are equated with single-region organisations in what follows.

(1)The research team are particularly grateful to Dr. Mitchell of the Business Statistics Office for allowing us to use these figures, and for his careful description of the basis of their collection.
(2)See the appendix to this chapter and paragraphs 176 and 177.

The data acquired from the BSO by the research team related to single-region returns. Estimates for multi-region organisations were obtained by subtracting the single-region data from total employment.

147. The multi-site returns that straddle two or more regions can only come from multi-region organisations. Although they may not include all multi-region organisations it is likely that they include a large majority of them. At the very least the multi-region returns constitute a majority sample of multi-region organisations and are thus unique in this respect. On the other hand the single-region returns can include responses from the following types of organisations :

(i) single-region corporations;
(ii) single-region subsidiary companies of multi-region corporations;
(iii) single-region divisions of multi-region corporations;
(iv) individual plants which form part of wider multi-region organisations or corporations.

For reasons outlined in the appendix to this chapter it is felt that single-region corporations probably contribute half of the employment in the single-region returns while subsidiary companies account for most of the rest. Although some individual plants from multi-region organisations may be included within the single-region returns it is likely that the majority of these returns consists of true single-region organisations.

148. The procedure described above only relates to returns made for regions in England. For Wales and Scotland the situation differs. The Census of Production form carries an instruction that companies should send separate information for any plants located in either Scotland or Wales, i.e. multi-site returns that include plants in Scotland or Wales are not allowed. It is obvious from the figures that some multi-region corporations or organisations comply with this instruction but a large number ignore it. The result is that figures for single-region organisations for Scotland and Wales exist and are relatively high compared with similar data for the English regions, whereas the estimates for multi-region organisations are artifically low (1). Since the data for Scotland and Wales is not strictly comparable with that for the English regions subsequent tables based on these figures separate those two countries from the English regions. Finally, minor technical adjustements have been made and these are described in the appendix to this chapter.

(1) Attempts have been made to estimate employment in multi-region organisations in Scotland and Wales, taking into account the volume of postwar industrial movement into those countries, using Department of Industry figures for 1945-66 and 1966-71 separately, and taking the North and North West regions as a benchmark. On this basis employment in multi-region organisations in Wales and Scotland comprise 46.1 % and 44 % of total employment in manufacturing industry, respectively. No attempt has been made to allow for the relatively high proportion of movement into Scotland that has come from outside the United Kingdom and which is likely to be single-region in a UK context.

Employment in multi-region and single-region organisations

149. Total and ATC employment in single and multi-region organisations is given in Table 5.4, from which it can be seen that the relative importance of multi-region organisations is greatest in the North and North West (1), followed by the South East. It is possible that this pattern reflects the geography of post-war industrial movement, with Development Areas acquiring a considerable number of plants belonging to large multi-region organisations. The relatively low proportion of 'multi-region' employment in East Anglia is partly a result of its industrial structure being biased away from industries that favour multi-site returns, and partly because industrial movement into the region has been largely in the form of overspill from London. This overspill has included a large proportion of transfers of complete firms, as opposed to moves of branch plants.

Table 5.4 Employment in multi-region and single-region organisations (1), 1971

Region	Employment in thousands				Total employment as a per cent. of total regional employment (2)	
	Multi-region organisations		Single-region organisations		Multi-region organisations	Single-region organisations
	Total	ATC	Total	ATC		
South East	888.9	360.6	1197.5	381.0	42.6	57.4
South West	145.7	39.3	241.0	70.4	37.7	62.3
West Midlands	412.5	96.1	672.4	158.7	38.0	62.0
East Midlands	227.8	48.9	350.3	81.1	39.4	60.6
East Anglia	63.9	15.8	133.9	33.0	32.4	67.6
Yorkshire and Humberside	278.0	55.9	486.0	110.1	36.4	63.6
North West	483.3	102.2	661.8	168.7	42.2	57.8
Scotland	190.9	39.6	456.1	104.9	29.5	70.5
Wales	75.4	4.2	245.6	60.1	23.5	76.5
North	204.4	34.9	238.9	57.6	46.1	53.9

Source : Unpublished Census of Production data, 1971.

1) For descriptions of the data, their sources and interpretation, see paragraphs 145-148 and the appendix to this chapter.

2) Total regional employment is defined as the sum of the total employment in multi-region organisations and the total employment in single-region organisations.

(1) Plus Scotland and Wales, if the estimates in the footnote to para. 148 are accepted.

Regional ATC employment disparities in single and multi-region organisations

150. Using the data described above it is possible to estimate the degree to which multi-region organisations and single-region organisations each contribute to regional disparities in non-production employment. Since the data source is in this case the Census of Production, the analysis is necessarily confined to ATCs and excludes the manual NP occupations, such as service workers. However, service workers exhibit relatively weak regional disparities (Table 5.3) and ATCs account for about 90 % of the total regional disparities in NPs.

151. Since the data available for single and multi-region organisations is in the same form as that for total employment, the calculation of regional disparities in ATCs at this disaggregated level follows exactly that described in paragraphs 53-55 for total employment. That is, actual, expected and national estimates of ATCs are first calculated, using the SIC Order level of disaggregation, and regional disparities in ATCs for each type of organisation are obtained after making allowance for industrial structure. These ATC disparities are displayed in Table 5.5 as percentages of the expected employment by each type of organisation in each region. The table shows immediately that the regional disparities have a similar pattern for both single and multi-region organisations, but that the differences between regions are much greater in the latter case.

Table 5.5 Residual disparities in ATC employment in single and multi-region organisations, 1971

per cent of expected employment(1)

Region	Single-region organisations	Multi-region organisations
South East	+ 20.1	+ 79.7
South West	+ 15.6	+ 2.3
West Midlands	- 11.5	- 20.1
East Midlands	- 3.8	- 18.4
East Anglia	- 8.3	- 12.3
Yorkshire and Humberside	- 9.3	- 21.8
North West	- 1.8	- 28.1
Scotland	- 12.3	- 29.5
Wales	- 8.6	- 82.8
North	- 14.3	- 44.7

Source : Unpublished Census of Production data, 1971.

1) ((Actual - Expected)/(Expected)) x 100.

152. For single-region organisations the ATC disparities show clear excesses in both the South East and the South West. All the remaining regions have relative deficits in ATCs but the pattern is not quite the familiar one of the deficits increasing in size with distance from London. The East Midlands and the North West have very small deficits while the rest of the deficit regions have deficiencies in ATCs to about 10 % of their expected employment. The deficits for Scotland and Wales are probably over-estimated because of the way in which the original data was obtained (1).

153. The ATC employment disparities within multi-region organisations, again after making allowance for regional differences in industrial structure, are much larger than those within single-region corporations. The South East has almost 80 % more ATC employment than expected while the North has 45 % less than expected and all the other regions have deficits of 10 - 30 % (2). The pattern of the residual is the familiar one, with an excess of ATC jobs in the South East, a small excess in the South West, and deficits that increase in size with distance from London. These disparities are likely to be the result of the centralisation of ATCs at head offices and their aggregation at other sites within organisations. This proposition is investigated further in the next three chapters and in Chapter 9 it is given a quantitative form.

The components of regional disparities in ATCs

154. From the previous sections it can be seen that the regional pattern of ATC employment is dominated by the way in which multi-region organisations or corporations locate their white-collar employees. This conclusion can be extended by measuring the quantitative contribution made by each component - industrial structure, single-region organisations, multi-region organisations - to the total disparity in ATC employment, defined as 'actual' employment minus 'national employment (3). This total disparity is given in the first column of Table 5.6, using Census of Production figures, together with an estimate of the relative importance of each of the three components.

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(1) See paragraph 148.

(2) The figure for Wales is not comparable with those of the other regions. It is probably very large because only the very highly-centralised organisations sent in multi-site returns, and the branch plants controlled by these organisations have very few ATCs. See paragraph 148.

(3) c.f. paragraphs 54/5.

Table 5.6 The components of regional disparities in ATC employment, 1971

Region	Total disparity in ATC employment (1) (thousands)	The results of : regional differences in industrial structure (2) %	single-region organisations %	multi-region organisations %
South East	+ 257.4	13	25	62
South West	+ 10.3	14	74	12
West Midlands	- 43.3	- 4	48	56
East Midlands	- 30.9	54	10	36
East Anglia	- 4.7	- 11	64	47
Yorkshire and Humberside	- 48.7	45	23	32
North West	- 42.9	0	7	93
Scotland	- 35.9	13	41	46
Wales	- 27.9	7	21	72
North	- 33.4	- 13	29	84

Source : Census of Production, 1971, including unpublished data.

1) 'Actual' ATC employment minus 'national' ATC employment. See paragraphs 54/5.

2) 'Expected' ATC employment minus 'national' ATC employment. See paragraphs 54/5. A minus sign indicates that the effect of industrial structure acts in the opposite direction to the total disparity.

155. The impact of industrial structure has been outlined previously (1), although it should be noted that the change of data to an ATC basis alters the conclusions in two cases. Scotland appears to have a slightly unfavourable industrial structure in Table 5.6 whereas it was considered to be slightly favourable in the NP analysis of Table 5.1. A more important change occurs in the case of the West Midlands for whom the industrial structure effect in Table 5.6 is very slightly favourable to ATCs, whereas in Table 5.1 it was particularly unfavourable, to the extent of 20,000 jobs. Other than in these two cases the general pattern is unaltered, with industrial structure accounting for a significant part of the total disparity in ATCs in only the two 'textile' regions of the East Midlands and Yorkshire and Humberside.

156. The impact of multi-region organisations is greater than that of single-region organisations in all regions except East Anglia and the South West, for whom the total disparity is in any case very small. The multi-region organisations are particularly important in the North, North West and Wales; the three regions which, with Scotland, have been the main recipients of post-war industrial movement. It is very likely that both have higher proportions of their total employment in manufacturing industry in branch plants than do other regions, and this may account for the large ATC employment deficits. The same process that leads to low

(1) e.g. paragraph 133

ATC proportions in branch plants also leads to high proportions in head offices, and the effects of this can be seen in the major role played by multi-region organisations in the South East.

157. Leaving aside East Anglia and the South West, with their small total disparities, the regions in which single-region organisations make their most significant impact are the West Midlands and Scotland. However, they make an important impact everywhere except in the North West and the East Midlands, and in all cases they reinforce the pattern created by the multi-region organisations alone.

158. The influence on the regional distribution of ATC employment can not be seen to be relatively complicated. An intuitive assessment of them would probably give most weight to the process by which white-collar jobs are concentrated in head offices, mostly in the South East, at the expense of branch plants, many of which are in the Development Areas. However, since this process must operate only within the multi-region organisations, the factors involved are shown by Table 5.6 to be of lesser importance in at least half the regions, including Scotland (1). Moreover, it is by no means obvious that this process even explains all of the regional disparities within multi-region organisations, since other explanations such as variations in regional productivity levels, the supply of NP services, or the average size of sites,could also cause ATC employment variations within multi-region organisations as well as single-region ones. Even so, the process of centralisation and aggregation is likely to be a major causal factor in regional employment disparities.

159. In conclusion, three factors are proposed as possible causes of regional disparities in ATC (or NP) employment. These are :

(i) the effects of regional variations in industrial structure;
(ii) consistent regional variations due to single-region organisations;
(iii) the effects of multi-region organisations.

Of these the last is the most important factor in those regions with the greatest excesses or deficits of NP employment. No analysis has been presented to account for the mechanism by which the latter two factors influence NP levels, although various statements have been made about the centralisation of NPs in multi-region organisations or corporations, with their concentration at head offices, and the intriguing correlation of NP proportions with regional productivity. The next three chapters consider NPs in general, starting with their numbers and proportions at individual sites (Chapter 6), then considering them in organisations and corporations (Chapter 7), and finally reviewing the role of corporate head offices and research laboratories (Chapter 8).

(1) It is possible that a certain amount of the variations in ATC employment in single-region organisations is the result of particular effects in the large, single-region, divisions or subsidiaries of multi-region corporations that are included in the single-region data (c.f. paragraph 147). The somewhat anomalous position of Scotland may be attributable to the data difficulties connected with Scotland and Wales, see paragraph 148 and its footnote.

APPENDIX TO CHAPTER 5

DATA ON SINGLE-REGION ORGANISATIONS

160. In principle the returns from companies responding to the Census of Production relate to individual sites. In practice many firms send in aggregated data covering several sites because their internal accounting and stockholding systems do not distinguish the individual sites. In 1971 multi-site returns accounted for half the employment in manufacturing industry. Most of these multi-site returns include sites in two or more regions, but a proportion of them are confined to only one region. Thus there are two types of Census returns that provide data that is confined to one region : (i) single-site returns and (ii) multi-site returns covering several sites in one region. These 'single-region' returns, as they are called in this report, accounted for 61 % of employment in manufacturing industry as measured by the Census of Production. The 'multi-region' statistics used in the report have been obtained by subtracting the single-region returns from the total employment in each region and industry. The important questions therefore relate to the single-region data.

161. There are two problems involved in using this data. The first is one of knowing how closely the single-region returns correspond to single-region organisations (1), the second is a question of accuracy. On the question of interpretation there are a number of possible types of single-region respondent : (a) the multi-site returns that are restricted to a single region must come from whole organisations, which may include (i) single-region corporations, (ii) single-region divisions of either single or multi-region corporations, (iii) single-region subsidiary companies of other single or multi-region corporations; (b) the single-site returns must relate to individual plants but these may form part of either a single or a multi-region organisation.

162. The three categories under (a) all fall within the definition of single-region organisations because they are all large sub-units within one region, but the individual plants in (b) do not necessarily belong in the single-region category because it is possible that they include individual plants or subsidiaries that properly belong to multi-region organisations. The problem is that the number of individual plants belonging to multi-region organisations included in the single-region returns (if any) is not known. However, from the Census of Production (Summary Table 8, 1971) it is known that corporations that employ 1000 people or less account, in aggregate, for over 2.6 million employees. Furthermore, the work involved in arranging the Organisation Survey included extensive searching through company records and trade directories etc., and on this evidence it can be claimed that most of these smaller corporations are single-region corporations. Some smaller corporations are multi-regional but these may be assumed to balance out with the few larger ones that are single-region and not multi-region. The figure of 2.6 million employees can therefore be assumed to relate to single-region corporations, and this accounts for over half of the employment included in the single-region returns.

(1) For definitions of the terms used see the Foreword, paragraphs (xiii) - (xx).

163. The remaining employment in the single-region returns is either in whole divisions or major subsidiaries of single or multi-region corporations, or in individual plants. Again, on the basis of the work needed to carry out the Organisation Survey, plus the way in which individual organisations arranged to complete the survey questionnaires for their sites, it can be claimed that :

(i) most corporations hold employment records at the subsidiary company or divisional level and find it most convenient to reply for these subsidiaries or divisions rather than for individual sites;

(ii) most operational divisions (i.e. those with more than a nominal number of division staff) are large multi-region organisations.

164. On the basis of this evidence it seems that the most likely originators of returns to the Census of Production are individual subsidiary companies, whether in a nominal division or not, or divisions when such divisions consist of a number of branch plants rather than a number of subsidiary companies. Support for these assumptions can be gained from the Census of Production (Summary Table II, 1971) which shows that the 100 largest corporations sent in an average of 34 returns each (1). This number is too large to consist wholly of divisions, and too small to consist only of individual plants. It could include a mixture of divisions, subsidiary companies and plants, but the number is of the right order of magnitude to agree with the assumption that the majority of the responses come from subsidiary companies or operating divisions. Thus, if half the employment in single-region returns comes from single-region corporations (paragraph 162), most of the rest must come from single-region subsidiary companies belonging to large corporations, whether they are included in some nominal division or not, and most of the rest will come from just a few, single-region, operating divisions. Thus the scope for there being a substantial number of individual plants belonging to multi-region organisations, but included in the single-region returns, is limited. On the other hand, most of the multi-site returns are likely to come from operating divisions that are large, multi-region organisations.

165. The second question of paragraph 161, on the accuracy of the data, involves rather more clear-cut considerations. It must be first pointed out that the figures for ATC employment in each region that are presented in the Census of Production involve a significant degree of estimation. The multi-site returns to the census include the total employment at each individual site covered by each return, but not the ATC employment, which is only provided for the aggregate of the individual sites in each return. The Business Statistics Office then estimates ATC employment at each site by assuming that the ATC proportion for the whole return applies generally at each individual site.

(1) The term 'establishment' used in the Census of Production means the same as the words 'response' or 'return' in this report.

166. The work on the Organisation and Head Office Survey indicates that this assumption, although simple and convenient to apply, is almost certainly wrong. The tendency is for ATCs to congregate at certain sites, particularly head office and research sites, with considerably higher ATC proportions in the South East and lower ones elsewhere, especially in the Development Areas. This view is supported by a comparison of the Census of Production figures for 1971 when those of the Census of Population (Table A1), using a classification of NP occupations that matched the Census of Production definition of ATCs as closely as possible.

167. Table A1 shows that the Census of Population estimate for total manufacturing employment in 1971 is about 500,000 greater than that of the Census of Production. This is thought by the Business Statistics Office to be due to the greater coverage of very small factories and fringe trades by the Census of Population. On the other hand, the figures for overall ATC employment from the two sources agree very closely in total, but not in their regional distribution. The Census of Production figure for the South East is 100,000 below that of the Census of Population, but the Census of Production figures are higher than those of the Census of Population in every other region (1). This pattern of relative under-estimation in the South East and over-estimation elsewhere is exactly that predicted in the previous paragraph.

Table A1 A comparison of data sources for ATC and total employment in manufacturing industry in Great Britain, 1971

thousands

	Total employment from the :		ATC employment from the :	
	Census of Production	Census of Population	Census of Production	Census of Population
South East	2,086,4	2,293.9	649.1	751.0
South West	386.7	420.8	113.8	111.1
West Midlands	1,084.9	1,115.0	259.8	258.0
East Midlands	578.0	604.8	139.3	131.6
East Anglia	197.8	201.5	52.7	49.5
Yorkshire and Humberside	764.0	802.1	173.4	168.2
North West	1,145.1	1,206.2	293.2	274.4
Scotland	647.0	693.8	154.5	146.3
Wales	321.1	337.3	78.1	65.1
North	443.1	460.5	109.1	93.7
Great Britain	7,654.1	8,135.8	2,023.0	2,048.9

Source : Census of Production, 1971, and Census of Population, 1971.

(1) The Census of Population figures used throughout this report relate to place of work, not place of residence.

168. Because it seems likely that the Census of Population estimates of ATC employment are the more accurate, these estimates have been adopted in Chapter 5, although for the purpose of accounting for the total disparity in ATCs they have been multiplied by 2023.0/2048.9 (= 0.987) to ensure that they sum to the Census of Production estimate for total ATC employment. Since the hypothesis of paragraph 166 is that the relative inaccuracy of the Census of Production data arises largely due to the estimating procedure used for multi-site returns it has been assumed that the ATC figures in the single-region returns are accurate and all the adjustments are made to the multi-region returns.

169. The calculation of 'expected' employment, allowing for industrial structure, requires one final minor point of explanation. For total employment the expected figures were initially calculated using the original (unamended) Census of Production figures. The results were then multiplied by the ratio of the amended to the unamended ATC employment. This process was also used in the calculation of expected employment in multi-region organisations, because all the amendments were presumed to relate to the multi-region returns and not the single-region ones, as explained above.

CHAPTER 6

NON-PRODUCTION WORKERS AT INDIVIDUAL SITES

170. In this chapter the numbers or proportionate importance of NPs at individual sites are examined in three ways. The first part of the chapter tries to assess the extent to which NPs are present at all at production sites, and the factory sizes at which various NP occupations are introduced. A second section then considers variations in average NP proportions with increasing factory size and then looks at the variations in NP proportions produced by other characteristics, such as the organisational status of the factory or its type of owner (1). Finally, the implications of regional variations in the average size of establishment are examined and it is concluded that they can have only a modest effect on the figures in Table 5.6. Much of the chapter is based upon the special surveys undertaken by the research team, especially the Site Survey and the Organisation Study (1).

The occurence of NPs at sites

171. Both the Site Survey and the Organisation Survey obtained data on individual locations. The Site Survey has the advantage that it produced a larger number of responses but suffers from the disadvantage of the restricted number of NP occupations for which information was requested, and from a sample that was heavily weighted towards firms that had moved. The Organisation Survey produced fewer responses from a more limited range of multi-region organisations, but covered a much wider range of NP functions, not occupations.

172. Table 6.1 is restricted to respondents to the Site Survey who claimed that their company had no other operating site. These single-site firms have been divided into those that are independent and those that are subsidiary to some larger organisations. In either case it can be seen that the typical small company of up to 25 employees only employs a general manager and clerical staff. At around the 25-49 size group a proportion of sites introduce some specialist activities, such as technical workers,salesmen, transport workers and warehousemen/ storekeepers, with the addition of specialist managers in the case of independent firms. It is not until sites have reached the 100+ size group that a full range of NP occupations can be said to be employed.

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(1) For descriptions of the surveys see the Foreword, paragragraphs (xiii) - (xi), and for definitions of the terms used see the Foreword, paragraphs (xiii) - (xx).

Table 6.1 The proportion of single-site firms that employ given NP occupations, 1974

Per cent of firms in given employment size-groups

Occupation	Independent firms					Subsidiaries of UK firms				
	Employment size groups (1)									
	0-24	25-49	50-99	100-199	200-349	0-24	25-49	50-99	100-199	200-349
General managers	74	85	89	77	100	93	89	87	89	92
Specialist managers	16	42	55	87	85	21	20	64	77	92
Accountants	19	27	57	79	92	29	29	71	78	85
Clerical and secretarial workers	86	92	99	100	100	100	100	97	100	96
Technican workers	19	37	46	77	100	21	36	70	78	90
Computer operators	-	4	6	15	46	-	2	4	14	23
Sales workers	26	40	60	79	100	29	38	64	62	77
Transport workers	29	40	53	82	85	14	40	62	71	75
Warehousemen and storekeepers	19	44	68	95	100	29	47	78	92	100
No. of observations	58	84	94	39	13	14	45	69	65	52

Source : Site Survey.

(1) Computer operators reach 100 % in size-group 500-749 employees for independent firms and 1000-14999 employees for subsidiaries of UK firms.

173. Comparison of the independent and subsidiary companies is a little difficult because of the different industrial compositions of the responses to the survey. On the whole the independent companies were small and concentrated in mechanical engineering, whereas the subsidiaries were more widespread in both size and industrial coverage. It is fairly clear that the larger subsidiaries make less use of computer operators, sales and transport workers, than the independent firms, probably because of their use of the facilities provided by their parent corporations. On the other hand there seems to be little difference between the two types of firm in their introduction of NP occupations in the smaller size groups.

174. Table 6.2 is taken from the Organisation Survey. It is based on a given set of NP functions rather than occupations, and has been obtained completely independently from the Site Survey, but corroborates the results for single-site subsidiaries in almost every detail. The main point of difference between Tables 6.1 and 6.2 is that some functions, such as the product design, research and development, market research etc., and sales, start to disappear as the size of factory increases. This is because large factories that do not contain a head office are likely to belong to large organisations, and these particular functions have been taken from them and concentrated in detached head offices, sales offices or R & D laboratories. In this respect Table 6.2 is of interest because it indicates the functions that branch factories lack,

in particular public relations, data processing, legal etc., product design, R & D, and most of the sales and marketing functions.

175. From Tables 6.1 and 6.2 it appears that factories include an increasingly wide variety of NP activities as their size increases. This does not necessarily mean that the relative number of NPs increases with increasing factory size since so far only the occurrence of activities has been considered, not the numbers of people employed in each one. This is the subject of the next section.

Average NP proportions for increasing factory size

176. The obvious data to use of ascertaining relationships between NPs and factory size is the Census of Production. Unfortunately, since 1968 the establishment in the Census of Production has been defined as 'the smallest unit which can provide the information sought'. Because of the spread of computers and integrated accounting systems such establishments may now comprise more than one factory unit in more than one region. In recent years establishments covering local units in two or more regions account for one third of total employment in UK manufacturing industry (1).

177. It follows that the use of census-based establishment information for analysing average NP proportions is suspect. Nevertheless, Figure 6.1 uses census data to examine NP proportions by industry and size of establishment, selecting the data for 1968 as a period when the use of aggregated returns was less common than now. The main feature of the figure is the rise in ATC proportions with increasing establishment size, with some tendency to stabilisation at the largest sites in certain industries.

178. To try and avoid the difficulties of the census data the research team acquired a considerable amount of material from Industrial Training Boards. This is less subject to the problems of defining an establishment and it also indicates that in industries that are narrowly defined, so that the effects of changing industrial composition are limited, there is still a general tendency for the NP proportion to increase with size of establishment. But in many cases the NP proportion tends to become stable after a given size-group, and it may then decline. In very few industries does the NP proportion decline steadily with size.

179. The reasons for these trends can be found by looking at individual occupations. A review of the Training Board statistics and the three surveys carried out by the research team shows that the individual occupation groups behave in the following manner :

(i) Managers The average NP proportion of managers has much the clearest trend, declining with increases in average factory size in almost all industries.

(1)M.C. Fessey. "Establishment-Based Research and the Business Statistics Office" in Urban and Regional Studies Discussion Paper No. 22, University of Glasgow, December 1976.

Table 6.2 The proportions of non-head office sites that include given non-manufacturing activities, 1975/76

Per cent of sites in given employment size groups

Department or function (1)	Employment size groups							
	0-24	25-49	50-99	100-199	200-349	350-749	750-1499	1500 plus
1. General managers (including assistants and secretaries)	80	96	91	86	91	94	80	84
2. Public relations and information	-	4	-	5	5	9	10	29
3. Data processing	-	4	7	17	16	28	38	61
4. General office services (not tied to specific departments, e.g. typing pool, filing, records, telephonists)	60	78	77	81	81	84	78	66
5. Wages and salaries	30	33	59	77	82	93	78	79
6. Accounts and financial services	10	41	61	78	86	96	90	100
7. Legal, insurance, pensions	-	-	2	14	11	10	23	39
8. Purchasing	-	26	41	59	61	70	69	87
9. Personnel (including training)	-	-	16	45	75	100	95	97
10. Health, welfare, canteens etc. (including hourly-paid workers)	-	15	47	53	65	88	83	87
11. Safety and security, factory maintenance (including hourly-paid workers)	10	22	54	73	77	94	89	87
12. Product design (including drawing office, artists etc.	10	33	34	36	46	48	48	39
13. Production planning and management	40	48	82	86	91	94	98	100
14. Quality control (inspection)	30	11	52	72	86	91	95	87
15. Research and development	-	4	11	20	26	34	60	39
16. Market research, advertising sales promotion	10	4	14	17	14	19	33	11
17. Sales	30	44	52	53	40	43	40	26
18. Installation, servicing of sales (including hourly-paid workers)	10	7	14	22	28	16	28	18
19. Transport, warehouse and stores (including hourly-paid workers)	20	56	68	80	79	88	83	82
No. of observations	10	27	44	64	57	67	40	38

Source : Organisation Survey.

(1) This table reproduces in full descriptions of the functions used in the Organisation Survey. Later tables and text that is based on the survey will use abbreviated descriptions of these functions.

(ii) Clerical and secretarial workers The average NP proportion of clerical workers increases with increases in the size of factories, but stabilizes when employment levels of 100+ are reached. The lack of any clear trend may be attributed to this occupation group depending largely on other occupations, and thus reflecting shifts in their relative distribution (c.f. Chapter 4).

(iii) Accountants and other administrative and professional workers No clear trend is apparent. The proportion of accountants as a group may decline with increasing factory size but this does not appear to be true for the aggregate of professional workers. The only common feature is a pronounced fall in the largest size-groups.

(iv) Scientists and engineers There are clear indications that the NP proportion of scientists and engineers increases with increasing factory size. One may also note that their proportion varies very considerably by industry.

(v) Technicians and draughtsmen These follow the pattern set by scientists and engineers but without their overall consistency. Again, their proportion varies widely by industry and falls in the largest size-groups.

(vi) Computer operators Yet again, the proportion of computer operators increases with increasing factory size, but may fall off in the largest size-groups.

(vii) Distribution workers This group appears to remain a relatively constant proportion of total employment, regardless of factory size.

180. The overall relationship of total NP proportions to the size of factories for any industry is the result of adding together the trends of the individual occupation groups. Generally speaking the proportion rises because increased proportions of the more technical occupations more than counterbalance a falling proportion of managers. Eventually the technical groups proportions reach a stable level and the declining managerial proportion begins to pull down the overall NP proportion. For the very largest size groups there is a pronounced fall in almost all NP occupation proportions, but this may be partially due to them being split off into separate, detached, offices, warehouses and laboratories.

The influence of other variables : 1. Organisation status of sites

181. The preceding discussion has indicated that the numbers of NPs at a given site may depend upon whether a company's head office, main warehouse, or research laboratory is located at that site. To obtain some indication of the impact of head offices the Site Survey classified sites according to whether they were the only site of the company nominally owning them (single-sites), whether they were production sites that contained the head office of a multi-site company (a non-detached head office - NDHO), or whether they were a site without a head office but belonging to a multi-site company (branches). Table 6.3 shows that there is a

consistent pattern across industries; branches have lower ATC proportions that single-sites, and single-sites have lower proportions than NDHOs.

182. That NDHOs should have more NPs than branches is obvious. The particular NP activities in which they excel is indicated by Table 6.4. NDHOs combine the production activities of a branch with the head office activities of a detached head office (DHO), so for production-oriented functions their average NP proportions are close to branches (cf. functions 1,2,11,13,14,19 in Table 6.4). On the other hand they have higher average NP proportions in peculiarly head office areas, such as data processing, accounts and financial services and sales etc. (DHOs by definition have 100 % NPs - the 96.1 % in Table 6.4 being due to an aberrant response).

Table 6.3 Average ATC proportions at sites by organisation status and industry, 1974

Per cent of total employment

	Branch site	Single site	Head office at a production site (NDHO)
Food	19.9	19.7	32.1
Coal/chemical	30.0	35.5	50.5
Metal manufacture	21.3	17.5	24.2
Mechanical engineering	22.4	26.9	33.5
Instrument and electrical engineering	17.9	28.1	27.2
Vehicles	16.6	17.3	19.8
Metal goods n.e.s.	16.9	19.1	26.7
Textiles	14.2	14.7	23.3
Clothing	7.9	10.8	20.2
Bricks, pottery, glass and cement	17.3	18.2	27.2
Timber and furniture	15.1	17.7	9.6
Paper, printing and publishing	22.8	18.7	20.5
Other manufacturing	16.7	17.4	21.3
Total manufacturing	18.8	21.8	27.5

Source : Site Survey.

