

**Small-town factories and the metropolis:
Manufacturing dispersal in Bogotá, Colombia,
1958-1990**

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Abstract

The research focuses on the capital city of Colombia, Bogotá, where, somewhat unusually in Latin America the nation's population and wealth continued to concentrate at a markedly faster and more sustained pace than in most large cities in the country in the period 1958-1990. Contrary to evidence from large cities in both the developed and the developing world there was little sign of a major dispersal of employment beyond a relatively small central sector. The research aims firstly to document shifts during the study period in manufacturing production and employment within what it defines as the 'Bogotá metropolitan area' (BMA); and secondly, to examine the possible reasons behind the lack of a more marked spatial dispersal of manufacturing jobs. Thus, the study seeks to answer the question: Why, despite Bogotá's sustained economic and demographic growth in the period 1958-1990, did manufacturing industry disperse only very moderately within the Bogotá metropolitan area?

Apart from an extensive coverage of the theoretical and empirical material on the subject, the study uses a combination of secondary material represented by a range of studies on the subject, and primary information, which includes spatially and sectorally-disaggregated official data on manufacturing industry, information collected through a specially-designed survey of a sample of manufacturing establishments equally distributed between the core and the rest of the BMA, and interviews with national and local government officials.

A series of hypotheses are tested for the case study using well known techniques such as shift-share and correlation analysis. The results of the field survey are used to examine how a range of factor costs are linked to the locational trends of a group of randomly selected establishments both in the core of the BMA and outside it. The study examines in turn the market orientation of the interviewed establishments, their present and future space needs, the incidence of labour factors upon their location, and an array of variables that may collectively be labelled 'government factors' as their availability is directly or indirectly dependent on official policies.

To the memory of Sonia (1944-1998)
To my parents
To Cecilia

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Acronyms

BMA	Bogotá metropolitan area
CAR	Corporación Autónoma Regional de la Sabana de Bogotá y de los Valles de Ubaté y Chiquinquirá (the name was changed in 1981 to Corporación Autónoma Regional de las Cuencas de los Ríos Bogotá, Ubaté y Suárez)
CBD	Central Business District
DANE	Departamento Administrativo Nacional de Estadística
DC	Distrito Capital (de Bogotá)
DE	Distrito Especial (de Bogotá)
DNP	Departamento Nacional de Planeación
IGAC	Instituto Geográfico Agustín Codazzi
SIC	Statistical Industrial Classification

1 Introduction

1.1 Aims and nature of the research

For some decades now planners and policy makers in industrialising countries have had to grapple with the challenges of an increasing concentration of population and employment in a few urban centres within their national territory. And although, compared to the 1960s and 1970s, the pace of this process of concentration has abated the challenge of rapid growth and a legacy of institutional responses that all too often have seemed insufficient seem to linger on. Like their counterparts in the richer nations that industrialised earlier, rapid expansion has confronted metropolitan planners and managers with the mammoth task of facilitating the expansion in infrastructure, services and housing to accommodate vast new numbers of people and plants, shops and stalls, cars and cinemas.

Another kind of evidence emerged in the 1970s and 1980s from some of the largest and fastest-growing industrial centres in the developing world: a marked slowdown in the pace of growth of population and jobs in the metropolitan core and a parallel dispersal of population and production away from the core towards the suburbs and even beyond the continuous built-up area, to smaller townships within the metropolitan region (UNCHS, 1996; Vining & Kontuly, 1978). And although the phenomenon of suburbanisation can be traced back to the 19th century in the United States (Schnore, 1965), the conditions in which this has taken place in countries like Brazil, Mexico and South Korea, often involving inadequate government resources and institutions in the receiving municipalities, highly polluting industries and a predominance of individual forms of motorised transport, seem to pose new and formidable challenges to metropolitan planners and potential sources of inefficiency for new and established firms alike.

At the same time, supported by economies of agglomeration, dramatic productivity gains and shifts in the structure of national production away from labour-intensive primary production, population and productive activities became increasingly concentrated in a few large urban centres. In many ways, spatial development in the largest and fastest growing newly-industrialised countries could be said to be

obeying Clark's 'law of concentration', which states that "the macro-location of industry and population tends towards an ever-increasing concentration in a limited number of areas; their micro-location, on the other hand, towards an increasing diffusion, or 'sprawl'" (Clark, 1967, p. 280).

This research documents a partial exception to this 'law' and probes into the causes behind the exceptional nature of the selected case study. The focus is the capital city of Colombia, Bogotá, where, somewhat unusually in Latin America, the nation's population and wealth have continued to concentrate at a markedly faster and more sustained pace than in most large cities in the country (thus agreeing with Clark's first statement), while there has been little evidence of a major dispersal of population and employment beyond what may be defined as the core of the Bogotá metropolitan area (thus refuting Clark's second statement).

The evidence from cities of a similar size or relative national economic weight in countries such as the US, the UK, France, Brazil, South Korea, Argentina, to name but a few, suggest a range of causes for the apparent spill-over of population and employment towards suburban locations and even beyond, to municipalities located within a larger area (often called a 'metropolitan region' in the specialised literature). By contrast, in the three decades after 1958 Bogotá¹ experienced only a modest process of dispersal involving some population and to a lesser extent also some employment.

The research is guided by two principal aims: firstly, to document shifts in manufacturing production and employment within what for the purposes of the study is defined as the 'Bogotá metropolitan area' (abbreviated BMA); and secondly, to examine the possible causes behind the lack of a more marked spatial dispersal of jobs and productive capacity. Under the assumption that manufacturing industry has considerable multiplier effects upon other sectors of production and, somewhat more contentiously also a capacity to attract population, in probing for causes of the observed modest dispersal the research focuses exclusively on manufacturing.

¹ The name officially changed to Santafé de Bogotá with the National Constitution of 1991. The abbreviated forms 'Bogotá' or 'Bogotá DE' will be used throughout this dissertation.

Thus, the study seeks to answer the question: Why, despite Bogotá's sustained economic and demographic growth in the period 1958-1990, did manufacturing industry disperse only very moderately within the Bogotá metropolitan area?

The research covers a period of structural change but especially rapid demographic, economic and physical expansion of the nation's capital city. Apart from an extensive coverage of the theoretical and empirical material on the subject, the study uses a combination of primary official data (chiefly spatially and sectorally-disaggregated information on manufacturing industry some available in digital form), and primary material collected by means of a survey of a sample of 28 manufacturing establishments equally distributed between the core and the rest of the BMA, as well as interviews with local government officials.

1.2 The Bogotá metropolitan area: The choice of case study

Since at least the 1970s there has been much concern and anxiety in Colombia about the demographic and physical expansion of Bogotá, its capital city and largest urban centre. Much of the concern stems from the belief that the city's rapidly expanding streets, sewers and shops have irreversibly been engulfing the *Sabana de Bogotá*, the lush and fertile plateau surrounded by a ring of mountains where the city sits at 2,600 m above sea level (Guhl, 1979). Despite evidence to show that much of the foodstuffs consumed in Bogotá comes from a large number of regions around the country, well into the 1970s the *Sabana* was still seen as the city's 'larder', and food production continued to be perceived as "the main economic function" of the *Sabana* (Departamento Nacional de Planeación, 1978).

Several studies undertaken in the period covered by this investigation sought to measure and to project into the future the process of physical expansion of the city and the growth of population in neighbouring municipalities. Most appeared to attribute the process of incipient suburbanisation of population outside Bogotá's administrative boundaries to a spill-over effect from the capital city. A few authors also tentatively identified possible causes in the growth of sources of employment outside the city, such as the cut-flower industry for export (Bosoni & Pizarro, 1987a; Montañez *et al.*, 1990), and somewhat more vaguely in "the establishment of new factories in the outskirts of Bogotá" (Montañez *et al.*, *op. cit.*, p. 138).

However, there does not seem to be a systematic attempt to establish a more direct nexus between the well-documented growth of a cut-flower industry which by the end of the 1980s generated a by no means negligible 120,000 direct and indirect jobs in over 400 firms² (Mendez, 1991) and the expansion of population in the townships around Bogotá. Nor is there a systematic attempt to monitor over time the development of other sources of employment outside Bogotá's administrative boundaries as possible forces behind the dispersal of population. This study aims to help fill this gap by examining in a systematic manner the shifts in manufacturing employment in Bogotá and its surrounding municipalities during 1958-1990, a period of rapid expansion in population and employment in the city.

As a background to the analysis that follows in subsequent chapters, this section reviews some of the more influential studies that informed the debate and some of the actions taken regarding the dispersal of Bogotá in the 1970s and 1980s, when the issue of Bogotá's growth became a serious policy concern.

1.2.1 Loss of agricultural land and suburbanisation

The idea that both population and employment would soon displace agricultural activities from a land that could potentially yield much higher profits if sub-divided and sold for urban uses not only permeated much of the specialised writing from the 1970s onwards but even generated some public alarm, as witnessed by regular newspaper features on the issue. A document by the central government's national planning agency warned that "given the existing conditions of the land market, Bogotá's growth rates, and industrial dispersal" no agricultural activity in the *Sabana de Bogotá*, no matter how profitable, could conceivably compete with the potential urban uses to which it could be put (Departamento Nacional de Planeación, 1976, pp. 11-12).

While pointing out that all the urban centres in Bogotá's hinterland are located on land with a high agricultural potential, another study by the same agency placed the accent on the high quality of the soil that is a salient feature of large sections of the region. It showed how in five of the 16 municipalities located within what it called

² Compared with the much older dairy industry consisting of 24 firms which generated 1,200 jobs in the mid-1980s (Antonin, 1986).

the "area of direct influence from Bogotá"³ more than 50 per cent of the land could be classified as optimal for agricultural purposes (i.e. Class I soil), while in three of them over a third of the land was regarded as optimal for such uses; of the remaining eight municipalities, four had more than a quarter of their area covered in Class I soil (Departamento Nacional de Planeación, 1978). A sense of the urgency of this concern may be glimpsed from a contemporary observation that Class I soil covered three per cent of the national territory and 43 per cent of it was located in the *Sabana de Bogotá* (Parra Gómez, 1979), an area which falls within the jurisdiction of the Corporación Autónoma Regional de la Sabana de Bogotá y de los Valles de Ubaté y Chiquinquirá (CAR),⁴ a watershed management agency created in 1961 to oversee land and natural resource use along the valleys of the Bogotá River and some of its tributaries (cf. map 1.1).⁵

The Departamento Nacional de Planeación document showed that out of a total *Sabana* area (excluding Bogotá) of 214,000 hectares, in 1970 88.3 per cent of the land was devoted to farming and 0.6 per cent to urban uses, with a projected increase of the latter to 2.8 per cent by 1985 and 7.3 per cent by 1990 (assuming annual population growth rates of over 6 per cent in Bogotá and close to 4 per cent in the rest of the region). The study's authors concluded somewhat gloomily that Bogotá's physical growth would spill-over onto neighbouring municipalities and that urbanisation of the city's hinterland in the period 1970-1990 would take place at the expense of land with some of the highest farming potential in the country.

By the end of the 1970s the alarm over the loss of valuable agricultural soil to bitumen and bricks was echoed by political and scientific commentators (Parra Gómez, 1979). It also became a source of concern for government agencies such

³ In a later study on the future of the Sabana, the Departamento Nacional de Planeación (the central government's main sectoral planning and policy-making body) described the "area of direct influence of Bogotá" as encompassing 16 municipalities: Bojacá, Cajicá, Cota, Chía, Facatativá, Funza, La Calera, Madrid, Mosquera, Soacha, Sopó, Subachoque, Tabio, Tenjo, Tocancipá and Zipaquirá (Departamento Nacional de Planeación, 1978).

⁴ Renamed Corporación Autónoma Regional de las Cuencas de los Ríos Bogotá, Ubaté y Suárez in 1980. For a brief discussion of CAR's relationship with Bogotá, see Forero et al. (1995).

⁵ There does not seem to be an agreed definition of what precisely constitutes the Sabana de Bogotá. Montañez *et al.* (1990) define it as the highest section of the Bogotá river basin covering an area of 400,000 hectares (p. 131). This is an area located at an altitude of some 2,600 metres above sea level or more. Guhl (1979) also uses the same definition but quotes a figure of 465,500 hectares, and describes the flat portion of the Sabana (as opposed to the mountains that surround it) as having 120,000 hectares (p. 72). Strictly speaking, to these figures must be added the relevant area within boundaries of the *Distrito Especial de Bogotá* (whose built-up area in the early 1970s represented some 31,000 hectares; Villamizar, 1985).

as Bogotá's planning authority which put into effect policies to increase densities and contain future growth within the existing service perimeter (Grupo de Consultoría URBE Ltda, 1984). Similarly, CAR sought ways of limiting the subdivision of rural properties on Class I soils to sizes below a minimum threshold which would make them unviable for agricultural production (though increasingly attractive as weekend retreats or even permanent residences for well-to-do commuters from Bogotá).⁶

The 1980s brought about more refined attempts to measure the impact of urbanisation and suburbanisation on the loss of agricultural land and further efforts to describe the growing spatial and economic integration between Bogotá and its neighbouring municipalities. A study by Grupo de Consultoría URBE Ltda (op. cit.), for example, noted that earlier studies had exaggerated the problem by projecting the high population growth figures of the 1960s and 1970s into the future thus disregarding the fact that Colombia had undergone a demographic transition which had slowed down its natural population growth and consequently also the growth rate of many cities including Bogotá.

By showing that negative population growth trends in the Sabana townships located closer to Bogotá had been reverted so that by the late 1970s they were growing at similar rates to the capital city while more distant ones languished, the study pointed to a budding process of suburbanisation of population and the appearance of "dormitory towns" housing a growing proportion of Bogotá's labour force. "In some ways Bogotá's process of expansion has been repressed", it noted, "but there is evidence that the city is reaching a threshold of metropolisation ... which could give rise to a more accelerated expansion of the city in neighbouring municipalities" (p. 19). In their projections, the study's authors saw Bogotá as having 6.8 million inhabitants by 2000 with an additional half a million living in neighbouring municipalities, a form of expansion "induced" by the city's own growth.

⁶ Cf. CAR Board of Directors' *Acuerdo* (Act) No. 33 of 1979, chapter 1, article 7. This Act sought to implement a disposition contained in the National Act (Ley) No. 135 of 1961. According to the Departamento Nacional de Planeación, in 1970 75 per cent of farmers worked on properties of less than five hectares, the minimum size for subsistence production for a peasant household (1978, p. 26). According to Bosoni & Pizarro (1987a, pp. 86-87) a farm with less than one hectare in cultivable area is "virtually non-productive" for commercial agriculture, with profitability starting in the three-hectare threshold.



Map 1.1 Colombia and *departamentos* of central sub-regions

A preoccupation with the comparatively rapid growth of population in towns closer to Bogotá is also found in subsequent research and policy documents which stress the effect that the city's growth had in attracting migrants not only to itself but also to neighbouring municipalities, especially to the south, west and north of the capital. A three-volume consultancy report commissioned by CAR to help formulate a set of regional policies to deal with the process (Bosoni & Pizarro, 1986, 1987a & b), noted that the area within Bogotá's existing service perimeter was rapidly being used up (cf. table 1.1) and this was gradually stimulating new growth to nearby urban areas, notably the municipalities of Soacha (to the south), Funza and Mosquera (to the west) and Chía and Cota (to the north). The authors argued that immigration made up 83 per cent of the additional population growth in these areas and that therefore a policy should be designed to attempt to divert some migration to alternative urban centres away from areas with Class I soils found to be under pressure to shift from an agricultural to an urban use (1987a, p. 12).

Table 1.1
Population and built-up area in the municipalities of the
Bogotá metropolitan area^a, 1962 and 1985

Municipality	1962		1985		Undeveloped land inside urban perimeter 1986 (Has.)
	Population ^b	Built-up area (Has.)	Population ^c	Built-up area (Has.)	
Bogotá DE	2,630,669	14,615.00	3,974,813	25,802.63	4,491.37
Cajicá	2,206	12.58	9,524	56.73	118.10
Chía	4,979	34.31	23,598	277.59	185.74
Cota	460	4.71	3,106	28.76	37.90
Funza	3,269	28.34	24,263	152.30	272.03
La Calera	1,555	7.03	4,055	41.26	43.84
Mosquera	3,967	29.06	9,801	118.81	131.49
Sibaté	9,017	100.86	14,335	58.55	42.31
Soacha	13,778	91.14	99,353	726.23	1,274.77
TOTAL	2,669,900	14,923.03	4,162,848	27,262.86	6,597.55

a. Not an officially designated area. For a definition see Appendix 1.

b. Estimated using interpolations of 1951 and 1964 census figures.

c. Unadjusted census return figures.

Source: Bosoni & Pizarro (1986).

