

6 The Regional Environment for Innovation

One of the main aims of this research has been to examine how regional characteristics influence the ability of small firms to develop new products. The main evidence which we have considered so far has come from differences between the small firms in our surveys. Now we turn to evidence from other sources, about underlying differences between the regions which might help to explain why innovation may be either fostered or made difficult.

If of course there had been previous research directly linking regional characteristics to innovation in small firms, then the present study would have been superfluous. There has been no such research, but there is a great deal of information about regional characteristics, of both a social and economic kind. It is our task to select from this mass of information and to suggest how it may shed light on the differences in innovative performance which we have already identified.

We do not claim that this type of review leads to strong, cause-and-effect conclusions. That could only be done by research directly connecting regional characteristics with what happens in particular kinds of firms. We can, however, sketch the background in a way which may help to make the differences in innovation easier to understand or interpret. In addition, the review may be able to *eliminate* some possible explanations and so simplify our ideas a little.

In this chapter, we consider only Britain (not the FGR), and so the relevant background data concern the East Midlands and Northern

regions. We have selected those aspects which seem to have a bearing upon the main findings of the past two chapters. In Chapter 4, we showed the importance of human resources, and of the deployment of those resources, in achieving product innovation. It is important, therefore, to consider whether regional characteristics facilitate or obstruct the supply of people with the skills needed in product development. In Chapter 5, it was shown that market relations, especially relations with customers, were crucial for product innovation. Accordingly, we examine characteristics likely to affect the regional economic structure. We conclude the chapter by looking at some of the sources of assistance to small firms, and consider how these might be expected to change regional differences in innovation.

The labour force

In Chapter 4 we looked at the some ways in which the availability of capable people helps to achieve innovation in small firms. We also asked firms in the British survey to rate the importance of various considerations for the efficiency of their operations. Innovative firms gave a particularly high rating, relative to non-innovators, to the availability of technical staff. It seems natural, therefore, to begin by considering each region's labour force.

Changes in population level provide a first indication of a region's social condition, with outward migration in particular signalling declining areas, and inward migration signalling areas of economic vitality. The Northern region's population declined by 1.1 per cent between 1978 and 1983, while during the same period the East Midland's population rose by 1.6 per cent¹. The net migration between mid 1982 and mid 1983 out of the Northern region was 8.4 per cent, a very steep rate of decline, while migration into the East Midlands was 3.1 per cent. It is generally assumed that skilled or qualified workers have a greater degree of mobility than unskilled or unqualified workers, so these patterns are likely to affect adversely the Northern region's supply of skills, while improving the position in the East Midlands.

The proportion of skilled and qualified workers can in its turn influence the rate of formation of new firms², partly because it is from this group that small business proprietors often come, and also because new firms need skilled people. It is also known that firms established

by highly qualified people, and by those who have previously had management experience, tend to have the highest growth rate³.

The proportion of households headed by managerial or professional employees in both the regions was lower than the average for the UK, but the national average is much influenced by the South East region^{4,5}. The proportion was higher in the East Midlands than the North⁶. In addition, the proportion of households headed by a self-employed person in the East Midlands was higher than in the North, and equal to the average for the UK⁷. On this basis the East Midlands appears to be more inclined to entrepreneurial activity than the North. This, together with the higher proportion of managerial and professional employees may help to create a more favourable climate for innovative small firms.

One foundation of skills in the labour force is the level of educational attainment. A higher proportion of economically active persons in the East Midlands had attained a degree or equivalent qualification (6.5 per cent) in 1983 than in the North (5.9 per cent). This pattern was repeated in the case of other higher educational qualifications, such as Higher National Diplomas. This is likely to reflect differences in inward and outward movement, or differences in aspirations for further and higher education between the regions, rather than differences in attainment at school. The two regions were about equal in the latter respect⁸, but a substantially higher proportion of school leavers in the East Midlands intended to go on to full-time further education⁹.