183. On combining the organisation status of factories with their size a puzzling feature appears (Table 6.5). Despite the Census of Production data of Figure 6.1 indicating that for all industries except chemicals and mechanical engineering, average NP proportions increase with increasing size of establishment, Table 6.5 shows that the proportions decline steadily in branches and NDHOs, and decline in single sites employing more than 2000. Moreover, the decline in branches in Table 6.5, based on the Site Survey, is confirmed by the Organisation Survey (Table 6.6) (1).

(1) This table also supports the overall trends of occupations with size of establishment, discussed in paragraph 180 above.

Table 6.4 Average NP function proportions by organisation status of factory, 1975/76

per cent of total employment

Department(or function) (1)	Branch	Production site including head office (NDHOs)	Detached head office (DHOs)
Number of observations	352	64	32
1. General management	2.1	2.0	12.0
2. Public relations	-	0.1	1.3
3. Data processing	0.3	0.9	5.5
4. Office services	2.0	2.2	10.1
Sub total : General management	4.5	5.2	28.9
5. Wages and salaries	0.9	1.0	1.2
6. Accounts and finance	1.9	3.4	11.9
7. Legal, insurance etc.	0.1	0.2	2.3
8. Purchasing	0.8	1.2	2.3
Sub total : Specialist services	3.7	5.8	17.6
9. Personnel etc.	0.6	0.8	3.2
10. Health, welfare etc.	1.1	1.4	1.9
11. Security and maintenance	4.4	4.6	1.4
Sub total : Personnel & maintenance	6.2	6.9	6.4
12. Product design	1.4	2.1	2.7
13. Production planning	4.1	4.1	3.7
14. Quality control	2.1	2.2	0.7
Sub total : Production-related departments	7.6	8.4	7.1
15. Research and development	0.7	1.7	5.4
16. Market research etc.	0.5	1.6	5.6
17. Sales	2.4	6.2	14.7
18. Sales servicing	0.5	1.9	3.8
19. Distribution	3.8	3.9	5.9
Sub total : Marketing and distribution	7.2	13.3	30.0
20. Other	0.6	0.4	0.6
Total : NP functions	30.4	41.7	96.1

Source : Organisation Survey.

(1) For detailed descriptions of functions see Table 6.2.

184. These differences can be reconciled fairly easily. Figure 6.1 includes all establishments, but the relative importance of each type changes with the size group considered. Most small sites will be branches or single-sites, with NP proportions of about 28 % on average (Table 6.5). As sites increase in size the relative number of single sites declines, but that of branches and NDHOs increases and this keeps the overall NP proportion increasing. For most industries there are relatively few large sites and these will mainly be NDHOs, so that the NP proportion still keeps increasing. However, in the chemical industry, which is highly concentrated, most of the larger sites are branches, so an overall decline sets in quite early. On the other hand mechanical engineering contains a large number of single site companies and these dominate that industry (c.f. Table 6.5 and Figure 6.1c).

Table 6.5 Average NP proportions at sites by organisation status and factory size, 1974

per cent of total employment

Factory size (employment)	Branch factories	Single sites	Head office at a production site (NDHO)
1 - 99	28.4	27.9	36.5
100 - 499	28.4	29.4	33.8
500 - 1999	27.5	34.0	30.5
2000+	24.6	31.0	29.3

2. The use and provision of NP services

185. The distinction between branch factories, NDHOs and DHOs implies that branches are users of services provided by the head office. Such services could be specialist personnel functions, wage payments, technical assistance and research etc. Similarly, it is possible that branches, head offices or corporations may buy in NP services from firms outside manufacturing industry. Such services may include transport, cleaning, advertising, legal assistance, maintenance of the shareholders register, etc.

186. Both the Site Survey and the Organisation Survey asked questions on the import and export of NP functions and Table 6.7 shows that to a great extent branches that imported services have lower average NP function proportions than those making no claim to use outside schemes. Of course no one branch would claim to use all NP functions from elsewhere, or supply them all, so that any particular branch factory that claimed to import some services and export others appears in both the relevant columns of Table 6.7 in respect of the services imported or exported. The third column of Table 6.7, headed 'Both imports and exports services' relates to branches that claimed they both used a particular service that was supplied from elsewhere, and supplied such a service themselves. For example, a branch might have limited data processing facilities,which it also provided to another factory in the same firm, but for a really big job it might have to rely on the company's central computer at the head office.

Table 6.6 Average NP function proportions by factory size : branches only, 1975/76

per cent of total employment

Department (or function) (1)	Employment 0-199	200-499	500-1999	2000+
1. General management	3.5	1.8	0.7	0.3
2. Public relations	-	-	-	-
3. Data processing	0.2	0.3	0.4	0.5
4. Office services	3.4	1.4	1.0	0.6
Sub total : General management	7.1	3.6	2.1	1.5
5. Wages and salaries	1.1	0.9	0.6	0.4
6. Accounts and finance	2.0	1.9	1.6	1.6
7. Legal, insurance etc.	0.1	0.1	0.1	0.1
8. Purchasing	0.9	0.7	0.7	0.4
Sub total : Specialist services	4.0	3.6	2.9	2.4
9. Personnel etc.	0.3	0.7	0.9	1.1
10. Health, welfare etc.	0.8	1.4	1.3	1.3
11. Security and maintenance	3.1	5.0	5.6	5.0
Sub total : Personnel and maintenance	4.2	7.1	7.9	7.4
12. Product design	1.7	1.3	1.4	0.8
13. Production planning	3.8	3.4	4.6	5.4
14. Quality control	1.2	3.1	2.3	3.4
Sub total : Production-related departments	6.7	7.9	8.4	9.6
15. Research and development	0.3	0.6	1.1	1.3
16. Market research	0.7	0.3	0.2	0
17. Sales	3.4	2.3	1.4	0.6
18. Sales servicing	0.6	0.7	0.4	0.1
19. Distribution	3.8	3.7	3.9	3.9
Sub total : Marketing and distribution	8.6	7.0	5.9	4.6
Total : NP functions (2)	32.0	30.2	28.3	27.1

Source : Organisation Survey.

(1) For detailed description of functions see Table 6.2.
(2) Includes function 20 : 'Other'.

187. To assess the possible implications of the import or export of NP services for NP employment one can assume that there exists a branch that imports some NP services in all the 19 functions and whose NP employment is given by the sum of the 19 NP % in the 'import' column, i.e. 23 %. This can be contrasted with a branch that neither imports or exports NP services, whose NP employment would amount to 33 %, the sum of the NP % in the final column of Table 6.7. On this basis the conversion of a 'total importer' to a 'nil' importer would add 10 % to its total employment.

188. As one might expect, the main NP functions that importers of NP services lack are those that occur in detached units, such as data processing, finance, purchasing, product design, market research and sales.

3. The effect of the location of decision-making

189. The Site Survey contained, as a variant on questions about the use of services, a question about where in the corporate hierarchy 12 specified decisions were made. The alternatives given were 'at this establishment , at divisional headquarters, or at company/group headquarters'. The replies to this question were weighted and converted into a 'decision index' for each site. Figure 6.2 relates the levels of the decision index to the average NP proportions in various occupations.

190. With the exception of scientific and technical employees the average NP occupation proportions in fully independent plants are double those in plants controlled from elsewhere. In the case of managers there is a steady decrease in NP proportions as the number of locally-made decisions diminishes, but in the 'clerical' and 'other' groups the NP proportions do not decline noticeably until a 'half and half' position is reached. When aggregated, these relationships cause the overall NP proportion to hold constant over the autonomous to half-way part of the range, but to fall steeply thereafter.

191. This implies that there is little difference in the proportion of NP workers between those sites that are fully autonomous and those sharing decision-making equally with their headquarters elsewhere. Only when control is largely from elsewhere does the NP proportion begin to decline significantly. This form of relationship was observed in most industry groups taken separately, although in chemicals the decline in white-collar workers was more marked, falling from fifty per cent down to fifteen per cent. This provides another reason for the marked fall in the average ATC proportions for the chemical industry in Figure 6.1c.

4. The type of process used

192. The Site Survey allowed respondents to select from eight specified types of process, of which three received very few replies, while quite a large number of respondents selected more than one. The Organisation Survey restricted the number of process types to three : individual units or small batches; large batches, mass production or continuous flow; both types.

Table 6.7 Average NP function proportions by whether the site is an importer or exporter of services : branches only, 1975/76.

per cent of total employment

Department (1) (of function)	(2) Imports services	(3) Exports services	(2) Both imports and exports(3) services	Neither imports nor exports services(4)
1. General management	1.5	4.6	1.6	2.3
2. Public relations	-	-	0.2	0.1
3. Data processing	0.1	1.7	0.5	0.5
4. Office services	2.3	1.9	1.0	2.0
5. Wages and salaries	0.7	1.0	0.8	1.0
6. Accounts & finance	1.2	2.9	2.5	2.2
7. Legal, insurance etc.	-	0.3	0.1	0.1
8. Purchasing	0.3	2.2	1.9	1.0
9. Personnel etc.	0.4	1.6	0.8	0.7
10. Health, welfare etc.	0.9	1.7	0.6	1.2
11. Security & maintenance	6.9	9.5	4.1	3.4
12. Product design	0.2	5.1	8.7	1.8
13. Production planning	2.2	6.3	6.1	4.5
14. Quality control	1.6	2.6	1.8	2.2
15. Research & development	0.6	3.9	1.9	0.6
16. Market research	0.1	1.6	0.2	1.1
17. Sales	0.5	6.9	3.1	4.0
18. Sales servicing	0.1	4.1	3.0	0.6
19. Distribution	3.4	5.0	5.6	3.9

Source : Organisation Survey.
(1) For detailed description of functions see Table 6.2.
(2) Uses NP services provided either from elsewhere within the organisation or from outside the organisation.
(3) Supplies NP services either to other sites within the organisation or to other sites outside the organisation.
(4) This column relates to those respondents who failed to specify that a particular function was imported or exported. It therefore assumes that a failure to include the function can be equated with neither importing nor exporting it. Since the majority of respondents to the survey answered the import/export question in respect of at least some NP functions this assumption seems to be justified, but it is possible that the failure to reply could be because a branch is making no use at all of a particular function, or to an unwillingness to answer the question.

193. A distinctive feature of both surveys was that although some industries concentrated particularly on one type of process, others did not. Thus although the food, drink and tobacco, and paper industries were predominantly based on mass production or continuous flow techniques, whilst paper products and printing concentrated on small batches, the textile industries, chemicals and other manufacturing seemed to use all the types of process specified. This makes the analysis of NPs by process hazardous. Any one process may be used by all types of industry with all types of NP proportions and an average over the sample is crucially affected by biases in it. It is therefore necessary to compare individual industries and see if any pattern appears.

194. The results of the Organisation Survey were consistent : for almost all industries factories using small-scale processes had higher average NP proportions than those using large-scale processes. The exception to this rule were chemicals, paper and paper products manufacture, and parts of the building materials industries. These results were, on the whole, corroborated by the Site Survey. Of the 13 industry sub-groups into which it was divided, in 11 cases it was one of the large-scale processes that had the lowest NP proportions,and in 10 cases one of these processes ranked second lowest. However, again some industries seemed to go against the trend, and this was particularly the case with the paper, printing and publishing industry. Thus, in general, large-scale processes are associated with low NP proportions, but this is not consistent across industry.

195. These inconsistencies between industries and processes probably lie in differences between mass production techniques and continuous flow processes. The former require considerable production labour and maintenance workers who may well be classifed as production workers. The latter type of process needs few production workers but a large number of NPs involved in plant maintenance and quality control. Thus mass production techniques require low NP proportions, continuous flow requires high NP proportions, and the overall relationship between large-scale and small-scale processes may depend upon the relative proportions of these two process types.

5. Other factors : ownership (1) and movement

196. 'Ownership' is distinguished by whether the factory belongs to a UK firm or is owned ultimately by a foreign company. The Site Survey received relatively few replies from foreign-owned sites but Table 6.8 gives data for three separate industries where the numbers of sites are substantial and on that basis it appears that foreign subsidiaries tend to have a higher proportion of NPs than either independent companies or U.K. subsidiaries, but divisions of UK companies have NP proportions approaching those of the foreign subsidiaries. These results should not be surprising. It is known that foreign subsidiaries tend to have higher productivity levels than UK firms, and Chapter 4 has shown that NP proportions in industries are highly correlated with productivity. It therefore follows that we should expect to find the results presented in Table 6.8.

(1) For definition of the terms used see the Foreword, paragraphs (xiii) - (xx).

Table 6.8 Average NP proportions at sites, by ownership, 1974

per cent of total employment (1)

Industry	Independent companies	U.K. subsidiaries	U.K. subsidiaries	Divisions of UK companies
Chemicals (including coal and petroleum products)	38.7 (19)	43.0 (36)	51.2 (29)	50.1 (10)
Mechanical engineering	31.4 (93)	33.5 (79)	36.4 (26)	28.1 (4)
Instrument and electrical engineering	26.8 (41)	30.4 (60)	33.4 (34)	35.4 (10)
Total manufacturing	26.5(442)	29.1(505)	34.8(148)	32.8 (52)

Source : Site Survey.

(1) Bracketed figures give the number of observations.

197. Table 6.9 is concerned with detailed NP occupations and the ownership of sites. Its main features are that foreign subsidiaries have considerably higher proportions of their workers in technical occupations, working as computer operators, and as salesmen. These results are in complete agreement with those presented in para. 12 of Chapter 1.

Table 6.9 Relative NP occupation proportions at sites, by ownership, 1974 (1)

Occupations	UK subsidiaries	Foreign subsidiaries	Divisions
	relative to independent companies		
NPs	1.10	1.25	1.24
ATCs	1.05	1.25	1.12
Managers	0.84	0.93	0.69
Clerical workers	1.16	1.18	1.08
Technical workers	1.25	1.60	1.83
Computer operators	1.30	4.62	5.05
Sales	0.81	1.29	0.71
Distribution workers	1.18	1.34	1.41

Source : Site Survey.

(1) The figures refer only to the aggregate of the chemical, mechanical engineering, instrument, and electrical engineering industries. Each figure is the ratio of the NP occupation proportion in the designated type of factory to that in independent companies.

198. The distinctive feature of the Site Survey was that it was designed to obtain data on factories that had moved recently as well as those that had remained in their present location for a number of years. It is important to distinguish these 'movers' from 'branches'. A 'branch' is an organisational concept and refers to a factory's place in the organisation of a corporation. A 'mover' is a factory that has been opened recently, having its origin elsewhere; it may be a branch, but it might be a single-site independent company.

199. This distinction is important because there is a tendency to equate branches with movers and claim that since branches have low NP proportions, so will movers. Table 6.10 appears to substantiate this partly, in that for total manufacturing the average NP proportion for branches that have moved is slightly lower (28.1 %) than that for non-moving branches (28.3 %). But this is the result of varying industrial composition. For branches, in 12 out of the 13 industries movers had a higher overall NP proportion than non-movers. A similar result holds for single-site companies, so that it can be fairly claimed that movers have higher NP proportions than non-movers.

200. This is probably the result of movers having new factories and equipment, higher P-productivity, and greater maintenance needs, a hypothesis that is supported by a review of the occupational differences between movers and non-movers that showed that movers are particularly strong in the technical and sales functions. It is perhaps not entirely coincidental that these are also the functions in which foreign subsidiaries excel. A proportion of 'movers' may well be branches of foreign subsidiaries.

Summary

201. In the last two sections the effects of seven independent variables on average NP proportions at individual sites have been investigated. In each case the variables have been taken in isolation, except that industry differences were usually taken into account because of their considerable and known impact. This procedure implies that some of the results found may have been due to the effects of other variables : for example, the effects of ownership may be the result of variations in the average size of factories by the different ownership types.

202. With this proviso, the key effects appear to be that average NP proportions :

(i) increase with average factory size but reach some upper limit;
(ii) are lower in branch factories than detached or non-detached head office sites;
(iii) are lower, the greater the extent to which services are imported from outside;
(iv) are lower, the greater the extent to which decisions are made elsewhere;
(v) are higher for factories using small-scale processes;
(vi) are higher in the subsidiaries of foreign corporations;
(vii) are higher in firms that have moved recently.

Table 6.10 NP proportions at sites by status, movement and industry, 1974

per cent of total employment

Industry	Branch		Single-site company	
	Non-mover	Mover	Non-mover	Mover
Food	35.4	28.3	27.5	28.4
Chemicals	44.5	45.0	39.7	48.5
Metal manufacture	26.9	28.4	21.5	23
Mechanical engineering	27.4	30.0	32.1	35.6
Instrument and electrical engineering	22.5	26.8	33.9	32.5
Vehicles	22.3	31.4	25.1	28.8
Metal goods n.e.s.	23.5	26.2	24.8	27.1
Textiles	20.4	21.4	21.7	25.0
Clothing	14.7	15.8	16.9	16.7
Bricks, potter, glass and cement	28.4	30.0	28.6	22.7
Timber and furniture	24.2	24.5	25.3	23.4
Paper, printing and publishing	20.1	32.5	20.9	27.2
Other manufacturing	17.6	30.5	20.9	25.1
Total manufacturing	28.3	28.1	26.9	30.3

Source : Site Survey.

Factory size variations as an explanation of regional disparities in NPs

203. The effects listed above give ample scope for there to be consistent regional variations in average NP proportions within corporations. Regions that include high proportions of small factories, of UK ownership, that have been located at their present site for a number of years, and that use large-scale processes and outside services, will have lower NP proportions than regions that have high proportions of the opposite type of factory. However, it is only possible to assess the impact of one of these variables - the average size of factories - on regional disparities in NPs.

204. Factory size distributions are difficult to illustrate because they are usually such that there are very large numbers of small plants and relatively few very large ones. The usual way to draw them is to use log-probability graph paper on which cumulative lognormal distributions appear as straight lines. This is done in Figure 6.3 in which the higher the line, the lower the average size of establishments. From the figure it can be seen that the southern and the midland regions have smaller factories than the development regions, with the South East having the smallest ones of all. The differences between regions are not great but it is nevertheless possible that the consequences for NP employment may be of significance.

205. Efforts to estimate the effects of different factory size distribution on regional disparities in NPs show that regional differences in size structure are not large enough to materially alter any conclusions already drawn about the impact of the effects of industrial structure and the residual effects. The estimates indicate that the residual (difference between actual and expected) for the South East has been slightly under-estimated and that allowance for both industrial structure and size structure would give a residual larger by about 10,000 jobs. Similarly the negative residuals in the Northern region and Wales have been slightly under-estimated, but only by a thousand or so jobs. Those of the remaining regions are hardly affected.

206. Differences in the average size of factories could in theory apply to both single-region and multi-region organisations and the effects of factory size cannot be allocated between these two categories. Of the other six variables listed in paragraph 202, three may be said to apply particularly to multi-region organisations with head offices in the London area and branch factories elsewhere. These three factors are factory status, importing services from outside and the location of decision-making. On the other hand two factors - being a subsidiary of a foreign corporation, or having moved recently - would point to higher NP proportions in the Development Areas.

207. Whatever the case, the rough one to two division of regional disparities between single-region and multi-region organisations shown by Table 5.6 can hardly be the consequence of regional variations in the average size of factories. The other explanations for site differences given in paragraph 202 are largely concerned with factors more likely to be met with in multi-region organisations than single-region ones. Regional disparities attributable to single-region organisations must therefore either be determined by a more restricted set of variables, such as local variations in the use of outside services or the process types used, or be dependent upon other factors not considered here. One such possible factor is the variation of NP proportions with different overall sizes of organisations.

CHAPTER 7

NON-PRODUCTION WORKERS IN CORPORATIONS AND ORGANISATIONS

208. In Chapter 5 the residual regional disparities in NPs, after taking industrial structure into account, were allocated between single-region and multi-region organisations (1), and it was argued that the distribution of NPs within multi-region organisations was a major factor in explaining these regional disparities. This chapter therefore concentrates on NPs at the corporate the sub-corporate level. It follows the structure of Chapter 6 in that it first reviews the occurrence of NPs in corporations and organisations, and provides some hypotheses for the manner in which they are introduced, and then continues by considering variations in average NP proportions in corporations and organisations by size, and as a result of other factors. There follows an extended discussion of the allocation of NPs within mutli-region organisations, and in particular their distribution between branch plants and head offices, and between regions. A final section describes the location patterns of the sub-corporate head offices of the respondents to the Organisation Survey. Corporate head offices are considered in Chapter 6.

The Organisation Survey

209. Official sources cannot provide data about NPs at the corporate level and almost all the statistics discussed in this chapter have been obtained from the Organisation Survey carried out by the research team. The procedure used in the survey was first of all to interview a senior executive in a large, multi-region, organisation, and then use his good offices to secure the completion of a one page questionnaire for each site of that organisation (2). This system resulted in responses whose quality and accuracy were superior to that achieved from postal surveys, such as the Site Survey. In addition, the questionnaire was based on a list of 19 specific NP functions, not occupations, and therefore produced data not obtainable from elsewhere.

210. This procedure incurred two disadvantages. Although it resulted in completed questionnaires from some 350 branches and more than 60 non-detached head offices as well as 34 detached head offices, this information came from only 84 organisations. This is really too few to analyse in terms of more than one variable and, because of biases in the sample, it provides an imperfect base for the estimation of aggregate figures for each region.

211. The second major problem of the Organisation Survey lies in the definition of a corporation that was employed. Ideally, for the analysis of geographic variations of NPs within a corporation it is essential that all its sites should be included. The omission of certain sites, such as sales offices, warehouses or research laboratories will bias the results. For example, if only a major subsidiary company, or an entire division, is investigated then certain NPs in the head office of the corporation,

(1) For definitions of the terms used see the Foreword, paragraphs (xiii)-(xx).

(2) The questionnaire is reproduced as Appendix A.

who are nominally responsible for and working on behalf of that subsidiary or division, will have been omitted from the reckoning. Their numbers may not be great, but their omission will produce a biased result.

212. Although it proved possible to obtain full details for all the sites of quite substantial corporations, employing up to 10,000 people, it was not possible to obtain such complete data from industrial giants that might employ 50,000 people on 50 or more sites. In these cases distinct subsections of the corporation, such as a major subsidiary company or a division, were approached. These subsections are called 'organisations' in the sense of Chapter 5. Thus in this report the word 'corporation' is used to refer to an entire corporate entity, including all its subsidiaries. An 'organisation' refers to an entity that may be a complete corporation, but it could also be a substantial and defined subsection of a corporation, such as a major subsidiary company or a division. The Organisation Survey obtained data from 84 organisations, but only 27 of these were corporations.

213. The effect of including organisations within the scope of the Organisation Survey is that it must be recognised that for many of the returns it is possible that some NPs, who are responsible for a particular organisation, have been omitted. They will be located in the corporate head office or research laboratory and not in the organisation. The omission of such NPs has a relatively slight effect on the total number of NPs in any organisation, but it tends to be concentrated in particular functions, such as accounts and finance, public relations, personnel and R & D. For this reason corporate head offices and research laboratories are treated separately in Chapter 8.

214. A further implication of dealing with organisations rather than corporations is that there is a lack of variables by which to analyse the data. Of the variables associated with individual sites in Chapter 6, the type of process used or the classification by industry present difficulties because organisations may straddle several industries or employ a variety of types of processes. The location of decision-making or the extent of the import or export of services are also less applicable to organisations; in an entire organisation both of these effects will net out, by and large. Ownership also presents a problem. Of the 12 foreign-owned organisations that responded to the survey, 10 were included as corporations; that is, their entire UK operations were included. This is logically the case for their UK status, but even so they may be subsidiary to a European or United States head office, and therefore be organisations when considered in a world context.

215. As a result of these difficulties the Organisation Survey needs careful interpretation when considered at the aggregated level, although even so it does provide valuable and original data on large, multi-region, organisations.

The occurrence of NPs in corporations

216. When considering the occurrence of NP occupations at individual sites, in Chapter 6, it was found that almost all such occupations were present in single-site independent firms employing 250-349 people. One might expect, therefore, that all corporations employing more than 500 people would include most NP functions, but this is not necessarily so (Table 7.1). Certain specialised NP functions, such as data processing; legal, insurance etc.; and research and development, only become common in corporations employing more than 500 workers, and even at sizes of 2000+, public relations is not a universal NP function. The slight shortfall in the other four categories at large corporate sizes (R & D, market research, sales, sales servicing), is probably the result of a failure to include certain sales offices in the survey, to sales servicing having an industry bias towards engineering industries, and to one or two rogue responses.

217. Taken together, Tables 6.1 and 7.1 show that the number of NP functions increases with increasing corporate size. To see how this comes about one must start with a typical small manufacturing firm. Such a firm will necessarily have to carry out a number of activities :

purchase of raw materials and supplies;
storage of raw materials and finished products;
maintenance of fixed capital;
payment and servicing of the labour force;
management of production;
production of commodities;
sale of finished products or search for others;
distribution, or arranging for distribution;
basic accounts;
general management.

218. This list of activities is almost entirely a recital of NP functions. They may be carried out by one or more people as part of their general duties, or they may be the particular responsibility of certain personnel or departments whose occupational or functional descriptions specify that particular function. In the former case the functions may be said to be implicit, in the latter they have become explicit.

219. As corporations increase in size four things happen :

(i) specialisation occurs and implicit functions become explicit;
(ii) external pressures add to the tasks of existing functions and lead to the introduction of new ones;
(iii) the goals of the firm alter and this necessitates the introduction of new NP functions;
(iv) the balance between the use of internal and external sources of NP activities alters.

Table 7.1 Representation of non-manufacturing activities in corporations,(1) 1975/76

per cent of total number of corporations

Department (2) (or function)	Employment			
	1-499	500-999	1000-2000	2000-4999
1. General management	100	100	100	100
2. Public relations	-	25	60	57
3. Data processing	33	87	80	100
4. Office services	100	100	100	100
5. Wages and salaries	100	100	100	100
6. Accounts and finance	66	100	80	100
7. Legal, insurance, etc.	33	75	80	86
8. Purchasing	100	100	80	100
9. Personnel etc.	33	100	100	100
10. Health, welfare, etc.	66	100	100	100
11. Security and maintenance	66	100	100	100
12. Product design	66	87	100	100
13. Production planning	100	100	100	100
14. Quality control	100	87	80	100
15. Research and development	33	62	80	86
16. Market research etc.	66	100	100	86
17. Sales	66	100	80	86
18. Sales servicing	33	62	80	86
19. Distribution	100	100	100	100
No. of observations (3)	3	8	5	7

Source : Organisation Survey.
(1) Corporations are defined here in the sense of paragraphs 211-3 and relate to complete entities.
(2) For detailed descriptions of functions see Table 6.2.
(3) It is realised that the number of observations included in this table is extremely small but the data has been reproduced in this form because this type of information has not, hitherto, been available for corporations in the United Kingdom.

220. Specialisation means than an NP activity previously carried out as part of one person's duties becomes too great for him/her and one or more people take it on as a particular occupation or function. For example in very small firms the transport or stores functions may be part of one person's duties. With increasing size they become the particular responsibilities of designated individuals or departments. Specialisation is almost always associated with economies of scale and implicit functions becoming explicit.

221. The external forces that impinge on the growing corporation largely stem from the government, trade unions, and financiers. They rarely involve the creation of new functions, unless a change in the legal status of the company requires the introduction of a company secretary, but they add to the burden of the existing personnel. More attention has to be given to government legislation and requirements. Trade unions necessitate the introduction of formal wage-bargaining, etc.

222. Although not completely inevitable, increasing corporate size is also likely to change the goals of the firms owners/managers. From being concerned with the immediate and short run their attention shifts to the long run. The longer time-horizon necessitates the introduction of functions whose objective is safeguarding the long-term future of the firm. These will be product design, market research, research and development and, in really large corporations, corporate planning and development. Public relations may also be included in this category, as may advertising, to the extent that it is an investment in goodwill.

223. These three factors increase the number of specialist NP functions carried out in corporations as they increase in size, but this does not necessarily imply that NPs increase in numbers or as a proportion of total employment. There is always the possibility that firms will solve any difficulties by purchasing services from outside, such as contract cleaning, canteen services, hiring transport or legal assistance. Furthermore, it may be possible to substitute capital for NPs in the form of computers, warehouse equipment, maintenance-free premises etc. Or there may be real economies of scale; processing orders for £10,000 may be far from ten times as labour-intensive as processing orders for £1000.

224. Thus, even if two corporations produce identical outputs using an identical number of production workers, the number of NPs may differ. If the methods of production differ, so that fewer production workers are used but more capital, then the number of NPs may increase even though the output remains the same as in the previous case. In this event the NP proportion will rise both because of the additional NPs and because of the reduced number of production workers. There is no a priori reason to expect the number or proportion of NPs to either rise or fall with increasing corporate size.

Average NP proportions with increasing corporate size

225. Table 7.2 is restricted to UK corporations and organisations because the subsidiaries of foreign corporations have characteristics that differ from UK ones and this necessitates their separate treatment. The table includes both whole corporations, where all the NPs in a corporate entity are known to be included, and also 'other organisations' as a separate set, where it is known that some NPs are missing because the organisation in question is a major subsidiary or division and presumably there are NPs in the head office of the ultimate corporation who are responsible for that organisation. These two types of organisation can therefore be expected to differ slightly in their NPs and this must be allowed for in the interpretation of the table, along with any other differences that may occur because of industry biases or rogue entries in the individual returns to the survey.

Table 7.2 Average NP function proportions in UK corporations and organisations, 1975/76

per cent of total employment

Department (or function) (1)	Organisation type and employment						
	Whole corporations(2)			Other organisations (3)			
	0-999	1000-2499	2500+	0-999	1000-2499	2500-4999	5000+
1. General management	3.7	1.2	2.0	2.8	1.8	1.2	0.8
2. Public relations	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3. Data processing	1.6	1.4	0.9	0.3	0.5	1.0	0.5
4. Office services	3.4	2.7	2.1	2.9	2.0	2.0	1.3
5. Wages and salaries	1.0	2.1	0.8	1.2	0.9	0.8	0.5
6. Accounts & finance	2.8	1.7	2.2	3.4	2.8	2.2	1.8
7. Legal, insurance etc.	0.2	0.1	0.2	0.2	0.2	0.1	0.1
8. Purchasing	1.9	0.9	1.3	1.1	1.3	0.8	0.4
9. Personnel etc.	0.4	0.9	0.9	0.3	0.9	1.1	0.9
10. Health, welfare etc.	1.3	0.6	1.0	0.9	1.1	1.6	1.4
11. Security and maintenance	2.6	2.2	3.1	2.2	2.7	8.3	4.8
12. Product design	1.2	1.3	3.1	1.8	2.2	1.0	1.6
13. Production planning	2.5	2.9	5.4	3.3	4.5	3.6	4.4
14. Quality control	1.9	0.9	4.6	1.7	1.9	2.0	2.1
15. Research & Development	1.3	1.0	0.9	0.8	2.1	1.7	2.8
16. Market research etc.	0.8	5.0	0.5	0.8	1.5	0.4	0.4
17. Sales	4.6	7.7	4.9	2.5	4.6	4.0	1.1
18. Sales servicing	1.7	0.9	1.1	1.2	1.5	0.8	1.7
19. Distribution	3.7	5.2	3.3	3.5	3.6	5.0	3.6
Total: NP functions	39.3	38.8	38.4	30.9	35.9	37.7	30.3
No. of observations	8	5	3	14	16	15	11

Source : Organisation Survey.