Backed by a fairly systematic analysis of past and projected urban demographic and spatial growth in the areas of major concentration of urban population in the

Sabana to the year 2015,⁷ the concern of the report's authors regarding the loss of optimal quality agricultural soil was more moderate than that of previous studies. They nonetheless identified areas where urgent action was required to stem suburban expansion and protect valuable agricultural soil, notably the municipalities of Chía and Cajicá, to the north of Bogotá, where the pressure of demand from potential commuters and affluent residents seeking the advantages of space and an attractive natural setting had already brought the prices of rural land up to the levels of land officially designated as urban (op. cit., p. 96).

In contrast with the Departamento Nacional de Planeación documents quoted earlier, the report explicitly accepts the irreversible nature of urbanisation in the *Sabana* but stresses the need to manage urban expansion in a way which protects the best soil and permits adequate supply of basic services to a growing population and to firms. The report also acknowledges the seriousness of the problem of a growing lack of adequate residential land within Bogotá's urban perimeter particularly for the city's lower income population strata, and recommends that low-income housing developments be permitted in selected areas officially designated for rural use so as to take advantage of their lower prices as agricultural land (1987b, p. 42).

The municipalities around Bogotá have been variously described in the different reports consulted as being part of the city's "area of influence", its "metropolitan area" or "metropolitan zone", and a "spill-over area" to accommodate the city's activities and population. Some researchers classified the different municipalities according to their relative location to the capital city and the growth rate of the urban component of their populations. One of the earliest attempts to identify a spatial pattern of development outside Bogotá's administrative boundaries was that of Grupo de Consultoría Urbe Ltda (1984) which drew on information on employment and daily travel from a 1982 household survey in 29 municipalities of the *Sabana* and other secondary data to define what the authors called the "Bogotá metropolitan area". In the authors' estimation, this consisted of the city of Bogotá (and its administrative area, called *Distrito Especial*, henceforth abbreviated as DE)

⁷ The authors labelled these areas of rapid urban growth "pressure axes" (Bosoni & Pizarro, 1987a & b).

and eight municipalities (this, in a slightly modified form, is the definition adopted for the present research as explained in more detail in Appendix 1).⁸

The same document identifies a “metropolitan region”, consisting of a further seven municipalities further away from Bogotá.⁹ Similarly, and partly based on the same background data, Villamizar (1985) identifies two separate ‘rings’ of municipalities surrounding Bogotá where urban population grew at comparatively high rates: an inner ring, which coincides with Grupo de Consultoría Urbe Ltda’s “metropolitan area” and an outer ring comprising 16 municipalities.¹⁰

The household survey of 29 municipalities¹¹ was perhaps the first significant effort at measuring trends in population and employment in the region and identifying the travel patterns of the labour force among the different municipalities and between these and Bogotá. The survey results revealed the existence of a surprisingly vigorous exchange of workers and other daily commuters among the *Sabana* municipalities (Villamizar, op. cit.). It was estimated that 17 per cent of the *Sabana*’s 245,000 urban inhabitants worked outside the administrative boundaries of the municipality where they lived, and out of these some 30,000 (72 per cent) worked in Bogotá DE. The results of the survey also challenged the somewhat imprecise notion to come out of earlier studies that the economy and the infrastructure of many of Bogotá’s neighbouring municipalities could not cope with a growing volume of migrants resulting from suburbanisation. Close to 78 per cent of the labour force in the 12 municipalities closest to Bogotá found work within the boundaries of the municipality where they lived (Grupo de Consultoría Urbe Ltda, op. cit., pp. 44 & ff.). Even in the urban centres of Funza, Mosquera and Madrid, which had been described in an earlier document as being no more than “dormitory towns” for people working or seeking work in Bogotá (Departamento Nacional de Planeación, 1976, p. 12), in 1982 between 67 and 83 per cent of workers commuted daily to work outside the municipality, and of these less than three-fifths commuted to Bogotá.

⁸ The eight municipalities are Soacha, Chía, Funza, Mosquera, Cajicá, Cota, Sibate and La Calera. See map 6.1 in chapter 6.

⁹ Tabio, Madrid, Sopó, Tenjo, Facatativá, Cogua and Zipaquirá.

¹⁰ Villamizar, who at the time of writing the quoted article was head of the Urban and Regional Planning Unit of the Departamento Nacional de Planeación, fails to include a rationale behind the classification.

¹¹ Undertaken by the consultancy firm Pedro Gómez & Cia Grupo de Consultoría in 1982.

The notion of a continual process of suburbanisation of population was challenged by Jaramillo writing in 1989 (quoted in Cuervo, 1993) who argued that in the 1980s higher income groups were no longer seeking distant residential locations towards the north of the city but had instead “re-discovered” and given new value to more central locations formerly occupied by high-income groups in earlier decades. With increases in land prices in these central locations, middle-income households had to resort either to more remote areas in the north (to which they now had motorised access in the context of general increases in average income levels) or to areas formerly occupied by lower-income strata, to the south-west and south. Poorer households who could not afford the much increased prices within the urban perimeter had little option but to acquire land or rent their accommodation in peripheral areas, mainly in the south and south-west (Gilbert, 1998).

Most of the studies reviewed so far had as their main focus of analysis changes in the use of land for residential purposes. None examines in any depth the shifts in the location of employment within Bogotá and how it might be linked to changes in residential location. This leads us to the second set of studies, which although much more limited in number, does provide us with an interesting set of interpretations of what might have happened to Bogotá’s jobs in the period of concern to this study.

1.2.2 Spatial shifts in employment

As will be seen in chapter two, detailed research into the spatial shift of employment either within a large city or within what could be regarded as its metropolitan area is comparatively rare in a developing country context. Perhaps partly because it requires highly spatially disaggregated information which statistics offices rarely collect or make available, and partly because, as Pineda (1991) argues planners and policy makers by and large still seem to believe in the effectiveness of spatial control policies, this type of study, though as vital as cross-sectional research to understanding urban change, is rarely given priority by either governments or researchers.

Bogotá, about whose recent development there is no dearth of studies, is somewhat of an exception. Two of the major research efforts to study the city in the period of concern to us here have included more or less detailed exercises of

measuring spatial changes in employment. The first major attempt arose in the context of The City Study, a large research programme launched by the World Bank in the late 1970s (cf. Mohan, 1986 and 1994; Lee, 1989). As is described in greater detail in chapters 6 and 7 of this dissertation, the City Study drew on two household surveys to trace spatial shifts in employment (including manufacturing) within Bogotá DE in the period 1972-1978; it also used information from annual manufacturing surveys and a specially commissioned survey of 126 establishments to examine more closely the nature and motivations of spatial shifts among manufacturing firms in the period 1970-1975 (Lee, 1985, 1987 and 1989).

Some findings from the City Study are presented later, so suffice it to note here that it finds evidence of shifts in the location of employment away from Bogotá's Central Business District (CBD), which roughly coincides with the historic centre, towards a range of budding employment sub-centres within Bogotá DE. The rate of creation of new jobs increased with distance from the CBD (which lost employment in absolute and relative terms), thus suggesting that new firms tend to locate in the periphery. The data also show that while manufacturing, commerce and services tended to disperse, the financial sector remained centralised (Lee, 1989). Although in many ways representing an unprecedented and very valuable research effort, the Study findings are somewhat limited by the focus on a short study period of prosperity in the city, as well as by a geographical framework which includes only the administrative area of Bogotá DE while leaving out neighbouring municipalities.

This was followed over a decade later (in 1990-1992) by another major research effort, this time developed entirely by Colombian researchers with financial support from the Bogotá Mayor's Office and coordinated by Misión Siglo XXI, a non-profit organisation combining representatives from among others private and public institutions, universities and non-governmental organisations. The study's overarching remit was to produce a diagnosis of the city's problems through a wide range of fairly detailed sectoral analyses followed in some cases by attempts to produce strategies for the future. Several documents were produced which dealt with one or another aspect of spatial change (e.g. Pineda, 1991; Pineda & Jiménez, 1990; Pachón *et al.*, 1992), but only one seemed to explicitly examine spatial shifts in employment (Cuervo, 1993).

Based on the work of Montañez *et al.* (1990), Cuervo (1993) turns his attention briefly to an enlarged scale of analysis which encompasses Bogotá DE and its neighbouring municipalities. The evidence of continued growth of population and employment in the latter suggests to this author that, contrary to Jaramillo's and Pineda's perceptions as quoted earlier, there is evidence of a continued process of suburbanisation. The phenomenon of apparently contained suburbanisation would result from limiting the analysis to the administrative area of Bogotá DE. Cuervo seeks to update some of the City Study findings about shifts in the relative location of employment and population within Bogotá DE, and suggests two possible explanations for the lack of dispersal of manufacturing employment beyond the administrative area of the *Distrito Especial de Bogotá*. These propositions are examined in some detail in chapters 6 and 7 of the present dissertation.

1.2.3 The arguments for the creation of a metropolitan area

As was shown earlier, the spatial dispersal of Bogotá onto land belonging to neighbouring municipalities and the appearance of a conurbation (i.e. a continuous built-up area between two or more formerly separate urban agglomerations) with a daily exchange of people, goods and services, were identified by some authors already in the early 1980s. The trends that had been perceived then of a population in the core (i.e. Bogotá DE) growing more slowly than a decade earlier and that of neighbouring municipalities expanding at comparatively high rates persisted in the early 1990s (Granados & Rinaudo, 1992). Not surprisingly, this continued to be a pressing policy issue well into the 1990s (Castro, 1996). Commenting on the 1993 census figures, in 1994 the head of the city planning department predicted that land with a potential urban use within the administrative boundaries of Bogotá DE would be exhausted by the end of the century (El Tiempo, 1994).

More than twenty years after the phenomenon of suburbanisation of population was first identified there was still no viable mechanism for the different local authorities represented (in what increasingly looked like a metropolitan area) to deal with the common problems of infrastructure supply and maintenance, taxation and resource use which beset them. The calls for the creation of a local authority separate from the provincial government of the Cundinamarca *departamento* (which surrounds Bogotá) date back to the early 20th century, but it was not until 1954 that an

independent local authority was created, in line with the city's status as the national capital (Vidal Perdomo, 1979).

However, by the late 1990s the region lacks a coherent coordinating body (e.g. a juridically constituted metropolitan administration) with the power to formulate and implement policies for a vast area encompassing at the very least eight municipalities and a core with over five-million inhabitants.¹² And although this is by no means unusual among Latin American metropolises (Ward, 1996), for some this gap augurs a serious predicament not only for the city and its population, but also for the tens of municipalities which provide the city with essential and scarce resources such as water or an outlet for its (solid and liquid) waste, whilst getting little in exchange. No doubt this is an issue lying beyond the scope of the present research, but it is one that will have to be faced by researchers and policy makers alike in the very near future.

1.3 Limitations of the study

Hindsight frequently offers useful lessons. This study is no exception. Despite the not inconsiderable statistical, bibliographical and methodological exercise embodied in the eight chapters that follow it may become clear to the reader that in the search for answers to the main research question new queries appeared, some of which had to be left unanswered while others were less than adequately investigated.

The shortcomings resulting from the use of official data drawn largely from surveys of manufacturing establishments with 10 or more workers will be discussed at several points of the dissertation, not least in chapter 3 which presents the methodological background of the investigation. A similar limitation will also be noted in chapter 3 resulting from a lack of statistical information disaggregated at the level of the *comuna*, the smallest spatial unit in which DANE, the Colombian government's statistical office, classifies and makes available statistical information for Bogotá DE. The bulk of the statistical information used in this research is available only at the level of the municipality, which is a comparatively large area to

¹² Opposition to giving Bogotá the status of a capital district, in the manner of Washington DC or Mexico City, came from municipal and provincial politicians in Cundinamarca's municipalities who feared the loss of taxation revenues from Bogotá and the ensuing loss of political clout. See Cárdenas (1979) and Zuleta (1979). For an updated view on the debate see issue number 4 (July-September 1996) of *Foro Económico, Regional y Urbano*, published by Bogotá's *Contraloría* (auditor's office).

satisfactorily detect short-distance moves of establishments of the kind the analytical exercises in this research require.

Yet another limitation of the study which is also pointed out in several instances in the text results from the small size of the surveyed sample. The reasons for this are also explained in some detail in chapter 3. This clearly precludes any more wide-ranging conclusions which might be applicable to all manufacturing establishments in the BMA.

Similarly, an important issue which the research failed to cover adequately is that of the effect of land prices and land-use controls on location behaviour. Land prices are powerful forces helping to shape cities and their surrounding areas (Trivelli, 1994). Although the World Bank's City Study made good use of an unusually long and detailed data series on land transactions in Bogotá covering over 20 years (cf. Mohan, 1986), the analysis derived from it refers only to residential land. No similar record appears to exist for industrial land and due to its small contribution to urban expansion¹³ studies on Bogotá's land markets tend to concentrate exclusively on residential land. And yet there is some evidence from other cities to suggest that rising land values in central locations would act as an added incentive for firms to move out towards peripheral sites thus allowing them to cash in the higher value of their asset (Townroe, 1983). However, in this particular research no specific question on previous land transactions was asked to survey respondents.

Finally, and again with the benefit of hindsight, several small lessons emerge from the survey of establishments itself regarding for example the drawbacks resulting from the use of vague questions which inevitably lead to vague answers, and the lack of adequate provision for certain respondents.¹⁴

1.4 Overview

The dissertation comprises nine chapters and three main appendices. The second chapter reviews the empirical evidence and a diversity of conceptual interpretations of the process of dispersal of population and especially manufacturing industry

¹³ In 1987-1991 2.2 per cent of the city's physical expansion was due to industrial growth (Jiménez *et al.*, n.d.).

¹⁴ Such as a question about space rental which was asked of all respondents when it was relevant only to renters.

away from the core of metropolitan areas. It draws on examples from industrialising and particularly industrialised nations where the process has been in existence for much longer and has, accordingly, been better documented and analysed. The chapter looks at an extensive bibliography (mostly though not exclusively drawn from English-language sources) on the incidence of two sets of factors, classified here as structural and locational, found in other contexts to foster the spatial dispersal of manufacturing jobs.

Chapter 3 presents the methodology used in the research, including a description of the various stages of the research process, a discussion of the sources of official information, some reflections on the process of selecting a sample of manufacturing establishments to include in a survey, and some of the findings to come out of the survey.

Initial steps towards meeting the first aim of the research are taken in chapter 4 which provides a description of the spatial shifts in population and manufacturing in a large region containing the three *departamentos* (provinces) around Bogotá in the period 1958 to 1990. The chapter casts a wide and fairly fine spatial and temporal net to describe these changes with the aim of detecting changes that may have lain undetected in previous research efforts. Like chapters 6 and 7 after it, this chapter's findings are based on a detailed scrutiny of information from national population censuses as well as from annual manufacturing surveys carried out by the Colombian government through DANE (*Departamento Administrativo Nacional de Estadística*), its statistics office. For the purposes of this research the three provinces have been grouped together under the title of 'Central Sub-region', not an administrative or geographical region *stricto sensu* but merely a convenient shorthand expression.

In chapter 5 the analysis shifts to the national scale as it focuses on the development of Colombia's manufacturing industry while also describing the growing national demographic and economic weight of the Bogotá metropolitan area. This shows how in the late 1950s Bogotá took its place from Medellín (the second largest city in the twentieth century) as the country's foremost industrial centre while it continued expanding demographically as well as in other sectors of employment.

Chapters 6 and 7 use spatially disaggregated information from DANE's annual manufacturing surveys to trace the evolution of manufacturing industry in the BMA. Chapter 6 quotes from the World Bank's City Study which showed how, along with other forms of employment, manufacturing jobs dispersed in the 1970s away from Bogotá's CBD but well within the boundaries of the *Distrito Especial de Bogotá*, an administrative area regarded in this research as comprising part of the 'core' of the BMA. The World Bank's findings are contrasted with the results of the analysis of spatially disaggregated data from DANE's annual manufacturing surveys covering the much wider area of the BMA and referring to the years 1974, 1980 and 1985. A first hypothesis derived from the literature and tested in the chapter posits a link between the growth of metropolitan manufacturing and its tendency to disperse. Finally, by using a shift-share technique, the chapter probes the extent to which the sectoral structure of manufacturing industry may help explain the modest dispersal of manufacturing employment and output documented at the beginning of the chapter.

Chapter 7 tests two further hypotheses derived from the literature which may help explain the dispersal (or lack of it) of manufacturing within metropolitan areas. The first one posits a link between the size distribution of manufacturing establishments and its tendency to disperse, cluster or concentrate. The second one conjectures that there is a link between the capital intensity of manufacturing production and its location within a metropolitan area.