Another factor of particular importance for the establishment of small firms is the level of owner occupation of homes. Many small businesses are initially located in homes, and home ownership is an important source of start-up capital^{10,11}. In fact, the proportion of home ownership in the East Midlands, at 65 per cent of all households, was higher than the national average and considerably higher than the figure in the Northern region in 1983, which was only 53 per cent. So the Northern region was in a disadvantageous position for starting new businesses. This would tend to reduce the flow of businesses responding to new technological opportunities, and to reduce local competition faced by established small businesses. Conversely, the unusually high level of home ownership in the East Midlands should

help to assure a strong flow of new small businesses, especially when acting in conjunction with relatively high qualification levels.

But the formation of new businesses can be stimulated by quite different influences. It has often been suggested that unemployment in an industry may lead workers whose future has become insecure to go into business on their own account. There is some direct evidence from surveys that this is so¹², and a relationship has been observed between the change in the national rate of unemployment and the rate of formation of new firms¹³. The rate of unemployment in the North has been consistently higher than in the East Midlands. In fact, the North has had one of the highest rates of unemployment of any region, while the rate of unemployment in the East Midlands has over the past decade consistently been below the national figure. In addition, the rate of unemployment grew particularly rapidly in the North during the recession of 1980-82¹⁴. The rate of redundancies was consistently higher than that for the East Midlands; in the first half of 1984, for example, it was 28 per 1000 workers in the North but 13 per 1000 workers in the East Midlands.

The existence of so many displaced and insecure workers in the North would have been expected to lead to a high rate of new business formation there. It is possible, however, that this was offset by the high rate of outward movement to which we have already referred. If the more enterprising workers from the North saw their best opportunities in leaving the area, this would reduce any tendency to form new businesses.

There seems to be a combination of influences which assures a supply of entrepreneurs and skilled and qualified workers in the East Midlands. Conversely, a combination of circumstances reduces the supply of human resources for small businesses in the North.

At this point, however, it should be recalled that in Chapter 4, we concluded that differences in the skills of the work-force did *not* except to a small extent distinguish innovative from non-innovative firms. It was the way in which available resources were deployed which made the main difference, especially whether firms had some organized R & D activities. How can the evidence presented earlier be reconciled with the apparent differences in labour supply favouring the East Midlands?

First, although the *numbers* of engineers, technicians and skilled production workers were similar in the two regions (and in innovative and non-innovative firms), the *quality* of the people in those jobs may have been different. A region with a greater supply of qualified people will tend to have posts at a given level filled by individuals with (on average) higher qualifications. More generally, firms in the region with the better supply will have more choice in recruiting the people with the qualities they require. It is true that in an expanding region, competition between employers in the job market will be greater than in a static or declining region, but the more successful and innovative firms should still have a better chance of getting the kinds of people they want. Our survey was not able to examine qualifications and other aspects of work-force quality in sufficient detail to test this interpretation directly, but it is a plausible one.

Moreover, a particularly crucial influence over innovation is likely to be exerted by the entrepreneurs running the small businesses. It is their outlook on product development, their choices over the organization of R & D activities, and their external contacts, which will decisively shape each firm's approach to innovation. At this level, the findings described in Chapters 4 and 5 are consistent with the points made in the present section. The East Midlands has been better placed to benefit from a flow of new businesses, bringing in fresh ideas and competing with the established firms. The North on the other hand is likely to have had a relatively slow growth of new businesses, with repercussions on competition and on the adoption of new technology.

Higher education

Since the supply of qualified people is important for the growth of new businesses, it is also of interest to examine the higher educational (HE) establishments in each region which contribute to this supply. In addition, HE establishments are among the external sources of expertise which small firms can draw upon in developing new products and processes. When we asked firms in the British sample to rate regional characteristics in terms of their importance, the innovators gave considerably more weight than the non-innovators to the possibility of cooperation with a local university or research institute. Other research has argued that Cambridge University played a central

Starting up Small Firms: Examples

Fabrication and Assembly Company (FAC) was started in 1972 by two redundant managers, with an initial capital of £800 and a car. Both men put up their houses as collateral and secured a bank loan with which they bought second-hand equipment. The company was located in a disused barn. This was gradually developed, but after four years FAC had to move because local farmers objected to the industrial use.