(1) For detailed descriptions of functions see Table 6.2.
(2) Relates to all the sites of a corporation, including those belonging to all its subsidiaries and divisions.
(3) Relates to all the sites of a distinct part of a corporation such as a major subsidiary or division.

226. With these provisos it appears that, on the whole :

(i) Average NP proportions in corporations decline slowly with increases in corporate size, due largely to declining NP proportions in the administrative functions - general management, data processing, office services, wages and salaries, accounts, purchasing etc. - which are not counteracted by increasing NP proportions in production-oriented functions such as security and maintenance, product design, and production planning etc. Thus there are clear economies of scale in employment terms in the administration of large corporations.

(ii) These trends for whole corporations are repeated by those for other organisations, but in a more extreme form.

(iii) Whole corporations have relatively more NPs in the administrative functions than other organisations, particularly in data processing, but excepting accounts and finance. They have rather fewer NPs in production-oriented functions.

227. These trends are as might be expected. 'Other organisations' have relatively few NPs in those functions that might take place in the head office of the ultimate corporation to whom they belong, and this lack accentuates NP proportions in other functions. The higher NP proportion in accounts and finance is probably a response to the more stringent financial monitoring required by the ultimate head office.

The influence of other variables

228. As paragraph 214 indicated, the nature of corporations and organisations prevents an assessment of the influence of variables, other than size, on NP function proportions except for the two variables considered in Table 7.3, the nationality of the organisation's ultimate owner, and the range of products produced by the organisation. In interpreting the effects of the range of products it is useful to remember that single product and dominant product companies are concentrated in industries that specialise in the mass production of standard commodities, such as beer, tobacco, cement, glass, steel, vehicles and some foodstuffs. These commodities require a fairly high capital/labour ratio and usually have a low value/weight ratio. Because the products are standardised it is possible to centralise administrative processes such as general management and accounts as well as other functions such as product design, production planning, R & D, and sales. So these functions have relatively low NP proportions. On the other hand, because of the high capital/labour ratio and low value/weight ratio, functions that are capital-oriented, such as maintenance, have high NP proportions, as does transport and distribution.

229. The other main feature of Table 7.3 is the extent to which NP proportions in subsidiaries of foreign corporations exceed those in UK-owned organisations, particularly in the more professional activities, such as data processing, accounts and finance, personnel, and sales, together with production-oriented activities. This is partly a difference in nomenclature; UK-owned firms have higher proportions in general management and office services. It is also partly a reflection of higher operative

Table 7.3 Average NP proportions in organisations by product-type (1) and by nationality of ultimate owner, 1975/76

per cent of total employment

Department (or function) (2)	Range of products			Ultimate owner	
	Single product	Dominant product	Related products	UK	Foreign
1. General management	1.6	1.7	1.9	1.9	1.2
2. Public relations	-	0.1	0.1	0.1	0.1
3. Data processing	0.9	0.6	0.9	0.8	1.5
4. Office services	2.3	2.3	2.0	2.3	1.1
5. Wages and salaries	1.3	0.9	0.8	1.0	0.7
6. Accounts and finance	2.2	2.5	2.8	2.5	3.5
7. Legal, insurance etc.	-	0.1	0.2	0.1	0.2
8. Purchasing	0.9	0.8	1.2	1.1	1.1
9. Personnel	1.0	0.8	0.8	0.8	1.5
10. Health, welfare	1.2	1.1	1.5	1.2	1.9
11. Security and maintenance	4.7	3.6	5.4	4.1	7.6
12. Product design	1.2	1.4	2.1	1.6	2.0
13. Production planning	2.7	4.6	4.1	3.8	5.1
14. Quality control	1.8	1.8	1.8	1.9	2.4
15. Research and development	1.2	1.2	2.0	1.6	1.3
16. Market research	1.7	0.6	1.2	1.1	1.1
17. Sales	3.2	3.6	5.3	3.8	4.5
18. Sales servicing	1.0	1.1	1.4	1.3	1.5
19. Distribution	4.8	4.1	4.2	4.0	4.5
Total : NP functions	35.4	33.1	39.8	34.8	42.7
No. of observations	18	21	35	72	12

Source : Organisation Survey.

(1) Two other product types are not included as only a small number of organisations were included in these categories.
(2) For detailed descriptions of functions see Table 6.2.

productivity in foreign-owned firms, which has the effect of boosting all the NP proportions. However, even taking these factors into account there seems to be some striking differences in the use of professional services between the two types of ownership, differences which parallel those of Table 1.3, which is on an international basis.

The geographic distribution of NPs within organisations

230. In Tables 6.3 to 6.5 it was established that average NP proportions varied according to the organisational status of sites and in particular their import and export of services, and the extent of their decision-making capability. As a result branches had lower average NP proportions than production sites that included head offices (i.e. NDHOs). (Detached head offices have 100 % NPs). It is therefore perfectly possible that if branches are distributed in a manner different from the distribution of head offices, then the distribution of NPs in multi-region organisations may help to explain the regional disparities in NPs.

1. Geographic variations in the use of services

231. An initial attempt at illustrating the geographic impact of importing services from outside is given by Table 7.4, which distinguishes branches from NDHOs by their location according to a broad area classification - London, Central and Southern England, development areas - and the extent to which they import or export services. Branches import services to a much greater extent than they export them, but the extent of their import increases with the distance of the branch from London, whereas the quantity of services exported decreases. This pattern is also true for NDHOs, but they always import fewer services than branches do, and export more.

Table 7.4 The import and export of services, by region, 1975/76

average number of functions (1)

Region	Branches		NDHOs	
	Imported	Exported	Imported	Exported
Greater London (2)	6.3	0.7	3.9	5.0
Central and Southern England	6.4	0.6	2.7	4.3
Development Areas	7.5	0.2	5.2	2.6

Source : Organisation Survey.

(1) The average no. of functions, out of 19, imported or exported by branches or NDHOs answering the use of services question in the Organisation Survey.
(2) Includes the Outer Metropolitan Area.

2. Centralisation within multi-region organisations

232. As the Organisation Survey obtained data for all the sites within an organisation, the number of NPs that could be 'expected' at each site can be calculated on the basis of the number of production workers at each site. That is, the total number of NPs in an organisation is allocated around its sites according to the distribution of production workers (1). The difference between the actual numbers at a site and the numbers expected can then be derived.

233. If this difference is taken for head office sites, whether detached or not, an Index of Centralisation can be calculated by relating the difference to the total employment in the organisation :

$$\text{Index of Centralisation} = \frac{\text{(Actual NPs at head office - Expected NPs at head office)}}{\text{Total organisation employment}}$$

This index shows the extent to which NPs are concentrated in the head office more than might be expected. The average Index of Centralisation for all organisations in the Organisation Survey was +7.7 %, that is, on average 7.7 % of total employment consisted of NPs who were located in the head office beyond the level that might be expected. The higher the index figure, the greater the degree of centralisation.

234. The extent of this centralisation partly depends upon the structure of the organisation. The main types of organisation were distinguished in the Organisation Survey :

(i) branch type : In this case the branch factories of the organisation carry the organisation's name. For example, the British Sugar Corporation operates processing plants throughout the sugar-beet growing areas of the United Kingdom, each of which is known as a factory belonging to BSC Limited.

(ii) Subsidiary type : This type of organisation operates through a series of subsidiary companies, each having their separate identity. For example, Royal Worcester Limited operates through 11 subsidiary companies in the United Kingdom.

(1) In practice two forms of 'expected' NPs were calculated (i) based simply on the number of Ps at each site (ii) based on the number of Ps at each site, but taking account of the site's industry, process type, employment size and the amount of merchanting undertaken. Regression techniques were used to calculate the expected values for the second type of estimate. It was considered that this second estimate was the appropriate one to use in the subsequent analysis since within any one organisation individual sites may differ very considerably, and the factors taken into account are those likely to affect the numbers of NPs at each site.

235. One would expect that subsidiary-type organisations would exhibit less centralisation of NPs than branch-type ones, since the existence of separate subsidiaries indicates a degree of autonomy greater than a normal branch factory would have. The Index of Centralisation supported this hypothesis, the values being 5.9 % for subsidiary-type organisations and 9.0 % for branch-type ones.

236. This distinction is of importance if certain regions have higher relative numbers of branch-type factories than factories that belong to subsidiary firms. There are faint indications that this is the case for the respondents to the Organisation Survey, but the survey is too small to rely on. There is further supporting evidence from the Site Survey, but this was biased towards firms that had recently moved, and this may have affected the relative numbers of branch factories. However, in general there is a belief that branch factories are more prevalent in the North, Wales and Scotland, than in the South East, and hence centralisation within branch-type organisations must be partly responsible for some of the NP disparities of these regions.

3. The distribution of NPs within multi-region organisations

237. Since the calculation of the 'expected' numbers of NPs was carried out for each site in an organisation, and by the six main categories of NP functions as well as the total, it is possible to calculate the 'actual-expected' figures for all the sites in any given organisation in the Organisation Survey. But the sites may be classified by a number of characteristics, such as their industry, range of products or, in particular, the region of their location. For any one region it is then possible to add up the excesses or deficits given by the 'actual-expected' calculation for all the sites in that region, and relate this total to the total employment of the sites in that region, as given by the Organisation Survey.

238. This exercise, the results of which are given in Table 7.5, cannot be expected to give an accurate picture of the overall distribution of NPs in multi-region organisations, simply because the Organisation Survey was too small to be used for that purpose and does not provide a proper sample. In addition, the survey included some organisations whose returns were quite evidently exceptional cases. Even so, Table 7.5, which is confined to sub-corporate organisations, provides statistics that are sufficiently similar to the regional disparities in NPs discussed in Chapters 3 and 5 to indicate that the distribution of NPs within multi-region organisations is partly responsible for those disparities. In particular, the development regions are consistently in deficit, whereas the South East is in surplus. In addition there are slight indications that the position is worse in hinterlands than in the conurbations.

The location of sub-corporate head offices

239. Given the key part that distribution within multi-region organisations plays in explaining regional disparities in NPs, it is of some importance to investigate the location of the head offices and other detached sites of these bodies. In this chapter emphasis is laid on the head offices of sub-corporate organisations, not corporations. This is because Chapter 8 discusses the location of the head offices of corporations, and the location of corporate research laboratories in greater detail.

1. Non-detached head offices at the sub-corporate level

240. Over three-quarters of all the sub-corporate organisations in the Organisation Survey had their headquarters at a production site. In some cases the head office was a distinct unit housed in an office block adjacent to a factory. In other cases it was difficult to distinguish the management of the whole organisation from that of the main company or factory, since senior executives had dual roles. There was no evident distinction based on size between those sub-corporate organisations with head offices at a production site and those without, but three particular types of NDHO stand out.

Category 1

241. This occurs when the organisation develops at a single location which remains both the main factory and the head office. There were nineteen such organisations in the Organisation Survey, of which five had locations that were geographically eccentric in relation to their production sites. Almost half of the nineteen had their main plants in the South East, but since virtually all of them had developed from their main plant location the predominance of the South East and Midlands plus Manchester cannot be explained as a rational or conscious choice of these regions as head office locations. It seems more likely that this distribution represents the outcome of a long history of enterprise in these areas. However, it is not possible to rule out the possibility that there was bias in either the selection of companies or the responses to the Organisation Survey.

Category 2

242. Eleven organisations were divisions or major subsidiaries of very large companies. In each case the headquarters were organisationally distinct and located in an office block adjacent to a major factory. All of these organisations were the results of rationalisation within their companies and are different from the organic growth which categorised the previous category. There was some element of conscious choice, even if only small, in the selection of their headquarters location, and the location pattern of their headquarters was different from those in the previous group. Southern locations were in a minority and main plants and most of the other factories were in the Midlands or in the Development Areas. Production site location has tended to entail a northern location for the head office.

243. The main question is why for these organisations, production site locations were selected in preference to detached sites. The most apparent reason is the six of the organisations were in heavy chemicals or engineering industries for whom a detached or London location is not a prerequisite for the sales and marketing functions.

Category 3

244. Eight organisations had recently moved their head offices from London and three of these had moved to the main production site, the others having moved to detached office blocks. All the moves occurred in the wave of office dispersal in the late sixties and early seventies. Finance in one form or another was a major factor and the three that moved to production sites seemed to be obeying a company tradition in that other parts of their corporations also had NDHOs. In addition, since they only moved to the South West, West Midlands and within the South East, they retained easy access to London.

Detached sub-corporate head offices near the corporate head office

245. Ten organisations in the survey (14 %) had detached headquarters which were located either in the same building as the corporate head office (in London), or else had recently moved out of that building to another office block not very far away. These moves were into London's commuter belt, with one exception which was over a distance of fifty miles. Eight of these organisations produced a relatively standardised product and were highly centralised leading to a large divisional staff and a greater likelihood of detachment from production sites. In three cases the companies appeared also to be highly centralised at the corporate level, giving strong links between the corporate and divisional head office staffs. The two organisations not covered by the remarks above seem to be special cases.

246. In seven of the ten organisations London was probably the best location from which to reach the production sites, either because most production was in the South East, or because it was very widely spread across the country. In the latter case the road,rail and especially air communications from London are superior to those of almost any other city. Several respondents emphasised the speed with which they could reach remote factories from a base in or near London.

Detached sub-corporate head offices away from group head offices

247. Four organisations had headquarters which were detached but which were not at (or near) group head office, nor had they ever been so. All four were subsidiary companies which had been formed relatively recently by a policy of acquisition and rationalisation. The major reason for the detached location for three companies was that they were subsidiary-type organisations, with a large head office. This had been formed from the merger of two large and well established companies each with its own substantial headquarters. The new location was not near either of the original head office sites and appears to have been a compromise between the conflicting claims of the two subsidiaries.

Summary

248. Detached head offices formed less than one quarter of the head offices of sub-corporate organisations but tended to be located in the South East. Non-detached head offices on the other hand were often away from the South East, particularly if the main plants of the organisation were not located there, or the location had been selected on a quasi-rational basis, rather than having developed with the overall growth of the organisation.

Chapter summary

249. Specialised NP functions increase in number with increasing corporate size, but average NP proportions probably show a small decline, as the effects of scale economies in administration are almost counterbalanced by increasing NP proportions in the production-oriented functions. Branch factories have lower NP proportions than head offices, and the regional distribution of branch factories and sub-corporate head offices favours the South East at the expense of the development areas.

CHAPTER 8

THE ROLE OF CORPORATE HEAD OFFICES AND RESEARCH LABORATORIES

250. Much the greater part of this chapter is devoted to the role of corporate head offices in explaining the regional distribution of NPs. In structure the section on head offices follows that of Chapters 6 and 7, starting with the occurrence of NP functions, followed by a discussion of the variations in average NP proportions by increasing corporate size and other relevant variables. The overall population of large UK manufacturing corporations is then surveyed and this population, together with the results of the Head Office Survey, is used to derive estimates of the regional distribution of NPs in corporate head offices. There then follows a short section on research laboratories.

I. HEAD OFFICES

251. This review of head offices is concerned almost entirely with whole corporations and only includes statements about the head offices of sub-corporate organisations, such as major subsidiaries or divisions, in paragraphs 255/6 and Table 8.2. It is based largely upon two sources :

(i) an analysis of the manufacturing corporations included in the 'Times, 1000, 1974/75' (1), using directories, company reports, publicity material etc.;
(ii) the Head Office Survey carried out by the research team.

The Head Office Survey

252. The Head Office Survey was carried out in two parts. For the smaller corporations (1) in the Times 1000 only a postal survey was used, but an interview was carried out with personnel in the head offices of most of the large corporations that responded to the survey. This interview was not only used to check the responses to the questionnaire but it also enabled the research team to ask subjective questions about the location of the head office, its history, and the links between the head office, the rest of the corporation, and outside bodies.

253. The questionnaire used in the Head Office Survey, reproduced as Appendix B, was unusual in that it allowed respondents to use their own departmental descriptions when filling it in. This resulted in over 160 categories of departments. After discarding those of no relevance, such as the offices of subsidiaries or divisions, the remaining categories

(1) 'The Times 1000, 1974/75', Times Newspapers Limited, 1974.
(2) For definitions of the terms used see the Foreword, paragraphs (xiii) - (xx).

were amalgamated into the 35 functions presented in Table 8.1 (1).

254. A head office is not just a building, it is the group of people who are called the head office staff in the administrative structure of a corporation. These people may be in several buildings, which may be located in separate towns. For example, the head offices of Fisons Limited and the Imperial Group Limited are split between London and Ipswich and London and Bristol respectively. Because of this possibility four definitions are used here :

(i) Aggregate Head Offices (AHOs). The total head office employment at all head office sites.

(ii) Main Offices (MOs). Head office employment at the sole or main office. These may, or may not, be detached from production sites. They are not necessarily the largest head office sites in employment terms but contain the top management and controlling functions.

(iii) Detached Offices (DOs). Head office employment at all single site DHOs plus the detached MOs of multi-site head offices and detached satellite offices.

(iv) Satellite Offices. All head office sites that are not Main Offices.

The occurrence of NP functions in head offices

255. If the Organisation Survey is used to consider the occurrence of NP functions in head offices then a comparison can be made, on a consistent basis, between branch factories and head offices, although it must be noted that the corporate unit is the organisation, not the whole corporation. A comparison of Tables 8.2 and 6.2 shows that normally, for any given size-group, the head office is more likely than the branch factory to include any particular NP functions, especially in the cases of public relations; data processing; legal, insurance etc; and market research. However, this is not always the case for accounts and finance, production planning, and quality control. These functions are closer to the actual process of production and are therefore more likely to be located at production sites.

(1) In Table 8.1 and subsequent tables based on the Head Office Survey the functions within two lines (Nos. 03, 07, 11, 17, and 34) comprise more than the sum of the constituent parts immediately above them (Nos. 01 and 02; 04, 05, and 06; 08, 09 and 10; 12 and 13; 15 and 16; 31, 32 and 33 respectively). This situation arises because some respondents replied in terms that could only be included as a total (e.g. Finance and Accounts), whereas others gave separate figures for each category (e.g. 'Finance' and 'Accounts' as separate items). In the former case the tables include only an entry for the total (No. 07); in the latter case they include entries for each individual item and a total (Nos. 04, 05 and 07).

Table 8.1 Functions used in the analysis of the Head Office Survey

Code No.	Description	Short description
01	Directors or directors and their secretaries	Directors
02	Other senior executives and managers	Other management
03	All directors and executives	Top management
04	Finance (wherever finance is mentioned, including financial accounts)	Finance
05	Accounts (all other types of accounts)	Accounts
06	All other financial	Other finance
07	All finance	Total finance
08	Company secretary, secretariat, etc.	Co. Secretary
09	Pensions	Pensions
10	All other sections of company secretary's office (including insurance, archives)	Other co. secretary
11	Company secretary's office	Co. sec. office
12	Legal department	Legal
13	Other legal functions (such as patents, contracts)	Other legal
14.	All legal functions	Total legal
15	Personnel (wherever personnel is mentioned)	Personnel
16	Other labour/staff-related functions	Other personnel
17	All personnel and labour functions	Total personnel
18	Economics and planning (including a mixture of business strategy, corporate development, etc.	Econ. and planning
19	Purchasing	Purchasing
20	Transport and distribution (including shipping, stores and warehouse)	Transport and d.
21	Sales (including exports and commercial depts.)	Sales
22	Overseas (including translation)	Overseas
23	Publicity, (including internal elements such as library, information, magazines, exhibitions etc.)	Publicity
24	Property (including estates, building services, architects etc., but excluding the maintenance of the head office)	Property
25	Production (including engineering, quality control and production planning)	Production
26	Marketing (including advertising and market research)	Marketing
27	Customer services, including installation	Customer serv.
28	Technical (including R & D, development engineering, technical services, standards, product development etc)	Technical
29	General administration (including various categories of administration and services which may include elements of other categories)	Admin.
30	Data processing (including computer, O & M, OR, systems, etc.)	Computer
31	Canteen or restaurant	Canteen
32	Secretarial and typing	Secretarial
33	Other services (chauffeurs, travel, security, printing, telecommunications, post, registry, etc.)	Other HQ services
34	HQ services	HQ services
35	All other	Other

Source : Head Office Survey.

Table 8.2 The proportions of head offices that include given non-manufacturing activities, 1975/76 (1)

Per cent of head offices in given employment size groups

Department (or function) (2)	Employment size groups					
	0-99	100-199	200-349	350-749	750-1499	1500 plus
1. General management	93	100	100	95	95	100
2. Public relations	36	20	13	25	45	60
3. Data processing	36	30	40	85	70	67
4. Office services	79	90	87	80	95	93
5. Wages and salaries	36	70	93	80	90	73
6. Accounts and finance	86	90	100	95	90	93
7. Legal, insurance etc.	57	30	20	50	45	67
8. Purchasing	36	60	73	80	90	80
9. Personnel etc.	57	30	80	100	100	100
10. Health, welfare etc.	7	80	73	85	90	93
11. Security and maintenance	7	80	80	85	100	100
12. Product design	36	40	67	60	65	93
13. Production planning	29	70	93	100	90	100
14. Quality control	14	60	67	75	90	87
15. Research and development	29	40	40	50	60	80
16. Market research etc.	29	80	80	70	85	80
17. Sales	43	100	100	90	90	73
18. Sales servicing	7	50	53	40	45	53
19. Distribution	14	60	73	90	90	100
No. of observations	14	10	15	20	20	15

Source : Organisation Survey.

(1) Includes both NDHOs and DHOs.
(2) For detailed description of functions see Table 6.2.

256. Despite head offices being more likely to include any given NP function, they do not do so universally. Public relations; legal, insurance etc.; and research and development are met with in hardly more than 60 % of head offices. Moreover, the rate of occurrence of some functions, such as data processing, or sales, appears to decrease with size. Both of these apparent peculiarities arise partly because Table 8.2 is based on the Organisation Survey, and thus relates to organisations and not whole corporations, and also because of the inclusion of both NDHOs and DHOs. Some functions are not represented in sub-corporate organisations as they are located at the corporate headquarters. The inclusion of NDHOs means that the size-groups are slightly misleading because an NDHO of size 2000 may include a factory employing 1900 production workers and only 100 NPs. To avoid these difficulties it is essential to consider only the head office staff of whole corporations.

257. This is the subject of Tables 8.3 and 8.4, the distinction between which is that whereas Table 8.3 relates to Aggregate Head Offices, Table 8.4 is concerned with Main Offices (1). Both of the tables exhibit the standard features of NP functions becoming explicit, and increasing their representation, with increasing corporate size. There are also indications in both tables that by no means all NP functions are present in head offices, particularly in the case of accounts, planning, sales, and marketing, although this may be partially due to the lack of specific functional categories in the questionnaire (2). The main differences between the two tables lie in the upper size ranges, where certain activities, such as pensions, legal, other legal, personnel, purchasing, and the computer, are present in Aggregate Head Offices but not necessarily in the Main Office. This shows the extent to which these activities are detached into satellite locations, often located in outer suburbs, whilst the Main Office concentrates on activities connected with the management and control of the corporation (top management, finance, personnel) plus certain longer-term functions, such as economics and planning.

Average NP function proportions in head offices

258. The Head Office Survey is of interest in that it enables a wider range of NP functions to be analysed by a greater number of variables than could be considered for the Organisation Survey. The relative importance of these functions both in the total corporation and in Aggregate Head Offices (i.e. all head office sites) is given in Table 8.5. Finance dominates the AHO employment, followed by the essentially service activities of HQ services and computer. Employment in any of the purely managerial or administrative functions is relatively small).

(1) c.f. paragraph 254.

(2) As the questionnaire left the specification of functions open, the lack of any indication for a function such as marketing, for example, could be due to its inclusion under some other heading, such as publicity. This is particularly the case for top management, as many respondents failed to include the directors of their company.

Table 8.3 Representation of functions in Aggregate Head Offices by corporate size : UK corporations only, 1976

per cent of total no. of corporations

Department (or function) (1)		Total corporate employment				
Code No.	Description	1-1999	2000-4999	5000-14999	15000-49999	50000 plus
03	Top management	64	77	81	63	63
04	Finance	50	63	73	68	88
05	Accounts	36	54	42	47	38
07	Total finance	79	94	96	95	100
08	Co. sec.	21	29	50	74	50
09	Pensions	-	9	46	58	62
10	Other co. sec.	-	11	31	42	37
12	Legal	-	14	42	47	63
13	Other legal	-	3	12	37	63
15	Personnel	21	40	73	68	88
16	Other personnel	14	17	31	37	50
18	Econ. and planning	-	17	62	58	63
19	Purchasing	36	11	38	58	63
21	Sales	36	23	15	32	13
22	Overseas	7	9	12	42	50
23	Publicity	-	29	58	68	88
25	Production	36	14	15	21	13
26	Marketing	36	14	27	42	38
30	Computer	21	29	38	68	75
31	Canteen	14	14	23	26	50
33	Other HQ services	21	23	38	37	75
No. of observations		14	35	26	19	8

Source : Head Office Survey.

(1) Code numbers and descriptions from Table 8.1.

Table 8.4 Representation of functions in Main Offices by corporate size : UK corporations only, 1976

per cent of total no. of corporations

Department (or function) (1)		Total corporate employment				
Code No.	Description	1-1999	2000-4999	5000-14999	15000-49999	50000 plus
03	Top management	57	77	81	63	63
04	Finance	43	63	73	68	63
05	Accounts	-	14	31	42	25
07	Total finance	71	94	96	89	88
08	Co. sec.	21	29	50	74	38
09	Pensions	-	9	31	32	25
10	Other co.sec.	-	11	31	21	25
12	Legal	-	14	38	37	38
13	Other legal	-	-	12	26	38
15	Personnel	21	31	69	58	63
16	Other personnel	7	14	27	26	38
18	Econ. and planning	-	17	46	53	63
19	Purchasing	36	11	38	47	38
21	Sales	36	23	15	21	13
22	Overseas	7	9	12	32	50
23	Publicity	-	23	54	68	50
25	Production	36	14	12	21	13
26	Marketing	36	11	23	37	38
30	Computer	21	26	31	37	13
31	Canteen	14	11	19	26	38
33	Other HQ services	21	23	38	32	38
No. of observations		14	35	26	19	8

Source : Head Office Survey.

(1) Code numbers and descriptions from Table 8.1.

Table 8.5 Average NP function proportions in Aggregate Head Offices, 1976

Department (or function) (1)		Mean % of corporation UK employment	Mean % of corporation AHO employment
Code No.	Description		
01	Directors	0.10	7.1
02	Other management	0.01	0.5
03	Top management	0.11	7.6
04	Finance	0.39	11.7
05	Accounts	0.34	8.7
06	Other finance	0.07	2.4
07	Total finance	0.80	22.8
08	Company secretary	0.04	3.8
09	Pensions	0.02	1.6
10	Other co. secretary	0.02	1.2
11	Co. sec. office	0.08	6.6
12	Legal	0.02	1.2
13	Other legal	0.01	0.6
14	Total legal	0.04	1.7
15	Personnel	0.15	3.9
16	Other personnel	0.03	1.3
17	Total personnel	0.17	5.1
18	Econ. and planning	0.07	2.0
19	Purchasing	0.18	2.5
20	Transport and d.	0.18	2.1
21	Sales	0.54	5.0
22	Overseas	0.03	1.1
23	Publicity	0.08	2.3
24	Property	0.05	1.3
25	Production	0.35	2.4
26	Marketing	0.23	2.9
27	Customer service	0.22	1.7
28	Technical	0.30	4.3
29	Admin.	0.22	3.9
30	Computer	0.38	9.6
31	Canteen	0.03	0.9
32	Secretarial	0.08	5.1
33	Other HQ services	0.07	3.2
34	HQ services	0.39	13.5
35	Other	0.02	1.8
	Total	4.45	100.0

Source : Head Office Survey.

(1) For detailed descriptions of functions see Table 8.1 and the note to paragraph 253.

259. Table 8.5 is based on each corporation's employment in the UK. The company reports of larger companies often also include their total employment throughout the world and this forms an alternative method of standardisation that is more appropriate when head offices service world-wide activities. Table 8.6 shows that the relative size of AHOs on a 'world' basis is about 20 % less than that on a UK basis, for large corporations. In addition the transfer to a world basis accentuates the main feature of Table 8.6; the relative size of AHOs diminishes with increasing corporate size. For corporations employing less than 1000 it is nearly 15 %, for those employing more than 50,000 on a world basis it is 0.6 %.

Table 8.6 The relative size of Aggregate Head Offices, by corporate size, 1976 (1)

Corporate total employment	UK corporations		Subsidiaries of foreign corporations		All corporations	
	No. of observations	HQ size as a percentage of total employment	No. of observations	HQ size as a percentage of total employment	No. of observations	HQ size as a percentage of total employment
UK based (1)						
Less than 1000	4	10.6	4	18.9	8	14.8
1000-1999	10	9.5	5	13.9	15	14.0
2000-4999	35	2.4	9	9.4	44	3.9
5000-14999	26	2.1	5	6.3	31	2.8
15000-49999	20	1.9	5	3.2	25	2.2
50000+	8	0.8	1	0.9	9	0.8
World based (1)						
Less than 1000	4	10.6	4	18.9	8	14.8
1000-1999	10	9.5	5	13.9	15	11.0
2000-4999	32	2.5	9	8.9	39	3.9
5000-14999	28	1.8	4	6.7	32	2.4
15000-49999	17	1.5	6	3.0	23	1.9
50000+	12	0.6	1	0.9	13	0.6

Source : Head Office Survey.

(1) In the top half of the table the mean size of AHOs is calculated as a percentage of the corporation's UK employment. In the bottom half of the table it is calculated as a percentage of the world employment of the corporation.

260. The other distinctive feature of Table 8.6 is the considerably larger size of the head offices of the subsidiaries of foreign corporations compared with those of UK corporations. The difference between the two is relatively greater in the intermediate size ranges than for either the smaller or larger ones. This is the result of a pronounced drop in the relative size of the head offices of UK corporations once they employ about 2,000 people. The probability is that beyond that size UK corporations move to an organisation that concentrates control at the centre, in relatively few hands, but develops decision-marking to the divisional or subsidiary level. Subsidiaries of foreign corporations on the other heand tend to concentrate their administration at the centre, partly because their relative concentration in single and dominant product activities allows them to do so, and maintain relatively large head offices.