Chapter 8 draws almost exclusively on the results of the sample survey to examine how a range of factor costs are linked to the locational trends of a group of randomly selected establishments both in the core of the BMA and outside it. The chapter examines in turn the market orientation of the interviewed establishments, their present and future space needs, the incidence of labour factors upon their location, and an array of variables that may collectively be labelled 'government factors' as their availability is directly or indirectly dependent on official policies.

The concluding chapter 9 presents a summary of the main research findings, examines their policy implications and presents suggestions for future research derived from the reflections in the previous chapters. Finally, three appendices complete the dissertation. The first one describes the 'Bogotá metropolitan area'

and provides a rationale for using this analytical construct. The second one consists of the list of questions asked in the sample survey. The third appendix contains two lists of deflators used for calculating constant prices.

1.5 Conventions

Even within the tight limits of a specialised field of study the same phenomenon may be described by different scholars with the help of different terms. In the social sciences this often compounds the epistemological problems arising from the co-existence of differing interpretations of the same observable phenomenon. In an attempt to minimise possible misinterpretations, this section therefore provides some clarification of the meaning of terms used in this study.

The term 'manufacturing industry' is used to describe the transformation of raw materials and other inputs in the production of finished articles by hand or with the help of tools or machines (Hewitt *et al.*, 1991). It is distinguished from the rather more general one of 'industry' which, in addition to manufacturing, also comprises a broader range of sectors of production such as mining, energy and construction (*ibid.*).

The term 'establishment' (often preceded by the term manufacturing) is used to describe a spatially-integrated unit or set of units of (manufacturing) production. It can consist of several plants "as long as these are located together under a single management" (Cortés *et al.*, 1986, p. 14). A 'plant', or factory, is a single industrial unit "manufacturing one or more products as part of an integral operation" (*ibid.*). A 'firm' may own several establishments in different spatial locations, each with its own local management.

The notion of 'dispersal' is meant to describe the spatial shift in jobs and population out of the core of a metropolitan area towards the periphery and beyond. This term is preferred to 'decentralisation' which is occasionally used to describe this process. The latter is often employed in the description of policies seeking to reduce the relative concentration of employment or even population in the largest city of a country (cf. Gwynne, 1985). More recently, the expression has been increasingly applied to describe a range of institutional and fiscal changes associated with the devolution of power and responsibilities from central government to lower tiers of government (UNCHS, 1996).

The study focuses on the city of Bogotá, the capital of Colombia. As was mentioned earlier, the city's administrative boundaries encompass an area of 1,587 km² (of which in 1980 some 300 km² were a continuously built-up area) under the official name of Distrito Especial de Bogotá (abbreviated Bogotá DE). Only about a fifth of this area is suitable for urban occupation. The city's physical expansion is constrained towards the east by a chain of mountains, part of Colombia's eastern *cordillera*. To the south expansion is also limited by a landscape of barren rolling hills followed by an abrupt end to the *Sabana de Bogotá's* plateau and steep slopes of dense vegetation unsuitable for construction and currently protected by planning regulations. Thus, much of the city's expansion in the next few decades can only take place towards the north, the west and southwest of the built-up area.

The new national constitution of 1991 changed the city's official name to Distrito Capital de Santafé de Bogotá (henceforth abbreviated Bogotá DC) and introduced a few changes to the status of the city as an administrative and fiscal entity, though not to its boundaries (Cámara de Comercio de Bogotá, 1991). Because the present research focuses entirely on the period when the city bore the official name of Bogotá DE, this term is used throughout the document (except when referring to a year after the end of the study period).

The existence of a 'Bogotá metropolitan area' is not undisputed, so this expression is explained in some detail in Appendix 1. It is important to stress again that (at least when referring to the period of study) this term has no official validity as either an administrative or a planning concept. It is used here as a shorthand to describe what amounts to a "functional area" (Hall & Hay, 1980) encompassing Bogotá DE and eight municipalities surrounding it among which there is a regular exchange of people, goods and services in a similar manner to that which takes place within a more neatly defined and compact space such as a city centre.

Colombia's currency is the peso. This is used in different parts of the study either in constant or current units. The average official buying exchange rate was 18.5 pesos to the US dollar in 1970 and 502.3 pesos in 1990 (López, 1997). Constant pesos are calculated using the deflators included in Appendix 3, as explained in the relevant passages or tables.

2 The dispersal of manufacturing in metropolitan areas: A review of the literature

2.1 The study of the spatial dimensions of manufacturing development

For centuries city centres around the world attracted craft production and other activities involving the use of tools and skills in transforming raw materials for subsequent sale to local or far-away markets. With industrialisation and the rapid growth and development of some cities in the nineteenth century large factories started appearing on the nearby green field periphery. The city eventually grew around them, and soon they were sharing an increasingly denser and expanded central district with other activities. In many cases, city centres were able to retain the smaller workshops that had been a secular feature of their economy and urban landscape.

As cities in Europe and North America turned into vast metropolises at the turn of the twentieth century, by then much enlarged central districts were able to retain large numbers of both large and small manufacturing establishments. But a feature of twentieth century urban development in many of the richer nations of the world has been a drastic loss of this function to peripheral metropolitan locations, to smaller settlements in other regions or even to distant locations in the so-called 'newly industrialising countries'.

This chapter reviews a body of literature (drawn mostly, though not exclusively, from English-language sources) seeking to document the spatial shift of population and production away from the core of metropolitan areas and advance explanations for this process. This section introduces a range of approaches to the wider issue of the study of the location of industry in space; the second section presents an overview of the development of the modern metropolis, with specific reference to the changing location of manufacturing; the third one examines evidence of the shifts in the location of population within metropolitan areas in both the developed and the developing countries; this is followed by some methodological considerations regarding the study and analysis of industrial location in metropolitan

areas; the fifth section returns to the theme of spatial shifts in manufacturing in metropolitan areas; and the sixth and concluding section reviews in some detail different explanations of the phenomenon.

Concern with the spatial dimensions of manufacturing development in metropolitan regions may be traced to the roots of industrial location studies. The analytical framework and the tools that have been used in the specialised literature to study spatial shifts in manufacturing industry in a metropolitan context have borrowed extensively from economic geography and urban economics, notably from the normative and behavioural approaches to these areas of scientific inquiry. These have also been very influential over several decades in the formulation of regional and metropolitan development policies both in industrialised and in developing countries. More recently, these approaches have come under criticism from structuralist and neo-Marxian writers, who have in turn proposed alternative approaches to the analysis of spatial changes in the context of development. It is not the intention of this section to examine at length the postulates of the different approaches. Its aim is rather to briefly outline some of the basic notions found in them, as a prelude to a closer examination of the available evidence about the dispersal of population and manufacturing industry away from the core of metropolitan areas and the main explanations that have been advanced to understand the phenomenon.

With roots dating back only to the early part of the twentieth century, the separate bodies of theory embodied under the term 'industrial location theory' have significantly evolved both in terms of their main object of inquiry and in the tools used to examine it. Until the 1960s, writers were largely responding to the changing conditions of manufacturing in the countries of Europe and North America and to a great extent their writings "reflected changes in the nature of manufacturing itself" (Chapman & Walker, 1991, p.18). Initial concern was with the location of new firms and the variables affecting the choice of site with a focus on the individual entrepreneur. Minimising the cost of location of new firms was regarded as an essential step for the successful development of heavy industry in the Europe of the late nineteenth and early twentieth centuries.

In the decades of rapid economic growth following the end of World War II realisation that major plant location changes were increasingly the result not only of

isolated decisions by single-plant firms, but also of corporate bodies controlling several establishments opened the way to an interest in the spatial implications of corporate decisions. For some writers concern with an unprecedented loss of manufacturing jobs to services and to the nascent industries of Latin America and especially Asia further exposed the limitations of classical industrial location theory and gave rise to approaches that took greater account of the social, political and international dimensions of spatial manufacturing development.

With this changing focus as a criterion Chapman & Walker (op. cit.) have classified the different contributions to the study of industrial location in five major categories: normative location theory, behavioural approaches, geography of enterprise, manufacturing in regional development theory and planning, and structural approaches. These will be briefly discussed in the paragraphs that follow.¹

i. Normative location theory

Although some of the principles of location theory were initially enunciated in the early nineteenth century by von Thünen (Isard, 1956, p. 27-28) and later by Alfred Marshall (Friedrich, 1929; Krugman, 1991), the roots of modern industrial location theory are found in the work of the German economist Alfred Weber (1929) who was active in the early part of the 20th century. With the individual firm in mind, Weber was intent on developing a set of rules to find the optimum location, that at which production costs are minimised. This focus subsequently gave his work (and subsequent work derived from it) the name of 'least-cost location theory', also known as 'classical location theory'. With a number of assumptions concerning the environment of production, Weber proposed a model in which three factors influence industrial location. They comprise two general regional factors, transport and labour costs, and one local factor, agglomeration or deglomeration forces.

Weber's model assumes constant demand and one point of consumption so that the optimum site for a plant is found at the point where a function combining the weight to be carried and the distance covered by both production inputs and the finished product is minimised. Given the limitations imposed by what were in the early 20th century largely undeveloped transport systems and the high costs of transporting heavy or bulky raw materials, for Weber and many of his followers

¹ This classification has much in common with that proposed by Smith (1981).

writing in the following decades transport was a prime component of production costs and therefore a crucial factor in determining plant location. While recognising its contribution, the assumptions of the model and those of its derivations were criticised in later decades. As Holland writing in the mid-1970s noted, the excessive importance attached to transport costs were "to persist in later location theory long after transport costs had been reduced to relative insignificance by other location factors through technical progress" (quoted in Smith, 1981, p.74).

Other writers in this tradition extended the principles of Weber's model, allowing demand to vary and introducing competition so that producers are perceived as seeking locations which best capture sales. Recognising the limitations of a model that assumes that decisions are taken omnisciently and under ideal conditions by 'economic man',² Smith (op. cit.) welcomed Rawnsstron's notion of spatial margins to profitability, "one of the few really original concepts introduced into spatial economic analysis by a geographer" (p.111). When viewed from the viewpoint of profit maximisation, locational decisions might be sub-optimal because they may be obeying partly to personal factors (personal preferences, family contacts, and so on). "The spatial margin to profitability thus bounds the area within which there is freedom of locational choice if the assumption of profit-maximizing behavior is abandoned" (ibid.). Profits beyond the margins become negative so location there ceases to be economically viable. This has drawn criticism that measurement of the margins is impossible in practice and even Smith contends that "the concept remains more a formal extension of traditional theory than a guide to locational practice" (p.115).

ii. Behavioural approaches

Normative location theory sought to provide abstract explanations for the location decisions taken by entrepreneurs under the assumption of economic rationality. However, in the circumstances of rapid manufacturing growth and investment of the 1960s in Europe, North America and Japan, governments became interested in influencing the spatial allocation of such investment flows. A necessary step in formulating policies was a need to understand how decisions are actually made

² In a contribution to the *Dictionary of Human Geography* (Johnston, Gregory & Smith, 1986) Mark Billinge notes the sexist and pejorative overtones of this term but adds that to date no alternatives have gained currency. Perhaps as a reaction to that, though no doubt with an eye on the ferocity of the political correctness debate in the US, Krugman's (1991) anonymous decision-maker or consumer is female.

rather than how they should be made, which had been the traditional concern of normative theory (Townroe, 1979 and 1991; Harrington & Warf, 1995). This gave rise to a group of contributions which have been collectively labelled behavioural approaches to the study of industrial location.

While retaining previous concern with the individual firm, these approaches borrowed from business administration theory (Marshall, 1982). They set out to challenge the usefulness and lack of realism of the concept of economic man arguing that no economic decision is based on perfect information and a perfect ability to utilise such information in a rational fashion. Thus, insofar as decision-makers can only adopt courses of action which they perceive to be satisfactory they are 'satisficers' rather than 'optimisers' (Chapman & Walker, 1991).

Reservations were often expressed about classical location theory on substantial grounds from the viewpoint of the 'structural approaches', but also on technical and procedural grounds from within what Saha (1987) calls the 'liberal school of geography'. Among those coming from the liberal ranks (chiefly the 'behavioural approaches') one may highlight not merely normative location theory's excessive concentration on the decisions of individuals but also its almost exclusive concern with the location decisions of new plants. By the mid-1960s, empirical evidence suggested that these were rather unrealistic assumptions as new plant locations were perceived as rare events, while the type of rational behaviour commonly assumed by normative theory could more easily be associated with large corporations rather than small enterprises. This gave rise to new lines of inquiry about the issue of industrial organisation which would be developed in a separate approach to the study of manufacturing location, that of the 'geography of enterprise'.³

iii. Geography of enterprise

The central tenet of this approach to the study of industrial location is that the spatial development of contemporary society is increasingly being shaped not by individuals but by the strategies of large organisations, both public and private. This was part of a wider concern with the power of large industrial corporations, in the domestic as well as in the international realm. In the case of less developed

³ According to Smith (1981, p.127), this notion was originally expressed by McNee in the late 1950s.

countries, such concern stemmed from the growing power of multinational corporations, one of whose objectives was to turn uncertainty into calculated risk even if that meant exerting political control over their operating environment. Thus, "the location decision, as traditionally conceived, has continued to have a place within the geography of enterprise, but is no longer regarded as the only or even the most important focus of study...(T)he location decision is secondary to the investment decision" (Chapman & Walker, *op. cit.*, p.25).

Among the contributions of this tradition one must count the explicit recognition that many non-spatial decisions have geographical or spatial consequences, whether they come from the private or the public sector. In the development literature this was to be reflected in increased criticism of the ineffectiveness of specifically spatial policies of governments in the 1970s and 1980s by those who argued that the most effective set of spatial policies are in fact sectoral or macro-economic policies (cf. Harris, 1978; Hamer, 1985; Gore, 1984). The lines of enquiry opened by this tradition were extended within the liberal school onto studies of the aggregate spatial consequences of corporate decisions and, more specifically, of the influence of manufacturing on the spatial patterns of economic development. Within the structural approaches this theme is to be found both in the neo-Marxian and the 'regulation school' writings (Massey, 1984; Lipietz, 1986; Hirst & Zeitlin, 1992; Humphrey, 1995).

iv. Manufacturing in regional development theory and planning

It would appear that the application of all the previous approaches might be extended to studies in the wider realms of regional and metropolitan development. In many ways, analyses of the rationality of locational decisions stemming from the normative or behavioural approaches or the logical extension of the views from the geography of enterprise approach have spatial implications at a scale that goes beyond the individual establishment or plant. However, these wider aspects are not explicitly examined under the traditions discussed above; an adequate consideration of these arise from a multi-disciplinary concern with the issue of polarised development rather than the narrower focus on industrial location found in the other approaches.

In the development literature the issue of 'polarisation' may be traced to the work of Albert Hirschmann and Gunnar Myrdal in the 1950s. This reflected a concern with

an accentuation of the differences between prosperous and lagging regions as economic growth proceeded, a process documented for different national contexts since at least that decade (Gore, 1984). The gradual spatial concentration of investment, population and industry in some regions (and more specifically a few large cities) at the expense of others were increasingly the subject of empirical investigation in the 1960s and 1970s (Gilbert & Gugler, 1992; Gwynne, 1985); the fact that it was perceived as a negative aspect of the development process formed the basis for the formulation of policies designed to counteract it. This is of interest to this study as it has helped to focus attention and generate some thinking on the national concentration of industry in metropolitan regions and even provided some elements for the analysis of the process of spatial dispersal within metropolitan regions.

For Chapman & Walker an important justification for grouping together the different contributions under one separate category lies in their common use of the time dimension, their recognition of the dynamic nature of the process. For while normative theory is essentially static, "models of regional economic development encourage the adoption of an evolutionary perspective as existing patterns are regarded both as derivatives of former conditions and as major influences upon future states of the economic system" (1991, p. 26). These observations draw inspiration from the fact that the distribution of economic activity tends to be spatially clustered rather than dispersed, an aspect that normative theory and behavioural approaches could not adequately tackle. In this, the work of urban and regional economists contributed much to that of geographers whose main concern had been with micro-space (Saha, 1987).

Both in the analysis and in the formulation of policies the focus was on manufacturing activity. This stems largely from the notion that manufacturing exerts a stronger influence upon spatial processes than other economic activities (such as for example finance or wholesale trade) because of its greater ability to generate multiplier and linkage effects (Krugman, 1991). These two concepts are closely related, especially when applied to spatial analysis and, given their importance in the regional and urban development literature, it is worth defining them here. Multiplier effects arise when an initial increase in income in a given activity is reflected in the generation of income in other activities in the same locality or region

(Smith, 1981, p. 360).⁴ In the specific case of manufacturing, the opening or expansion of an establishment may have the intended or unintended effect of creating employment not only in its own premises but also in other establishments that supply it with goods and services; this in turn may result in increased purchasing power and subsequent increases in employment in a range of other firms.