Initially FAC had no employees and the two founders manufactured the product (bridge parapet anchorages) themselves, as they both had extensive practical experience and one was an expert welder. The first employee was recruited after five months.

Farm Machinery Manufacturer (FMM) began its business by selling the cattle feeding device to local farmers. It was located in a converted barn on the farm owned by one of the partners. The two partners provided start-up capital from their private resources, and the company remains primarily financed by shareholders' loans. After the device was exhibited at an agricultural show, demand permitted the business to become fully established. Shortly after, it moved to industrial premises on a nearby estate.

Specialized Knitting Machines (SKM) was based on a small subsidiary company which the owners had put into the hands of the receiver, despite the offer of a management buy-out. The present owner, who was the managing director of the former company, re-mortgaged his house in order to purchase the business from the receiver. However, this finance was insufficient and additional funds were obtained from an American entrepreneur. The business initially continued on its former site, with the premises being leased from the original owners. The lease expired after a short period, however, so that SKM was obliged to seek new premises.

Incinerator Company (IC) was a spin-off from a general engineering company run by three partners. The engineering company was, itself, their second attempt at starting a business. Initial capital, a few thousand pounds, had been put up by the partners and was used to buy second hand machines of a simple type. Two of the partners were skilled machinists, and they initially carried out the production work while the third partner attended to sales and administration. The rate of growth, before developing the incinerator business, was very slow: after five years, there were eight employees. Their first premises were a disused yard in a coalpit. With the growth of the business in 1980, it became possible to construct a purpose-built factory.

role in the growth of ‘sunrise’ industries surrounding it¹⁵. The university was said to create contacts not only within the academic and research community but also between this community and local high technology businesses. There are numerous other examples where industries have sprung up around universities, or where firms have been set up to exploit ideas coming from university research.

In each of the two regions of the British study, there were five HE

Table 6.1 Higher education establishments, by region

	Student population
(a) East Midlands	
University of Leicester	5428
University of Loughborough	6302
University of Nottingham	7722
Leicester Polytechnic	6621
Trent Polytechnic	8224
(b) North	
University of Durham	4770
University of Newcastle upon Tyne	8085
Newcastle upon Tyne Polytechnic	7398
Sunderland Polytechnic	4151
Teeside Polytechnic	3531

establishments, and these are listed in Table 6.1 below.

This simple list offers no clear indication of advantage for one region over the other. It is true that the East Midlands boasts three universities to the North’s two, but the balance is redressed by the three polytechnics in the North, to the East Midlands’ two. Again, total student numbers are somewhat higher in the East Midlands, and this leads to higher numbers of academic staff; but the difference is not large. It is possible that the HE establishments of one area have characteristics which make them a more valuable resource for innovation, but it would require a separate research study to examine this.

The size distribution of firms

If education is one potentially important influence upon the supply of entrepreneurs, so too is practical experience. There is a considerable body of research evidence which shows that the chances for individuals of becoming entrepreneurs are increased by working in small rather than large plants^{16,17,18}. Entrepreneurs have often learned about running small businesses by working in such businesses. So a region which already has many small businesses is likely to favour a further growth of entrepreneurship.

A first view of the prevalence of small firms is given by considering the numbers of small manufacturing establishments (employing between 1 and 99 people) as a proportion of all manufacturing establishments. There has been a general rise in this proportion throughout the UK in recent years. For the North, the figure was 84 per cent in 1979, rising to 90 per cent in 1985. For the East Midlands, the figure rose from 87 per cent in 1979 to 92 per cent in 1985. These differences do not appear to be great, but they are rather 'broad brush'.

Table 6.2 Proportions of manufacturing employment in small firms
percentages

	1979	1985
East Midlands	25	33
North	15	20

Source: Business Monitor PA 1003 Table 9.