261. A comparison of the AHO figures of Table 8.6 with those for Main Offices in Table 8.7 shows that the restriction of the definition of a head office to a particular site reduces its proportionate weight by between 10 - 20%. This implies that 10 - 20% of AHO employment is in satellite offices, away from the Main Office.

262. The Main Office concept also allows the use of the distinction between detached and non-detached offices and from Table 8.7 it can be seen that, despite some instability in the figures, DHOs are usually smaller than NDHOs, and can be as little as between one half and one quarter of their size. This difference is probably the result of comparing disparate corporate structures rather than detachment as such. DHOs of UK companies tend to include control functions only, and as such have fewer employees than an NDHO that is actively engaged in production as well as control.

Table 8.7 The relative size of Main Offices, by size and detachment : UK employment based, 1976

Corporate total employment	Detached offices		Non-detached offices		All Main Offices	
	No. of observations	Main Office size as % of total employment	No. of observations	Main Office size as % of total employment	No. of observations	Main Office size as % of total employment
Less than 1000	6	10.9	2	13.4	8	11.5
1000 - 1999	9	7.0	6	14.9	15	10.1
2000 - 4999	29	2.2	15	4.8	44	3.1
5000 - 14999	23	2.4	8	1.7	31	2.2
15000-49999	20	0.8	5	5.1	25	1.7
50000+	8	0.5	1	0.5	9	0.5

Source : Head Office Survey.

263. One way of comparing the head offices of UK-owned and US-owned companies is to take the ratio of the average NP function proportions (UK/US). These can then be ranked as follows : -

Functions in which the UK average employment is greater than the US (UK/US ratio in brackets) :		Functions in which the US average employment is greater than the UK (UK/US ratio in brackets) :	
Overseas	(22.0)	Total personnel	(0.3)
Canteen	(3.1)	Total legal	(0.3)
Other co. secretary	(2.5)	Technical	(0.3)
Admin.	(1.9)	Purchasing	(0.3)
Co. sec. office	(1.7)	Finance	(0.3)
Pensions	(1.5)	HQ services	(0.3)
Production	(1.3)	Computer	(0.2)
Top management	(1.1)	Total finance	(0.2)
		Marketing	(0.2)
		Sales	(0.2)
		Accounts	(0.2)
		Transport & d.	(0.1)
		Other finance	(0.1)
		Econ. & planning	(0.1)

(Functions as defined in Table 8.1).

264. Some of these differences are purely definitional - the obverse positions of administrative and HQ services for example. Others are legal; the subsidiaries of US corporations are, in the main, private companies and therefore do not need quite such a large company secretary's department. The UK corporations probably classify some activities as 'production' that might be more closely defined in the foreign subsidiaries. Nevertheless, the clear tendency is for UK corporations to have larger amounts of general administration,whilst US ones have larger numbers in precisely defined departments of a technical nature.

265. Figure 8.1 shows that the picture is rather more complicated than this. The company secretary's office is always larger in the UK whatever the size of the corporation, but top management in the different ownership types becomes similar in relative numbers with increasing corporate size. This is presumably because smaller UK corporations are run by directors, whereas US companies have one factory manager or managing director and a series of specialised managers. With increasing size UK corporations pass more into the hands of the specialist managers and become more like their US counterparts.

266. A similar situation holds for purely administrative functions, such as HQ services and accounts. Here, for smaller corporations the US-owned ones have a considerably larger HQ employment, but with increasing size this is reduced towards a UK level. But for a large number of technical functions, such as finance, marketing and sales, although the US proportion does decrease more rapidly than the UK equivalent, even for the largest subsidiaries of US corporations it remains above the equivalent UK figures. The US subsidiaries always have a greater proportionate employment in computer operations.

267. These variations with size necessitate the qualification of first impressions about subsidiaries of US corporations. Their larger head offices are due partly to the smaller US subsidiaries being much more centralised than UK ones. But in the larger size ranges they appear to be acquiring certain of the characteristics of the UK companies, although still having far more personnel in technical functions.

268. A subjective categorisation of corporations by type of product (single or multiple) and by strength of control (loose/tight) gives fairly consistent results for both UK and US owned corporations. Single-product corporations usually have larger head offices than multiple-produce ones, and this holds true for both nationalities of ownership. The sole consistent exception is 'other HQ services' hardly an important category. The expected relationship of the head offices 'loosely-controlled' companies being smaller than those of 'tightly controlled' companies is not quite so consistent. There are more occasions when the UK loosely-controlled companies appear to have larger AHOs than the tightly-controlled ones - an unexpected result and against the US trend. There are two occasions when both UK and US corporations go against expectations and although one is a relatively meaningless category - 'other' - the second case is 'overseas'.

Corporate head offices and regional disparities in NPs

269. To find out the extent to which regional disparities in NPs are due to the geographic allocation of corporate headquarters it is simply necessary to establish the geographic distribution of these head offices, preferably by corporate size, and then multiply them by the appropriate NP %, derived from the Head Office Survey. Before carrying out this exercise some attention is given to the overall population of manufacturing corporations and in particular to those large manufacturing corporations included within the 'Times 1000' for 1974/5.

The population of large manufacturing corporations in the United Kingdom

270. Table 8.8 shows that over 20 % of the largest manufacturing corporations are subsidiaries of foreign corporations, although the proportion declines with increasing corporate size. These foreign subsidiaries are concentrated, to a greater extent than UK-owned corporations in single or dominant product activities. There is a tendency for the UK-owned corporations to spread over wider product ranges with increasing size, but the proportion of single or dominant product UK companies appears to fluctuate. This is probably due to the patterns of industrial concentration for commodities such as beer, cement or bricks. In these cases the market is shared between a few very large corporations and a larger number of small ones, without any firms straying into wider product ranges.

Table 8.8 Large UK manufacturing corporations by size, ownership and range of products (1) 1974/75

U.K. employment	Ownership and range of products (1)															
	U.K.				U.S.				Other foreign				All corporations			
	1+2	3	4+5	Total	1+2	3	4+5	Total	1+2	3	4+5	Total	1+2	3	4+5	Total
	Number of corporations															
Less than 2000	17	66	22	100	4	28	1	33	4	4	-	8	25	98	23	146
2000-2999	7	66	14	87	3	12	1	16	1	3	-	4	11	81	15	107
3000-4999	4	68	18	90	4	18	2	24	2	3	-	5	10	89	20	119
5000-9999	5	52	22	79	2	7	1	10	-	6	-	6	7	65	23	95
10000-29999	11	44	11	66	2	7	-	9	1	1	-	2	14	52	11	77
30000-49999	2	6	5	13	2	1	-	3	-	-	-	-	4	7	5	16
50000+	2	12	5	19	1	-	-	1	-	1	-	1	3	13	5	21
Total	48	314	97	459	18	73	5	96	8	18	-	26	74	405	102	581
	Percentage of row totals															
Less than 2000	16	63	21	100	12	85	3	100	50	50	-	100	17	67	16	100
2000-2999	8	76	16	100	19	75	6	100	25	75	-	100	10	76	14	100
3000-4999	4	76	20	100	17	75	8	100	40	60	-	100	8	75	17	100
5000-9999	6	66	28	100	20	70	10	100	-	100	-	100	7	68	24	100
10000-29999	17	67	17	100	22	78	-	100	50	50	-	100	18	68	14	100
30000-49999	15	46	38	100	67	33	-	100	-	-	-	-	25	44	31	100
50000+	11	63	26	100	100	-	-	100	-	100	-	100	14	62	24	100
Total	10	68	21	100	19	76	5	100	31	69	-	100	13	70	18	100

Source : Times 1000, 1974/75 plus company reports etc. and a subjective assessment of product ranges.

(1) 1+2 = Single and dominant product, 3 = related products, 4+5 = vaguely related and unrelated products.

271. For corporations smaller than those included in the Times 1000 there is an increasing tendency to be single or dominant product, and single rather than multi-region as size diminishes. The numbers of substantial manufacturing corporations below the Times 1000 is not great, perhaps some 400, and a considerable proportion of these are subsidiaries of foreign companies (1). Major subsidiaries, such as Watney Mann or Wiggins Teape, are already included in Table 8.8 as part of their parent companies.

272. The proportions of headquarters that are detached away from production sites are very similar for both the UK and foreign-owned corporations and for each category the extent of detachment increases steadily with size (Table 8.9). In two size groups, 2-3000 and 5-10,000, the subsidiaries of foreign corporations have a considerably higher proportion of DHOs but there seems to be no particular reason why this should be so. However, as the overall extent of detachment is fractionally greater for subsidiaries of foreign corporations, and there are few really large ones, the implication is that, size for size, subsidiaries of foreign corporations are slightly more likely to have DHOs than UK corporations. Below an employment of about 1500 there is a rapid fall in the proportion of corporations that have detached head offices.

Table 8.9 Head offices of large UK manufacturing corporations, by ownership, size and detachment, 1974/5

Total UK employment in thousands	UK corporations			Subsidiaries of foreign corporations		
	Detached head office	Non-detached head office	Total number	Detached head office	Non-detached head office	Total number
	%	%		%	%	
Less than 2	45	55	105	41	59	41
2 but less than 3	39	61	87	60	40	20
3 but less than 5	42	58	90	41	59	29
5 but less than 10	65	44	79	69	31	16
10 but less than 20	64	36	44	60	40	10
20 but less than 50	80	20	35	75	25	4
50 but less than 100	87	13	15	100	-	2
100+	100	-	4	-	-	-
Total	51	49	459	52	48	122

Source : 'Times 1000' for 1974/5 plus company reports etc.

(1) cf. Britain's Quoted Industrial Companies, 1975, Financial Analysis Group Ltd., and Britain's Top 1000 Foreign Owned Companies, 1975/6, Graham and Trotman Limited.

The regional distribution of corporate head offices

273. Table 8.10 gives the regional distribution of the DHOs of the manufacturing corporations in the Times 1000 and Table 8.11 gives the same data for the NDHOs for comparison. For UK-owned corporations the regional distribution of detached head offices follows the expected pattern (Table 8.10). The large majority of them are in Central London, and the proportion located there increases steadily with corporate size. This does not mean that other regions are devoid of DHOs. The development regions, containing large cities such as Manchester, Glasgow and Edinburgh, muster some 17 % of them and Southern England a further 11 %. The rather high percentage of very small corporations having detached head offices in Central London can probably be explained by them being, in the main, small holding companies. For the subsidiaries of foreign corporations the regional distribution is very different. They have virtually no DHOs outside the South East, where they are concentrated to a greater extent than UK firms.

274. The distribution of non-detached offices also follows the expected pattern for UK corporations (Table 8.11). There are virtually none in Central London, other than those of newspaper offices and publishing companies. In the area around London NDHOs are present in roughly the same proportion as DHOs. However, both Central and Southern England and the Development Areas have a considerably greater share of NDHOs than DHOs,although it is the former area and not the development regions that is comparatively the worse off. The distribution of the NDHOs of the subsidiaries of foreign corporations is again different. The Outer London Area is still dominant but outside that area it is the development regions that do best. This pattern is probably due to history. In the inter-war years foreign companies settled near London. After the war regional incentives caused them to locate in development areas.

275. For UK companies a rough interpretation of Tables 8.10 and 8.11 is that small companies are confined to one region and have NDHOs, or DHOs, in that region. Only if a firm becomes a true holding company does it migrate to London. But with increasing size there is an increasing tendency for head offices to be 'detached' and located in the London area. This still leaves quite a number of large companies with detached or non-detached head offices out of London, especially if they are confined to one broad product area in which a region has an expertise. Thus Tootal remains in Manchester, Pilkington Bros. in St. Helens, Coats Patons in Glasgow, Distillers in Edinburgh, and Joseph Lucas and Tube Investments in Birmingham.

The impact of corporate head offices on regional disparities in NPs

276. The overall population of detached corporate head offices can be multiplied by the average proportions of total employment in DHOs, given in Table 8.7, to obtain an estimate of employment in DHOs. Certain adjustments need to be made to the data of Table 8.7 to allow for other detached satellite offices, and an additional estimate has to be made for the small corporations not in the Times 1000. These estimates are made and incorporated in Table 8.12.

Table 8.10 Regional distribution of detached corporate head offices by corporate size group and ownership, 1974/75 (1)

Total UK employment	Central London	Inner and Outer London	Other South East	Central and Southern England	Development regions	TOTAL
	Per cent of total					Number
UK corporations						
Less than 2000	53	9	2	13	23	47
2000 - 2999	38	26	-	18	18	34
3000 - 4999	42	11	-	18	29	38
5000 - 9999	73	20	-	-	7	44
10000 - 29999	50	18	-	14	18	44
30000+	93	-	-	7	-	29
Total UK	57	14	-	11	17	236
Subsidiaries of foreign corporations						
Less than 2000	41	53	-	6	-	17
2000 - 2999	58	42	-	-	-	12
3000 - 4999	50	42	-	8	-	12
5000 - 9999	55	45	-	-	-	11
10000 - 29999	43	43	14	-	-	7
30000+	75	25	-	-	-	4
Total foreign	51	44	2	3	-	63

Source : 'Times 1000' for 1974/5 plus company reports etc.

(1) Central London is defined as being roughly within the Circle Line. Inner and Outer London is the area beyond this but has not been taken as extending as far as the officially designated Outer Metropolitan Area. Central and Southern England includes the East and West Midlands, East Anglia and the South West. Development regions include all other regions.

Table 8.11 Regional distribution of non-detached corporate head offices by corporate size group and ownership, 1974/75 (1)

Total UK employment	Central London	Inner and Outer London	Other South East	Central and Southern England	Development regions	TOTAL
	Per cent of total					Number
UK corporations						
Less than 2000	2	17	2	38	41	58
2000 - 2999	-	13	2	40	45	53
3000 - 4999	2	21	8	27	42	52
5000 - 9999	9	20	4	21	34	35
10000 - 29999	5	23	-	32	41	22
30000+	-	33	-	66	-	3
Total UK	3	18	4	35	41	223
Subsidiaries of foreign corporations						
Less than 2000	-	33	17	8	42	23
2000 - 2999	-	25	13	37	25	9
3000 - 4999	-	41	18	6	35	17
5000 - 9999	-	80	-	20	-	5
10000 - 29999	-	50	-	50	-	4
30000+	-	100	-	-	-	1
Total foreign	-	41	14	15	31	59

Source : 'Times 1000' for 1974/5 plus company reports etc.

(1) Regions are defined in Table 8.10, note 1.

Table 8.12 Estimates of employment in detached corporate head and satellite offices : GB, 1975

	Central London	Other London Area(1)	Rest of South East	Central & Southern England(2)	Development regions(3)
Times 1000					
Detached head offices and satellite offices in the same region					
UK corporations	20,000	3,500	350	2,600	4,500
Subsidiaries of foreign corporations	8,500	9,250			
Total	28,500	12,750	350	2,600	4,500
Satellite offices in other regions					
UK corporations	1,350	800	450	3,800	250
Subsidiaries of foreign corporations	800	300	-		
Total	2,150	1,100	450	3,800	250
Non-Times 1000					
Detached head offices					
UK corporations	500	250	100	600	1,000
Subsidiaries of foreign corporations	500	1,500	150		
Total 'detached' units	31,650	15,600	1,050	7,000	5,750

Source : Research team estimates; see paragraph 276.

(1) Outside the Central Area and including most of the Outer Metropolitan Area.
(2) East and West Midlands, East Anglia and South West.
(3) Yorkshire & Humberside, North West, North, Wales, Scotland.

277. Detached corporate head offices appear to have accounted for the employment of nearly 50,000 people in the South East in 1975, 30,000 of them being in Central London. At first glance the latter figure may appear to be low but it must be realised that it excludes non-manufacturing corporations and sales offices; major subsidiaries such as Shell UK Oil and Watney Mann; and the staff of divisional offices. Moreover it is confined to the central area of London so that British Oxygen in Hammersmith and ICL (Holdings) Ltd. at Putney are also omitted. Non-detached offices, such as those of the newspapers and breweries, are also excluded. The other factor to be borne in mind is that UK companies typically operate on a devolved basis with a very small head office, so that the giant London offices of Shell, ICI and Unilever are an exception. The resulting figure of 30,000 jobs is not out of line with other estimates, allowing for the differences outlined above and the drift of office jobs out of London.

278. Subsidiaries of foreign corporations with their tendency to have more concentrated head offices, account for a disproportionate amount of employment in corporate head offices in Central London, nearly one third. They also appear to have moved out of the centre to the suburbs well ahead of UK corporations so that they employ about three times as many people as UK corporations in the OMA.

279. Satellite offices and small corporations add little to these figures. The major additional source of NP employment in the London area arises from major subsidiaries and divisional headquarters not shown in the table. In the other areas major cities have a number of main offices and since development regions have more cities they acquire more employment in main offices. Central and Southern England appears to have more satellite offices, usually as a spin-off from head offices in the London Area.

II. RESEARCH AND DEVELOPMENT LABORATORIES

280. Research and development laboratories, like head offices and sales offices, can be classified according to their place in the corporate structure, by the nature of the products with which they are concerned, or by whether or not they are located at a production site. As industrial R & D concentrates on development and applied research, and a considerable quantity is undertaken by the metal and engineering industries, a large proportion of R & D employment is located at production sites. Typical patterns of the dispersion of R & D facilities within corporations and organisations are : (i) small units at all production sites, (ii) one central facility plus smaller units at some or all production sites, (iii) one central R & D unit.

281. In addition to these basic categories large corporations with a series of divisions or subsidiaries may carry out research at this level, using one of the basic categories above or variants thereof, but in addition have a central group facility such as the Hirst Research Centre of GEC or the Rank Research Laboratories of the Rank Organisation. A further variant occurs when a corporation hives off research into a specialised company, such as Shell Research Ltd., or Glaxo Research Ltd. In this case a definitional problem arises as to whether the staff of such companies are truly in manufacturing industry. In this report it is taken that they are.

The population of research units

282. There is no general guide to the research units of industrial firms so that it is not possible to describe R & D laboratories other than by using the results of the research team's R & D and Organisation Surveys. Of 84 organisations in the Organisation Survey 18 carried out no research, or failed to include any employment under the appropriate functional category. There were usually small companies employing less than 2000 people. In one case the lack of R & D was the result of a conscious decision; in a financial crisis in 1971 the firm had decided to dispense with research and license other peoples developments.

283. The remaining 66 organisations distributed R & D as follows :

30 at one site only, including 5 that had only a handful of people involved;

21 at less than half their sites;

15 at more than half their sites (including 4 at all their sites).

Thus the majority of organisations in the Organisation Survey concentrated their R & D at a few sites, usually one site, perhaps with small laboratories at one or two others. Of those organisations that had concentrated their R & D the majority had established it either at a production site or at an NDHO. In only 7 cases was it established at a DHO and so detached from production.

284. These general proportions were borne out by the R & D Survey, which focussed on the central or group research laboratories of corporations but also obtained details of the distribution of R & D within them. Only two firms, both of them in the engineering industry, had spread R & D to all their sites. In 7 other cases there was some R & D activity at most of the production sites but for these there was noticeable concentration at one particular location. A typical situation occurs when the central facility does the more basic and longer term research and also acts as a consultant or advisory service for the other sites carrying out the shorter term development work. Otherwise, the proportions of the responses to the R & D Survey were more or less in line with those of the Organisation Survey.

Employment in R & D

285. It is well known that employment in R & D varies widely according to corporate size and the nature of the products produced. The R & D Survey indicates the following broad ranges of corporate R & D employment, by industry :

	% of total corporate employment
Food, textiles	0 - 3/4 %
Engineering, electrical engineering	1/2 - 2 1/2 %
Metals, ceramics, glass, rubber, plastic products	1 1/2 - 4 1/2 %
Chemicals	4 - 9 %
Electronics	5 - 10 %

286. The subsidiaries of foreign corporations form an outstanding exception to these broad general ranges. In some cases their R & D appears to fall into the UK pattern but in others it can be wildly outside, falling as low as 1/2 % and rising to over 25 % for some chemicals firms. The explanation of these discrepancies lies in the structure of the parent corporation. Sometimes the UK subsidiary includes one of the three or four world research bases of the parent, and in this case R & D appears to be extremely important. In other cases the world laboratories are elsewhere and the UK operation produces the results of somebody else's research, thus having a very small R & D function.

287. The composition of employment in R & D laboratories is fairly consistent comprising :

41 % Scientists, engineers, other research workers of degree standard.
38 % Technicians and other technical personnel.
5.5 % Managerial and other senior administrative personnel.
7.5 % Secretarial and clerical workers.
8 % Others (e.g. cleaners, canteen, security, maintenance, transport).

There are some variations around these figures - US companies may employ more degree-level personnel and fewer managers; research dependent upon animals, agriculture or the maintenance of machinery may use more 'other' - but otherwise the proportions are similar for most research work.

Regional employment in detached corporate R & D laboratories

288. Research and development staff are included in most of the tables that arise out of the Organisation Survey, particularly in Table 7.5 on regional disparities. However, these tables exclude employment in corporate 'central' or 'group' laboratories, because they are based on organisations rather than whole corporations, and they also exclude the detached R & D laboratories of the separate research companies that have been created by some large corporations. To estimate employment at these

sites the numbers of such units and their locations were obtained using directories (1), company reports, the Organisation Survey,etc. Sixty sites were identified, of which the employment in 27 was directly available from the R & D Survey, Organisation Survey, company reports or careers literature. In a further 26 cases the directory gave the number of graduate staff employed and the results of the R & D Survey were used to produce a total employment figure on the basis of there being 1 1/2 other employees for each graduate. This left 7 cases where crude estimates were resorted to.

289. The results of these calculations are that the South East accounted for over 17,000 jobs in R & D whilst Central and Southern England had only 2,850 and development regions 3,300. Over 5,000 of the employment in the South East came from the project development teams of the big car manufacturers, but the rest is quite widely spread, with large detached laboratories of the oil and fine chemicals corporations predominating. Moreover, these figures are likely to be underestimated because of the imperfect nature of the population used. One might conclude that the group and detached R & D centres of manufacturing industry account for some 20,000 jobs in the South East, 3,500 in Central and Southern England and 4,000 in development regions. This is out of a total of 163,000 jobs in the research departments of all manufacturing industry, most of which are at production sites (2).

(1) e.g. 'Industrial Research in Britain'. Francis Hodgdon, 1971.
(2) 'Employment on scientific research and development in British Industry'. Trade and industry, 13 February 1975.

CHAPTER 9

THE EXPLANATION OF REGIONAL DISPARITIES IN NPs

290. This chapter brings together a series of explanations for the regional disparities in NP employment, concentrating on those applicable to multi-region corporations and organisations. In Chapter 5 the regional disparities were disaggregated into three components - industrial structure effects, disparities attributable to single-region organisations and disparities resulting from multi-region organisations (1) - the last of which was found to be the most important factor in accounting for the disparities in the South East and the development regions. In the first part of this chapter the accounting procedure is continued with a further disaggregation of the multi-region component, using some of the material displayed in Chapters 5-8. This is followed by a second section that discusses the reasons for the location of detached corporate head offices and research laboratories in the South East. The chapter ends by considering two other factors that could lie behind the regional disparities in NPs. These factors are in principle applicable to both single- and multi-region organisations, although the main analytic section relating the regional productivity of production workers to regional NP proportions is carried out using data for single-region corporations.

I. The effects of Aggregation and Centralisation in Multi-region Corporations and Organisations

291. Previous chapters have provided ample evidence for part, at least, of the disparities in NPs being the result of the effects of aggregation and centralisation in multi-region organisations and corporations. The reasons for this aggregation and centralisation are easy to understand. Although many NP activities have fairly direct links with production, or the personnel and equipment needed for production, a high proportion of them are essentially footloose - they may be located anywhere and not necessarily at production locations. The historical improvement in communications techniques, together with the increasing specialisation of professional activities and the introduction of new activities such as market research and publicity, has led to increases in the number of such footloose activities, both over time and with increasing corporate size.

292. The natural inclination of such footloose activities is for them to cluster or concentrate at particular sites and thereby gain economies of scale, so long as communications costs do not outweigh this. In principle, if a corporation is multi-site there will be one production site that is preferred for any footloose function. However, in as much as the function is truly footloose there is no need to restrict it to existing production sites. It may well be located in a 'detached' location, away from production. Thus there is a natural and inevitable tendency for NP activities to cluster, either at particular production sites, or in particular detached offices, research laboratories, warehouses etc. This clustering of NPs is considered first at the sub-corporate level and then corporate sites such as head offices are brought into the discussion.

(1) For definitions of the terms used see the Foreword, paragraphs (xiii) - (xx).

NP disparities within sub-corporate multi-region organisations

293. A rough estimate of regional employment disparities at the sub-corporate level is included in column 2 of Table 9.1. It has been derived by multiplying the employment disparities from the Organisation Survey (Table 7.5) by the estimated employment in multi-region organisations (Table 5.4) (1). Although these figures are included in the same table as the total disparity (column 1 of Table 9.1) they are not strictly comparable with it as they refer to NPs, not ATCs, and also because the basis of standardisation used in arriving at the estimates in Table 7.5 involved more than a simple allowance for industrial structure (1). Finally, the figures are for 1975/76 survey results multiplied by 1971 employment estimates and therefore are not on par with the 1971 ATC disparities.

294. Despite these differences in the basis of the calculations the magnitudes in column 2 are broadly in line with expectations in that in the South East and South West regions sub-corporate organisations give rise to an excess NP employment, while elsewhere there are deficits, except in the two Midland regions. The excesses in the Midland regions may be due to biases in the Organisation sample, but it is possible that at this sub-corporate level they reflect the effects of postwar industrial movement. Sub-corporate head offices have tended to remain in the regions that have exported branch plants to the development regions, and the Midlands have been a source of industrial movement as well as the South East. Thus, at the sub-corporate level, it is possible that the Midlands have excess NPs as well as the South East and South West regions.

(1) In more detail, the NP/P ratio, on which Table 7.5 was based, was multiplied by the number of operatives in multi-region organisations. This procedure is in accordance with that used to derive the regional disparities in Chapter 3 and, as in that chapter, the move from NP proportions to NP/P ratios has the effect of increasing the disparities (cf. paragraph 58). It should also be noted that these figures, and those for detached corporate head offices and research and development laboratories in columns 3 and 4 of Table 9.1, have been standardised for differences at each site. That is, an 'expected' number of NPs was first obtained on the basis of the number of production workers at a site, and then the residual disparity at that site was calculated (equal to the 'actual' minus the 'expected' numbers). The employment disparity in each region can then be thought of as the sum of the residuals at the individual sites. In the case of the detached corporate sites there are no production workers, so the expected number of NPs is zero, and the residual values equal the actual employment. Columns 3 and 4 of Table 9.1 therefore give actual employment in detached corporate head offices and research and development laboratories.

Table 9.1 Employment disparities and multi-region organisations and corporations, Great Britain, 1971 (1)

Region	Total disparity in multi-region organisations(2) (ATCs)	Estimates of NP employment disparities at the sub-corporate level(3)	NP employment in corporate detached sites	
			Head offices(4)	R & D laboratories(5)
	1	2	3	4
South East	+ 159.8	+ 59.3	48.3	20.0
South West	+ 1.2	+ 4.7	1.9	0.1
West Midlands	- 24.2	+ 28.0*	4.6	2.1
East Midlands	- 11.0	+ 5.2	0.3	0.8
East Anglia	- 2.2	- 10.0	0.2	0.5
Yorkshire and Humberside	- 15.5	- 34.9	1.3	-
North West	- 40.0	- 29.5*	1.7	3.7
Scotland	- 16.5	- 42.3	1.5	0.1
Wales	- 20.2	- 12.1	0.4	-
North	- 28.2	- 33.6	0.8	0.2

Source : see footnotes and text.

1. See paragraph 293.
2. Derived from Table 5.6.
3. For derivation, see paragraph 293 and the footnote thereto.
4. Derived from Table 8.12.
5. For derivation, see paragraph 289.

*. One extreme observation has been omitted from the calculation of this figure.

295. The analysis of the Organisation Survey showed that most, but not all, of the regional disparities within multi-region organisations was the result of the centralisation of NPs within head offices which tended to be in the South East or the Midlands. However, there was also a tendency for branch plants in the Midlands and South to have higher NP proportions than those in the development regions. A major reason for this appears to be that Southern or Midland branches are often older and more integral parts of the production process, undertaking more skilled operations. One engineering company for example had a headquarters outside London and two branch plants. One branch, in London, was the company's oldest plant and specialised in prototype work, and the manufacture of spare parts in small runs. The other branch in the North East was much larger and involved in the more routine mass production and assembly operations with a relatively low ratio of NPs to operatives. Another situation, encountered several times, was for a sub-corporate R & D department to be located away from the headquarters, but at a nearby branch rather than at a distant one in some Development Area.

NPs at the corporate level (1)

296. In principle the consideration of NPs at the corporate level should include all corporate sites. In practice the analysis here is restricted to detached sites alone. This is for two reasons. Firstly, the distinction between corporate and sub-corporate staff becomes blurred outside the largest corporations, except when the head office is a physically distinct unit. Secondly, non-detached head offices tend to be distributed around the country more or less in proportion to the number of operatives. The South East for instance had 31 % of the NDHOs of the corporations in the 'Times 1000, 1974/5', compared with 25 % of the operatives (in 1971) (2). Hence the main disparities at the corporate level are the result of employment in detached units.

297. In Table 9.1, columns 3 and 4 give the number of NP workers in detached corporate head offices and in detached corporate R & D sites (3). Since the figures include all NP occupations they are not strictly comparable with the ATC figures of the first column but the difference is slight as the manual NP occupations comprise under 10 % of all employment in these detached sites (4). A further cause of non-comparability is that column one refers to 1971 while the other figures are for 1976.

298. Table 9.1 shows that, except in the South East, employment in detached corporate head offices is very small indeed. Even in the South East it represents less than a third of the overall disparity in multi-region organisations. The same conclusion holds for detached corporate R & D laboratories. Only in the North-West (where I.C.I. among others have their corporate R & D site) and the West Midlands, are there more than a few hundred employees in such sites. Taken together these two types of corporate level non-production site account for about 40 % of the South East's 'excess' employment in multi-region organisations. The other side of the coin is seen in the remaining regions which have much less employment in detached corporate units than might be expected, given the amount of manufacturing employment in each region.

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(1) The calculation of the NP employment disparities in column 2 of Table 9.1, which was based on the Organisation Survey, excluded all corporate level sites and it is therefore proper to consider the corporate level as an additional factor in accounting for the NP disparities.

(2) cf. Table 8.11.

(3) The figures were obtained by the methods described in Chapter 8, paragraphs 276 and 289. See also footnote 1 to paragraph 293.

(4) cf. Table 8.5 and paragraph 287.