For Pred (1977, pp. 30-31) multiplier effects may be grouped into backward linkages, forward linkages and employee expenditure.⁵ Employee expenditure arises when the aggregate spending of employees at the new or expanded establishment is sufficient to generate the birth or expansion of certain consumer-serving facilities, whether locally or not. Backward linkages occur when the new or expanded establishment generates sufficient demand of goods or services to justify job additions in the supplying units. Forward linkages, finally, occur when the increased output of goods or services of the new or expanded establishment induces other establishments to increase their level of employment and consumption.

The concerns of writers whose work may be classified within this approach are manifold and include the study of the concentration of population and manufacturing in metropolitan regions and of dispersal within metropolitan regions. But other themes have also been explored, such as the industrial specialisation of urban areas (Henderson, 1988), the industrialisation of non-metropolitan areas (Fothergill *et al.*, 1985; Garza & Sobrino, 1989), the regional effects of industrial restructuring (Gatto *et al.*, 1987) and the international relocation of manufacturing industry (Gwynne, 1990; van Liemt, 1992).

⁴ Samuelson and Nordhaus (1989, p.191-192) note that multiplier effects in a regional context are akin to those of open economies and therefore smaller than in closed economies. Insofar as regions operate as open rather than as closed economies, investment in a relatively undeveloped region or a medium-sized city may generate more limited local multiplier effects than in a developed region or large city. This is because the investment (say, a sports club) may demand a set of specialised skills (eg. specialised architects, health consultants) which are not available locally but may have to be imported from outside the region.

⁵ The concept of forward and backward linkages was first proposed by Albert Hirschman in *The Strategy of Economic Development* published in 1958.

v. Structural approaches

The incorporation of broader concerns into the analysis of industrial location found in the work of authors mentioned in the previous sub-section is also a crucial distinguishing characteristic of the contributions collectively labelled here structural approaches. These have in common an explicit or implicit critique of classical and behavioural approaches and of their derivations within a 'liberal' framework and combine spatial analyses with insights from political economy, sociology and development theory. Initially, and particularly those that we have here called the 'neo-Marxian' approaches, started out with a "powerful and substantive" criticism of industrial location theory (Saha, 1987, p. 9). These were then followed by proposals for alternative frameworks within which to examine more recent processes of industrial and spatial restructuring both in the domestic and international arenas, which have found expression in the writings of the French 'regulation school'.

For Massey (1979 and 1984) a major problem of location theory is that it has as its object of study an abstract firm with no structural connection to the rest of the economy and with little or no historical contextualisation. She argues that the fact that development processes take place over space and are affected by it implies that there may be no conceptual dichotomy between the social and the spatial. Spatial change must be understood predominantly as an effect of non-spatial developments. Location theory may not, therefore, claim to have "a genuinely separate object of its own, and in that sense there (can) never be an *autonomous* theory of industrial location" (1979, p.57; emphasis in the original).

Despite a large number of studies and individual positions, authors writing within a neo-Marxian framework could be said to share an interest in the dynamics of capitalism and the structuration of both economic and social relations over time and space (Johnston, Gregory & Smith, 1986). More specifically, their work displays a set of concerns with the historical particularity of different phases of capitalist development, with the structural interdependencies between commodity production, social reproduction and the urbanisation of the space-economy and with the global context of different phases of capitalist development. Many of the themes in the set of approaches discussed in the previous sub-section are found again among these authors, the major difference being the wider framework within which they are

examined. There is nonetheless some degree of convergence among them, and the boundaries between the two categories often become blurred.

Those writing about the experiences of structural change and 'de-industrialisation' in Europe and North America have given particular attention to processes such as the reorganisation of production and increasing fragmentation expressed in the physical separation of administration, research and development and production processes (Massey, 1984), the intra-metropolitan dispersal effects of industrial reorganisation (Scott, 1982a and 1982b), the impact of new technologies in shaping urban space (Castells, 1989; Graham & Marvin, 1996) and the 'feminisation' of new service areas and regional convergence in female participation rates (Henwood & Wyatt, 1986).⁶

Throughout the 1980s, in the case of the less developed countries and more specifically the 'newly industrialising countries' (NICs) of Asia and Latin America, the areas of concern were somewhat different on account of the different economic and spatial restructuring processes taking place there. The issues examined include the shifting spatial patterns of global manufacturing (Harris, 1987), the impact of structural adjustment reforms on cities (Harris & Fabricius, 1996), the role of metropolitan areas as focal points of global capital accumulation processes (Armstrong & McGee, 1985), the welfare implications of regional industrialisation processes (Saha, 1987) and the role of labour relations in metropolitan dispersal of manufacturing (Storper, 1984).

More recent concerns about the spatial impact of changes in the world economy have appeared in the form of discussions about the increasing integration of the world economy and society to a scale and at a pace never before seen in history. This integration (known by the often poorly-defined term of globalisation) takes shape in a whole range of dimensions of human life: cultural, economic, in the way work is organised, in communication techniques and so on (Beck, 1998). Growing volumes of international trade have been at the centre of the process, accompanied by increased liberalisation of trading conditions, while manufacturing processes

⁶ The list of authors and themes is considerably longer but an exhaustive review lies beyond the scope of this study. A sample of these may be found in the collections of papers by Scott & Storper (1988) and Martin & Rowthorn (1986).

increasingly take place at a global scale with different localities exploiting their comparative advantage to create a 'global factory' (Harris, 1997).

In the 1980s this was also accompanied by exponential growth in the volume of international capital which now flows easily and in a matter of seconds from one location to another: "the old distinction between capital-rich developed and capital-scarce developing countries has lost its meaning" (op. cit., p. 1694).

A shift from what were largely inward-oriented development policies (particularly in the Latin America of the 1940s to 1980s) to a more liberalised outward-oriented strategies has implications for cities. At the end of the twentieth century, the world economy is increasingly supported on a reduced number of 'world cities' where the majority of financial transactions take place every day aided by a network of secondary cities (where much smaller volumes of global business are conducted but which serve an important national or regional purpose), while other cities and their inhabitants are largely by-passed by many of these processes of global integration and their accompanying consumption patterns.

Without denying that it is an area of genuine and urgent policy concern in the 1990s (cf. Townroe, 1996), a theoretical discussion of the role of cities in a more integrated global economy has not played a central role in the present analysis largely because the period covered in the study was one when Colombia's national economy and more specifically Bogotá's manufacturing industry could be said to be still in the last phases of import substitution industrialisation and therefore comparatively isolated from the effects of globalisation and liberalisation (cf. Dávila, 1996; Roda, 1994).

2.2 The development of the industrial metropolis

An attempt to understand the roots of dispersal of metropolitan manufacturing requires initially examining the factors that brought industrial production to central areas in the first place and then those factors and processes that impelled it to move out towards new locations. By looking at 'snapshots' of cities in different geographical locations at different points in time, this section introduces some basic notions on industrial location including a range of factors that have been used to explain the initial concentration of manufacturing in central areas and its subsequent location in the metropolitan periphery.

By the end of the nineteenth century two types of manufacturing industry had evolved in the large cities of Europe and North America: a large-scale materials intensive set of activities, and a small-scale labour intensive industry (Scott, 1982a). Large-scale industries were capital intensive and were principally located close to the terminals of rail and water transport systems, the main modes of transport for the heavy and bulky raw materials used in industries like slaughtering and meat packing, steel production, brick-making, grain milling and sugar refining. Their central, clustered, location has been explained from the angle of normative theory by the high cost of moving goods within cities compared to the cost of moving both goods between cities and people within cities (Moses and Williamson, 1972; Feller, 1975). People moved short distances using street trams and trolleys which were comparatively cheap and efficient, while goods within cities were moved by horse and wagon, a slow and inefficient mode of transport.

These large-scale industries were enjoying what Weber (1929) described as *economies of agglomeration*, or benefits derived by individual plants and other economic actors from locating close to one another. In particular, they were benefiting from one particular type of agglomeration economy that Edgar Hoover, a follower of Weber, would later describe as *urbanisation economies* which result from an increased supply of facilities, services, skilled labour force and potential suppliers and buyers as a city grows (Chapman & Walker, 1991).

Central locations were also important for small-scale industries, like jewellery, leather goods, garments, printing and publishing, watch-making, furniture, and so on which prospered in old established centres like London, Amsterdam, Birmingham and New York (Hall, 1964; Scott, op. cit.; Lampard, 1986). Such industries share some common characteristics which reinforce their need for central and clustered locations (Vernon, 1972; Hall, op. cit.): they are subject to swiftly varying and unpredictable levels of demand, generally for small volumes of tailor-made products subject to seasonal factors; the manufacturing process often involves intricate and delicate operations which cannot be easily standardised, so skilled and unskilled labour is a significant component of the process; inputs in many of these industries are manufactured or semi-manufactured products supplied locally by other industries; and given all of these factors, they need proximity to their market, be it wholesale or retail. Typical examples of these industries are

Clerkenwell's watch and clock-makers in London, Manhattan's garment district in New York, and jewellers and goldsmiths in Birmingham's centre.

In Hoover's view, such small-scale industries would be taking advantage of a second type of agglomeration economies which he called *economies of localisation* allowing small plants working in related areas of production to reduce their internal production costs by acquiring specialised services, parts or components from other suppliers located close by. They thus tend to cluster together in specialised districts within cities. But they also need central, accessible locations as this also increases their chances of building a local pool of specialised labour, acquiring technology and innovating, and reducing their marketing costs (Chapman & Walker, op. cit.).⁷

Thus, the late nineteenth century industrial city was a compact, core-dominated agglomeration. Close to the dense core where commercial, manufacturing and administrative functions competed for the best locations residential districts housing the labour force rapidly developed, usually marked by appalling conditions of overcrowding and poor sanitation (Pred, 1964; Garside, 1984; Evenson, 1984; Lampard, 1986). Those who could afford to moved out of central areas to the greener parts of town, but still within short distances of the city centre to which they commuted by private non-motorised (and later motorised) forms of transport.

A wide range of factors has been assembled in the specialised literature to explain the shift of large-scale manufacturing industry out of the core to peripheral locations. The range is varied and complex, and very good documentation exists on individual cities. The following selection cannot therefore do justice to the richness of the available literature, but can only aspire to highlight the relevance of some factors in an historical context.

Several authors argue that the scarcity and rising prices of centrally located land has been a constraining factor for central expansion, especially given the fact that technical change and growing demand combined to increase production space requirements in many sectors of industry (Vernon, 1957; Hoover & Vernon, 1959;

⁷ Hoover's third type of agglomeration economies are scale economies, arising from larger production volumes which up to a point permit reductions in unit costs. These are by definition internal to the plant, and are therefore not attributable to cities or urban locations. Yet another type of economy not discussed by Hoover which is internal to the plant and which took renewed importance in the late

Pred, 1964; Dennis, 1978; Lampard, 1986), though it has also been suggested that "high land costs at the urban core were not a deterrent to industry" (Chapman & Walker, 1991, p. 243). Sanitary codes which controlled the development of new factories in the core of US cities have also been credited by Pred (1964) as fostering the flight of some industries from the centre. Slum clearance and housing construction programmes in the London of the 1890s (Garside, 1984) and in the Paris of the 1920s (Evenson, 1984), as well as vast expansion plans such as Cerdà's 1854 Pla d'Eixample for Barcelona (Centre de Cultura Contemporània de Barcelona, 1996), are also said to have accelerated suburban sprawl (thus helping increase the supply of labour in the periphery which would facilitate the future relocation of plants in some peripheral districts).

New forms of motorised transport, initially rapid transit systems like suburban trains and networks of trams and buses, and later the motorcar, are said to have greatly facilitated the expansion of cities and the relocation of population to suburban areas (Pred, 1964; Schnore, 1965; Hall, 1984). Similarly to the way railroad spurs had freed US metropolitan factories from downtown waterside locations a few years earlier, from the 1920s onwards the truck helped free plants from their central location close to railway terminals and ports and spread even further around the sprawling metropolis (Vernon, 1957; Moses & Williamson, 1972). Bulky goods could now be moved efficiently over short distances to and from terminals and sales outlets, so factories no longer needed to be tied to rail connections or be centrally located. This also meant that large-scale manufacturing could escape from what was rapidly becoming an even more heavily congested central area (Hoover & Vernon, 1959).

Over the next decades and up until the 1960s and 1970s, an often growing and not insubstantial share of total manufacturing production in the richer nations of Europe and North America would be concentrated in a handful of metropolitan areas and their hinterlands. For example, between 1900 and 1960 the manufacturing labour force in New York's standard metropolitan area (including New Jersey) represented between 10 and 11 per cent of US manufacturing workers, while its share of manufacturing output dropped from a high of about 17 per cent in the 1930s to 11 per cent in 1960. The metropolitan areas of Chicago and Los Angeles were not far

twentieth century are economies of scope, which refer to the range of different products that a single plant or establishment can produce using the same machinery and the same labour force.

behind in second and third place, respectively, with shares of 5.5 and 4.6 per cent of US manufacturing workers in 1960 (Lampard, 1986, p. 75). Even in a country with a highly dispersed pattern of spatial development as West Germany, in 1960 West Berlin's manufacturing jobs amounted to nearly 4 per cent of the national total (Ewers and Stein, 1986, p. 298).

It was in that context that the striking dispersal of manufacturing away from metropolitan cores to be described in a later section took place. But this does not mean that small-scale industries disappeared altogether from the richer nations' urban areas. On the contrary, many continued to thrive in central or clustered locations, until a complete turnaround in world-wide trade in the 1970s and 1980s would make volumes of manufacturing employment in many areas of production like garments, textiles and steel a mere shadow of their former past in countries like Britain, France, the United States, Canada, Spain and Germany (Bouchet, 1984; Fothergill *et al.*, 1985; van Liemt, 1992).

By 1951 over half a million people representing a third of Greater London's manufacturing labour force still worked in the 'Victorian manufacturing belt', a large crescent-shaped area running round the north and east sides of central London. The great majority of industries were small workshops and still retained many of the characteristics described earlier that attracted them to central, clustered locations (Hall, 1964). In 1956 over a quarter of manufacturing jobs in the New York Metropolitan Region was to be found in Manhattan's central business district, a small area covering nine square miles (Hoover & Vernon, 1959, p. 13). The larger Core area (including Manhattan and the four central counties) contained half of the Region's manufacturing employment, but over 60 per cent of establishments with 60 employees or less (*op. cit.*, p. 50).

So far we have described some of the spatial features of the late nineteenth century industrial city, as well as some selected features of the mid-twentieth century developed metropolis. The remaining sections of this chapter will describe the major shift of both population and manufacturing employment seen in the developed metropolis in the second half of the twentieth century, and more recently in the developing metropolis. In addition to a methodological interlude, the chapter will introduce some of the theoretical frameworks used to explain the spatial dispersal of metropolitan manufacturing.

2.3 Population dispersal: An assessment of international experience

The movement of population and manufacturing away from the core of metropolitan areas can be traced to as early as the second half of the nineteenth century in the United States (Pred, 1964; Schnore, 1965), and by the early decades of the twentieth century faster population growth in the periphery than in the core was an established feature shared by the world's metropolises including London, Paris, New York, Berlin and Moscow (Hall, 1984). This aggregate effect of individual movements, called here metropolitan dispersal, is defined as the relative locational shift of population, establishments or aggregate production (whether measured in terms of jobs or output) from the core to the fringe of metropolitan regions or to locations beyond the metropolitan fringe.⁸ This section reviews some of the international experience of population dispersal away from metropolitan cores. The US experience of metropolitan dispersal takes centre stage here, partly because it has been well documented, but largely because it occurred at a much larger scale and at an earlier period than in any other country.

Whether in situations of output and employment growth or contraction, as discrete movements of a few firms or as more complex instances of restructuring of entire industrial sectors or production processes, some measure of dispersal has been observed in many developed and developing countries alike in the past century and a half or so. Often, though particularly in the more developed nations, this has been paralleled or preceded by faster population growth in outlying areas than in older and more established central cities, a process whose earliest expression is found in the suburbs of London (Hall, 1975) and perhaps more dramatically in those of the largest American cities (Schnore, 1965). In more recent decades, particularly after 1950, population dispersal has involved absolute population losses in core areas, often followed by losses in the peripheral rings of a number of metropolitan areas.