Stronger contrasts emerge when we consider the proportion of jobs provided by small establishments (those with less than 100 employees). This is summarized in Table 6.2 below.

So, by 1985 one in three of those employed in manufacturing in the East Midlands were gaining experience of working in a small business, while in the North the proportion was only one in five. Moreover, the table shows that the relative difference between the regions had persisted for some time.

Similar contrasts appear when one compares the average size of manufacturing establishments by region. In 1979, this was 63 employees in the East Midlands, falling to 35 employees by 1985. For the Northern region, on the other hand, the average number of

Table 6.3 Size distribution of manufacturing establishments
per cent of manufacturing employment

	1979		1985	
	East Midlands	North	East Midlands	North
1-10 employees	3	2	6	4
11-19	4	2	5	3
20-49	8	5	10	6
50-99	10	6	11	8
100-499	37	28	28	33
500 or more	38	57	29	47

Source: as Table 6.2

employees per manufacturing establishment was 95 in 1979, falling to 55 by 1985. The East Midlands was, in fact, close to the UK national average on this measure, while the North was much above it.

It is worth analyzing the size distribution further to isolate the differences between the two British regions. This is done in Table 6.3.

It seems rather probable that the supply of entrepreneurs to establish new manufacturing businesses was impeded in the North by the prevalence of large plants in the region, so that relatively few workers could learn about small businesses at first hand. In the East Midlands, on the other hand, there was a much more normal balance between larger and smaller manufacturing businesses.

New firm formation

We have shown that a number of influences should favour the formation of new businesses in the East Midlands, by comparison with the North. It is also possible to show that the actual rate of formation has been considerably different in the two regions.

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A large study, which used information from Value Added Tax records, was conducted in 1980¹⁹. This study, however, covered services as well as manufacturing businesses. In the East Midlands, there were approximately 7500 'births' of new firms in 1980, and approximately 6700 'deaths': a net increase of about 800 businesses. In the North, in the same year, births numbered about 4200, but deaths about 5500: there was therefore a net loss of about 1300 businesses.

Of course, the formation of new businesses does not necessarily mean more innovation, especially as service businesses predominate in the figures just quoted. But a climate in which many new businesses are coming into being is perhaps likely to be attractive to entrepreneurs with new ideas.

Industrial structure of the regions

There is a body of research which suggests that the ability of a firm to innovate is influenced by the industry of which it forms a part^{20,21,22,23}. In other words, there are relatively innovative and relatively non-innovative industries. Generally speaking, opportunities to innovate appear to be greater in growth industries, while in the more mature industries opportunities to innovate decline and the emphasis is switched to cost reduction or other marginal improvements²⁴. In addition, some industries are more suitable than others for innovation by *small firms*. In industrial sectors where R & D costs or capital costs are high (such as chemicals or pharmaceuticals) small firms are unable to contribute much to innovation. In those industries in which R & D costs and capital costs are relatively low (including machine building) small firms have played an extremely important role in innovation²⁵.

The structure of industries can also have secondary effects in either stimulating or inhibiting innovation in supplier firms. Our results presented in Chapter 5, concerning both the FGR and Britain, suggest how strong such influences can be. Growing and innovative industries are likely to introduce new ideas and make continually changing demands on supplier firms, pushing them towards innovation. Stagnating or declining industries may have the opposite effect on their suppliers, constraining rather than stimulating their potential for innovation. Finally, individuals who have worked in an innovative firm may be more likely to acquire skills and experience which they can later

apply to product innovation when they go into business in their own

Table 6.4 Manufacturing industry groups, by region
per cent of manufacturing employment

	East Midlands	North
Chemicals and related	12	22
Engineering and related	38	44
Other manufacturing	49	33

Source: Business Monitor PA 1002 Table 7, 1982.

account or work for a small manufacturing firm.

The East Midlands and North have a similar proportion of total employment involved in manufacturing industries. This factor can therefore be left out of the account, and we can focus upon the composition of those manufacturing industries. A simple breakdown is shown in Table 6.4.