299. The other forms of corporate-level activity are of less importance. The non-detached head offices of UK-owned corporations are evenly spread over the country and it is only the NDHOs of the subsidiaries of foreign corporations that are concentrated in the South East region (Table 8.11). An approximate estimate would be that NP employment in foreign-owned, non-detached, head offices amounts to about 5000 in the South East region (with about the same number across the rest of the country). Since some production workers in the subsidiaries of foreign corporations also work in the South-East not all of this total of 5000 jobs can be viewed as part of the South East's excess of NP employment.

300. Finally, there may be a few corporate R & D sites that are not detached from factories, although few of these were discovered in the R & D Organisation Surveys and, in general, companies prefer corporate R & D staff not to be too closely identified with any one production site. It is important to realise that the great majority of R & D staff are employed at sub-corporate levels in the hierarchy and at production sites, because involvement with production problems is usually an important part of their work.

301. The concentration of NP staff in corporate headquarters and laboratories thus leads to some 70,000 'excess' jobs in the South East region, with a corresponding (conceptual) deficit shared between the remaining regions. Thus something over two-fifths of the disparity in multi-region organisations in the South East occurs at the corporate level. The reasons for the location of these head office and R & D sites are an important aspect of the overall explanation of NP employment disparities and they are discussed in the next section of this chapter.

Summary : components of multi-region corporation disparities in NPs

302. Although the various sets of figures in Table 9.1 are not strictly comparable with one another a clear set of conclusions emerge with respect to the process of organisational centralisation. Because large corporations locate their central head office in the South-East, some 70,000 'excess' NP jobs accrue to that region. The headquarters of subsidiary companies and divisions also tend to be in the South East but often because the company developed there originally, subsequently expanding with branch plants in other areas, particularly in the Development Areas. The location of NP staff at sub-corporate headquarters and in other branch plants in the South East leads to a further excess estimated at 60,000 NP jobs. Together these would appear to account for most of the total disparity estimated at 160,000 jobs in 1971 (although this estimate is for ATCs only).

303. In the other regions there is much less consistency between the various sets of figures in Table 9.1. The implication of the Organisation Survey is that large deficits are generated by sub-corporate organisations but in several cases these are larger than the total (ATC) disparity in column 1 of Table 9.1. For the two Midland regions the Organisation Survey predicts a surplus in NP employment at the sub-corporate level, and in addition almost 7000 jobs exist in detached corporate sites in the West Midlands. These advantages accord with intuition since many Development Area branch plants are controlled by Midland companies,

and yet the total disparity in column 1 of Table 9 is negative in both cases. The relative lack of corporate level employment is one factor, but other, more general, factors may be at work. This particularly applies to the West Midlands, which has one of the largest proportional deficits within the single-region organisations (Table 5.5).

Interim conclusion on accounting for regional disparities in NPs

304. The important lesson to be drawn from the employment accounts compiled in this chapter and in Chapter 5 is that regional disparities in NP employment have a variety of causes. This is best summarised in the case of the South East which includes virtually all of the excess employment. The total disparity in the South East is of the order of 250,000 jobs (1), although only about 230,000 of this total is accounted for here. The favourable industrial structure accounts for about one seventh of this latter figure, while single-region organisations account for about one-sixth. The largest factor appears to be the process of centralisation in multi-region organisations at both corporate and sub-corporate levels. This accounts for about half the total excess, although a variety of different causal factors are included within this general heading. Finally, it can be estimated from a detailed analysis of individual occupations that perhaps 10 - 15,000 people are employed in detached sales offices and distribution depots in the South East. The location of these units is likely to reflect the importance of the South East market and the strategic position of London in the national communications system.

II. Reasons for the Location of Detached Corporate Head Offices and Research Laboratories in the South East

Detached corporate head offices

305. The paragraphs that follow present a set of reasons that account for the concentration of detached corporate head offices in the South East. They are based upon the interviews associated with the Head Office Survey. In these paragraphs stress is laid on three sets of contacts or linkages :

(i) external contacts : i.e. outside the company. These are : with other companies as buyers or sellers; with institutions and advisers such as merchant banks, clearing banks, legal advisers, patent agents; with official bodies such as government departments, Trade Unions, the CBI; and with professional bodies, committees, etc.

(ii) internal contacts : i.e. within the company. These include contacts with subsidiaries, divisions, production sites etc. Such contacts may be by telephone, telex or letter, or may involve travel to the sites or from the sites.

(iii) internal contacts within the head office : i.e. the pattern of daily meetings and discussions within the head office. Traval may be involved if the head office comprises several locations.

(1) The exact figure depends upon the source of the data. If the Census of Population is used the figure is 280,000 jobs.

The key figure : the chairman or managing director

306. The key figure in the location of corporate head offices appears to be the chairman or managing director, the strength of his impact on its location depending in part upon his own strength of character, in part upon that of his fellow-directors. In several cases firms have moved out of London to locations within easy travelling distance of the managing director's house, although in each case the location was also convenient for travel into London, Heathrow, and the rest of the country. On the other hand there are firms whose head office has moved to London, or where the head office is outside London but the firm maintains a chairman's office, pied-a-terre, showroom, etc. in London. In the latter situation it is common to find the senior executives of the company travelling into London two or three times a week, with the chairman nominally resident there.

307. It is difficult to pin down the contacts and linkages that make the London area so essential for these key figures. The chairman or managing director has no particular functional role, he is a jack-of-all-trades. His main characteristic appears to be that as the top decision-maker of a large corporation he deals with equally senior decision-maker in other companies, official bodies, and overseas visitors. London offers aggregation economies in this respect. Not only does it have most of the senior business personnel, but it also has all the senior financial personnel, all the top civil servants and ministers, and most of the top class hotels and facilities for overseas businessmen.

The key linkage : finance

308. Although the key figure may be the managing director the main direct external linkage in London is undoubtedly finance. A distinction must be made between financial control, which is largely an accounting function, and money management. The financial control activity is internal to the company, involving the preparation of plans and budgets, meetings to discuss them, etc. As such it can take place almost anywhere. Money management on the other hand is much more technical in nature and far less administrative. It comprises three basic functions: the raising of cash or credit; the centralisation of cash flow; foreign exchange operations. Of these three the first appears to necessitate frequent contacts with merchant bankers or the main clearing banks whereas the second is more of an accounting procedure. Foreign exchange operations may take place via intermediaries or from afar, but many companies feel that it is essential to have a continuing presence and ear to the ground in London, otherwise they may lose £100,000 in an afternoon.

309. The strength of these linkages can be measured by the amount of time the finance director spends out of his office in the City. For the very largest companies finance directors appear to spend two days a week in meetings in the City, and this applies even if the corporate head office is outside London. In cases where the corporate head office is well outside the London area it is common to find the finance director sharing a London office with the chairman or managing director. Smaller companies

may not generate sufficient cash flow, or need sufficiently large sums, to warrant such intensive contact and in these cases the finance director may visit London only once a fortnight.

Other strong London linkages

310. Commodities/purchasing Companies dependent upon commodity purchasing must maintain a purchasing facility near the main commodity markets. This applies to commodities such as coffee, cocoa, tea, rubber, and, to a lesser extent, the non-ferrous metals. The need for a purchasing facility goes further if a company buys in semi-processed manufactures frequently and in quantity.

311. Sales Although sales offices are very often detached from head offices, corporations involved in selling large quantities of bulk commodities, such as glass bottles, cans or paper, may feel that the presence of important purchasing companies in London requires a high-level sales presence in the head office. For example, if you are selling cans or bottles by the million to food processors you need to be near the executives who buy them as well as the production planners in your own corporate head office.

312. Personnel Much of the work of the normal personnel department does not require a specific location. However, the increasing intricacy of labour legislation is leading to more consultation with government departments and thus adding to the attractive power of London for the personnel function. Moreover, mostly for single-product corporations but also for others, the increasing centralisation of wage bargaining coupled with the location of the headquarters of the major trade unions in London has added to the pressure to locate a personnel function there. Many personnel departments in large corporations also maintain an extensive monitoring system of senior personnel on an international basis, and this requires proximity to Heathrow.

Less strong London linkages

313. For a series of functions London is a preferred location without there being any strong reason. In the main this is the case for functions which frequently require the expert advice which tends to be concentrated there, such as advice on taxation, pensions, legal, insurance, patents, etc. For the more financial services the links needed and contacts made may be real and frequent but in the main they tend to be more haphazard and less frequent.

The multiplying effect of internal linkages within the head office

314. The general impact of the preceding paragraphs is that London has a magnetic attraction for the chairman or managing director, the finance director, and possibly one or two key functional groups. The hypothesis of this section is that there are a series of internal linkages which operate so as to increase the size of the desirable head office.

315. At the first stage the managing director and finance director find it necessary to have at hand the company secretary and personnel director or manager. At the second stage these four find that, for efficiency, a small number of key departments need to be set up. These include a planning function, a small finance and personnel staff, and a series of functional groups under the general oversight of the company secretary and finance director, including taxation, insurance, legal, pensions and management accounting departments. In each case the key element at work is that of reducing the inefficiency of having broken communication links.

316. The ultimate cause of the need to keep these communication links lies in the hierarchical structure of firms and the nature of responsibility. Responsibility is exercised by taking note of and monitoring the activities of those one level below you in the hierarchy. The customary span of control of the financial director includes not only the money management activities, but also the financial control ones. He therefore needs to keep at hand those directly below him in both activities, even though there may be no locational significance in having the financial control activity in London rather than Birmingham. Similarly, if the company secretary's span of control includes the legal and pensions departments, the nature of that responsibility necessitates linkages between him and them. In addition there are less strong direct links between these individual functions and London.

317. At some point the link of responsibility may be broken by the detachment of the lower order in the hierarchy. This break will usually occur when that lower order is essentially executive or administrative in nature whereas the superior one is policy-making or controlling. In addition some large companies feel the need to centralise some activities, such as personnel, technical departments, O & M. etc., which are service activities for the whole organisation. These are often dignified with the separate status of 'Group Services' and are completely separate from the direct chain of links and responsibilities that belong to the head office proper.

318. The mechanism described above increases the size of the desirable head office from the managing director plus finance director to a rather compact group of policy-making and control activities. At that stage head office may grow further, by keeping in the administrative or executive functions, or centralising or internalising a number of service functions. However the policy-making group is relatively fixed and could only be reduced by altering the corporate structure so as to reduce the responsibilities of the senior executives. For example, if the financial director were not responsible for financial control, but only money management, the financial control function could be more easily detached

from the head office. Again, if the legal aspects of the company secretary's customary functions were to be separated into a specifically legal department with direct responsibility to the managing director, the company secretary's status would become more like that of a normal committee secretary, and again might be detachable. On the other hand there would then be even stronger reasons for the legal department to be in London.

319. On this basis one may use the Head Office Survey to construct a 'minimal' head office, taking this to consist of top management, finance, the company secretary, pensions, legal, personnel, economics & planning, purchasing and overseas departments with a limited amount of office services. This crude calculation gives, as a percentage of total UK employment :

Employment size group	'Minimal' head office	'Actual' head office in Central London
1000 - 4999	1.2 %	0.9 %
5000 - 49999	0.65 %	0.7 %
50000 +	0.3 %	0.6 %

320. The closeness of the results is due in part to the calculated 'minimal' head office being based on the aggregate results of the Head Office Survey, including head offices with quite large departments. Nevertheless the general picture is that existing head offices in Central London are already fairly close to a minimal size.

321. This subjective impression of the contacts and linkages of manufacturing head offices in Central London is corroborated by the work on office communication patterns by Professor Goddard (1). His conclusion is that over 80 % of all contacts in Central London (where contacts includes telephone calls) could be readily carried on outside the centre. Only 15 % of all contacts exhibited characteristics that suggested telecommunications would be inappropriate. But of this 15 %, 75 % were meetings, and these involved only a relatively small number of people. As it happens those most frequently involved in meetings were managing directors and chairmen, followed by other directors, company secretaries and other managers. Moreover meetings were particularly important for the advertising, purchasing, finance and insurance departments, and meetings connected with business overseas were of greater importance to manufacturing industry. Thus the impressions of the Head Office Survey reproduce the more refined statistics of a study on communications patterns.

London and contacts within organisations

322. The final major advantage of London is that it is the centre of communications in the United Kingdom. The Head Office Survey found one or two companies that had moved into London specifically because it made access to their sites easier, and one company that had moved out 30

(1) 'Offices Linkages and Location' by J.B. Goddard, Pergamon 1973.

miles commented that whereas their London location enabled their plant managers from anywhere in the UK to visit the head office and return within one day, this was no longer possible in their new location.

323. The importance of this factor is that certain head office functions involve a good deal of travel, particularly for the managing and divisional directors and the personnel staff. Typical situations are where the managing director visits each production site once a month, Board meetings rotate around the production sites, and personnel officials spend two days a week out of head office visiting sites. For extensive country-wide travelling there is no superior location to the London area. In particular cases with a specific pattern of production sites, the motorway system may allow other locations near motorway nodes to rival London, but in general transport improvements have either accentuated the advantages of Central London or moved the optimal location positions to the west side of London.

324. London or areas to the west of it also has a general superiority in overseas communications. These are not confined to the almost daily interchanges of the three trans-nationals - Shell, Unilever and Dunlop-Pirelli - but are widespread. In particular US subsidiaries have extensive contacts with Europe when the UK company is part of a European operation, whether it be as the European Regional Head Office or merely as a satellite site. Moreover any company with overseas subsidiaries almost automatically generates a number of trips abroad by the managing director or divisional director, merely as part of their general responsibilities. In addition there are the overseas trips required for sales, installation of equipment and general review of markets.

Summary

325. The preceding section may be summarised as follows :

(i) the London area has positive advantages for chairmen and managing directors because of the potential for extensive contacts with other senior personnel in other companies, government, finance and from abroad;

(ii) finance directors of large organisations need to be near the City;

(iii) internal linkages within firms make it desirable that a head office includes a company secretary and personnel function;

(iv) the hierarchical structure of organisations and the need for frequent contact with those for whom one is personally responsible, impel the creation of a number of small, policy-oriented and controlling departments, for many of which London is also a desirable location because of the opportunities for contacts that it affords;

(v) these tendencies are accentuated by the superiority of the London area for UK and international communications, and they are being increased by the centralisation of wage-bargaining and extensive government interaction with industry.

The location pattern of corporate research and development laboratories

326. In general, corporations that distribute R & D throughout their sites are largely engaged in development work, and they are predominantly in the engineering industries. Such units tend to be small and scattered throughout the London area, the Midlands and most of the development regions. On the other hand, single or dominant product corporations concentrate their R & D to obtain such economies of scale as exist. If production facilities are needed for this purpose, as tends to be the case for engineering development, a branch factory or NDHO has to be selected, its location depending upon the availability of space and facilities. But if research is not directly connected with production, which may be the case for research into many aspects of the chemical, metal manufacturing, ceramics and rubber industries, a decision has to be made whether to locate the research facility at a production site or not.

327. Two separate factors come into play here. The first is the existence of well-established feelings, in each case based upon many past case-histories of disaster, and well expressed by the people interviewed by the research team. These feelings involve two contradictory views : (i) you must locate your research at a production site or otherwise the scientists will be shut away in an ivory tower and produce little of any use, (ii) if you put your central R & D at a production site your scientists spend too much time on the short term problems of that site at the expense of their proper tasks of longer term research for all sites. As far as is known there is no research on research sites to establish the degree of truth in these statements.

328. The other major factor is the size of the research laboratory. If main research sites only are considered, detached ones employ on average 300 people against 150 for non-detached ones. Clearly, if a multi-site corporation wishes to concentrate its R & D and is considering whether to add 300 rather than 150 people to an existing production site it is more likely that the 300 will end up by being entirely detached. The most likely place for detachment is near the head office, so that an eye may be kept on them. Given the distribution of head offices it is natural to find a tendency towards the South East in this type of R & D location. It is also likely that even when a production site is chosen it will be one not too far from the head office.

329. This leaves one category of R & D site - the Group one. Here it is probably even more essential that the site should not be at a production site, and companies large enough to warrant a group of central laboratory are also likely to have their head offices in Central London and quite a number of production sites in the South East. Thus the South East is again favoured.

330. Four other factors accentuate the tendency of detachable R & D laboratories to be located in the South East; the supply of labour, contacts, ownership and the ease of international contacts, and the history of site acquisition.

331. As with many of the professional and scientific occupations, the accessibility of a large pool of qualified staff is an important factor accounting for the location of new research laboratories. The largest existing pool of scientific personnel is in the South East and this must be a considerable factor in any assessment of new sites. Moreover, the existence of such large numbers of scientific and technical workers guarantees an ease of contact and the exchange of ideas that cannot be provided by any other area of Great Britain. In addition, London houses the professional institutions and has three major scientific universities within easy reach. These are more attractive to the industries providing detached R & D laboratories that the engineering-based northern universities. Finally, of course, the London area houses the head offices to which the corporate-level laboratories are nominally responsible.

332. An increasingly important part of present-day contact patterns is the ease of access to international travel facilities, and this applies to scientific staff as well as administrative and sales staff. If the corporate R & D facility of a UK corporation is concerned with problems encountered in overseas subsidiaries it will be more likely to be located near Heathrow. This is an even more important feature for those subsidiaries of foreign corporations whose research base in the United Kingdom is the regional research facility for a European region, or is one of only two or three world research laboratories.

333. A last factor that accounts for the considerable number of scientific staff in the Outer Metropolitan Area is concerned with the history of the acquisition of their sites. The interviews associated with the R & D Survey revealed that many large research laboratories had been founded in the early years after the Second World War, when new buildings could not be provided, but the supply of labour and the necessity for easy access to head offices and other scientific centres were still of importance. In these circumstances many large firms bought country houses within easy reach of London, and these sites have now increased in size until they employ several thousand research workers.

Summary

334. The concentration of detached corporate research facilities in the South East can be explained by :

(i) the regional distribution of industries in the United Kingdom being such that industries with a low R & D content, or that are organised in such a way that R & D is located at production sites, are relatively absent from the South East, whereas industries whose organisation structure is amenable to detached facilities for R & D are located there to a more than proportionate degree;

(ii) the existence of a large potential supply of scientific and technical personnel in the South East;

(iii) the contact advantages of being near head offices and scientific centres and having easy communications both to production sites and abroad;

(iv) the past history of the acquisition of suitable sites.

III. Other explanatory factors

335. The accounting procedure carried out in Chapter 5 and the first section of this chapter was restricted to the effects of three components - industrial structure and single and multi-region organisations - and the previous sections of this chapter have emphasised the factors underlying the effects of multi-region organisations. Attention is now focussed on two other characteristics that could apply equally to single and multi-region organisations.

336. In principle, any characteristic that varies between regions could provide an 'explanation' of regional disparities in NPs. For example, Chapter 6 discussed the average size of establishments and found that regional differences did exist but that they are of minor explanatory value (1). Other variables that could be employed include some of those used in the industry analysis of Chapter 4, such as output per production worker or capital per operative, as well as a host of other factors such as regional variations in the input of the labour force, the quality of management, or the supply of NP services from outside manufacturing industry; or regional differences in the extent of urbanisation or agglomeration. However, this type of analysis is hampered by the lack of suitable statistics and although work has been carried out on three or four hypotheses the results have been relatively limited. In the event only two variables are considered here; industrial concentration and production-worker productivity.

The effects of industrial concentration

337. Areas with high concentrations of particular industries may be expected to have high NP proportions for two reasons that are independent of the industries involved. Firstly, they may have more large companies and large plants, and average NP proportions certainly increase with plant size until the very largest plants are reached. Secondly, they may have relatively more head offices or sales offices. The latter will occur because companies selling to those industries will be more likely to locate their sales office in the areas of industry concentration than in London or other major cities. London may be a fine place for an office selling printing ink, but if you are trying to sell ceramic glazes or fluxes for the steel industry you are more likely to place your sales office in the Potteries or Sheffield, respectively.

338. Extreme examples of industrial concentration occur for textiles in Lancashire, Yorkshire and the East Midlands, footwear (East Midlands), motor manufacture (West Midlands), spirit distilling (Scotland), office and refrigeration equipment and scientific instruments (South East). By using the 1968 Census of Production some illustrative examples can be provided for these industries. For spirit distilling 90 % of production is in Scotland, and the ATC/non-ATC ratio in Scotland is greater than the GB ratio, whereas the ATC/non-ATC ratio for all industries in Scotland is only 90 % of the national ratio. Hence, this case provides some support for the hypothesis. Other supporting cases are wool textiles, of which 70 % of production is in Yorkshire, and hosiery and footwear, of which 56 % and 40 % production respectively is in the East Midlands. At lower levels the same is true for glass (33 % in the

North West region). Indeed in a selection of eight randomly chosen examples only one clear counter-example emerged. This was watches and clocks, of which 52 % of output comes from Scotland. In this case the ATC/non-ATC ratio was much further below the national level than is true for all ATC workers in Scotland.

339. Further work on concentration taking into account other variables showed that although it may have some effect upon NP proportions, particularly in cases of extensive industrial concentration, distance from London is a more significant explanatory factor, and concentration as such must be rejected as a significant structural effect.

Production-worker productivity and NPs

340. Relationships between NPs and productivity at the individual site or corporation are easy to rationalise. Additional O & M engineers, personnel officers or salesmen may enable plant to be used more effectively, increasing output per operative. On the other hand a more efficient labour force may increase output, necessitating the use of additional managers, administrators and salesmen. Thus the causal mechanism may operate in either direction. If in addition the high operative productivity is due to large amounts of capital, this in itself will require additional NPs for maintenance etc. In either case, the higher productivity of a given number of Ps is associated with more NPs, a higher NP proportion, and a greater NP/P ratio.

341. It is less clear that these relationships will hold equally in both single-region and multi-region organisations, or that they may be considered to hold at the regional level. Intuitively, one would expect multi-region organisations to have more control over plants in different regions, and more scope for regional comparisons, than single-region organisations. They should therefore be more able to maintain a certain consistency between regions in productivity, the age of their capital stock, and the expertise of their management. Single-region organisations are not in a position to make such comparisons and therefore if there are any factors that can create regional differences in production-worker productivity, and hence NP proportions, they are more likely to operate in such organisations. But it is fairly easy to provide such regional factors; differences in the age of the capital stock or the infrastructure, regional variations in production-worker absenteeism, sickness or strikes, consistent differences in the quality of management, would all produce regional differences in P-worker productivity.

342. Figure 9.1 tests these hypotheses by comparing actual net output per production-worker (1) (productivity) with ATC/non-ATC ratios, by region, for single-region organisations. It is clear that there is a strong

(1) These figures have been obtained from the Regional Abstract of Statistics 1974 table 57. Although not described as figures for single-region organisations the methods used in their compilation mean that this is largely the case, although more so for English regions than for Scotland or Wales. Neither they, nor the ATC/non-ATC ratios in Figure 9.1 are adjusted for industrial structure.

relationship between the two variables, but even so there are some considerable deviations. For example, the North and North West appear to have a level of productivity that is greater than the level the ATC/non-ATC ratio would indicate, and the South West seems to have a level of productivity below that indicated by its ATC/non-ATC ratio.

343. This should not be surprising. As Chapter 3 shows, it is known that NPs in regions differ from those 'expected' on the basis of their industrial structure and assuming national NP proportions. If these differences arise out of other considerations then they are distorting the natural relationships. Figure 9.2 therefore relates productivity per production-worker to ATC/non-ATC ratios that are 'expected'. This provides a better fit than the data for Figure 9.1, and thus gives additional support to the general hypothesis that the relationship between operative productivity and ATC/non-ATC ratios that operates at the plant or industry level creates a similar relationship at the regional level.

344. This analysis does nothing to explain regional disparities in NPs in single-region organisations. It relates NPs to regional productivity directly and calls in the still unexplained regional excesses/deficits in NPs to help explain the variations in regional productivity. An alternative procedure is to start from the hypothesis that both national ATC/non-ATC ratios and national net output per production worker is 'given' for each industry. The number of Ps in each industry, for each region, may then be used as a basis for both 'expected' NPs and 'expected' net output per production worker. Differences between the actual and expected productivity may then be compared directly with the differences between actual and expected NPs, that is, the excesses and deficits for single region organisations.

345. This procedure is carried out in Figure 9.3, using proportional variations in productivity and ATC excesses/deficits. There is a fairly strong relationship between the residuals so there seems to be something in the hypothesis. For single-region organisations there therefore not only seems to be a general relationship between NPs and productivity, but there are also indications that this extends to the deviations from expected productivity being related to the deviations from expected NP employment. This is, if single-region organisations in one region have a lower NP proportion than expected, then they are also likely to have lower productivity, measured as net output per worker, than expected.

346. This relationship still fails to provide an explanation of the disparities in NPs, because it gives no indication of the direction of causality. That is, it is not clear whether productivity is low because of the relatively few NPs, or that the NPs are relatively few because productivity is low. Moreover, there is no evidence as to why the productivity in one region should differ from that in another, although there are many possible hypotheses, such as the age of the capital stock, the education or ability of managers, or the quality or input of the labour force. The productivity/NP relationship therefore provides an interesting field for further research, which would need to look at the basic reasons for regional differences in productivity existing, but it provides no explanation for regional disparities in NP proportions in either single-region or in multi-region organisations.

Chapter summary

347. In the first section of this chapter it was shown that the concentration of detached corporate head offices and research laboratories in the South East are an important factor in explaining that region's excess NPs, but in almost all other regions they are of lesser importance and it is the centralisation and aggregation of NPs within multi-region organisations that are the predominant factor. The second section of the chapter provided a series of reasons for the location of corporate research laboratories and head offices in the South East, reasons that are fundamentally concerned with the contact and communication advantages that come from the agglomeration of senior executives and professional staff in the Greater London area. Using data for single-region organisations, a third section then showed that there exists a correlation between the regional productivity of production workers and NP proportions, although it did not prove possible to specify the causal connection between the two variables.

CHAPTER 10

IMPLICATIONS OF THE ANALYSIS

348. The principal theme of this report has been the explanation of disparities in the regional employment patterns of NPs. The explanation has been based on three main instruments - industrial structure and single and multi-region organisations (1) - whose relative importance has been assessed in Chapter 5. There has also been extensive discussion of the factors underlying the effects of industrial structure, the spatial allocation of NPs within multi-region organisations, and the location of corporate head offices and research laboratories. Less has been said about single-region organisations although an intriguing correlation between NP proportions and operative productivity has been spotlighted, using single-region organisation data. The overall impact of the analysis is that the causes of the regional disparities are complex and inter-related. In this chapter some of the implications of the analysis are considered, concentrating initially on the implications for regional policy before considering some more general questions in a later section.

Regional policy and NPs

349. Regional disparities in NP employment patterns are only one aspect of the general regional problem, which may be taken to include regional differences in unemployment, incomes, social class and the availability of social capital, as well as the existence of less defined feelings, in areas away from London, of being remote from decision-makers, whether in government or industry. Regional policy directed at NPs could be expected to alleviate several aspects of this general problem. Measures designed to attract NPs to the Development Areas would go some way to alleviating differences in unemployment. If the policy were to be aimed at the ATC occupations in particular, there would also be a marginal rise in the average level of incomes in those areas, as well as slight alternations in the class structure. It is possible that there might be an increase in local discretionary powers in industry and government, although it must be noted that since Development Areas already obtain more than their proportionate share of manufacturing investment and public expenditure this would only be slight. Finally, because NPs have greater stability of employment over the course of short-term business cycles than Ps do, although this is now far less the case than it was ten years ago, one could expect to find a modest improvement in the overall stability of the economic conditions of the recipient areas.

350. On the other hand regional policy has to be seen in dynamic terms, especially as past experience has shown it to be most effective in an expanding economy. One must question whether the present time, with employment in manufacturing industry continuing to decline and the overall NP proportion tending to stabilise, can be said to be an auspicious one for an NP-oriented policy. Moreover, it is known that the dispersal of offices from London over the past five years has included those of several large manufacturing organisations, and the analysis of Chapter 10 indicated that head offices in the London area were probably

(1) For definitions of the terms used, see the Foreword, paras.(xiii)-(xx).

near a minimal size already, so that the number of jobs that are potentially mobile in that one area has already been reduced and is now limited. In addition, the pool of potentially mobile NPs is declining as the attractions of the London area increase because of the additional contacts now taking place between government, the trades unions and industry.

351. One may also question whether a regional policy for NPs would necessarily have the desired effects. Until recently the removal of large offices from the London area has been to locations within one hundred miles of Central London and not to the Development Areas. Usually such moves have involved the movement of senior and middle management, whereas the clerical and service workers have stayed to find new jobs in London. The recipient areas have benefitted from the arrival of the managers and executives, and from the increased demand for clerical and service workers. This has helped to create employment opportunities for younger members of the labour force and new entrants to it, as well as leading to a slight increase in regional incomes and expenditure. But such moves do little to help the large numbers of middle-aged or elderly production workers who are unemployed.

352. The main dynamic factors in favour of a regional policy for NPs at the present time are the rapid and continued improvement in the road, rail and telephone communication systems and an increasing disenchantment with large cities on the part of professional workers and managers - although the latter sentiment can hardly be said to be favourable to Glasgow or Liverpool.

353. To summarise the situation it may be said that although there are points in favour of extending regional policy directly to NPs, the resultant benefits would not be as great as is sometimes supposed, whereas the true costs of such a policy are unknown. Moreover, past experience has shown regional policy to be most effective when the economy is growing rapidly, and this is not the case at the moment, nor is it likely in the immediate future.

The implications of the analysis for an NP-oriented policy

354. Table 5.6 divided the components of regional disparities in NPs into three components ; the effects of industrial structure, and the effects of single and multi-region organisations. Industrial structure only played a limited role in explaining the disparities, except in the cases of Yorkshire and Humberside, and the East Midlands, neither of whom are the worst off regions in unemployment terms. On the other hand two of the more seriously placed development regions, the North and North West, have a marginally advantageous industrial structure. As policies to alter industrial structures are very long-term, and development regions need jobs now, there is no point in considering an NP-oriented regional policy in terms of regional industrial structure.

355. The effects of single-region corporations are considerable in the South East, contributing 70,000 jobs to the excess NPs in 1971, but otherwise they only played a substantial role in Scotland and the West Midlands,

with a minor but significant impact in Yorkshire and Humberside, the North and Wales. The West Midlands has not been considered to be a problem area in the past but it does seem to be in a deteriorating situation as far as NPs are concerned (c.f. Figure 2.1). The other three areas are Development Areas or Intermediate Areas.