A distinctive feature of population growth in the twentieth century has been the development of an unprecedented number of large urban agglomerations. This is not to say that cities approaching or exceeding one million inhabitants did not exist before, as examples such as Rome in the first century BC and Baghdad and

⁸ As explained in the introductory chapter here the term 'dispersal' is preferred to 'decentralisation'.

possibly Córdoba in the tenth century AD demonstrate. What makes the twentieth century distinctive is that these metropolises developed in a context where, for the first time in recorded history, urban populations grew consistently faster than rural or national populations in most regions of the world. This resulted in substantial increases in urbanisation levels: the urban share of national population in the group of developed countries grew from an average of 30 per cent in 1900 to 66 per cent in 1980, while in the group that may be classified as developing countries it rose from nine to 28 per cent.⁹

If all regions of the world are counted, the number of cities which had more than half a million inhabitants grew from two in 1500 to seven by 1700 and 49 by 1900. By 1980 this had multiplied more than tenfold to a total of 510, of which 225 had a population of over one million. Even faster was the twentieth century increase in the number of cities with more than 100,000 inhabitants, from a total of 292 in 1900 to 2,300 in 1980. Of these, some 1,100 cities were located in the developed countries which contained about one quarter of the world's population, while the group of developing countries, with three quarters of the total population, had some 1,200 cities with populations of 100,000 inhabitants or more. The shares of cities with one million inhabitants or more was similar in 1980, with some 110 in the developed countries and 115 in developing countries (Bairoch, 1985, Table 27/3).

It is in this general context that the phenomenon of the dispersal of metropolitan population must be viewed. The relative or absolute loss of urban population is by no means a new historical phenomenon. Indeed, it was partly the observation that history is dotted with examples of entire urban civilisations disappearing and large cities shrinking that led the British historian Jim Dyos to remark that one of the challenges faced by urban historiography is to question the irreversibility of urbanisation.¹⁰ Economic cycles, epidemics, political upheavals and wars have been the cause of the sudden or gradual loss of urban (and national) population at

⁹ Figures taken from tables 18/1, 19/1 and 27/1 in Bairoch (1985). These figures should be treated with some caution as averages are merely indicative and conceal wide differences between countries. The group of 'developing countries', for example, includes nations with marked differences in urbanisation levels such as Uruguay - with 3.1 million inhabitants and an urbanisation rate of 86 per cent in 1990 - and India - with a population of 850 million and an urbanisation rate of 27 per cent in 1990 (World Bank, 1992).

¹⁰ Correspondence quoted in Lampard (1983).

different points in history.¹¹ But the pattern of relative or absolute loss of metropolitan population under conditions of political stability, demographic expansion and economic growth is an exclusive twentieth century feature.

As noted earlier, the relative dispersal of metropolitan population was first documented in the United States.¹² Since the last decades of the nineteenth century and up to 1950 most of the growth in the US population had been captured by metropolitan areas.¹³ During the large waves of immigration begun in the nineteenth century and even after this had waned by the 1920s, metropolitan areas as a group were growing at rates that exceeded in more than 50 per cent the growth rate of national population (Schnore, 1965, p. 80). In New York, for example, already by the second half of the nineteenth century some of its 300,000 inhabitants were relocating from the centre of the rapidly growing city to its peripheral areas. By the 1920s the suburbs (or 'rings') of most US metropolitan areas were growing faster than the central cities ('core'). Between 1920 and 1930, for example, the population in the rings grew by a third, that of the core cities expanded by a quarter and the national population by just over 16 per cent. The process gained momentum during the 1940s when the rings expanded by over a third while the metropolitan cores grew by 13.8 per cent, more slowly than the 14.5 per cent of national population (ibid.).

Schnore describes American metropolitan dispersal as being the result of two parallel trends: "a tendency for residents of the central city to move in increasing numbers to various parts of the adjacent ring area and a tendency for migrants from outside the metropolitan area to move directly to the ring rather than to the city itself" (op. cit., p. 82). The contribution of in-migration (from rural areas and smaller cities) to the growth of US metropolitan areas was substantial at least until 1950, as shown by the fact that non-metropolitan areas typically grew half as fast as the national population.

¹¹ Cycles of mineral exports, for example, lie behind the fact that in the northern Andes there were more towns of 20,000 or more inhabitants in 1750 than in 1850 (Bairoch, 1985).

¹² An analysis of 99 US metropolitan central cities that at some point had attained a population of 100,000 allows Schnore to infer that population was already dispersing in New York as early as the 1850s. By the end of the nineteenth century it had been joined by no less than nine other core cities (Schnore, 1965, chapter 5).

¹³ The expression 'metropolitan areas' in the US context includes the 168 Standard Metropolitan Areas. For the analysis, Schnore held their 1960 areas constant and retrojected them to 1900.

During the 1960s population dispersal not only continued but in fact deepened in the US to the extent that, while growth in the rings continued, the cores of fifteen of the largest metropolitan areas had become net losers of population and dispersal was spilling beyond metropolitan rings to adjacent non-metropolitan counties (Hall & Hay, 1980). A variety of reasons have been cited to explain this process, but in many cases it seems linked to the sluggish growth or even decline in manufacturing jobs (an issue discussed later), while in other cases it may have stemmed from increased individual prosperity and mobility and the search for the space and amenities that suburbs offered, especially to the better off.¹⁴

A part was played by specific government policies aimed for example at reducing the densities of what were seen as unmanageable metropolises and thus reduce congestion in central areas and the diseconomies associated with it. No doubt the flight to the suburbs at least in the US was facilitated in no small measure by continued falls in energy prices which "permitted increasing separation of activities and the outward spread of urban areas at decreasing densities" (Owens, 1992, p. 80).¹⁵ And in the view of some commentators, even geopolitics could be credited with playing its part as some of the pressure for dispersal in the 1950s "arose from the presumed vulnerability of large cities to nuclear attack" (Wood, 1974, p.136).

Yet another related change was documented in the US during this decade which would also find an echo in other industrialised nations: this involved the virtual stagnation of the larger metropolitan populations as a result of out-migration and the rapid growth of smaller cities largely through in-migration (Vining & Kontuly, 1978).¹⁶ In a reversal of the previous century's developments, non-metropolitan areas started to grow faster than the larger metropolitan areas. Perhaps more remarkably, remote and sparsely populated areas became net receivers of population and this included even poor rural areas in the country's South and West,

¹⁴ Suburbanisation has been selective, thus leading to a preoccupation among policy-makers and scholars with a process of spatial segregation along ethnic and income lines (cf. Bollens, 1988; Frey, 1995; Hill & Wolman, 1997).

¹⁵ Aided in no small measure by US policies geared towards maintaining energy prices low or containing excessive rises.

¹⁶ Vining & Kontuly (1978, p.55) observe that in some cases such as the US and Sweden foreign immigration to core areas might have helped to counteract rather than reinforce this process.

a 'clean break' with the rural-to-urban migration patterns seen since the Industrial Revolution (Hall & Hay, *op. cit.*).

Though "no other nation has produced systematic analysis of urban growth and change on quite the American scale" (*ibid.*, p.14), by 1980 some of the processes seen in the US had also been documented in other countries for the previous two or three decades.¹⁷ Despite the fact that comparisons between countries must make allowances for differences in data collection procedures and in definitions of concepts such as metropolitan area or core, many of the US trends may be found in other contexts, particularly since the 1950s.¹⁸ For example, Canada did not seem to have experienced de-urbanisation but some of its metropolitan regions underwent instead some dispersal, a process apparently fostered more by worsening congestion and higher costs in core areas than by deterioration of the core in the scale seen in US cities in the 1960s. Urban growth in Australia was also marked by suburbanisation and exurban extensions mostly beyond the metropolitan boundaries in place by 1980. Growth in Japan was much more concentrated in a few large metropolitan regions in whose fringes were located the fastest-growing urban centres; dispersal away from the core became substantial only in the 1970s, a decade when the central cities' share of metropolitan population fell.

The United Kingdom had an earlier start in the dispersal process than Japan, Australia and Canada. By the 1950s the population in the ring of the major UK metropolitan areas was expanding faster than in the core and by the 1960s this sluggishness had turned into absolute losses in the core and, in the cases of London, Manchester and Liverpool, absolute losses in metropolitan population. In addition, growth rates in the outermost rings of what Hall & Hay call the "metropolitan economic labour areas" had risen to nearly double the national average. During the 1960s, and with some delay in relation to population, employment emulated the locational changes of population and soon several core areas went on to become net job losers.¹⁹

¹⁷ Unless otherwise indicated, the unattributed evidence presented in this and the next paragraphs is taken from Hall & Hay (1980).

¹⁸ Czerny (1989) also discusses the difficulties of defining and utilising concepts such as 'suburbia' across national boundaries. See also Thomas (1974) for a discussion of the definitions of the 'urban fringe'.

¹⁹ For a review of the interpretations of this process see Fielding & Halford (1990).

The experience of dispersal in other European countries has been mixed, though in general trends were broadly similar to the UK experience. Sweden, Norway and Denmark, for example, underwent a similar process to Britain's though with a ten-year lag; faster population growth in metropolitan rings than in the core became substantial only in the 1960s while cores started losing population in the 1970s. In southern Europe (Spain, Portugal and Italy) population dispersal had at least a fifteen year time-lag in relation to the UK though a major difference was that by 1980 core areas had not yet started losing population to any sizeable degree; contrary to the American case up to 1980, these countries experienced national concentration of population in a few metropolitan areas and a continued absolute loss of rural population. As in the US, increased average incomes, improved rail infrastructure and a greater availability of individual forms of motorised transport facilitated suburbanisation, which came earlier to the richer countries of northern Europe than to those in the less developed south (Cheshire, 1995).

Up to 1980, declines in population in the core of metropolitan areas around the world were accompanied by drops in population densities. Kenworthy *et al.* (1994) report that average density fell consistently in a number of regions of the world between 1960 and 1980: from 53 to 44 inhabitants per hectare in a sample of ten US cities, from 31 to 24 in a sample of six Australian cities, from 126 to 91 in a sample of eleven European cities, and from 226 to 177 on average in Singapore, Hong Kong and Tokyo.²⁰

The tendency of metropolitan areas to lose population in absolute terms appears to have been reversed in several of the more industrialised countries during the 1980s (Cochrane & Vining, 1988). In the United States, for example, growth in metropolitan areas was faster than in non-metropolitan areas while in Sweden, Denmark, the Netherlands and Belgium net out-migration from these areas was virtually nil during the decade. In Japan the three main metropolitan regions attracted migrants again (*ibid.*).

²⁰ The sample of US cities included: Sacramento, Portland, Phoenix, Denver, San Diego, Boston, Houston, Washington DC, San Francisco, Detroit, Chicago, Los Angeles and New York. The Australian cities were Canberra, Perth, Adelaide, Brisbane, Melbourne and Sydney. The European cities were Frankfurt, Amsterdam, Zürich, Brussels, Munich, Stockholm, Vienna, Hamburg, Copenhagen, London and Paris.

More importantly for this research, there have also been changes in trends within metropolitan areas. As was pointed out earlier, during the 1970s and 1980s the core and even the ring of many of the larger metropolitan areas in north-western Europe, the US and Japan became net population losers. More recent evidence suggests that some of these areas are approaching a 're-urbanisation' stage, whereby a slower rate of loss in the core than in the ring results in the core increasing its share of metropolitan population.²¹ In Tokyo's core area, for example, losses between 1975 and 1980 were followed by gains in 1980-85 (Mera, 1989). Evidence is less unequivocal in other cases but it seems that the core of metropolitan areas like New York, Boston, Chicago, Indianapolis, Philadelphia and San Francisco in the US, and London, Copenhagen, Glasgow and Essen in north-western Europe may also be experiencing a turnaround (Lever, 1993; Kenworthy *et al.*, 1994).

A process of population dispersal in metropolitan regions of several less developed countries has also been detected, though it remains more scantily documented. One of the earliest forms of dispersal in several of Latin America's capital cities may be traced to the last decades of the nineteenth and early years of the twentieth centuries. "Upper class families - who used to be known as 'the families from the plaza' - started to emigrate in the opposite direction as the poorer strata moved into the large mansions (of the city centre) turning them into tenements. New 'barrios' some distance from the centre welcomed those who had abandoned the neighbourhoods close to the city's central square" (Romero, 1976, p. 278; my translation). Some of these new 'barrios' grew out of subdivided farms or villages linked to the centre by train or tramway and there the bourgeois newcomers found the space, the clean air and the greenery that centuries of densification had long before eliminated from the colonial core. The majority of the poorer inhabitants, by contrast, could not afford to move out of the cheaper tenements until several decades later when new peripheral settlements appeared on the outskirts of the rapidly growing metropolises.

Most of Latin America's large cities absorbed nearby towns as they expanded. With urban sprawl came a decline in the residential and commercial importance of

²¹ A model proposed by Van den Berg & Klassen (quoted in Lever, 1993) describes population growth in metropolitan areas as undergoing eight stages, grouped into four phases: urbanisation, suburbanisation, disurbanisation and reurbanisation.

the historic centre. The traditional central areas of Lima, Caracas, Santiago, Mexico City and Bogotá have lost population almost uninterruptedly since the 1960s and 1970s while more peripheral districts and suburban rings have continued to expand. The spontaneous flight of wealthier families and the arrival in the city centre of poorer occupants so vividly described by Romero was followed in some cases by government-backed wholesale redevelopment projects which destroyed thousands of low-income rental housing units and replaced them with motorways or office and commercial developments (Gilbert, 1996a). In the case of Mexico City and Santiago, earthquakes accelerated the loss of population from central districts. By contrast, central areas in other large cities like Sao Paulo, Buenos Aires and Rio de Janeiro have maintained their attraction to local residents, many of whom are well-heeled inhabitants.

Schteingart (1989) describes how the population of Mexico City's metropolitan area dispersed towards concentric rings ('contornos') around the city centre: in 1950, three-quarters of a total of nearly three million inhabitants lived in the central area; by 1980, the share of the centre had dropped to less than a fifth, that of the first ring had risen to over half and the second and third rings had over a quarter between them, of a much increased metropolitan population of nearly 14 million.²² Similarly to some richer countries documented above, the population in the core area had risen in absolute terms to 2.9 million by 1970, subsequently losing 300,000 people by 1980 and a further 600,000 by 1990 (Villa & Rodríguez, 1996). By contrast, the population in the rings continued to rise uninterruptedly throughout this period so that by 1990 the metropolitan areas of Mexico City extended to within a close distance of those of Toluca, Puebla and Cuernavaca in a vast megalopolis of 18 million people (UNCHS, 1996).

Through an examination of the growth of Brazil's eight largest metropolitan regions between 1940 and 1980, Y. J. Lee (1985) concludes that, as a general rule, the metropolitan population tends to remain concentrated in the area's core (defined as the municipality located at the centre of the region) until the size of the region reaches about one million, it remains stable in the range from one to 1.5 million and then starts dispersing in ranges above 1.5 million. For example, the share of Sao Paulo's metropolitan population in the core area dropped continuously from 84.6

per cent of a total of 1.6 million in 1940 to 67.5 per cent of a much higher 12.5 million in 1980. The metropolitan regions of Rio de Janeiro and Recife showed similar drops, while in Salvador, Fortaleza and Curitiba (all under 2 million in 1980) the core substantially increased its share of the total.

The methodological difficulties in describing spatial processes and making international and even national comparisons once again become apparent here. For example, using the definition of metropolitan core as proposed by Lee for Brazil's cities, dispersal in the case of metropolitan Bogotá²³ appears to have been much more limited than in Brazil. Defining the core as the central municipality of Bogotá's metropolitan area (i.e. Bogotá DE), the metropolitan share of (urban and rural) population in the core rose from 92.6 per cent in 1951 to 96.1 per cent in 1993 (cf. Appendix 1). However, if one were to choose a finer sub-division of the core into six smaller 'rings', this would show that the two inner-most rings (with a combined area representing 6 per cent of a core of some 30,000 hectares) lost population in absolute terms between 1964 and 1973, while the outermost ring gained population at an astonishing yearly rate of 38 per cent in the same period (Mohan, 1986, table 3-8).

The difference in interpretations of the same process suggests that the issue of the scale at which a spatial analysis is carried out remains a methodological issue that must be confronted at some point in a research (Wood, 1974). And it is precisely to methodological issues that the next section is devoted, as any conclusions regarding the relative spatial shifts in population or employment must take into account a careful assessment of the instruments and parameters used to measure such shifts.

2.4 The measurement of manufacturing dispersal: Some methodological considerations

Before presenting a general panorama of dispersal both within and outside metropolitan regions, this short section briefly discusses the issue of the measurement of industrial location and more specifically its dispersal. Close

²² The 1980 census returns for the city are now widely believed to have been over-estimates. The more accurate 1990 census returned a figure of 14.7 million (Rowland & Gordon, 1996).

scrutiny of the nature of manufacturing dispersal reveals it to be a complex affair involving much more than a simple relocation of plants. In fact, outright relocations generally contribute little to the aggregate process. A substantial part of the empirical literature has attempted to examine dispersal in its different components. Scott (1982a) distinguishes two distinct processes: a negative one involving losses of jobs or production capacity at the core through plant closures, direct out-migration and *in situ* contractions, and a positive one in the rings consisting of new plant openings, in-migration and *in situ* expansions. In addition, dispersal may sometimes be accompanied by central-city growth trends which would tend to compensate for movements away from it.