Using employment as the measure understates the *economic* importance of the first group in the table, because the industries which it contains are highly capital intensive. Re-expressing the table in terms of gross value added at factor cost, the chemicals and related industry group accounted for 17 per cent of East Midlands' manufacturing, and for 28 per cent in the Northern region. The other two groups' importance was correspondingly reduced.

The North has a particularly large chemical industry, while the East Midlands has a large textiles, clothing and footwear industry which accounts for the high proportion classified under 'other' manufacturing. The East Midlands and North both have important engineering and metal manufacture industries, with the North having slightly the higher proportion in this category, because of a particular concentration in heavy transportation and construction equipment.

Taken as a whole, the differences in industrial structure between the regions are perhaps less marked than one might have presumed. In themselves, the structural differences offer little indication of advantages to either region in terms of innovative opportunities. The chemicals and related industries are among Britain's strongest from the

viewpoint of growth and innovation, and this would have been expected to stimulate rather than obstruct innovation by small firms in the region. Moreover, as we showed in Chapter 5, these industries were the most important customers for the small firms in the Northern sample. Conversely, textiles clothing and footwear have been among the industries with the highest rate of contraction in Britain. Yet these industries were not only important customers of the small firms in the East Midlands sample, but also seemed to offer them good opportunities for introducing new products, especially those with microelectronics.

On the whole, the analysis of industrial structure does not lead to much insight into the innovative possibilities in the two regions. However, this may result from the fact that we are interpreting the local industries in terms of their position in the national economy. For example, we have considered the chemicals industry to be conducive to innovation, but not the textiles industry, because of different national performance trends in those industries. What we seem to be faced with, is that the industries in each region to some extent function differently from the national pattern.

Government finance and other forms of assistance

The present study showed that product development in these small firms was rarely constrained by lack of funds. But the availability or scarcity of finance can affect the founding and subsequent growth of small firms, and firms finding it hard to finance growth may become generally less interested in innovation. So, despite our evidence, finance may be indirectly important for innovation.

There have been various government schemes to assist small firms in recent years. It is interesting to consider how far these schemes have, either intentionally or incidentally, impinged upon regional differences in small firm formation and growth.

The Loan Guarantee Scheme (LGS) was introduced in the Finance Act 1981, having been recommended by the Wilson report²⁶. The aim of the scheme was to remove small firms' particular difficulties in raising finance from banks. This was to be achieved by government underwriting of the loans provided by the financial institutions under the terms of the scheme. In practice the scheme exempts the lender from bearing the risks associated with the investment.

This is a national scheme, but firms in different regions may make use of it to different degrees. Where the take-up is high, the rate of growth of small firms should increase compared to areas where take-up is low, and this could also be reflected in innovation. According to an official assessment of the scheme²⁷, 38 per cent of the loans were made to small firms in the South East, the core area of the UK economy. Seven per cent of loans were made to firms in the Midlands, which is more or less in line with that region's share of the economy. But only three per cent of loans went to the Northern region, which accounts for nearly six per cent of the national economy. The average size of loans to firms in the South East was £36,400, while the comparable figure in the case of the East Midlands was £34,200 and in the case of the North £30,200. In practice, this scheme appears to have accentuated regional differences in the strength of the small firms sector.

Since the present study has repeatedly stressed the significance of microelectronics in small firms' new products, it is also interesting to examine the government's Microelectronics Applications Project (MAP) scheme, launched in July 1978. One of four objectives of this scheme was to improve the rate of adoption of microelectronics in firms' products and processes, particularly by first time users. MAP consisted of three distinct parts. Part A covered awareness and training, and was supported by the establishment of an information and training centre. Part B, known as MAPCON, provided funds to meet part of the cost of engaging consultants to undertake a feasibility study on the possible application of microelectronics to products or manufacturing processes. It was targeted upon those without previous experience of microelectronics.