356. Chapter 9 proposed that operative productivity and NP proportions were related and that this relationship was likely to be stronger for single-region corporations than multi-region ones, but the mechanisms and direction of the causal relationship could not be ascertained. They could be due to regional differences in wage levels, the age and quantity of the capital stock, managerial competence, or labour problems such as absenteeism, strikes, alcoholism etc. In any event one could not prescribe a policy for improving productivity that discriminated between regions, and the effect of such a policy could be to create increased production-worker unemployment without increasing the number of NPs. If it were to be established that regional differences in productivity existed and were the result of specifically regional prime causes then a policy directed at those prime causes would be feasible, but without such prior knowledge there is no scope for affecting regional disparities in NPs through working on the levels of operative productivity.

357. This leaves only the effects of multi-region corporations to be considered. Table 5.6 showed that they are the dominant factor in three out of four major development regions, the North, North West and Wales, and also accounted for the greater proportion of the South East's excess. For the South East, out of a total excess of 160,000 jobs accounted for by multi-region corporations, about half appeared to be attributable to the centralisation of NPs in corporate head offices and research laboratories, particularly those that are detached from any production site. The rest is partly the result of the spatial allocation of NPs at sub-corporate levels, with an unknown additional element arising from factors that could be associated with both single and multi-region organisations, such as differences between regions in average levels of productivity. A small part of the South East's excess employment is a consequence of the relative concentration of sales and distribution workers in small detached offices and warehouses.

358. Any policy intended to influence the distribution of NPs within multi-region corporations needs to recognise the varied roles played by NPs and the differing factors that tie them to particular locations. For example, it may be taken that the distribution of sales offices and warehouses follows that of markets and communications patterns and that there are only limited possibilities for altering those patterns. The paragraphs below are therefore restricted to corporate head offices, research laboratories and computer centres, plus one general point on communication.

359. A policy directed towards corporate detached head offices could have two points of focus. Firstly, Chapter 9 discussed the possibility that there is a 'break' point in the hierarchical structure of corporations at the point where policy decisions move into executive action. It is the staff immediately below this 'break' point that some firms have moved into satellite offices. The possibilities for the dispersal of NPs are increasing as improvements in transport, telecommunications and data

transmission have the effect of pushing the break point for particular NP categories further up the hierarchical structure of firms. There might be 10,000 jobs in the London area that are potentially mobile for this reason and perhaps double that number in the South East as a whole. The policy instruments needed to encourage such a process would be those of the familiar 'stick and carrot' type.

360. A second possible course of action would be to aim to detach entire NP functions and locate them away from the South East. For example, the personnel department in head offices undertakes a variety of tasks, such as advising the chairman or managing director, negotiating with trades unions and officials of the Department of Employment, advising subsidiary companies on industrial relations problems, visiting sites, administering management career and development programmes, processing the arrival and departure of executives from and to overseas postings, keeping track of new labour legislation etc. Of these activities only two have strong links with London; direct contacts between the personnel department and trades union and government officials, indirect links through the personnel function needing to report to the chairman and managing director. To move the personnel or any other NP function in its entirety it is necessary to cut or significantly weaken such links. One way would be to persuade the firm to go against its present practice. The other way is to move the contacts on which the function depends. In the case of personnel this would imply first moving the headquarters of the trades unions and certain sections of the Department of Employment - hardly a popular or feasible policy.

361. The scope for a regional policy directed at research and development laboratories and computer centres is more promising in that their links with the South East are less strong than those of head offices. It is difficult to envisage a policy that would entail interference with the present distribution of such establishments, other than at an unacceptable national cost, but it would seem possible for any new operation, or even large extensions of existing ones, to be guided elsewhere, according to individual circumstances. The advantage of such a policy would be that the more skilled and better paid people would be involved so that the average incomes of the recipient areas would be enhanced, and there would also be some take-up of local unemployment directly through the technical, maintenance and clerical functions as well as local multiplier effects. On the other hand it is in the scientific, technical and service worker categories that the development regions are relatively better off.

362. On a general level there appears to be scope for the dissemination of NPs by continuing the past improvements in communications systems. Central London is already losing its position as the focal point of physical communications in the United Kingdom. This point is moving west to the Slough, Uxbridge areas, from which there is easy access to three motorways (M1, M3 and M4), rapid rail services to Bristol and South Wales, Birmingham and the Midlands, and the North West, and proximity to Heathrow.

363. The latter plays a key role in the location of many head offices, sales offices and research laboratories. Easy access to a wide range of international air connections is becoming increasingly necessary for senior executives and directors, at whose behest the location of many NPs is determined. At the moment international air travel from the UK is dominated by Heathrow, and the present policy appears to be to divert additional capacity to Gatwick, which is also in the South East. There are alternative methods of obtaining international air connections. A local businessman from Norwich may travel internationally by taking a place from Norwich to Amsterdam and travelling on from there. Similar two-flight trips may be taken from other regional airports and it is possible that regional policy could foster such connections - at the probable expense of the balance of payments. However, this would be merely a palliative as direct international connections would still be dominated by airports in the South East.

Some general features of NP activities in UK manufacturing industry in recent years

364. Because this report has concentrated on regional disparities in NPs less attention has been given to the general features of the analysis and the considerable amount of data and information on UK manufacturing industry that the research team acquired, especially from the large number of interviews that were carried out. The following paragraphs pick on three main topics for comment; general trends in NPs, trends within the managerial and professional workers category, and the corporate structure of UK organisations. Because they are based, to a great extent, on interviews, these paragraphs are more subjective in nature than the preceding ones on regional implications.

365. (i) It seems clear that the long-term growth rate in NP proportions has slowed down over the last decade and the structure of NP occupations has moved in the direction of the professional and technical activities and away from those needing lower qualifications. One of the major factors in these changes within the occupation structure has been the delayed effects of the introduction of computers. However, although it is known that computers lead to reductions in the demand for labour only after a period of years (1), it is not generally appreciated that their effect is to reduce the relative demand for such diverse occupations as draughtsmen, warehousemen and road goods vehicle drivers, as well as leading to the substitution of systems analysts and programmers for clerks. In addition the introduction of new capital in the form of office machinery warehouse systems, etc. has also had an impact on the number of NPs.

366. The result of these trends is that it can no longer be assumed that manufacturing industry will be a plentiful source of lower-grade 'white-collar' and semi-skilled jobs, unless total employment in manufacturing is expanded steadily. The implications for education and manpower planning are evident.

367. (ii) Within the category of managers and professional workers two particular trends have been at work within recent years. One the one hand a period of acute financial stress has led some firms to question

(1) cf. P. Stoneman, op.cit.

the value of some of their departments, such as R & D, market research or publicity, the work of which is not directly concerned with current production or future orders but is of a longer-term nature. The Organisation Survey obtained some evidence that in some cases this had led to the virtual abolition of individual departments. On the other hand, there has been a considerable increase in the demands on firms made by government. Little quantitative work has been carried out in this field (1), but the effects of the Health and Safety at Work Act, Credit Control Act, pensions legislation, the introduction of VAT and the work of the Prices Commission can only have imposed an additional load on NP functions, especially in the finance, pensions, health and welfare, personnel and company secretary's departments.

368. The net effect of these different factors has been to shift the attention of senior management towards the financial and legal activities, whilst those connected with production and the longer-term have been relatively reduced in importance. Given that international comparisons, even in the 1960s, indicated a relative lack of technical expertise in UK corporations, and the evidence of the Head Office and Organisation Surveys is that this is still the case if UK-owned corporations and the subsidiaries of US corporations are compared, it seems unfortunate that there have been few attempts to support the technical side of management in a direct way.

369. (iii) A surprising feature of the interviews carried out for the two surveys was the extent to which the corporate structure of UK-owned corporations was based upon the financial control of subsidiary companies from a small central head office, whereas the subsidiaries of US corporations of similar sizes had higher proportions of the more technical NP occupations, in larger head offices that ran a number of branch factories, rather than subsidiary companies. It is possible that the domination of the 'subsidiary-type' corporate organisation in the UK is in part responsible for some of the deficiencies of UK manufacturing industry. For example, running six subsidiary companies that operate in one industry and produce similar but not identical products makes it difficult to acquire the long runs needed to take advantage of full economies of scale - and this is one factor that recent research has shown to be associated with the relatively low level of productivity in UK manufacturing industry (2). Similarly, purchasing, sales etc. cannot be centralised easily in such corporations (3).

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(1) There has been extensive correspondence in the press on this subject. See, for example, the letter from Mr. Anthony Grant M.P. in the Financial Times, February 22nd 1977. The only academic work is by R. Evely. op.cit.

(2) C.F. Pratten "Labour productivity differentials within international companies" Cambridge University Press, 1976.

(3) On the other hand, small size and adaptability are essential in industries for whom short-term changes are common, such as fashion goods.

370. In addition it has been suggested that British management lacks professional expertise and that this is partially the result of executives being unable to acquire experience in large executive headquarters where 'high-fliers' can both exercise responsibility at an early age and obtain the benefits of passing through a variety of departments, prior to entering head office (1). Instead the head office is concerned with control in the financial sense, and perhaps dominated by people with relatively narrow financial and legal backgrounds, whereas technical expertise is dissipated through a large number of subsidiary offices.

371. This domination of the subsidiary-type corporate structure may also help to explain why the large number of mergers and increased concentration in the United Kingdom does not seem to have brought concomitant economic benefits. The full economies of scale are never achieved because the individual constituents of the mergers carry on their previous activities with relatively minor alternations.

(1) D. Granick "Use of Corporate and Divisional Headquarters : A peculiar Americal innovation", Michigan State University Business Topics. No. 22 (4).

CHAPTER 11

SUMMARY

General review

372. Non-manufacturing activities in UK manufacturing industry now account for more than one third of total employment in the sector, their share having increased steadily over at least the last 50 years. In recent years the rate of increase in their share of total employment has slowed down, because of a decrease in the growth-rate of the proportion of total employment taken up by clerical workers, managers, draughtsmen, warehousemen, sales staff and road goods vehicle drivers. On the other hand there has been a continued increase in the growth-rate of the proportion of total employment accounted for by professional staff, and scientific and technical workers.

373. NP proportions vary widely between industries, the major differences being attributable to concentrations of scientific and technical workers in the chemicals and engineering industries, and sales and distribution workers in the consumer goods industries. Compared with other similar countries, UK manufacturing industry employs more service workers, but fewer sales and educationally qualified professional and technical workers.

374. The growth-rate in output per NP-worker has accelerated steadily over the last twenty years, but even so it remains less than the growth-rate in output per production worker. The acceleration in NP productivity has largely resulted from the widespread application of computers and this may also have been responsible for the stabilisation in the relative proportion of total employment accounted for by clerical and secretarial workers, warehousemen and draughtsmen.

The regional distribution of NPs

375. The distribution of NPs is correlated with distance from London. In the Greater London area NPs comprised 45.7 % of total employment in manufacturing industry in 1971, but this proportion declines to 41.9 % in the Outer Metropolitan Area, 36.5 % in the rest of the South East, 31.6 % in the Midlands, 31.5 % in the North West and Yorkshire and Humberside, 29.8 % in the North and 28.9 % in Wales, but rises to 31.0 % in Scotland. Within regions, conurbations tend to have proportionately more NPs than their hinterlands.

376. In general the distribution of individual NP occupations follows that for total NPs, the main marked divergences being that scientific and technical workers tend to form a slightly higher proportion of manufacturing employment in hinterlands than in conurbations, and that service workers are distributed relatively uniformly across the country, but with a tendency towards higher proportions in the north.

The role of industrial structure

377. The regional distribution of NPs is heavily influenced by the industrial structure of each region, because NP proportions vary widely between industries and industries tend to be concentrated in particular regions. The industrial structure of the South East is favourable to NPs, and this helps to explain the relatively high NP proportions found there. Industrial structure is also relatively favourable in the North, North West and Scotland, and in these cases it slightly improves the situation of regions that are relatively lacking in NPs. When industrial structure is taken into account the general decline in NP proportions with distance from London is, if anything, accentuated.

378. These general trends also hold for the particular categories of managerial and professional workers, secretarial workers, and scientists, general engineers, and technicians. On the other hand, clerical workers and sales and distribution workers are more evenly spread, and in the case of service workers the general trends are reversed; the industrial structure of the south is unfavourable whereas that of the north is favourable.

Reasons for industry variations in NP proportions

379. The number of NP workers in an industry can be considered to be dependent upon certain characteristics of that industry, to depend upon the numbers in other occupation groups in the industry, or to be determined by a combination of these factors. In practice it appears that only the clerical workers and typists/secretaries are dependent upon the numbers employed in other NP occupations. Scientists, technologists, engineers and draughtsmen are associated with industry characteristics such as expenditure on R & D, or capital per workers, and the relative numbers of sales and distribution workers, together with professional workers, also appear to be determined by an industry characteristic in the form of productivity, or output per production worker. The occupation groups that appear to be dependent upon both industry characteristics and the numbers employed in other NP occupations, are managers, computer and other technicians, and service workers (including maintenance).

Accounting for residual regional variations in NPs

380. When regional industrial structures have been taken into account the South East remains the only region with substantially more NPs than expected, whereas all other regions are deficient in NPs, the extent of the deficiency increasing with distance from London. It is hypothesized that these regional disparities in NPs can be considered to be the result of the spatial allocation of NPs within multi-region organisations (1), plus regional differences in the relative number of NPs in single-region organisations.

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(1) For definitions of the terms used see the Foreword, paragraphs (xiii) - (xx).

381. Using Census of Production figures for ATCs as the best approximation to data for single and multi-region organisations, it is shown that single-region organisations are an important factor in accounting for the relative deficits in ATCs in the South West, East Anglia, West Midlands and Scotland. They are also responsible for about one quarter of the relative deficits in ATCs in Yorkshire and Humberside, Wales, and the North region. On the other hand multi-region organisations account for the greater part of the ATC deficits in Wales and the North, North West and West Midland regions, as well as being responsible for over 60 % of the relative excess of ATCs in the South East. In addition, they play a considerable role in East Anglia and Scotland.

NPs at sites

382. The larger a site is, the more likely is it that specialised forms of NP activity will be found there, except that certain activities, such as public relations; data processing; legal, insurance and pensions; research and development; market research and sales are not found at normal production sites but are detached into separate head offices, sales offices, computer centres etc. For production sites, average NP proportions increase with size but stabilise at some level, as declining proportions of the managerial and administrative functions outweigh increasing proportions of the scientific and technical ones. There may be a decrease in NP proportions at large sites of factories, as certain functions are moved into separate detached head offices etc.

383. Although consistent regional variations in the average size of factories do exist they appear to be insufficient to account for anything other than a minor proportion of the regional disparities in NPs.

NPs in organisations and corporations

384. The larger an organisation is, the more likely is it that specialised forms of NP activity will be found in it, so that by the time it employs 2000 or more workers most NP functions will be present. On the other hand, it appears that average NP proportions decline slightly with increasing corporate size, because the economies of scale in management and administration are greater than the increases in the NP proportions of scientific and technical workers. In addition, organisations whose production is concentrated on a few products use fewer NPs than those whose production is more diversified, and subsidiaries of US corporations use proportionately more NPs in general than UK-owned ones; particularly in the more professional activities such as data processing; accounts and finance; personnel; sales; and production-oriented activities.

385. NPs tend to be clustered at particular places within organisations, especially in head offices. This is particularly the case for branch-type corporations as opposed to subsidiary-type ones. The evidence of the Organisation Survey carried out by the research team is that this clustering helps to explain the regional disparities in NPs and that this is partly attributable to the location of detached head offices.

NPs in head offices

386. The main head offices of large corporations do not necessarily contain a wider variety of NP functions than those of small ones because several of the more administrative functions, such as accounts, pensions, sales, or the computer, may be hived off to satellite offices with increasing head office size, or increasing corporate size. In general, head office employment declines as a proportion of total corporate employment, with increasing size of corporations, and the head offices of the subsidiaries of foreign corporations are larger than those of UK-owned ones.

387. The population of large UK corporations known as the 'Times 1000' included, in 1974/5, 581 that could be said to be in manufacturing industry, of which 122 were subsidiaries of foreign corporations. In general, the larger the corporation, the more likely it is to have a detached head office. These are very much concentrated in the London area, but more so for the DHOs of subsidiaries of foreign corporations, which have a strong representation in the London area, than for the DHOs of UK-owned corporations. The NDHOs for UK-owned corporations are distributed much more in accordance with their total employment, but here again the subsidiaries of foreign corporations are concentrated in the London periphery.

388. Employment in detached corporate head offices accounts for some 50,000 NP jobs in the South East, 30,000 of them being in Central London. On the other hand only 7000 jobs can be accounted for in this way in Central and Southern England, and less than 6000 jobs in the development regions.

389. Employment in corporate detached research laboratories appears to amount to some 20,000 jobs in the South East whilst Central and Southern England have only 3500 and the development regions about 4000.

The explanation of regional disparities in NPs

390. Industrial structure only explains a small part of the excess NPs in the South East, but is a more substantial factor in explaining the deficits in Yorkshire/Humberside, and the East and West Midlands. The industrial structure of the North, North West and Scotland is relatively favourable to NPs.

391. After industrial structure has been taken into account, single-region organisations are only a major factor in Scotland, the South West, West Midlands and Yorkshire/Humberside. For the other regions, the effects of multi-region organisations are of greater importance. The distribution of NPs within large multi-region corporations, at the sub-corporate level, plays a considerable role in accounting for the relative deficits in NPs in all the Development Areas, and it is also an important factor in explaining the excess NPs in the South East region, amounting to some 60,000 jobs. Two reasons for this are that the large detached head offices of subsidiary companies tend to have a southern location, and a considerable proportion of the non-detached

head offices of subsidiaries and divisions are also located in the South East, often for historical reasons. In addition, the South East region has 50,000 jobs in detached corporate head offices and 20,000 in corporate research laboratories, whereas no other region can muster more than 7000 jobs in both categories taken together.

392. Detached head offices are located in the South East because of :

(i) the positive advantages of agglomeration that accrue to chairmen and managing directors because of the potential for extensive contacts, at a senior level, with personnel in other companies, government, finance, and from abroad;

(ii) the need of finance directors to be near the City;

(iii) internal linkages within firms that make it desirable that head offices should include a minimum number of NP functions that require extensive contacts with the chairman, managing director, and finance director. Many of these functions also derive benefits from the possibility and ease of contacts with experts in the London area;

(iv) the span of responsibility of senior personnel dictating that immediate subordinates should be close at hand, except in situations such that there is a break between control and executive action;

(v) the superior facilities provided for both UK and international communications.

393. The relative concentration of corporate research laboratories in the South East can be explained by :

(i) the region's industrial structure favouring high R & D industries whereas that of other regions is either biased towards low R & D industries or towards industries whose R & D has to be located at production sites;

(ii) the existence of a large potential supply of scientific and technical personnel in the South East;

(iii) the contact advantages of being near head offices and scientific centres, and having easy communications both to production sites and abroad;

(iv) the past history of the acquisition of suitable sites.

394. Using data for single-region organisations a strong correlation between output per production worker and average NP proportions was found at the regional level although this cannot be used to explain regional disparities in NPs attributable to either single-region or multi-region organisations because the mechnaism and direction of the relationship between the two variables cannot be identified.

Implications of the analysis

395. Although it is clear that measures to disseminate NPs from the South East could be a useful addition to regional policy there can be no guarantee that they would necessarily have the desired effects. In addition, the continued decline in employment in manufacturing industry, the tendency for the overall NP proportion to stabilise, and the recent exodus of head offices from London, all imply that at the present time conditions for introducing regional measures are far from ideal.

396. Of the three components considered to account for regional disparities in NPs only one, their distribution within multi-region corporations, offers much scope for policy. Policies directed at corporate head offices are not likely to move many higher-grade jobs, nor are they likely to go to the Development Areas. The more practical policies appear to arise for functions such as research or data processing, for whom contacts are of less importance, or for the head offices of subsidiary companies or divisions. In addition, general improvements in communications, especially international air links from areas outside the South East, could also play a long-term role.

397. On a more general level, it is clear that NP functions in manufacturing industry no longer provide a plentiful source of semi-skilled and unskilled 'white-collar' opportunities, and that there is an increasing need for professional and technical personnel. At the present time the pressure on senior executives is diverting their attention towards financial and legal activities, rather than technical and production-oriented activities. The relative dearth of fully experienced executives may be due to the domination of the 'subsidiary-type' of corporate organisation in British industry.

Appendix A Questionnaire used in the Organisation Survey

Strictly Confidential

SURVEY OF NON-PRODUCTION EMPLOYMENT IN MANUFACTURING INDUSTRY

(This survey is being carried out by the University of East Anglia (Norwich) under the sponsorship of the U.K. Government and the EEC. It is attempting to identify the major influences on the types, numbers and locations of non-production workers in industry.)

ALL QUESTIONS REFER TO: **COMPANY** .....

SITE .....

A– PRODUCTS

A knowledge of the products, processes used, and markets served by this factory will help us to identify broad links between these characteristics and non-production employment.

THE FOLLOWING QUESTIONS REFER TO TYPES OF PRODUCTS RATHER THAN SPECIFIC BRANDS, MODELS OR DESIGNS

MAIN PRODUCT TYPE .....

SECOND PRODUCT TYPE (if applicable) .....

	MAIN PRODUCT	SECOND PRODUCT
1. Approximately what proportion of the total output *of this factory* is contributed by each product type (in per cent)?		

2. Is the dominant type of process of production at this factory	PLEASE TICK	
Individual units or small batches		
or Large batches, mass production or continuous flow		
or Both types used extensively		

3. Using the code: A = over 90% B = 60–90% C = 40–60% D = 10–40% E = less than 10% How much of the output *of this factory* goes for further processing to:–		
(i) Other factories within your company or group		
(ii) Factories not within your group		

4. If *this factory* is responsible for selling its own products, are they sold:–	PLEASE TICK	
(i) Mainly in a few large orders?		
(ii) Mainly in many small orders?		
(iii) Neither (i) nor (ii), (ie intermediate or mixed situations)?		
(iv) Not applicable, (ie sales not a local responsibility)?		

5. Would you describe the major markets for your products as: [A] Highly competitive [B] Quite competitive [C] Not very competitive	A/B/C	A/B/C

6. Approximately what proportion of the output of each product types is exported?		

7. Approximately what proportion of the turnover *of this factory* is accounted for by the merchanting of goods produced outside your company or group?	

Survey Code Number .....

B– EMPLOYMENT

A knowledge of the numbers employed in individual non-production departments and of links with other sites will help us to understand the relative size of your non-production labour force

1. EMPLOYMENT *(if the headings below are inapplicable please amend them or add new ones)*

DEPARTMENT (or function)	NUMBERS EMPLOYED (Excluding all shop-floor employees other than managers)	DEPARTMENT (or function)	NUMBERS EMPLOYED (Excluding all shop-floor employees other than managers)
GENERAL SERVICES		**PRODUCTION-RELATED DEPARTMENTS**	
a. General Management (including Assistants and Secretaries)	.....	l. Product Design (including Drawing Office) Artists etc	.....
b. Public Relations and Information	.....	m. Production Planning & Management	.....
c. Data Processing	.....	n. Quality Control (Inspection)	.....
d. General Office Services (not tied to specific departments eg Typing Pool, Filing, Records, Telephonists)	.....	o. **RESEARCH AND DEVELOPMENT**	
SPECIALIST FINANCIAL AND LEGAL SERVICES		**MARKETING AND DISTRIBUTION**	
e. Wages and Salaries	.....	p. Market Research, Advertising, Sales Promotion	.....
f. Accounts and Financial Services	.....	q. Sales	.....
g. Legal, Insurance, Pensions	.....	r. Installation, Servicing of Sales (including hourly-paid workers)	.....
h. Purchasing	.....	s. Transport, Warehouse and Stores (including hourly-paid workers)	.....
PERSONNEL, WELFARE AND SAFETY		**OTHER OR OWN CATEGORIES**	
i. Personnel (including Training)	.....	.....	.....
j. Health, Welfare, Canteens etc. (including hourly-paid workers)	.....	.....	.....
k. Safety and Security, Factory Maintenance (including hourly-paid workers)	.....	.....	.....
		.....	.....
		TOTAL EMPLOYED (including operatives)	

2. SERVICE LINKAGES *('services' refers to those activities listed above and does not include public services)*

(i) INCOMING SERVICES i.e. services provided *to this factory from elsewhere* (whether from sites within your company (group), or from companies outside your group).

Please indicate such services in the appropriate spaces below, using the identifying letters for the individual services as in question 1. For example, if Data Processing is provided totally from elsewhere insert a 'c' on the first line.

Totally provided from elsewhere: .....

Largely provided from elsewhere: .....

Partially provided from elsewhere: .....

(ii) OUTGOING SERVICES i.e. services provided *from this factory to elsewhere* (whether to other sites within your company (group), or to companies outside your group).

Please indicate such services in the appropriate spaces below, using the identifying letters as before.

Large amount of the department's work is for use elsewhere: .....

Small amount of the department's work is for use elsewhere: .....

Name of Respondent: .....

Position in Company: .....

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R.E. Crum
Director, EEC/DI Project
University of East Anglia
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MANY THANKS FOR YOUR KIND HELP IN THIS RESEARCH

Appendix B Questionnaire used in the Head Office Survey

Strictly Confidential

SURVEY OF HEAD OFFICE EMPLOYMENT IN MANUFACTURING FIRMS

(This survey is being carried out by the University of East Anglia (Norwich) under the sponsorship of the U.K. Government and the EEC. It is attempting to identify the relative importance, in employment terms, of the various departments within Head Offices, and also the factors that influence the location of those departments)

ALL QUESTIONS REFER TO THE HEAD OFFICE OF .....

I – SITES

Please give the address of the Head Office of the above company.
If Head Office functions are carried out at several addresses, including separated group service departments, please give each address.

Site A: Head Office or Main Office .....

Site B: Other Office .....

Site C: Other Office .....

Site D: Other Office .....

Please indicate those of the above Head Office sites that are situated on or adjacent to a production site, and those that are physically separated from production sites by at least two miles.

At production sites ..... Away from production sites .....

II – EMPLOYMENT IN HEAD OFFICE DEPARTMENTS

Please complete the table below, using your own departmental descriptions

DEPARTMENT	Site (A, B, C etc. from I above)	Numbers Employed (Staff plus hourly-paid)	DEPARTMENT	Site (A, B, C etc. from I above)	Numbers Employed (Staff plus hourly-paid)
1.			11.		
2.			12.		
3.			13.		
4.			14.		
5.			15.		
6.			16.		
7.			17.		
8.			18. (if necessary continue overleaf)		
9.			Total Employment in	U.K.	Overseas
10.			Total Head Office Employment (including hourly-paid employees)		

Survey Code Number .....

PTO

IIA (Continuation Space for II overleaf)

DEPARTMENT	Site (A, B, C etc.)	Numbers Employed (Staff plus hourly-paid)	DEPARTMENT	Site (A, B, C etc.)	Numbers Employed (Staff plus hourly-paid)
19.			25.		
20.			26.		
21.			27.		
22.			28.		
23.			29.		
24.			30.		

III – MANAGEMENT SERVICE COMPANIES It may be possible that some employees in the group, whose main responsibility is administration or management services for the group as a whole, have not been included in the figures above because they are on the payroll of subsidiary companies within the group whose main function is the provision of such services (e.g. Sales, Export, Marketing or Technical Services companies). Could you please list such companies below, giving their location and total employment.

IV – DIVISIONS AND SUBSIDIARIES If any of your divisions or subsidiaries have Head Offices or Administrative Offices that are physically separated from a production site by at least two miles, could you please list them below, giving their name, address and Head Office employment

---

We realize that it may well be misleading to try to capture the complexity of Head Office activities by sole reliance on a postal questionnaire. In many cases we are making a formal request to a company for an interview, but for all companies approached any relevant additional information will be welcome.

Name of Respondent: .....

Position in Company: .....