Dillinger & Hamer (1982) quote a study of manufacturing employment change in Cincinnati (Ohio, US) showing that the central business district (CBD) lost some 8,400 jobs and gained over 2,300 over the period 1971-75 (a net loss of 6,110). A third of the losses were due to plant relocations (also called out-transfers), three-fifths were due to plant closures (deaths) and some 5 per cent came from *in situ* contractions (job losses in stationary plants). By contrast, the CBD gains were almost evenly distributed between new plants (births) and in-migration (in-transfers) from within the metropolitan area.

In Cincinnati's suburban ring, by comparison, over a tenth of the net increase of nearly 7,000 jobs in the same period was due to *in situ* growth, nearly two-fifths originated in new plants and nearly half were due to in-migration from the core. And, to further complicate the picture, the study showed that the suburbs also lost close to 4,500 jobs. One fifth of these originated in transfers out of the ring and the rest in plant closures. A similar picture emerges from a study of Atlanta also quoted by Dillinger & Hamer, with the difference that there both the core and the ring lost employment in 1973-76.

As in any branch of the social sciences, analysis of the components of dispersal and of the precise mechanisms behind it is marred by data problems and is partly shaped by the interpretation that the analyst chooses to assign to the phenomena he or she observes. The large majority of location studies rely to a greater or lesser

²³ This is the area within what we have here called the Bogotá metropolitan area. It is worth stressing again that this is not an official denomination but a functional concept developed for this study. See Appendix 1.

extent on official statistical data (from censuses, surveys or other kinds of regularly updated data bases) which are limited by disclosure rules forbidding the public release of information in a manner which allows identification of any given firm or establishment (Townroe, 1979; Lee, 1987). This restricts the extent to which movements of individual firms can be traced in space and over time, for example. It may also limit the analysis of developments within areas other than the larger and cruder administrative boundaries of metropolitan areas or regions. Time series and comparisons between nations are also often hindered by data compatibility problems.

In other cases the information released is too aggregated to allow researchers to trace connections within or between firms or to study the effect of production linkages on spatial changes (Massey, 1984). As a response to this researchers have had to work using samples drawn from manufacturing statistical data bases (e.g. Hamer, 1985; Struyk & James, 1975), or from other data bases such as those of industry inspectorates (Mason, 1980), utility or pollution-control companies (Townroe, 1983) and population censuses or household surveys (Lee, 1989); to produce estimations through modelling (Moses & Williamson, 1972), including econometric models (Henderson, 1988); or to gather primary data through survey techniques using questionnaires or in-depth studies (Townroe, 1979 and 1991; Lee *et al.*, 1985; Lee, 1989).²⁴

2.5 The dispersal of manufacturing in metropolitan regions

In the early 1970s, before it became evident that a substantial process of restructuring was beginning that would deeply change the economic and spatial nature of manufacturing in the old established centres of the major market economies (and lead to unthinkable losses in manufacturing jobs), dispersal could perhaps rightly be regarded as "the major locational trend of urban industry during this century" (Wood, 1974, p.135). This section reviews some of the international evidence on manufacturing dispersal within metropolitan regions, a process in evidence for several decades as Wood's phrase and the references cited earlier suggest. The section ends with an illustration of dispersal of manufacturing out of a metropolitan area but within what may be described as a 'metropolitan region'.

²⁴ For a more complete discussion of the nature of statistical data and its uses in the United Kingdom context, see Healey (1983). Lindenboim (1984) discusses compatibility problems in the use of

In the early years of the industrial revolution in Britain comparatively little manufacturing production could be found in urban centres. Before the introduction of the steam engine in the late eighteenth century, wool and cotton textile mills operated with water power and so were forced to locate close to waterfalls. Even small-scale workshops producing agricultural implements benefited from a close contact with their customers to sell and improve their products. This radically changed during the nineteenth century with the introduction of mass production and perhaps its most eloquent expression, the factory, a primarily urban (and peri-urban) phenomenon (Hobsbawm, 1969; Pred, 1964). The growth and spatial concentration of manufacturing became major driving forces behind the unprecedented development of towns and cities: by 1750 there were only two cities in Britain with over 50,000 inhabitants (London and Edinburgh); to these another six had been added by 1801 and 29 in 1851, of which nine had a population of over 100,000 (Hobsbawm, *op. cit.*, p. 86). By the middle of the nineteenth century there were more Britons living in urban than in rural areas.

But the need to remain tightly concentrated in or around an urban core was relatively short-lived. In the large cities of the United States "by 1910 observers recognized the slow, persistent relative increase of manufacturing in the suburbs" (Pred, *op. cit.*, p. 169). Four decades later this process had become almost commonplace in the larger US agglomerations. J. F. Kain (quoted in Scott, 1982a, p.122) shows that an average increase of 218 manufacturing jobs in the core of each of a group of 40 large US metropolitan areas²⁵ between 1948 and 1954 was followed by average losses of over 2,100 jobs per core area in 1954-58 and of nearly 3,500 in 1958-63. At the same time, the rings of these metropolises showed average gains of 2,400, 1,300 and nearly 2,200 jobs respectively during the three periods.²⁶

The flight of manufacturing jobs out of central areas has continued almost uninterrupted in most large metropolitan areas since then, but this has been

Argentina's manufacturing census data for the years 1964 and 1974 in the context of an analysis of regional development.

²⁵ SMSAs or Standard Metropolitan Statistical Areas.

²⁶ Core losses were not restricted to manufacturing. Kain shows that wholesaling and retailing lost an average of 673 jobs per area in 1948-54 but gained 243 in 1954-58. By contrast, jobs in the service sector grew uninterrupted both in the core and in the rings between 1948 and 1963.

compensated in most cases by corresponding increases in service sector employment. As a result, while population numbers and densities in central areas fell job densities remained relatively stable. In the sample of ten US cities analysed by Kenworthy *et al.* (1994), average density between 1960 and 1980 remained static at 30 jobs per hectare, in Australian cities it dropped from 29 to 27, and in European cities it fell from 93 to 80.²⁷ In the same period job density rose in Tokyo from 110 to 114 jobs per hectare.

One of the first detailed empirical studies to be done on intra-metropolitan manufacturing movement looked at the metropolitan areas of Cleveland, Boston, Minneapolis-St. Paul and Phoenix in the US in the years 1965-68 and found manufacturing to have a surprisingly high degree of mobility even during the short period covered by the study.²⁸ In these metropolitan areas the general trend was one of dispersal away from the core, all of which lost employment in the aggregate, though there were areas within all the cores where the number of jobs showed an increase (Struyk & James, 1975).

Manufacturing dispersal and intra-metropolitan movements of plants have also been in evidence within other large metropolitan regions around the world but documentation for the period prior to the mid-1960s is scarcer than in the American case. In the British case, for example, this would appear to be partly the result of a lack of disaggregated information at the intra-metropolitan scale, but also of a lack of interest on the part of academics and policy makers in a phenomenon whose incidence was probably still comparatively minor (Mason, 1980a; Ortona & Santagata, 1983).

An example of the concern with inter-regional processes is Hall's work on London (1964) showing that during the 1950s most of the growth in employment in what he calls the "London Region" took place in the outer ring, an area between 24 and 64 km from the city centre but outside the Greater London conurbation. But shifts were also in evidence within the more restricted space of the Greater London Area. Tulpule (1969) used employment information disaggregated at borough level to

²⁷ See note 20 for a list of cities included in the study.

²⁸ As will be shown in more detail below, "movement" refers to aggregate movement of manufacturing production and employment through the appearance of new establishments and the closure of others, rather than to the actual displacement of individual factories, a relatively rare occurrence.

offer a detailed picture of intra-metropolitan movements. He found that the centre of gravity of manufacturing industry (at a two-digit level of disaggregation) shifted 1.5 km away from Central London in 1951-1961, with some industries such as vehicle production moving an average of 2.45 km and others, like printing and publishing, shifting a mere 0.65 km. The service sector moved on average smaller distances, with financial activities and distribution shifting 0.44 km and 0.85 km, respectively.

As a result of inner city decline in the 1960s and 1970s, the focus of metropolitan analysis in the UK and other developed countries widened decisively to take account of intra-metropolitan movements of employment. A preoccupation with the patent loss of metropolitan jobs explicitly or implicitly permeates Keeble's work on UK's conurbations (1976, 1980a and b), Dennis' work on Greater London (1978), Mason's on Greater Manchester (1980a and b), Ortona & Santagata's on Turin (1983) and to a lesser extent Cameron's earlier work on Clydeside (1973). Cameron describes how a high concentration of manufacturing plants in Clydeside's two innermost rings in 1958 was substantially reduced ten years later as a result of lower start-up numbers and a high incidence of transfers out of the centre. He finds that the birth rate of plants tended to increase with distance from the centre (with a disproportionate number of births along the main trading axis between Glasgow and the south), while the death rate of plants varied little over space.

Mason (1980a) documents the high incidence of manufacturing plant transfers within the Greater Manchester area in 1966-1975 and concludes that the net contribution of 2,500 new jobs by migrant plants to overall employment was modest compared with conurbation losses of over 110,000 jobs in the period. The aggregate effect of plant movement was nonetheless one of dispersal away from the metropolitan core and away from the centre of nearby satellite towns. He finds that dispersal is limited by four factors: "the small scale of the movement, the small size of most migrant plants, the short average length of move and the considerable amount of relocation in the city" (p. 280).

The average distance of moves was only 3.94 km, with 60 per cent of relocating plants moving less than 3 km and 10 per cent moving over 10 km. Plants in some industries, like instruments, leather and clothing moved the shortest average

distances, a reflection of their greater need for agglomeration economies. This case corroborates earlier studies in the US (for example Hoover & Vernon, 1959) in its findings that larger plants were able to internalise costs and linkages and therefore tended to move longer distances than smaller ones, while smaller plants (particularly those requiring cheaper premises and with specific marketing and production needs) tended to favour the inner city.

There is even clearer evidence of dispersal within Seoul's metropolitan region (including Seoul and Gyeonggi province, where it is located). Between 1973 and 1978, manufacturing employment decreased in the CBD at an average yearly rate of 7.6 per cent but grew at an accelerating rate away from the centre (Lee *et al.*, 1985). This, it must be noted, was in the context of a very fast expansion of manufacturing employment in the region (an average of 12.2 per cent per year) including a very high firm birth rate. Small new firms tended to locate in the core while larger new firms tended to prefer the outer rings where space was less at a premium. As an aggregate result of dispersal the share of employment in the CBD dropped from 7.8 per cent of the metropolitan total in 1973 to 3 per cent in 1978, while the combined share of the two outer rings increased from 29.5 to 47.7 per cent in the same period.

Manufacturing dispersal has also been in evidence in Latin America's largest cities. Against a background of continuous expansion in manufacturing employment in Mexico City's metropolitan area in 1960-1980 followed by a severe contraction in the 1980s, the central area's share of jobs dropped from over half of all metropolitan jobs in 1960 to a quarter in 1988 while outer areas were registering gains (cf. table 2.1). Interestingly, during the period of uninterrupted growth in overall employment (1960-1980) job dispersal appeared to benefit all concentric rings around the Central City. In the ensuing recession and economic restructuring of the 1980s, when the metropolitan area lost nearly a third of all manufacturing jobs, dispersal appears to have benefited the First and Third rings while the Second ring was apparently by-passed.

Table 2.1
Mexico City: Manufacturing employment by ring, 1960-1988

Sub-division ^a	Share of employment (%)				Annual growth rate (%)		
	1960	1970	1980	1988	1960-70	1970-80	1980-88
Central City	52.8	37.5	25.6	23.7	5.4	2.5	-14.4
First Ring	32.9	44.2	45.5	50.5	26.6	16.0	-8.2
Second Ring	12.8	25.6	27.4	23.1	26.5	30.6	-17.2
Third Ring	1.5	1.0	1.5	2.7	3.6	27.7	10.8
Mexico City total	100.0	100.0	100.0	100.0	--	--	--
Number employed	407,005	672,446	1,059,182	733,389	16.7	15.1	-11.6

-- Not applicable

a. *Delegaciones* (boroughs) and municipalities included in ring definitions:

Central City: Federal District (DF): Benito Juárez, Cuauhtémoc, Miguel Hidalgo, Venustiano Carranza.

First Ring: DF: Azcapotzalco, Coyoacán, Cuajimalpa, Gustavo A Madero, Iztacalco, Iztapalapa, Alvaro Obregón. State of Mexico: Naucalpán, Netzahualcóyotl.

Second Ring: DF: Magdalena Contreras, Tláhuac, Tlalpán, Xochimilco. State of Mexico: Atizapán de Zaragoza, Chimalhuacán, Coacalco, Cuautitlán Izcalli, Ecatepec, Huixquilucán, La Paz, Tlalnepantla de Baz, Tultitlán.

Third Ring: DF: Milpa Alta. State of Mexico: Chalco, Chiautla, Chicoloapán, Chiconcuac, Cuautitlán Ixtapaluca, Melchor Ocampo, Nicolás Romero, Tecamac, Tultepec.

Source: Rowland & Gordon (1996, tables 8.5 and 8.6).

In the three years after 1985, when total employment in Mexico City fell by some 50,000 jobs, the Central City lost some 17,000 jobs, a result of gains of nearly 19,000 service jobs and losses of 34,000 jobs in manufacturing and 2,000 in commerce. By the end of the 1980s, and following a generalised process of dispersal of population and jobs, and similarly to London's case two decades earlier, manufacturing employment in Mexico City was considerably more dispersed spatially than either commerce or services: by 1988 the Central City still had 42 per cent of all commerce employment and 58 per cent of service employment, compared to 24 per cent in manufacturing (Rowland & Gordon, 1996).

Research by Aguilar (quoted in Rowland & Gordon, *op. cit.*) shows that some establishments are more likely to move out than others. Those serving local markets tend to follow the suburbanising population, while those catering for a national or international market are more likely to remain in central areas. Some manufacturing activities enjoyed a resurgence in the Central City between 1975 and 1985, notably electronics and printing and publishing, which tend to thrive on the city's urbanisation economies.

When examining manufacturing dispersal caution must be exercised as regards the scale and the sources of growth in different locations of a metropolitan area or region. Peripheral growth should not be simplistically interpreted as a process of physical relocation of plants from a congested core to a suburban periphery offering space and other amenities. And although "there is ample evidence that the suburbanization of manufacturing is a distinct phenomenon from *interregional* shifts in the location of industry" (Dillinger & Hamer, 1982, p.25; emphasis in the original), this form of dispersal has received less attention from researchers and policy makers than intra-metropolitan changes. The two types of trend may be difficult to distinguish in practice, mainly due to data availability problems of the sort discussed earlier. For example, in the absence of individual monitoring the closure of one plant may be alternatively interpreted as a death, as relocation to a site within the metropolitan region or else as a location beyond the metropolitan boundaries.

However, a distinction between the two forms of dispersal is conceptually relevant and often has policy implications. Dillinger & Hamer (op. cit.) note that while relocation from the core to the periphery of a metropolitan area may arise from the need for lower factor costs (including extra space), relocation beyond metropolitan boundaries may instead be motivated by the search for new markets. Incentives for plants to relocate in distant, backward regions may succeed in the case of firms seeking to tap an international market, for instance, but may fail if the main market of these plants is a large but distant metropolitan region.²⁹

Thus, in discussing dispersal beyond metropolitan boundaries it is important to bear in mind the forms that dispersal takes. It appears, for example, that inter-regional relocations play a very small part in overall changing patterns of employment. A 1975 study of US metropolitan areas by Allaman & Birch (quoted in Dillinger & Hamer, op. cit.) suggests that the contribution of inter-regional transfers to employment growth between 1969 and 1972 was almost negligible in comparison with plant births or *in situ* expansion. Transfers from outside the region were rare or non-existent even in rapidly growing areas such as Albuquerque or San Diego. Dillinger & Hamer note that a few other studies in the US have also concluded that

²⁹ Such was the case of SUDENE, a development programme set up in the late 1950s by the Brazilian government to support the development of the Northeast region. Some manufacturing industries set up there with considerable support from the programme, like metallurgical, electrical, machinery and vehicles retain close backward and forward linkages with the Centre-South region (Gwynne, 1985).

firm branching across regions is not a major contributor to employment expansion either.³⁰

The case of Sao Paulo, Brazil's first urban agglomeration and most important manufacturing centre, illustrates a process of dispersal in a metropolitan region where the dynamics of non-metropolitan settlements play an important role. In the 1960s manufacturing employment in the secondary cities within a radius of 150 km of the city was registering higher growth rates than metropolitan Sao Paulo (Greater Sao Paulo or GSP).³¹ Growth extended to other major cities beyond 150 km in the region in the 1970s with the result that GSP's share of manufacturing employment in the state of Sao Paulo dropped from a peak of 70.7 per cent in 1960 to 70 per cent in 1970 and 67.9 per cent in 1975 (Dillinger & Hamer, 1982).³² As a result of substantial differentials between the growth rates of manufacturing employment in GSP (3 per cent *per annum* in 1980-1989) and those in the rest of the state (18 per cent *per annum*) relative dispersal would continue in subsequent years so that by 1987 GSP's state share of manufacturing had dropped to 60 per cent (Santos, 1996).³³

Documentation on the case of Sao Paulo illustrates the finer mechanisms behind manufacturing dispersal and helps to visualise dispersal as an aggregate of individual decisions to shift location away from a metropolitan core. Unlike DANE's data, Brazilian census information allow separate identification of firms and any plants belonging to them and provide some locational information. The data show whether a plant is a 'birth', meaning that it was opened after a certain date (1970 in the case study reported here); a 'branch', which describes a new plant belonging to a firm founded before 1970; a 'transfer', which includes new plants belonging to a firm founded before 1970 but with no other plants in operation; and finally 'stationary plants', or those in operation prior to 1970 (Dillinger & Hamer, *op. cit.*).