Part C, of most direct significance to the present study, provided financial assistance towards the cost of developing products or processes involving the application of microelectronics. Grants could cover a maximum of 25 per cent of the development costs.

A detailed study of Parts B and C of the scheme was conducted in 1986²⁸. In MAPCON, by the beginning of 1986 6831 applications had been received by the Department of Trade and Industry. Firms in the East Midlands made about eight per cent of these applications, in line with that region's share of the national economy, but firms in the North

made only four per cent of the applications, which was inferior to that region's economic significance.

The evaluation of Part C, with its more direct financial support for product innovation, showed that more than half of grants awarded went to firms in the South East, the core region of the economy. The firms based in the East Midlands received seven per cent of grants awarded, which was almost in line with the economic significance of the region. Once again, however, the North failed to get its proportionate share of grants: only three per cent went to Northern firms, though they made up nearly six per cent of the manufacturing economy.

It seems, then, that national schemes of financial assistance run the risk of widening regional gaps in innovation and growth, because those regions which already have superior vitality are most likely to take advantage of the opportunities offered. An alternative approach is regional targeting of financial aid. There has been a long and complex series of schemes here, and to review these lies beyond the scope of this study. There are however two points to be made.

The first point is simply to observe that the magnitude of these schemes has been considerable, although with considerable variation in amounts and forms of aid from year to year. Over the years, industry in the Northern region has been one of the main beneficiaries of regional preferential assistance. In 1981-82, the North received £144 m. of Regional Development Grant, 23 per cent of total expenditure under this scheme. By 1983-84, although regional preferential assistance had been divided into three main schemes and the total expenditure reduced, the North's share remained unaltered at 23 per cent. The East Midlands, which has few areas qualifying for assistance, received one per cent of the funds of this type in 1981-82 and four per cent in 1983-84.

The second point is to question whether these forms of assistance are likely to stimulate innovation. The funds may equally be used to permit relatively stagnant industries to continue. It is only if regionally selective financing is combined with a mechanism for directing funds to innovative or technologically dynamic industries, that it can be said to support innovation.

Similar considerations can also be applied to local government funding of industrial development. A hitherto unpublished study²⁹ indicates that local authority support of this kind has been provided at

Finance for growth: examples

The partners in *Fabrication and Assembly Company (FAC)* regarded the unavailability of capital as a serious barrier to the development of small business. They had found it difficult to obtain bank finance to satisfy firm orders from customers, as the banks feared that the completed order could be rejected by the customer. This was a particular difficulty for FAC, because of the long throughput time for their heavy engineering products, which necessitated an accumulation of work-in-progress stocks.

However, FAC had received a number of loans and grants from official sources which it regarded as very helpful. An interesting example was help from the British Overseas Trade Board to participate in an international trade show. This was seen as very important in leading to successful participation in the show, which had directly generated orders for the company.

Farm Machinery Manufacturer (FMM) had used bank loans as well as retained profits to finance its rapid growth during the late 1970s and at the start of the 1980s. In 1984, when the company made substantial losses because of a sharply contracting market, combined with high development and servicing costs on its new advanced system, the bankers had actively sought to liquidate the company, applying pressure by calling in the overdraft. The company changed bankers and found the new bankers more supportive. The financial crisis was weathered by rationalization and shareholders' loans.

FMM had received a number of grants from both local and national schemes of assistance to industry, and its policy was to apply for all relevant grants.

Incinerator Company (IC) had financed growth through retained profits, and grants and loans from local and national government schemes of assistance to industry. When building its new factory, a mortgage was obtained from the local authority at a favourable rate, and this provided 70 per cent of the capital. A further 20 per cent were supplied by a Regional Development Grant. IC had also received two grants under the Selective Assistance Scheme from the Department of Trade and Industry. One was for £12,000 to help with building works, and the other was for £13,000 to help purchase a CNC lathe. Other grants included:

- An Innovation Grant to help with the development of a prototype incinerator
- A grant to employ a consultant to assist in the development of the company's computer system
- A grant towards the cost of a marketing consultant who identified export market opportunities
- A grant of £66,000 towards a £300,000 investment in CNC and related machines.