(PLEASE USE THE PRE-PAID ENVELOPE – IT NEEDS NO STAMP)

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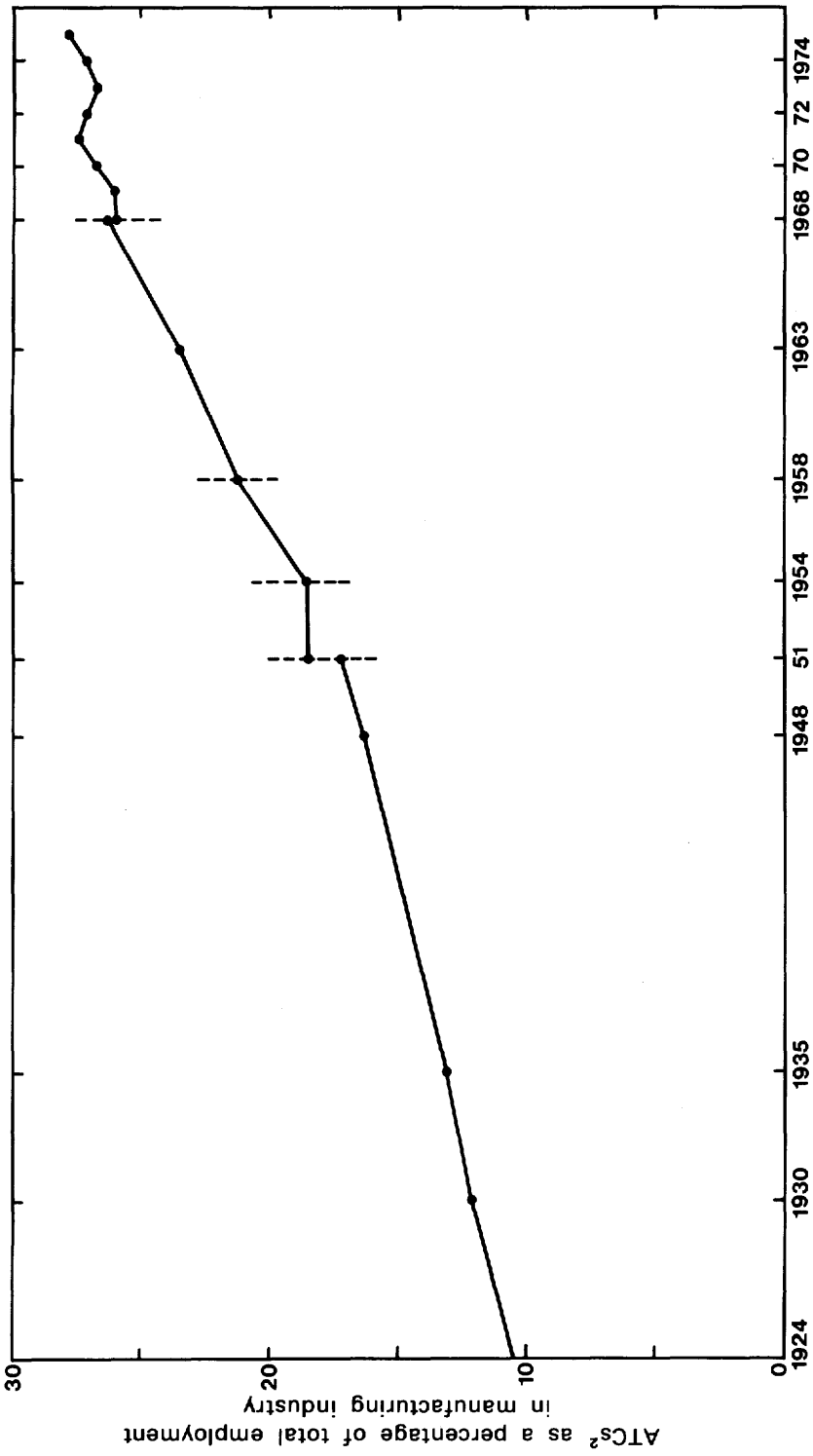
Director, EED/DI Project
University of East Anglia
Norwich NR4 7TJ
Telephone: 56161 ext. 2639

MANY THANKS FOR YOUR KIND HELP IN THIS RESEARCH

Appendix C

Figure 1.1 Growth in non-production employment in UK manufacturing industry, 1924-75[1]

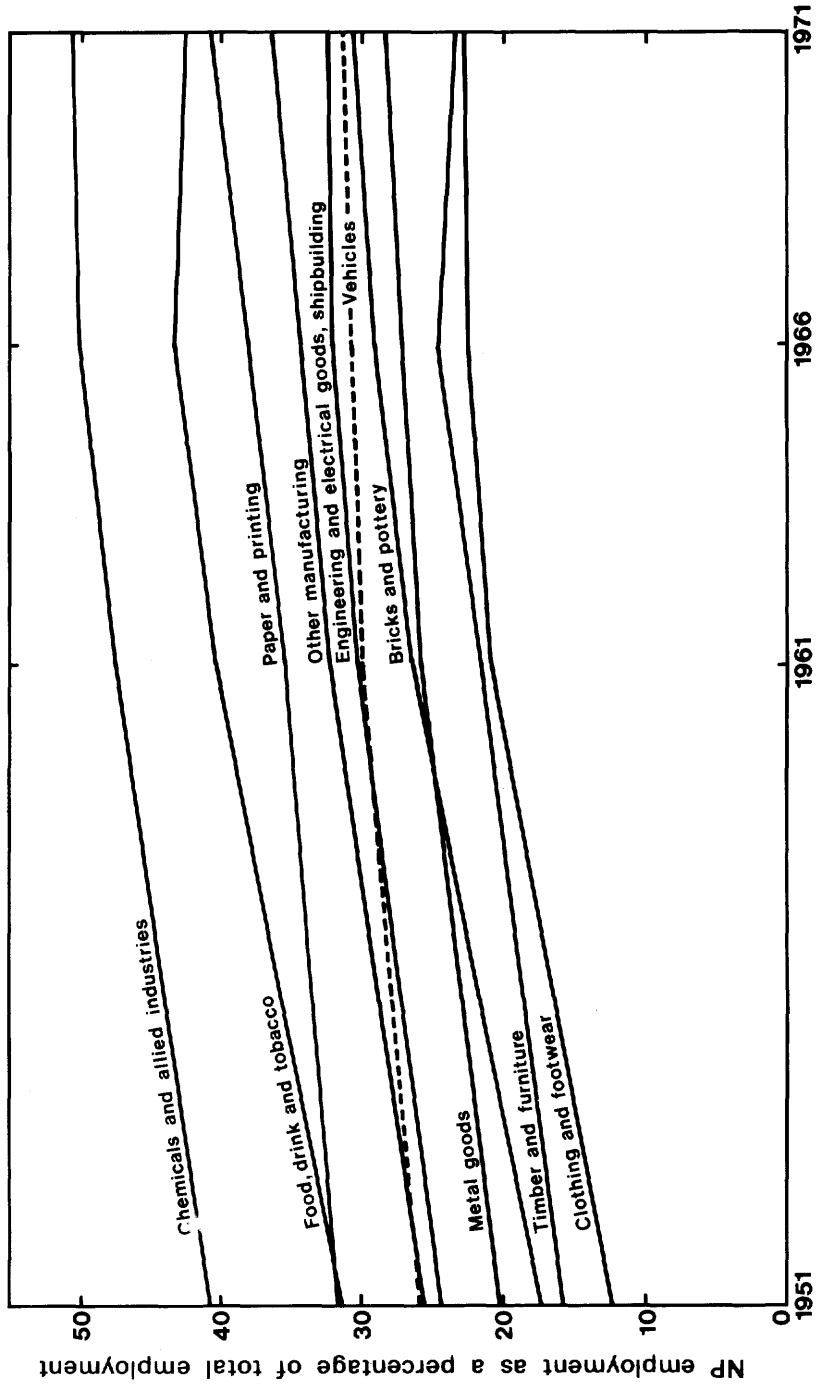


Source: British Labour Statistics, Department of Employment Gazettes.

[1] The dotted lines indicate years in which changes in definitions occur.

[2] ATC=Administrative, technical and clerical workers.

Figure 1.2 Non-production employment by industry, 1951–1971[1]



Source: Census of Population, 1951, 1961, 1966 and 1971

[1] Because of the difficulties involved in obtaining comparable data the occupations included here differ from those elsewhere in this report and the figures for 1951 refer to England and Wales whereas other years refer to Great Britain

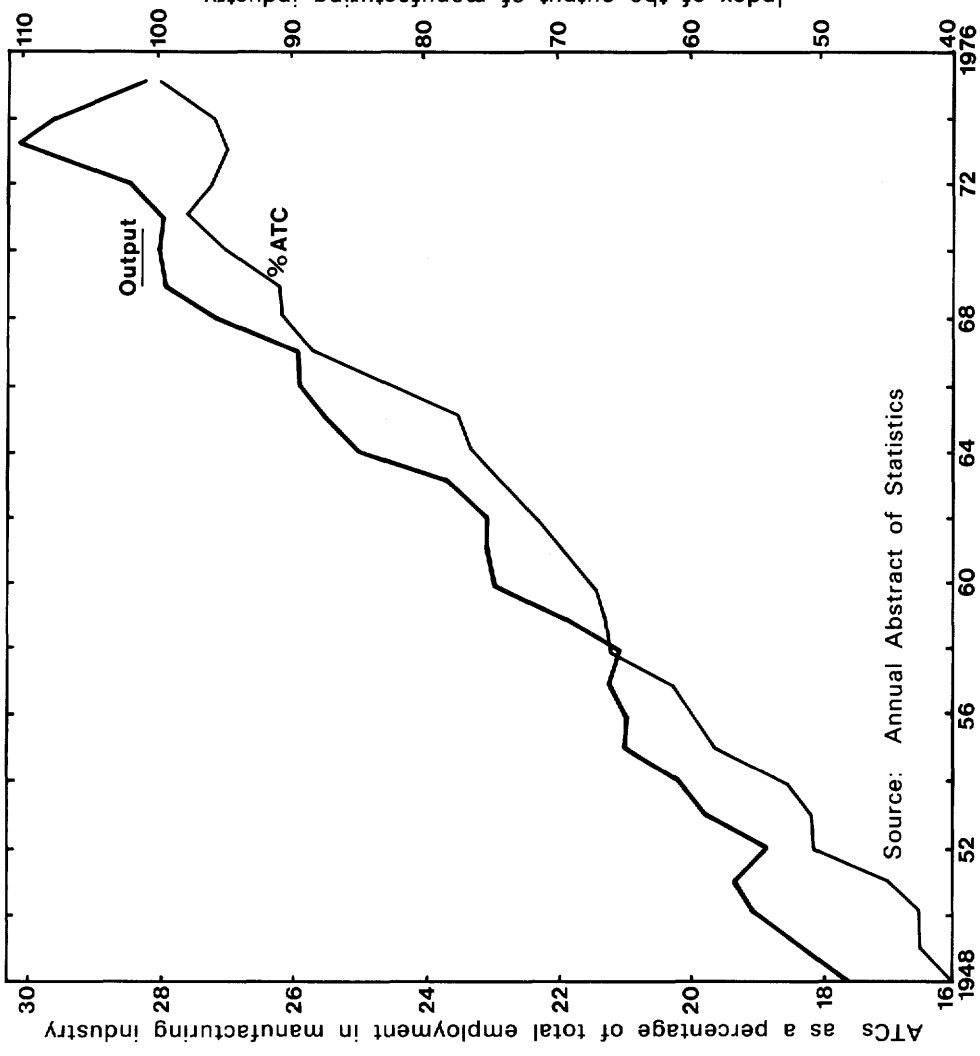
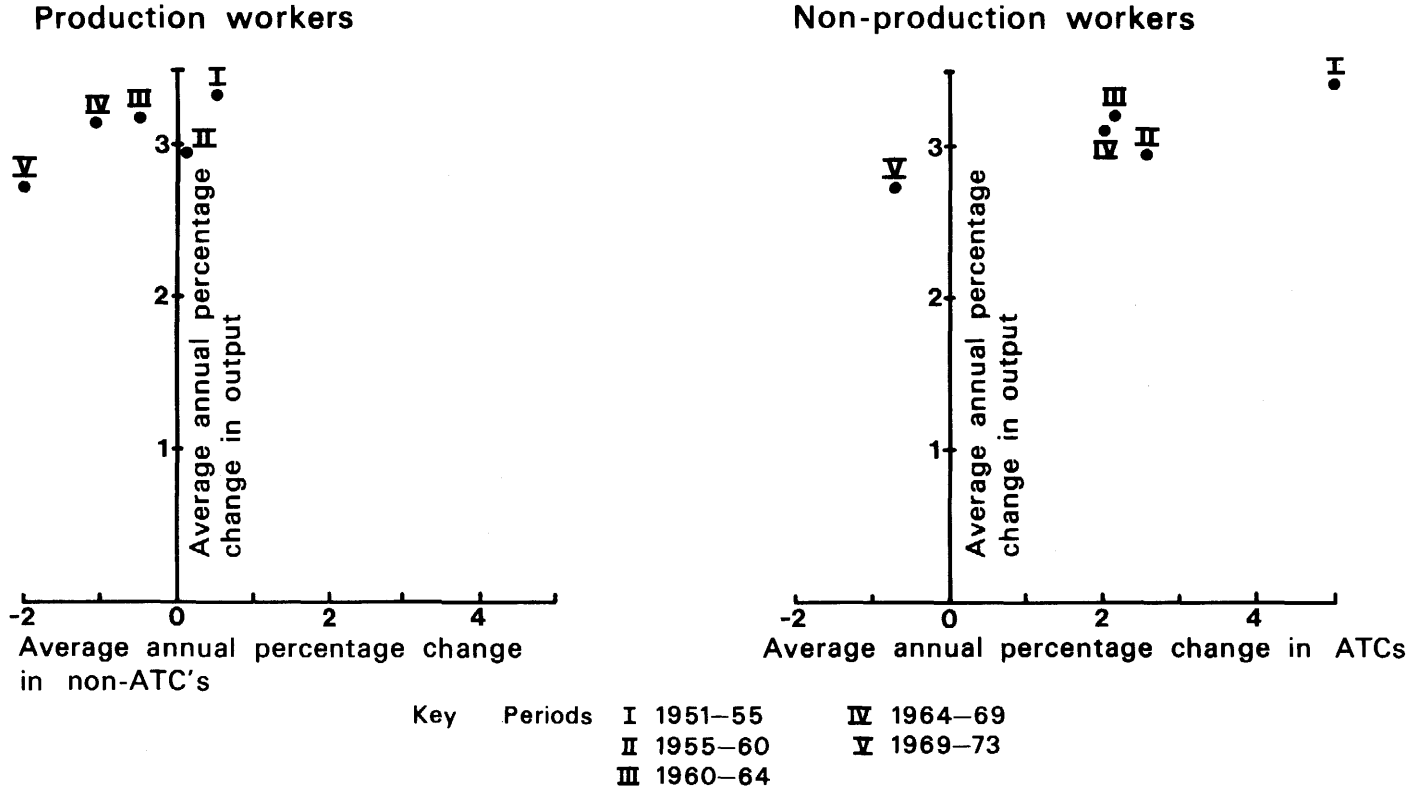


Figure 1.3 The proportion of ATCs in manufacturing industry and the level of output, 1948–1971

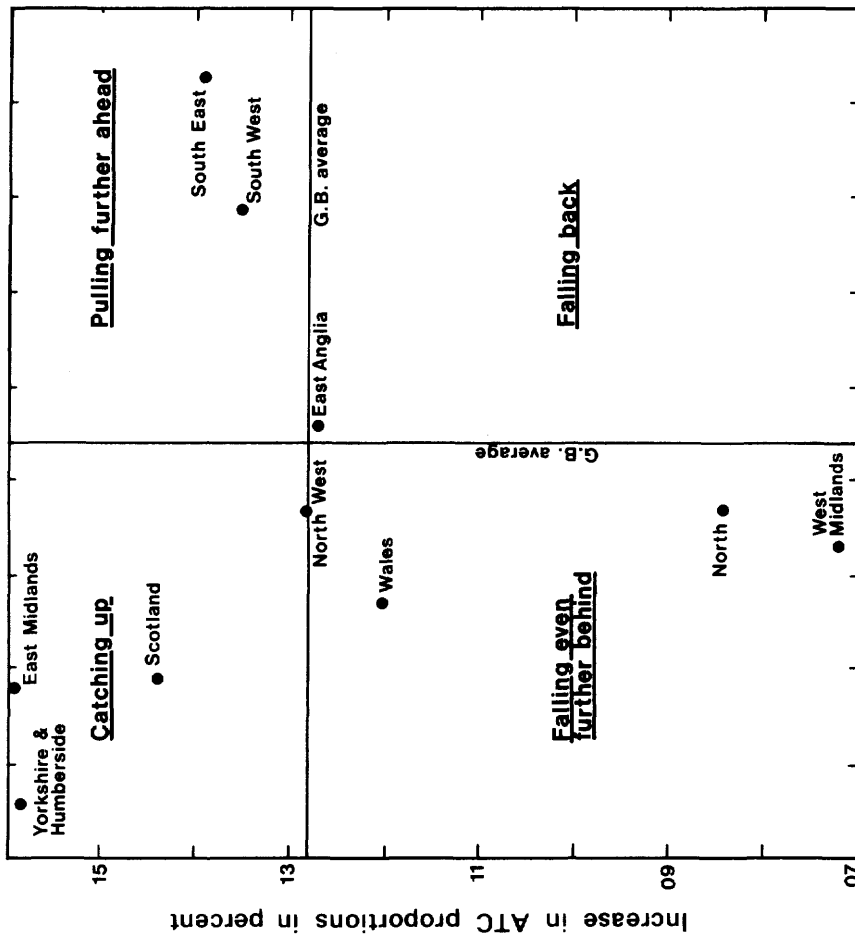
Figure 1.4

Changes in ATCs,non-ATCs and output over successive trade cycles, 1951–1973



Source: Annual Abstract of Statistics, British Labour Statistics and Department of Employment Gazettes

Figure 2.1 Growth in ATC proportions, 1963–1971



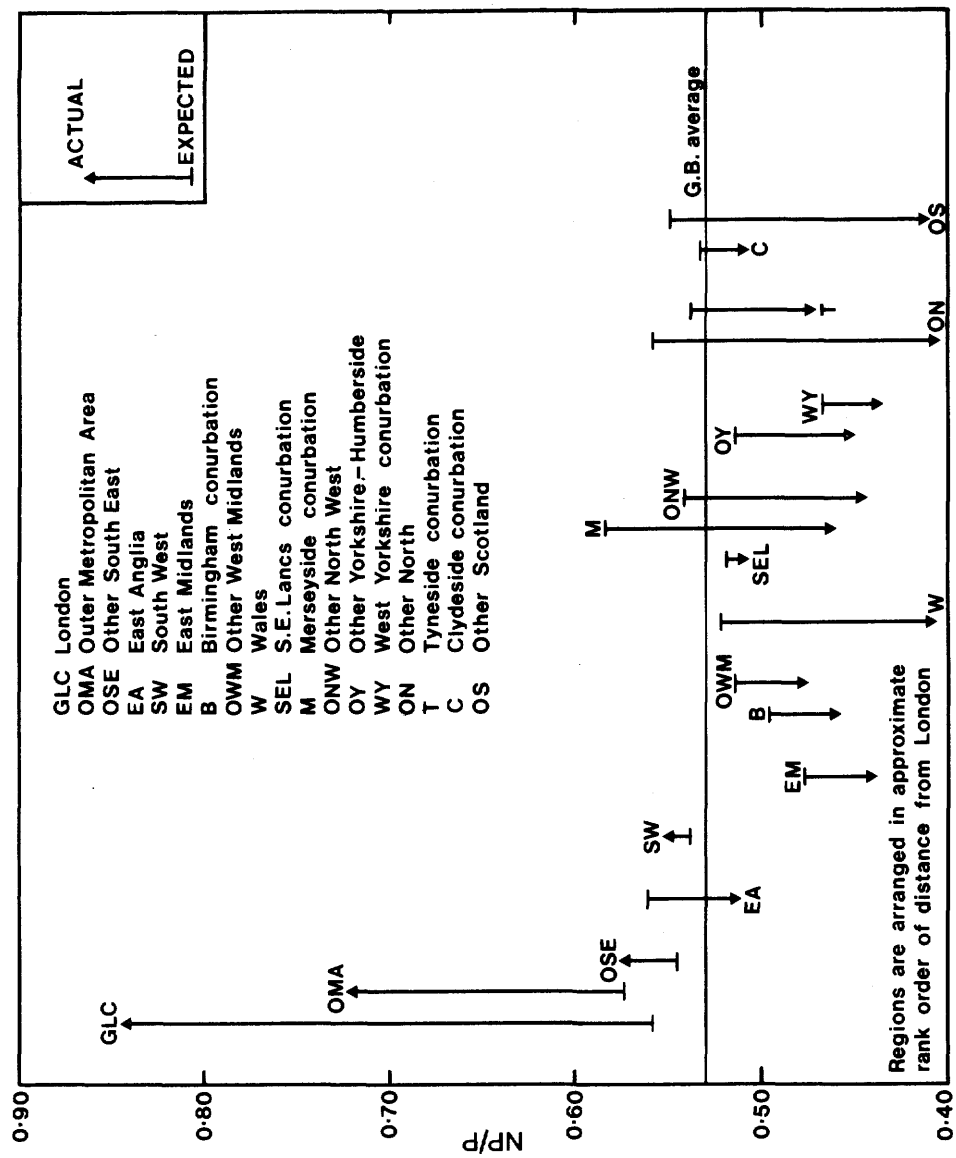
Key

Regions to the left of the vertical line started in 1963 with an ATC proportion less than that for Great Britain as a whole.

Regions above the horizontal line had a greater proportional increase in the ATC proportion over the period 1963–71 than the average for Great Britain

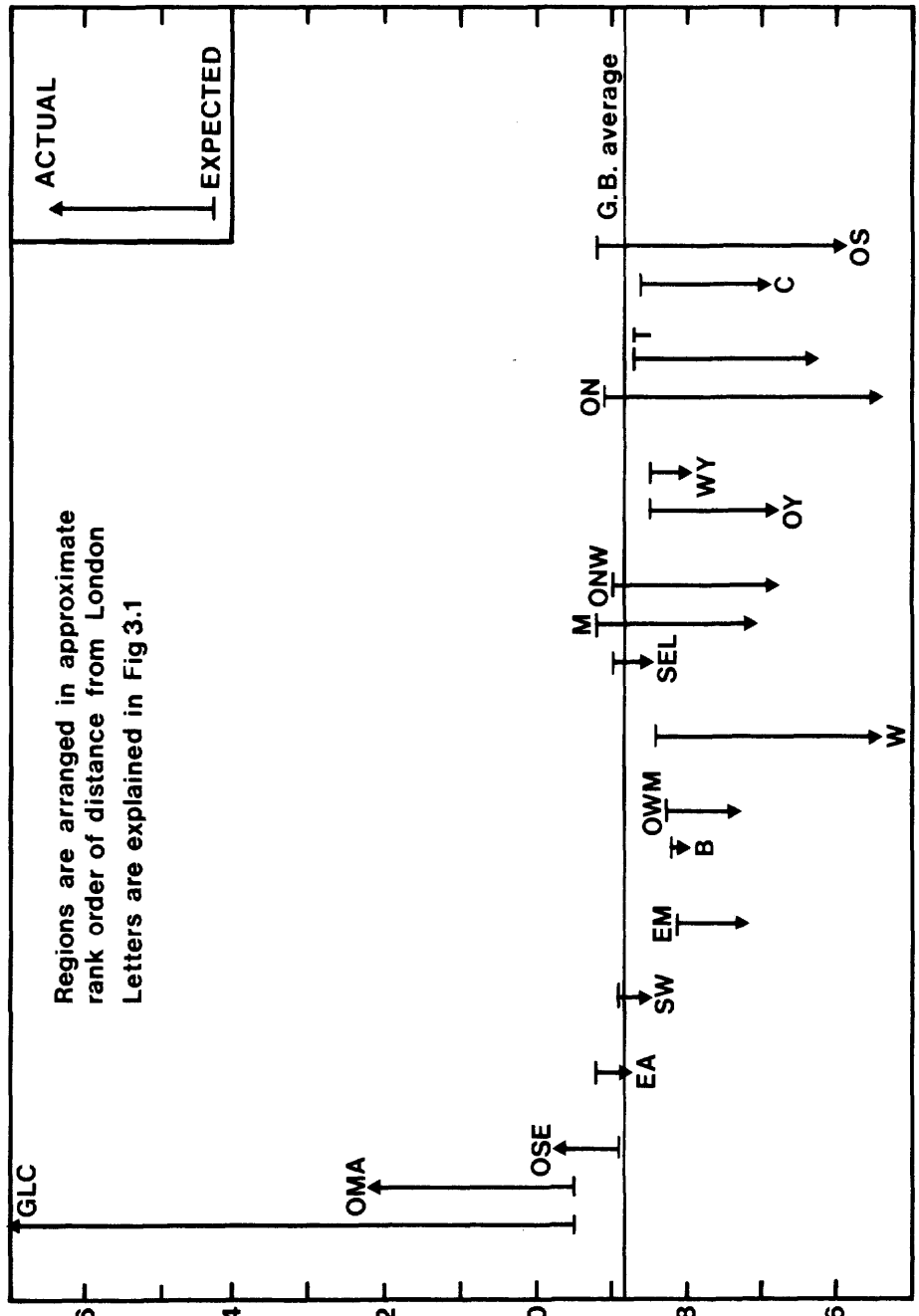
Source:
Census of Production,
1963,1968 and 1971

Figure 3.1 Actual and expected NP/P ratios: all NP workers, 1971



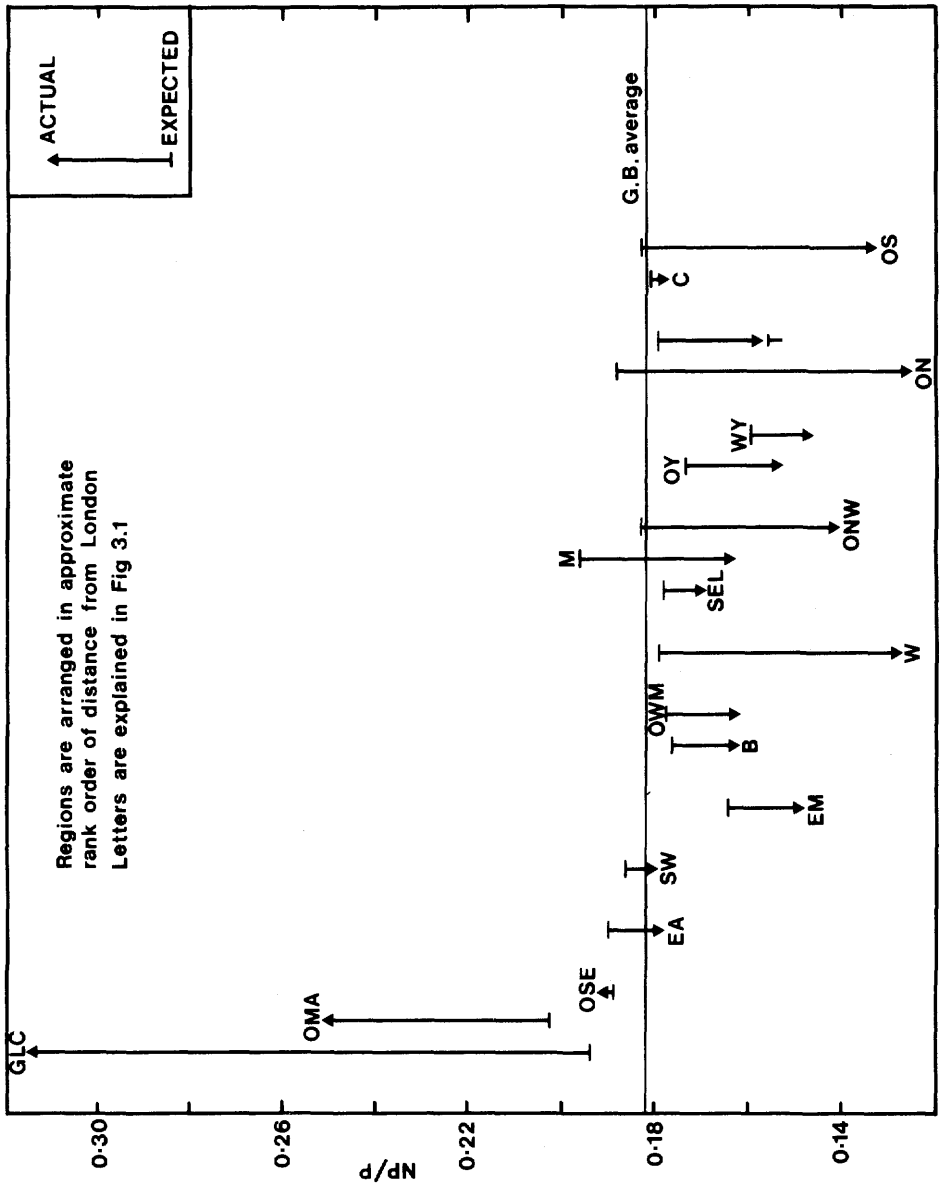
Source: Census of Population, 1971

Figure 3.2 Actual and expected NP/P ratios: managerial and professional workers, 1971