³⁰ Dillinger & Hamer note that Allaman & Birch did not distinguish between plant births and new branch plants.

³¹ The population of Greater Sao Paulo in 1970 was 8.1 million, of which 5.9 million were in the municipality of Sao Paulo. By 1980 the GSP population had risen to 12.6 million, with 8.5 million living in the municipality of Sao Paulo (Tolosa, 1996).

³² The state of Sao Paulo has an area of 248,000 km². Its population rose from 13 million in 1970 to 33.3 million in 1990 (Macedo, 1983 and 1990).

³³ The figures used by Santos in his table 10.2 to describe the distribution of manufacturing within the state of Sao Paulo are vaguely labelled "manufacturing industry" thus failing to specify whether the information refers to employment or output.

Table 2.2
Sources of manufacturing growth in Sao Paulo state, by region
1970-1975

Region	Employment (thousands)			Percentage contribution to net growth from:				
	1970-1975		Net growth rate (%)	Stationary expansion (old plants)	New plants ^a			Total ^b
	1970 employ- ment	Net growth			B	Br	T	
Metro Sao Paulo ^c	904.3	331.7	36.7	46.0	38.3	7.8	7.4	99.5
Large ring cities ^d	194.3	98.5	50.7	48.9	29.9	10.8	10.2	99.8
Large interior cities ^e	47.2	27.1	57.4	41.9	48.3	5.0	4.8	100.0
Small cities ^f	144.0	69.3	48.1	27.0	49.0	10.0	9.9	95.9
State total	1,289.1	525.7	40.8	44.1	38.8	8.5	8.1	99.5

a. Key: B: births; Br: branches; T: transfers.

b. Excluding non-classified.

c. Consists of 37 municipalities in the officially designated metropolitan area.

d. Eleven municipalities within a 150 km radius of Sao Paulo with a 1970 population of over 50,000, plus their industrial suburbs (for a total of 40).

e. Ten municipalities outside a 150 km ring, with a 1970 population of over 50,000.

f. Includes the remaining 484 municipalities in the state.

Source: Dillinger & Hamer (1982, table II-4)

Manufacturing employment grew very fast in GSP in the first half of the 1970s. It grew even faster in its hinterland, particularly the large cities beyond a 150 km ring around Sao Paulo City (table 2.2). In the cities located within this ring, about half the contribution to growth originated in new plants, and of these some two thirds were births and one third consisted of branches and transfers. Although data do not permit an identification of the origin of branches and transfers, other sources of information quoted by Dillinger & Hamer (op. cit.) suggest that the contribution of GSP based firms to the growth of employment in the ring cities would have been only some 11 per cent.

The further one moves out of Sao Paulo City, the smaller the contribution of stationary expansion and the greater the incidence of births on overall employment growth. In the large cities outside the ring and in the smaller municipalities of the state births contributed with half of all new employment, while the joint contribution of branches and transfers never exceeded 20 per cent. The contribution of branches and transfers from GSP-based firms is estimated at no more than 1.2 per cent of total employment growth in the large cities outside the 150 km ring.

The examples of manufacturing dispersal mentioned above describe a process that is common to many metropolitan areas around the world at different points in their history. The different cases highlight the diversity of forms and intensities that the process may take, and as such mark it as a genuine area of fruitful investigation and of potential concern to policy makers, planners and even entrepreneurs. Thus, the final section of this chapter looks more closely at some of the most salient theoretical analyses of the process *qua* process as opposed to isolated factors which, even when assembled together, do not amount to a coherent attempt at explaining it.

2.6 Explaining intra-metropolitan dispersal of manufacturing

Many interpretations have been advanced to explain the process of manufacturing dispersal away from metropolitan central areas. In most of the literature emanating from the traditions of 'least-cost theory' and 'behavioural' approaches (cf. section 2.1) factors used in the explanation of dispersal are frequently separated into those which exert a 'push' out of central areas, and those which 'pull' jobs to the periphery (Hoover & Vernon, 1959).

Other attempts at explaining spatial shifts have been produced some of which draw on a combination of the 'least-cost theory' and 'behavioural approaches', while others may be seen as falling in the 'manufacturing in regional development theory and planning' and the 'structural' approaches. These seek to provide a comprehensive theory of change over time, thus attempting to transcend Scott's critique of factor-based explanations as being "essentially static and formalistic" and which, even if grouped together, fail to provide a coherent explanation of change (1982a, p. 123).

In this section the effect of push and pull factors will be reviewed first, to be followed by two sets of comprehensive explanations of the process of dispersal. The first of these sets draws on some of the postulates of classical location theory but advances along the lines proposed by the 'manufacturing in regional development theory and planning' approach; it is a dynamic perception of the process. The title under which a small range of related explanations is classified is borrowed from Scott's (1982a) extensive review of the literature. The second one is proposed by Scott himself, and constitutes an interesting and stimulating attempt at

linking the spatial dynamics of manufacturing with observed long-run factor-substitution processes.

i. Push and pull factors of dispersal

The list of push and pull factors found in the literature is long.³⁴ Townroe (1979) highlights some of the more important factors which have attracted manufacturing industry to suburban sites. The effect of some of these was already seen in the historical examination of dispersal presented earlier. Given their importance, however, it is worth briefly reviewing the more prevalent factors, particularly as they apply to the contemporary Latin American metropolis, along with the 'pull' or 'push' effect they are ascribed in the literature.

Availability and cost of space: space may be seen as a push factor once production expands and requirements change, land becomes scarce and costly in central areas and manufacturing starts to compete for it with other activities (such as services). Non-central locations offer larger sites at lower unit costs which may be more suitable for single-storey flow-line integrated production processes, while providing space for subsequent *in situ* expansions. In a 1979 survey of 581 new companies establishing new locations in Sao Paulo state, Townroe (1983) finds that nearly half of suburbanising firms rated space for expansion as of 'major importance', while a fifth thought this to be a 'decisive factor' in their decision; it was a decisive factor for over half of "exurbanising" firms (i.e. those moving out of the city of Sao Paulo elsewhere in the state). Cost of land was a decisive factor for about one third of suburbanising and exurbanising firms, a lower share than that found in similar studies in the US.

Labour supply and cost: the growing displacement of labour to suburban locations has been perceived as another important factor in the relative spatial shift of industry, especially in the US metropolitan context (Townroe, 1979).³⁵ Hoover &

³⁴ Based on a wide survey of the specialised Anglo-Saxon literature, Scott (1982a) lists a number of factors found mainly in empirical studies. Push factors include, among others: growth of firms and lack of space for expansion; obsolete plant and equipment; traffic congestion; labour-related factors such as high wages and higher incidence of labour conflicts; high central land prices and taxes; planning restrictions and urban renewal projects. Pull factors include: efficiency improvements in transport and mass transit systems; more efficient horizontal physical plant layouts; the prior decentralisation of the labour force; favourable social climate and greater proximity to managers' residences in peripheral areas; proximity of suburban locations to airports.

³⁵ The rapid shift of sources of employment out of core metropolitan areas along with a skilled, largely white population, has been attributed as part of the cause of growing unemployment among those

Vernon (1959) speculate that while higher wages in the core of the New York Metropolitan Region might have had an effect in pushing some industry out to the suburbs in the 1920s and 1930s, by the 1950s there was no indication that either location had an absolute advantage; this leads them to conclude that "earnings in an industry tend to be higher where the industry is concentrated and lower where the industry is sparse" (p. 46). The Sao Paulo survey found that plentiful labour was considered of major importance by half of suburbanising firms and a third of exurbanising ones, while the availability of particular skills was of no importance to more than half the firms in both groups.

Transportation and availability of infrastructure: the part played by transportation improvements (such as the introduction of the truck) in accelerating dispersal was discussed earlier. Accessibility to suppliers and to customers was a decisive factor for a fifth of suburbanising firms and a quarter of exurbanising firms in the Sao Paulo survey. The availability and reliability of urban infrastructure has particular importance in the context of a rapidly growing metropolitan area in a developing country context. The Sao Paulo survey found that a reliable supply of electric power was either of major or decisive importance for two-thirds of suburbanising firms and for four fifths of exurbanising ones. Water did not rate as high as a location factor, with a quarter of suburbanising firms and a third of exurbanising ones declaring it to be of major or decisive importance, respectively.

Government policies and measures: higher taxation levels in the core of metropolitan areas have been perceived as influencing dispersal, in a self-perpetuating process involving a continuous erosion in the fiscal base at the centre followed by rises in taxes to compensate for it (Townroe, 1979), although this would appear to be more of a problem in the US than in other regions of the world, including Latin America. Incentives to shift location seem to be a more prevalent policy tool, though their influence is much more modest. The Sao Paulo survey found that unspecified municipal incentives were a decisive factor for a mere two per cent of exurbanising firms, although not to a single suburbanising one; other government measures (such as grants of land, immediate provision of infrastructure and industrial districts) received only a slightly stronger endorsement from respondents.

staying behind, mostly unskilled, minority populations. This phenomenon, known as the "spatial mismatch hypothesis" has been debated for several years in the US (Holzer, 1991; Astrakaniaki,

Pollution and land use planning controls: enforcement of official regulations over the use of land or development control, and control to pollutants in populated areas have also been perceived as a push factor in different contexts. In the Sao Paulo survey, however, pressures from the pollution control agency was rated as a decisive factor to move by 10 per cent of suburbanising firms, and by 14 per cent of exurbanising ones. Enforcement of zoning regulations was a decisive factor for only 5 per cent of suburbanising firms and for 11 per cent of exurbanising ones.

Markets: ease of access to buyers is often perceived as another factor in the decision to locate or shift location. In large US cities, smaller firms in certain areas of production will follow the larger firms to which they sell their output in their outward shift or will encourage the birth of new ones in nearby, peripheral locations (Townroe, 1979). However, only 6 per cent of suburbanising and exurbanising firms in the Sao Paulo survey ranked the need to improve access to existing and new markets as of major or decisive importance.

ii. The incubation, product cycle, and hierarchical filtering theory of dispersal

The brief historical sketch of the spatial structure of the industrial city in different periods presented earlier provides a useful point of entry into the discussion of the now well-known notion of the incubator hypothesis. It was shown how the concentration and clustering of new small manufacturing establishments in the centre of large cities has been explained as the result of their need to share common facilities and services, production factors which few firms can or are willing to internalise mainly because doing so would weigh onerously on their production costs (Vernon, 1957; Hoover & Vernon, 1959). A metropolitan central area provides such firms with both urbanisation and localisation economies.

As some establishments grow and their scale of production expands, their capacity to internalise such costs will increase thus reducing their dependency on the environment which provides such facilities. They can then move out of central areas to peripheral locations where they will find lower job densities and much reduced supply of services, but where they can acquire more space (often in purpose-built plants built for larger and more mechanised production processes) at lower unit costs. Other firms will either stay in a central location or go out of

business altogether. In sum, the incubator hypothesis argues that the central area of a metropolis provides a favourable environment which favours innovation and nurtures new small-scale establishments through a period of 'incubation' when they are most vulnerable (Hoover & Vernon, 1959). A modified version of the incubator hypothesis (Struyk & James, 1975; Lee, 1989) contemplates the possibility that the location chosen by small new establishments may not be restricted to the central business district (CBD) but may also fall within a substantially larger "central industrial district" or other traditional areas of manufacturing activity within the metropolis.

Although most attempts at testing this theory in a developed country context have proved negative or inconclusive (Nicholson et al., 1981; Scott, 1982a; Chapman & Walker, 1991), Lee (1985 and 1989) finds some support for it in the cases of Bogotá and Seoul. In their analysis of establishment relocation in Cleveland, Boston, Minneapolis-St. Paul and Phoenix in 1965-1968, Struyk & James (1975) conjecture that the lack of an incubator effect in these cities could be explained by the availability of sites with sufficient external economies in peripheral areas to which new small firms gained access. In his study of births and relocations in Bogotá in 1970-1975, Lee (1989) defines an incubation area as having a high concentration of new firms, a higher percentage of employment by births of employment in the base year (1970), and a small average size of new businesses. Support for the incubator hypothesis comes from the large number of small firms which move out of an area ('ring 2') surrounding the inner-most central area ('ring 1') which in 1970-1975 contributed with 18 per cent of the employment created by new manufacturing firms, while the area's 1970 share of total manufacturing employment had been 15 per cent.

The incubator hypothesis has been broadened and complemented with the notion of a product cycle in a metropolitan environment (Scott, 1982a). At an early stage in the cycle a new product appearing in the market is likely to be produced by small establishments which take advantage of the skills and other agglomeration economies found in centralised locations. Growing demand for the article will lead to a standardisation of the production process, which will in turn allow establishments producing it to dispense with some of the specialised labour and to seek more peripheral sites where production takes place in larger spaces. A final phase of the process involves capital-intensive production in medium-sized or small

towns away from the major urban centres. For Scott the filtering component of the theory is the transfer of production processes from metropolitan areas down the urban hierarchy to smaller townships.

The literature offers several illustrations of the links between the product cycle and the spatial shift of production. Vernon (1972) describes the beginnings of wireless production in 1920s New York where the budding new industry consisted of a number of small establishments testing the new technology and producing different parts of the radio, each drawing on local specialised skills and suppliers. The market was uncertain and firm mortality was high. Once the product had been standardised and there was an established national demand a decade or so later, large factories appeared in distant locations from New York where the whole process was integrated under one roof while smaller firms disappeared altogether.

The links between product innovation and diffusion and the spatial shifts of manufacturing activity have also been examined by, among others, Feller (1975) and Norton & Rees (1979). Feller notes that traditional (least-cost) location theory recognises two instances where technological change contribute to spatial shifts in activity: changes in transport technology (such as the introduction of the truck and car mentioned earlier), and technical innovations leading to lower production costs and hence to locational shifts (such as the increased use of scrap steel as inputs which allowed plants to locate closer to the markets that generate it). He argues, however, for a finer, four-part classification of technological change in the context of spatial shifts in production: first, technological change which is site specific, allows an industry to extract raw materials more efficiently from a region, and thus leads to a regional re-distribution of production; secondly, technological change leading to lower production costs and thus to downward shifts as the minimum efficient scale of plant increases; thirdly, technological change which opens the way to new, footloose industries; and finally, technological change which may be readily adopted by all dispersed firms within an industry thus potentially leading to a regional re-distribution of industry as some firms are more efficient at adopting the new technology.

In examining the major shift in the location of US manufacturing industry from the Manufacturing Belt (Northeast and Upper Midwest) to a "periphery" of states (the Sunbelt, Mountains, Plains and Far West) in the late 1960s and early 1970s, Norton

& Rees (1979) identify the spread of innovative capacity as one of the forces impelling spatial change. Although they recognise the taxonomic difficulties in defining innovation (and the issue of distinguishing modifications of existing products from new process technologies and completely new products), for these authors "the replacement of nineteenth century industrial technology by the science-based industries of the twentieth century may be the most important causal factor" behind this change (p. 149). This line of enquiry was advanced also by Castells & Hall (1994) in a study of the world's 'technopoles', and one of the most significant conclusions they reached was that "by far the commonest location of innovative milieux, especially in earlier times, has been in the hearts of the great metropolitan cities: London, Paris, Berlin, New York, Tokyo, and latterly Los Angeles and Munich" (p. 225).

A variation on the theory of the product cycle as it fosters spatial shifts in production is presented by Dillinger & Hamer (1982). They describe a framework used in the analysis of national manufacturing development where each primary industrial sector is classified as early, middle or late according to the stage at which it makes its contribution to the rise of manufacturing industry in a country (or, in their case, a metropolitan region). Early industries require relatively simple production technologies and supply a population with low average incomes. These will tend to disappear as average incomes rise and are superseded by middle industries, which require a relatively complex production technology, modern marketing networks and larger volumes of seed capital. As the national economy continues to expand, the share of middle industries in total output will gradually decline, to be replaced by late industries which require more sophisticated technologies and greater volumes of capital and will tend to grow more rapidly than the growth of per capita income.