It is notable that IC never made use of bank loans or overdraft facilities, because of adverse experience at the time of the partners' former business failure. They had also changed banks twice because of what they perceived as the rigid and uncooperative attitude adopted by the bankers.

about twice the level in the North as in the East Midlands. However, it appears that the underlying policy in the two regions has tended to be rather different. The majority of local authorities within the Northern region did not appear to specify any particular types of industry which they aimed to attract. Their primary aim appeared to be immediate employment generation, with less attention paid to the long-term competitive implications. The local authorities within the East Midlands, on the other hand, appear to have devoted their main efforts to attracting high technology industries. These industries may, in relative terms, yield fewer jobs for a given capital investment, but this has not deterred these local authorities from pursuing a policy which more directly favours innovation and competitiveness.

Concluding comments

We began this chapter by observing that we could not expect to draw any strong, cause-and-effect conclusions linking characteristics of regions to the activities of small firms. Indeed, linking different levels of economic information to arrive at a more complete explanation, is a new and little developed field of research, so our aim has been no more than exploratory. What we can say by way of conclusion is less clear-cut than we would like, but on the whole we feel that it does deepen our appreciation of how regional conditions influence small firms' innovation.

The most positive links, of those we have reviewed, seem to concern the supply of skilled and qualified people (shaped by education and migration); housing and house ownership; and the size distribution of firms. Taking account of previous research findings, we could visualize how regional differences in these characteristics might affect the supply of innovative entrepreneurs and the formation of new businesses, both of which are important foundations for innovation. And there was little doubt that the East Midlands had a favourable profile in terms of these characteristics, which would help to explain the higher level of innovation there in our survey, by comparison with the Northern sample.

We can also find some further confirmation of the importance of these influences in an analysis by Whittington³⁰. He concluded that the rate of entrepreneurship in a region could best be accounted for by

three factors: wealth, represented by owner occupation of homes; skill, measured occupationally; and the prevalence of small manufacturing plants. These correspond to some of the influences to which we have attached most importance in our interpretation.

Where we had much less success was in finding differences in industrial structures which would help to clarify the regional differences in innovation within the British study. However, we would not be hasty to conclude that the industrial mix is unimportant. Any temptation to do so can be resisted by thinking of the findings concerning the German regions, presented in the preceding chapter. There, we saw a clear correspondence between the regional differences in industrial composition, and the different networks of supplier-customer relations, which in turn affected the intensity of innovation. So there certainly can be cases where the influence of industrial structure is strong enough to show through.

As to why we did not get a similarly clear result for the British regions, there are two chief possibilities. One is, simply, that regional industrial structure may sometimes be important but sometimes not; and it may be more important when local firms are tied to a particular industry, as in the case of the 'Montan' industry suppliers of Nordrhein-Westfalia. This may also be as much a matter of the particular details of local history, of how industries have developed in relation to one another, as of industry structure in its own right.

The alternative explanation is to maintain that industrial structures *are* likely to be generally important, but that the crucial features of the local industries may not be apparent from a straightforward industrial classification. We may need a more flexible approach to identifying the regional industries' key characteristics.

One characteristic which we have already noted as important, in the British regions, is the size distribution of firms. We have looked at this as an influence on the preparation or training of potential entrepreneurs. But it may also have a structural role. In 1979, a mere 74 giant plants (with more than 1000 employees) accounted for 40 per cent of all the manufacturing employment of the Northern region. We have seen, in Chapter 5, how the small firms in that region tended to be dependent upon a few major customers, and upon local or regional customers, while the small firms in the East Midlands, a region less

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dominated by large plants, had developed widely spread markets which seemed to play an important part in their capacity to innovate. It may be that a better understanding of how the industry of the North has been shaped around its largest manufacturing plants, would take us considerably further in accounting for small firms' difficulties in innovation.