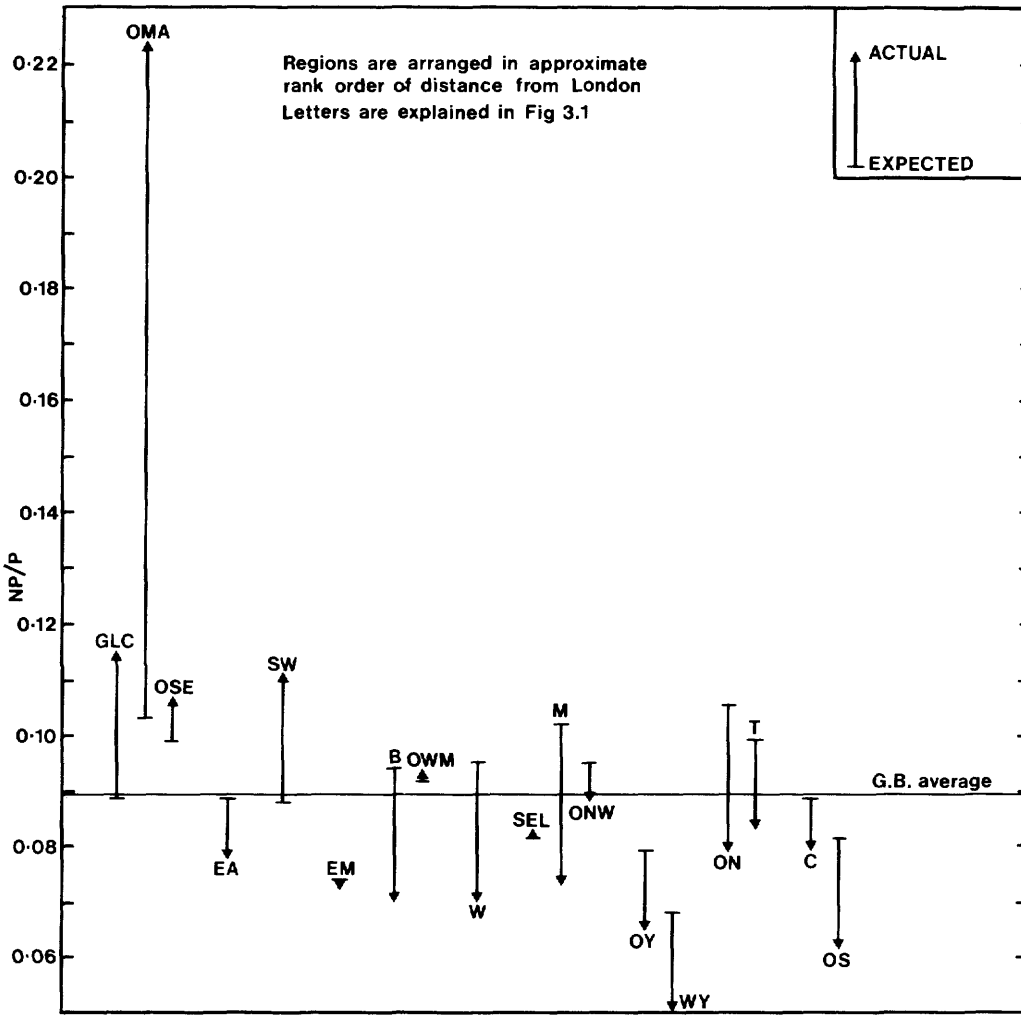
Source: Census of Population, 1971

Figure 3.3 Actual and expected NP/P ratios: clerical workers



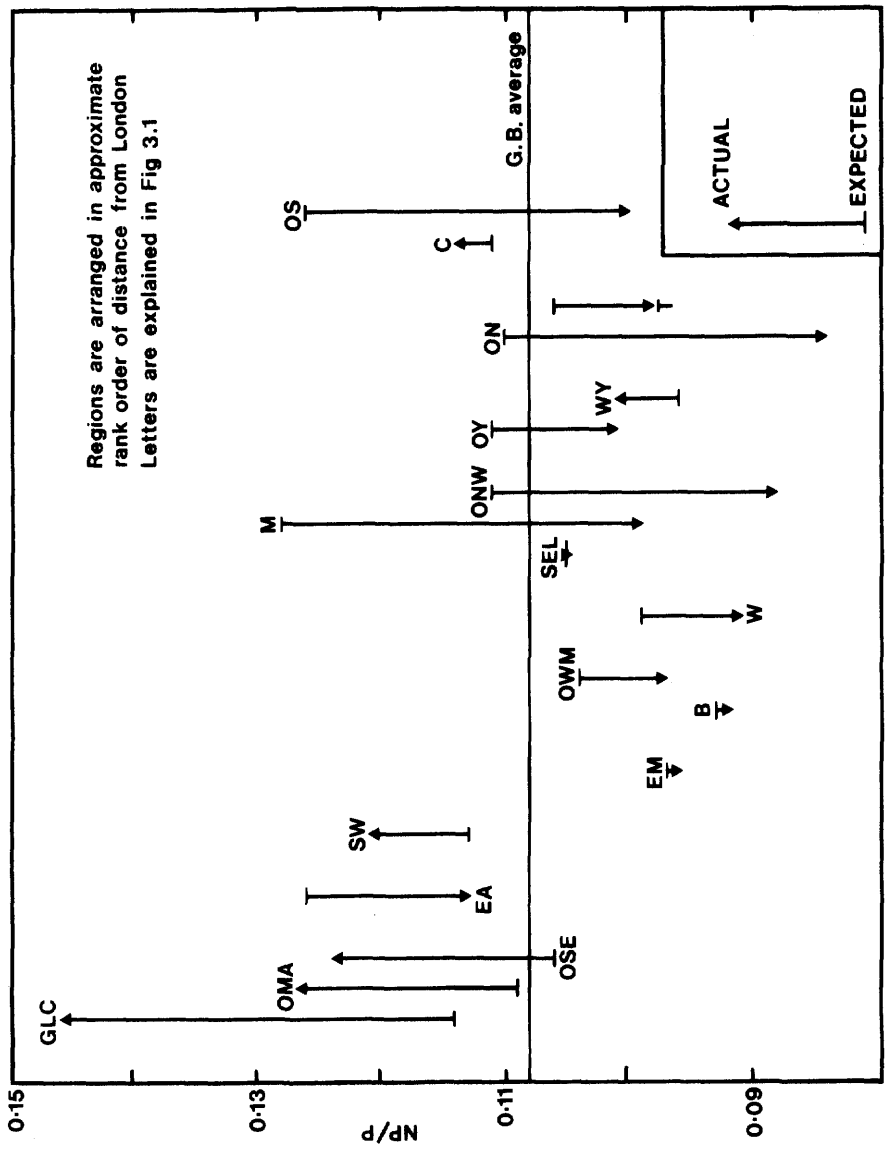
Source: Census of Population, 1971

Figure 3.4 Actual and expected NP/P ratios: scientific and technical workers



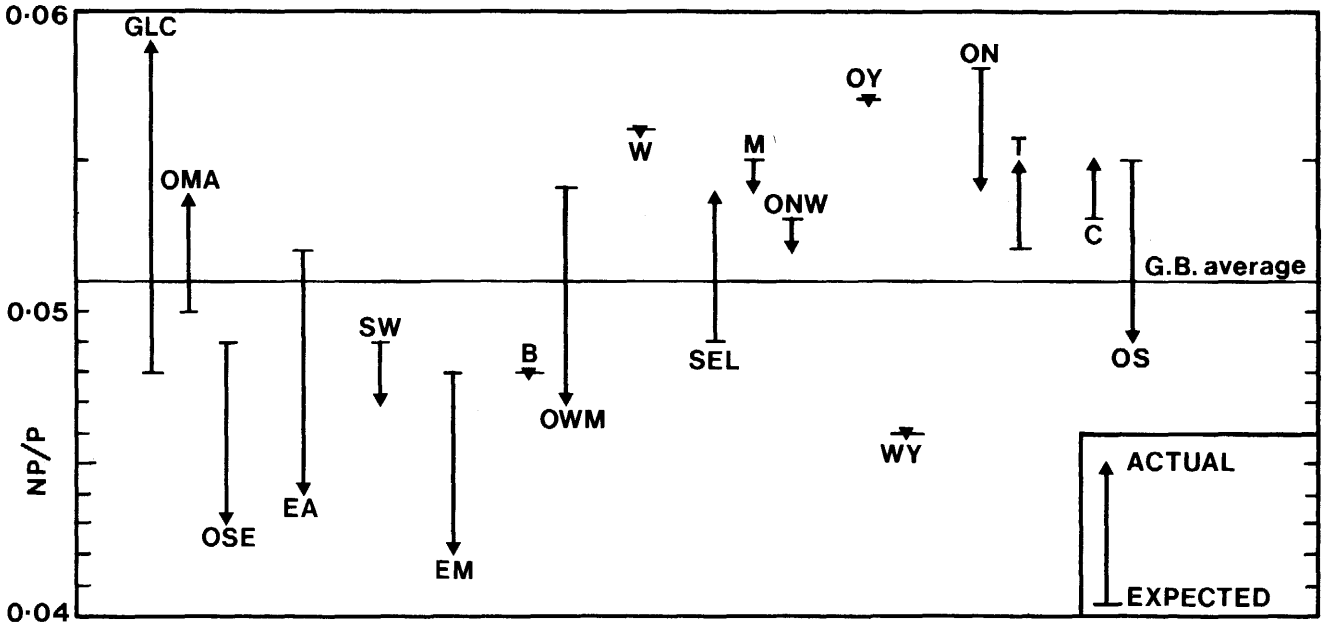
Source: Census of Population, 1971

Figure 3.5 Actual and expected NP/P ratios: sales and distribution workers



Source: Census of Population, 1971

Figure 3.6 Actual and expected NP/P ratios: service workers



Regions are arranged in approximate rank order of distance from London
Letters are explained in Fig 3.1

Source: Census of Population, 1971

Figure 6.1 ATC[1] employment as a proportion of total employment, by size of establishment,[2] by SIC industry order:1968

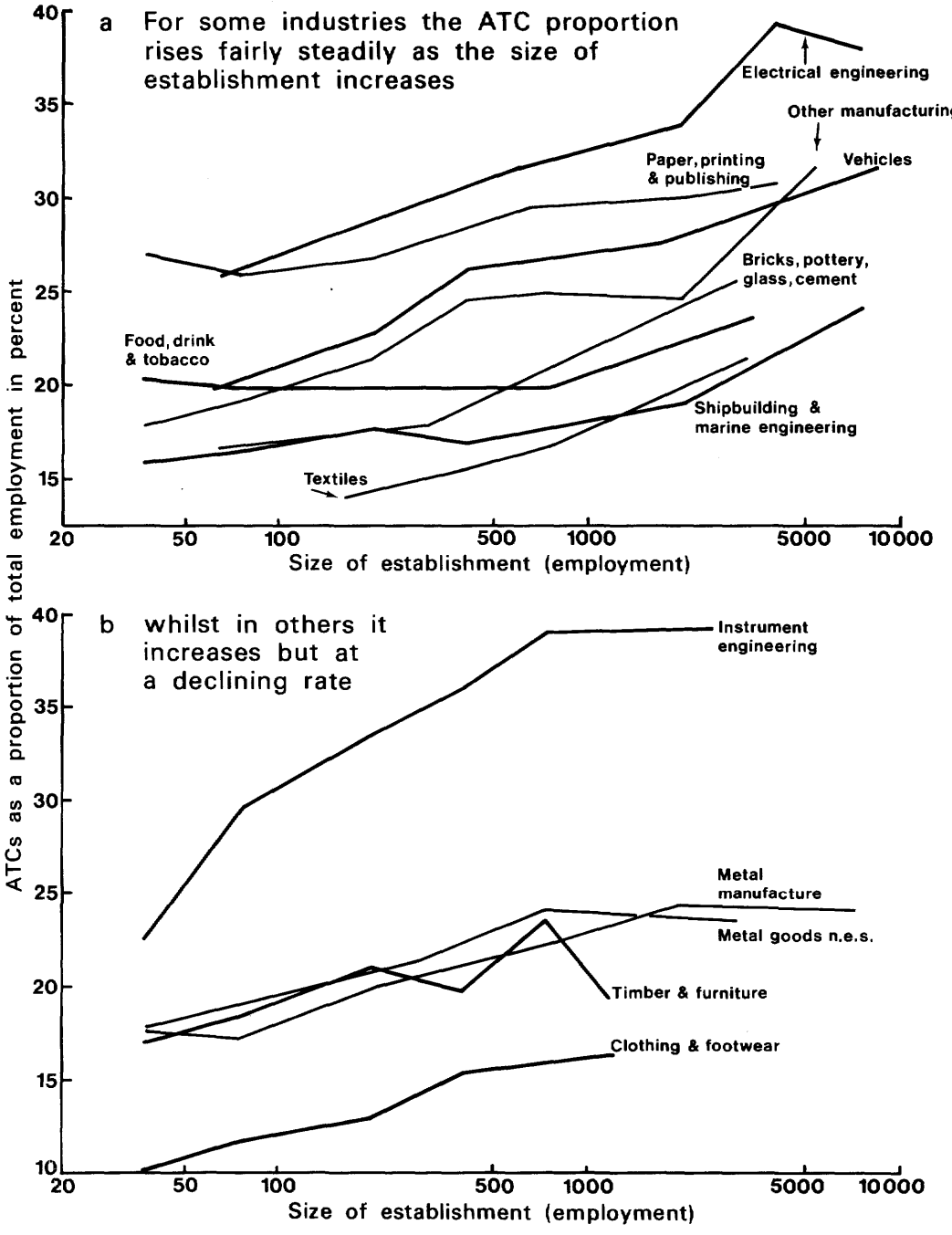
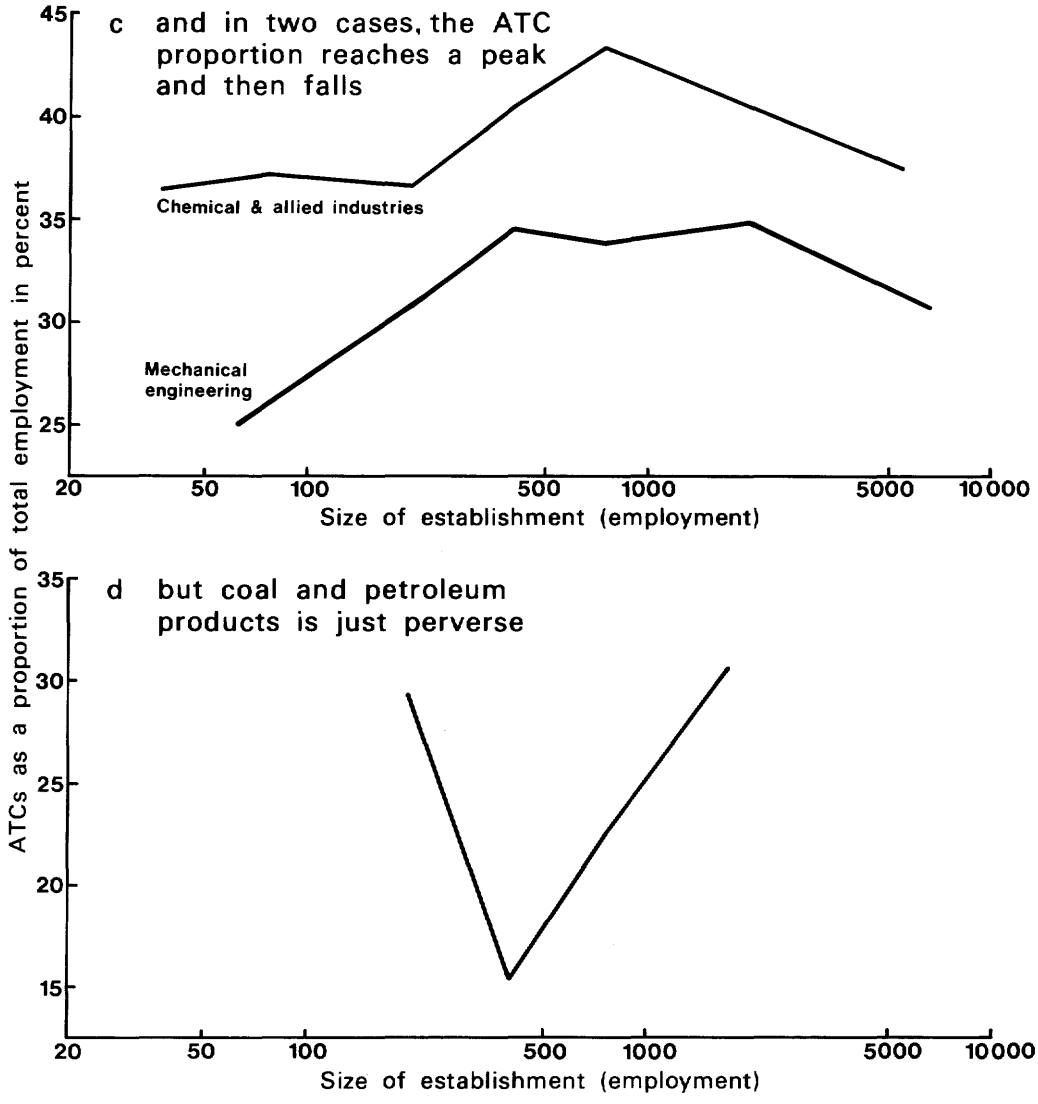


Figure 6.1 (Continued)

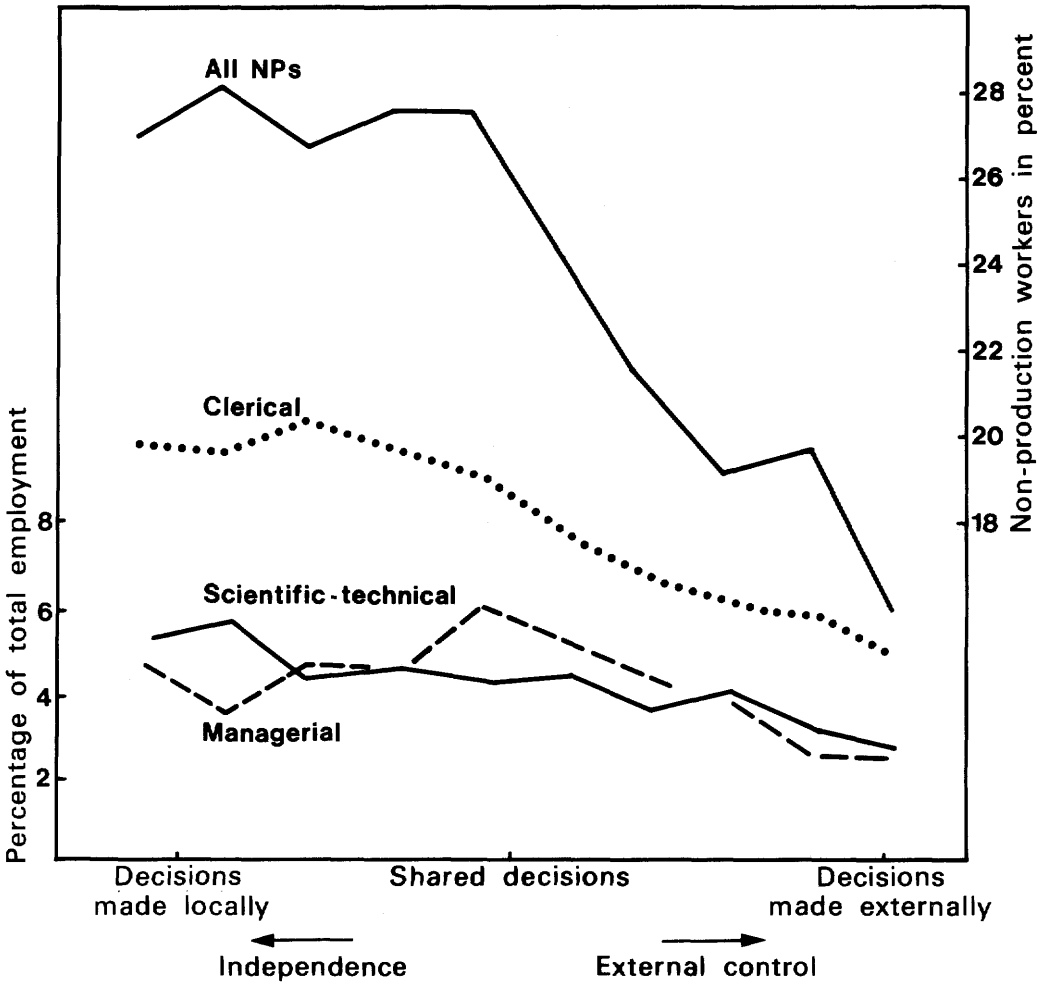


Source: Census of Production,1968: Analysis of manufacturing industries by employment size of establishment: Business Statistics Office 1973

[1] Strictly speaking 'non-operatives' and therefore including working proprietors

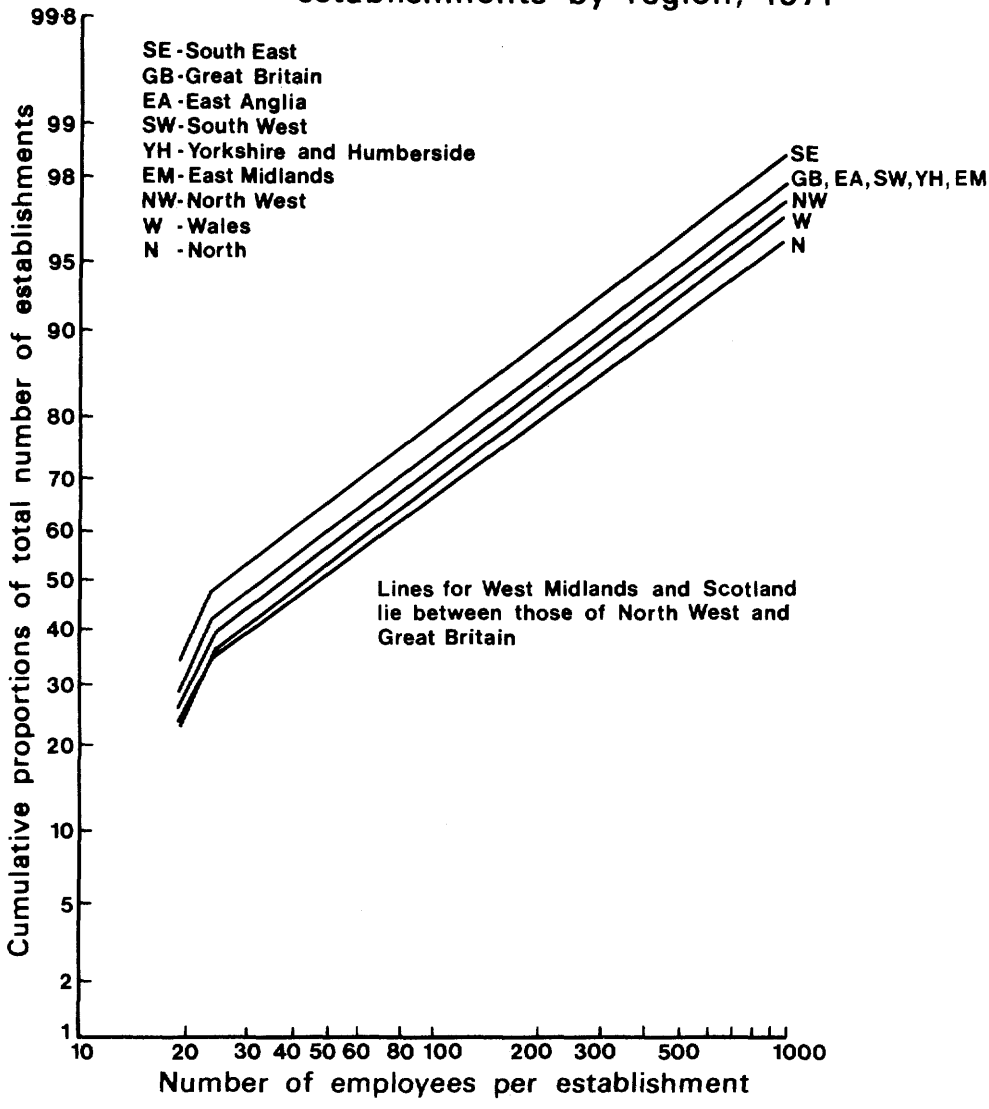
[2] See paragraphs 176 and 177

Figure 6.2 The effects of the location of decision-making on average NP proportions at sites,1974



Source: Site survey

Figure 6.3 Size distributions of manufacturing establishments[1] by region, 1971

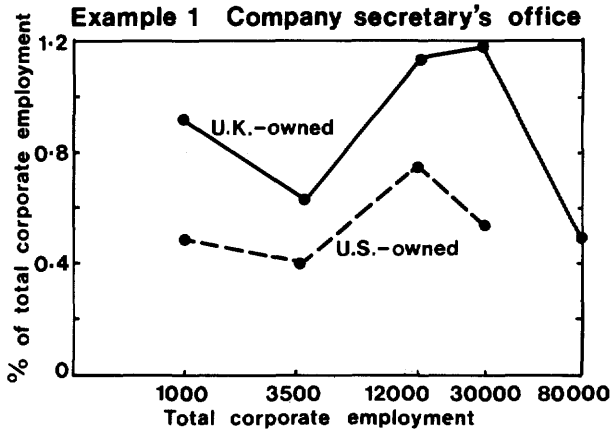


Source: Census of Production, 1971

1 See paragraphs 176 and 177

Figure 8.1 Selected head office functions by ownership and corporate size, 1976.

For a few functions U.K. corporations' head offices have a greater proportion of total corporate employment than U.S.-owned ones, for any size range:-



But in some of these cases as corporate size increases the two types of corporation arrive at similar proportions:-

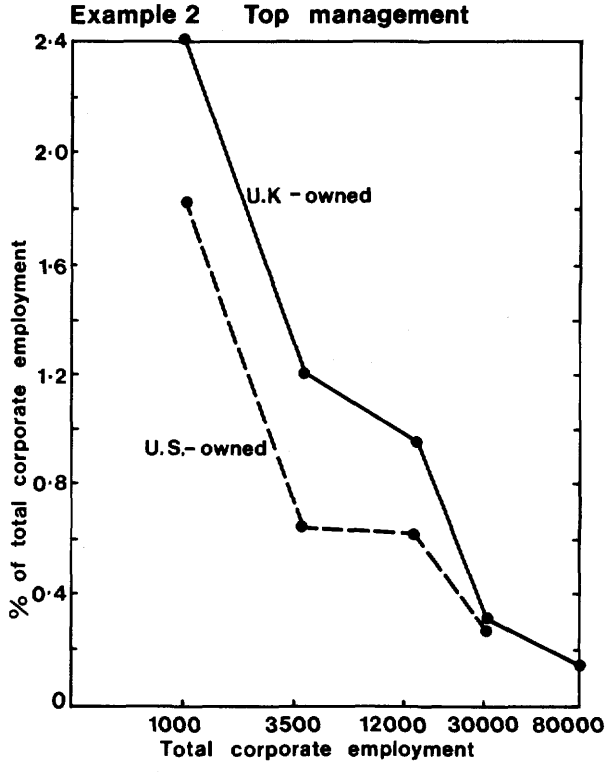
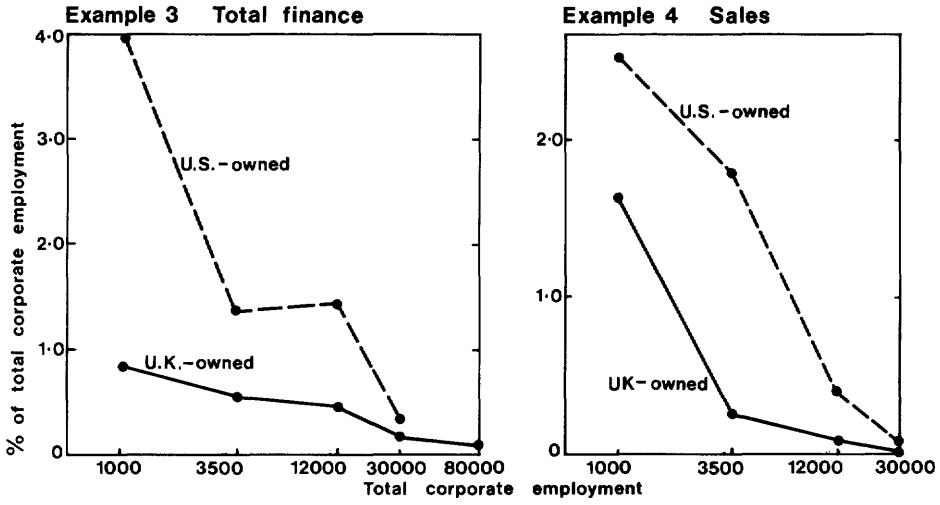
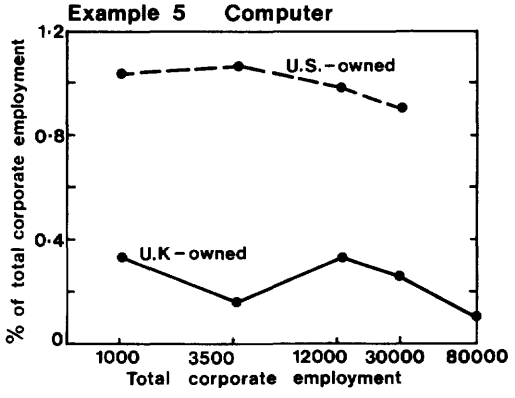


Figure 8.1 (Continued)

This is also the case for a number of functions where U.S.-owned head offic have larger average function proportions than U.K.-owned ones:-

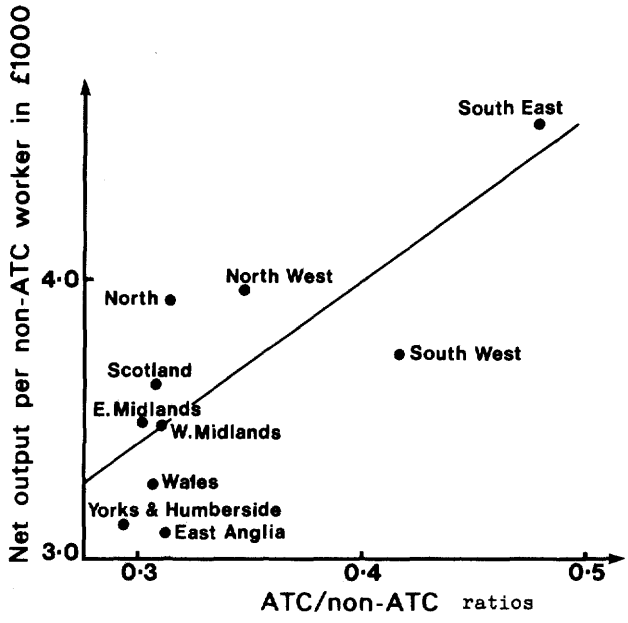


Finally, for some functions U.S.-owned corporations employ more than U.K. -owned ones in all size ranges:-



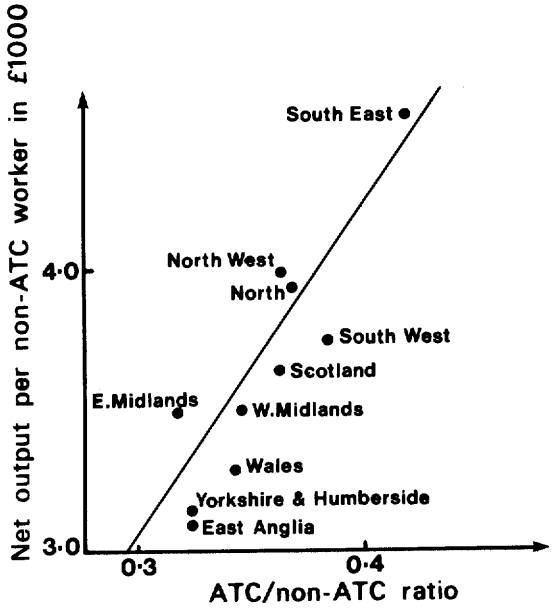
Source: Head Office Survey.

Figure 9.1 Net output per operative and ATC/non-ATC ratios in single region organisations 1971: actual data



Source: Census of Population, 1971, and Census of Production, 1971.

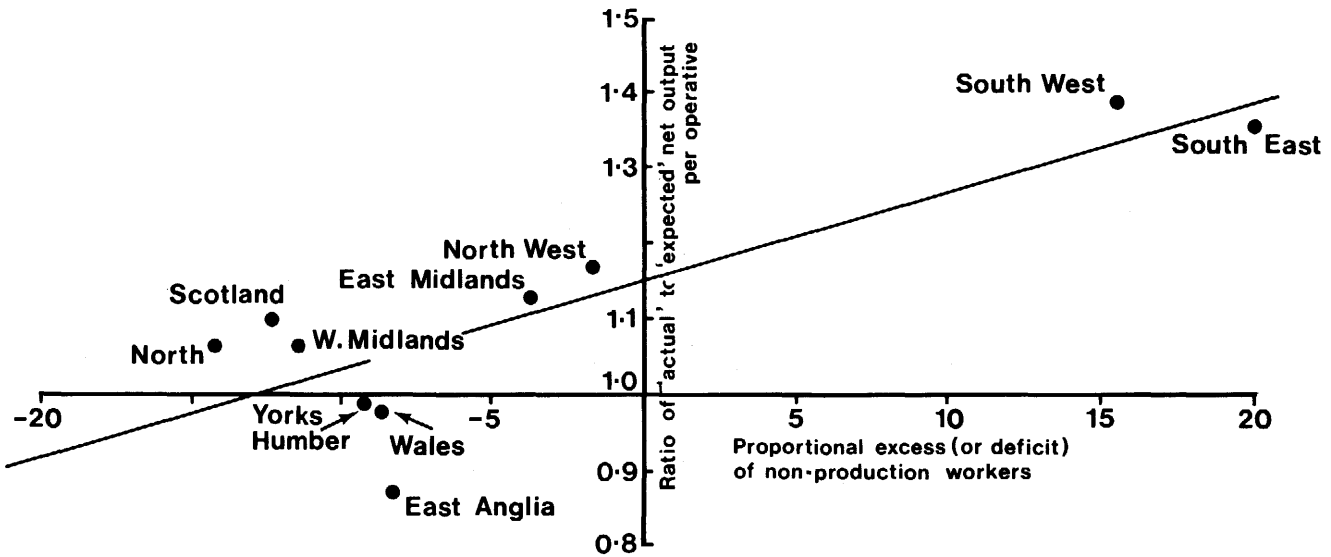
Figure 9.2 Net output per operative and ATC/non-ATC ratios in single-region organisations, 1971: adjusted data[1]



Source: Census of Population, 1971, and Census of Production, 1971, plus research team estimates.

1. 'Actual' net output per production worker together with 'expected' ATC/non-ATC ratios. See paragraph 343.

Figure 9.3 'Residual' operative productivity and non-production workers[1] in single-region organisations, 1971.



Source: Census of Population 1971, Census of Production 1971 and rearch team estimates.

1. Non-ATCs and ATCs respectively.

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