The framework may then be adapted to the context of a metropolitan region:

"Regional and sub-regional development can then be viewed as following a sectoral diversification ladder over time, moving from traditional to semi-modern and modern activities. The national metropolitan centers and, to a lesser extent, the regional metropolitan centers are assumed to lead the way in sectoral diversification, followed by their inner rings, their hinterlands, and finally, the periphery. With the passage of time, the non-metropolitan areas graduate from one sectoral profile to another. In the most advanced economies, space becomes increasingly homogeneous and different locations become relatively interchangeable" (p. 17).

The model is illustrated by these authors with the case of the State of Sao Paulo, Brazil, in the period 1960-1975. In 1960 the share of manufacturing employment in "early industries" (textiles and food) was 23.3 per cent in the regional core (Greater Sao Paulo) and over 40 per cent in the other regions of the state (except Santos). By 1975, this share had dropped ten percentage points in the core, and did not exceed 36 per cent in the other regions, with values as low as 20.7 per cent. Conversely, the participation of engineering industries tended to grow everywhere in the period, with the core attaining the highest share in 1975 and regional shares tending to drop with distance from the core.

iii. A structuralist interpretation of the intra-metropolitan dispersal of manufacturing

For Scott (1982a), push and pull factors should be regarded as no more than elements providing support to a comprehensive account of spatial change. "Some of these factors most certainly do help to explain the spatial pattern of manufacturing in the modern metropolis: others must be seen as mere secondary contingencies; and still others are to be dismissed at once as pure chimera" (p.124).

In his view, the 'incubation, product cycle, and hierarchical filtering theory' "attempts more seriously (though still inadequately) to come to terms with the process as a long-run trend" (p. 123). With the argument that this 'theory' "fails to go much beyond the investigation of formal spatial relationships" (p. 125) Scott advances a "composite theory" of his own which takes as a starting point "the proposition that an adequate theory of location can never be established independently of an encompassing theory of production" (ibid.). In this respect, he coincides with Massey's (1979 and 1984) critical perception of the classical theories of industrial location whose object of study is the abstract firm "without effective structural relationships with the rest of the economy" (1979, p. 57). She argues that the fact that development processes take place over space and are affected by it implies that there may be no conceptual dichotomy between the social and the spatial.

Scott focuses on the internal logic of the firm as "a structured relation within capitalism" (ibid.) which exhibits a tendency to substitute capital for labour in the production process. Thus, "in recent decades, in large metropolitan regions, core areas have tended to have a comparative advantage for labour intensive industrial activities, while peripheral areas have tended to have a comparative advantage for

capital intensive industrial activities” (p. 130). This is, furthermore, expressed in a spatially structured Hecksher-Ohlin effect between core and periphery.

The Hecksher-Ohlin theory derives its name from its two originators and seeks to explain, within a neoclassical framework, the notion of comparative advantage in trade between nations specialising in certain areas of production. In essence it argues that “regions specialize in the production of goods that use the most of their cheapest inputs” (Harrington & Warf, 1995, p. 70). Scott’s use of the theory involves its adaptation to a context of inter-regional (i.e. sub-national) trade in manufacturing and is restricted to two factors of comparative advantage, capital and labour, the relative availability of which determine the extent to which a region will specialise in either labour-intensive or capital-intensive industries (Norcliffe & Stevens, 1979).

In its modified version as a theory of static regional comparative advantage the Hecksher-Ohlin hypothesis (also called theorem) posits then that “a region will exploit a relative abundance of capital or labour by producing a given type of good which other regions cannot produce so cheaply”. Therefore “both the distribution of manufacturing among regions and the trade of manufactured goods between regions are...attributed to the regional availability of labour and capital” (op. cit., p. 240).

Its further adaptation to a metropolitan context by Scott (1980 & 1982a) assumes that the ‘regions’ in question are respectively at the core of a metropolitan area and its periphery. An empirical observation that as metropolitan areas develop smaller firms will tend to cluster in central locations while larger firms will tend to leave them is then recast into the notion that each of these two areas provides a comparative advantage for certain forms of production: labour-intensive in the centre and capital intensive in the periphery.

Underpinning this is the observation that, as the process of capital accumulation advances, there is a general tendency for firms to grow and become more independent from one another, to reduce inputs relative to outputs, to become more capital intensive in production, and to dislocate with respect to previous, more centralised, locations (Scott, 1980). Though suburban locations allow firms to extract higher profits resulting from lower relative costs of inputs such as land and

labour, these will also tend to rise in the face of mounting demand from a growing number of firms so that dispersal movements will gradually ease down. But soon new rounds of innovation in production technology and administration will refuel the trends towards greater capital intensity thereby fostering new shifts even further away from the centre for the more capital-intensive industries, and out of central locations for less capital-intensive ones.

Movement to inaccessible locations away from the centre is by and large limited to those firms or industries prepared to trade off the lower land costs of such locations for the higher wages required to attract workers there. Higher capital-labour ratios are likely to be accompanied by higher inputs from administrative staff and highly skilled labour who are also likely to be more mobile either because they have access to private forms of transport, or because the cost of transport is included directly or indirectly in their wages. Meanwhile, firms or industries either unable to internalise these additional costs due to their higher labour-intensity or because they have particular production factor requirements will tend to remain in central locations (ibid.).

The outcome of this process, expressed in a labour-intensive core and a capital intensive periphery, may nonetheless be a transitory phenomenon at least in the more advanced economies such as the US. For, "as capital intensification proceeds, and as firms continue to disperse outwards on a massive scale, there occur concomitant changes in the rest of the urban environment, including changes in the basic distribution of urban population and transport infrastructure" (op. cit., p. 130). This creates, in turn, "changes in the distribution of comparative advantages in the city, so that just as the specific spatial form of the Hecksher-Ohlin effect...seemed to emerge at a particular moment in time somewhere around the turn of the century the question arises as to whether it will continue to exist in the future" (ibid.). Already by 1980, and as a result of decreases in the labour force, some evidence was coming out of US metropolitan areas that labour intensive industries might be leaving the core areas in a process which mirrored the movement of capital intensive ones and labour in earlier years.

2.7 Concluding remarks

The attention of researchers working in the field of industrial location studies has only relatively recently turned to the phenomenon of manufacturing dispersal in

metropolitan areas. This chapter has reviewed the conceptual roots underpinning this analysis. Although dating back to the early part of the twentieth century and used largely in the context of the more developed nations of Europe and North America, some of the analytical tools offered by the various industrial location traditions have also been applied somewhat scantily in a developing country context. Notable among these are the detailed empirical analyses offered by behavioural approaches and normative theory. They provide us with the tools to probe into the links between trade orientation of manufacturing establishments in Bogotá and their relative location within the metropolitan area. They also allow us to weigh more precisely the relative role of different factors in location, such as the site characteristics, labour and government policies.

However, the literature review has also offered a particular use for the theoretical notions put forward by Dillinger & Hamer (1982) regarding the links between product cycle and sub-regional (i.e. metropolitan) spatial development, and a variation on the Hecksher-Ohlin hypothesis as presented by Scott (1980 & 1982a). Insofar as it may be used to examine a metropolitan region or a relatively large sub-national space, the former provides the necessary elements for an analysis of shifts in industrial and spatial development in the region around Bogotá (called here the 'Central Sub-region').

Similarly, Scott's proposition appears in principle suited to examining a situation of simultaneous spatial and industrial change within a metropolitan area such as Bogotá's where at least one commentator has advanced the proposition that the process of suburbanisation of manufacturing industry (or absence of it) might be at least partly linked to differentials in the rate of development of small-scale and large-scale establishments. As size of establishment has been positively correlated with capital intensity in the Colombian context (cf. Cortés et al., 1987), Scott's comprehensive framework would appear to offer an interesting set of interactions to seek further insight into the links between spatial and sectoral changes in the Bogotá metropolitan area.

3 Methodology of the research

3.1 Introduction

This chapter describes the process of research and discusses some salient methodological issues regarding the nature and shortcomings of the information used. It must be said at the outset that a discussion of methodological issues is not restricted to this chapter. The reader will come across short methodological explanations at different points in the dissertation regarding analytical procedures, and the use of terms, concepts and data in specific contexts.

The research went through a series of main stages, including a review of the literature, discussions with experts on the subject and other informants, acquisition and analysis of official statistical databases mainly using a statistical software package (SPSS-PC both in the DOS and Windows versions), design of a sample survey, collection and processing of sample data, and a process of writing up. Given the focus of the research on spatial dispersal, the research sought to understand the process simultaneously from the viewpoints of population and of manufacturing employment and production. This involved consulting both primary and secondary information so as to permit a reconstruction of the process of spatial shift in Bogotá and its surrounding region over the long period chosen for the analysis, 1958 to 1990.

A number of libraries and documentation centres in different countries were consulted throughout the research; these are listed in Appendix 3A of this chapter. The documents consulted included published books and articles, research reports, under-graduate and post-graduate dissertations, and published and unpublished official documents. The investigation also involved consulting a number of people including academics, policy-makers and civil servants in the national, provincial and local governments, as well as the representatives of the firms included in the sample survey.

The second section of this chapter presents a discussion of the sources and nature of the quantitative information available on manufacturing in Bogotá and its surrounding region as used in the bulk of the research. Three main sources of

quantitative information on manufacturing employment and output provide the backbone of the statistical analysis, two of which are official in nature while the third one was especially collected for this study. The first official source of information is represented by the annual manufacturing surveys undertaken uninterruptedly by DANE, the Colombian government's statistical office, throughout the study period. Despite limited coverage and methodological changes in the way information is collected and presented, these surveys provide a consistent source of information across the study period and as such were used as the main source of manufacturing data in the empirical analyses presented in chapters 4 to 7.

A second official source, and one used only occasionally in the analysis, is the 1990 national and multi-sectoral economic census (DANE, 1991b) which provides a more complete cross-sectional overview of economic activities in Colombia for that single year; despite its much better coverage than the annual manufacturing surveys, especially of small-scale enterprises, the fact that its predecessor was more restricted in scope and dates back to 1970 limits its use in a time-series analysis of the kind called for in this research. The third source of information is the sample survey, which was designed and carried out especially for this study and which is described in more detail in the third section of this chapter.

A word must be said about the choice of period of analysis. The years covered by the research, 1958 to 1990, represent a period of considerable change in Colombia's economy and society. These were the years when the urban-rural distribution of population shifted from half to nearly three-quarters urban while Bogotá's demographic weight in the nation doubled from one tenth to nearly two-tenths. The main reason for choosing such a long period to situate the research was a recognition that spatial changes are relatively slow and take a while to be detected and become stable. A period of 32 years in the life of a metropolitan area like Bogotá's allows the observer enough leeway to identify those changes which are more likely to be long-lasting, while also permitting a test of a number of hypotheses seeking to link spatial change to other changes such as in the structure of manufacturing production and employment.

The choice of break years for the analysis of official source data as shown especially in chapters 6 and 7 was governed largely by the availability of disaggregated data in magnetic form as required for a complex and meaningful

spatial analysis. Access to highly disaggregated official statistical data is normally barred on confidentiality grounds, but given the academic nature of this research, an exception was kindly made by the head of DANE.

3.2 The official data

The main institutional source of official statistical information on population and production is DANE. Like most national statistical offices, DANE is charged with collecting, processing and publishing statistical information on a diverse range of issues, from population to the economy, social services to taxation.¹ In the period chosen for this research, for example, DANE organised and completed national population censuses for the following years: 1951, 1964, 1973, 1985 and 1993. Other statistical information used widely in this research regarding for example availability of basic services, employment in different economic sectors and even geographical data disaggregated at the level of municipalities was also obtained from DANE's published and unpublished documents. This was complemented by information obtained from other official sources, such as provincial and municipal governments, and from specialised institutions like the national geographical institute (IGAC) which produces official maps, and CAR, the regional watershed management corporation covering most of the study area.

However, given the focus of this research, particular attention will be devoted in this chapter to the coverage and the quality of information on manufacturing activity. In the absence of regularly-conducted manufacturing censuses as found in other national contexts, most of the statistical data on manufacturing used in this research comes from the annual manufacturing surveys which DANE has been carrying out yearly since 1955 (DANE, 1976).² Up to 1982 annual manufacturing surveys sought to collect information on a range of variables from all medium and large-sized establishments, as well as from a sample of small-sized ones. It must be noted that DANE's definitions of establishment size varied over time. While up to 1970 so called "small-scale establishments" comprised those with less than five workers, from 1971 onwards the cut-off point was increased to 10 workers (DANE, 1982). In addition, from that year onwards the survey excluded establishments

¹ DANE is not the only source of official information on the economy. The central bank (Banco de la República) also monitors and publishes regularly information on a diverse range of topics pertaining to the nation's economy such as monetary issues, foreign and domestic investment, banking and so on.

² National manufacturing censuses have been conducted only in 1945, 1954, 1970 and 1990.

which might more strictly be classified as repair or maintenance shops (Jaramillo & Cuervo, 1987).

Thus between 1971 and 1982 DANE's annual surveys sought to collect information on all establishments with 10 or more workers, as well as on a sample of establishments with under 10 workers. In this period the main database included establishments which had at some point had at least 10 workers but might have lost jobs in subsequent years. In 1983 DANE officials made the decision to purge these from the database on the grounds that this small sub-sample was not representative of the population of establishments with less than 10 workers and that the additional cost involved in collecting and processing the information delayed unnecessarily the publication of the survey (DANE, 1992, p. 212; Barrera, 1994).

Starting in 1983 DANE's database includes solely establishments with 10 or more workers, including temporary workers. With the exception of the annual manufacturing survey of 1990, employment figures reported by DANE in its published surveys and the 1990 census include both permanent and temporary workers.

There is no systematic collection of information on manufacturing production in establishments with less than 10 workers in Colombia. Some information may be derived from the results of the household surveys undertaken regularly by DANE in seven cities, though these are limited in their spatial coverage. The only recent direct source of such information is DANE's 1990 economic census (DANE, 1991b) which provides a fairly good coverage of all economic activities throughout the country, including manufacturing establishments with less than 10 workers. However, this has not been used systematically in the present study for two main reasons: firstly, its official results were made available in magnetic form (at a monetary cost beyond my reach) after the fieldwork and much of the statistical analysis had been undertaken; and secondly, because of its wider coverage and different methodology, its results may not fruitfully be incorporated into time-series analyses of the kind used in this study where annual manufacturing surveys provide the main source of information.

However, the spatially disaggregated information collected for the 1990 economic census (cf. DANE, 1991b) provides an indication of the nature and size of the gaps in the data from the annual manufacturing surveys used in the present research. Table 3.1 offers a comparison of the two sources of data. Provisional 1990 census figures suggest that DANE's annual surveys might be leaving out over 40 per cent of Bogotá's manufacturing jobs and some 90 per cent of establishments. They also suggest that nearly 85 per cent of all establishments recorded in the census nationally have less than 10 workers, with 31.3 per cent employing a single person and 43.4 per cent consisting of 2 to 4 persons (DANE, op. cit.).

Table 3.1
Manufacturing employment and number of establishments:
A comparison of the 1990 manufacturing survey and the 1990 economic census

Source	Total employment				Number of establishments			
	Number		Share in establishments with under 10 workers (%)		Number		Share in establishments with under 10 workers (%)	
	Bogotá DE ^a	Colombia	Bogotá DE	Colombia	Bogotá DE ^a	Colombia	Bogotá DE	Colombia
Survey	165,781	496,193	n.a.	0.8 ^b	2,359	7,533	n.a.	8.9 ^b
Census	295,826	845,751	21.1	24.6	26,856	94,650	80.4	84.8

n.a. Not available

a. Figure for manufacturing survey includes the municipality of Soacha

b. 1989

Sources: DANE (1991b, 1991c and 1992)

As was mentioned in the introductory chapter, this clearly poses a limitation for the research findings. The analysis conducted here focuses largely on records of about 60 per cent of manufacturing employment and as such it is admittedly limited in its explanatory power. As the discussion in chapter 7 shows, this limitation may become more significant at certain points of the analysis such as the attempt to correlate spatial shifts in employment with changes in the distribution of employment among a range of establishment size categories.

Discussion of the nature of primary official data such as the one used here must also include a note on the spatial coverage of the annual manufacturing surveys. The results of these surveys are published by DANE as printed volumes normally two years after the end of the year they nominally cover. In recent years the data

has also been made available in magnetic form. In both cases, confidentiality rules prevent the publication of information which might help identify a single establishment. This means that published information is rarely made available on the number of establishments in a certain spatial statistical unit such as a municipality or a *comuna*.³ Similarly, magnetic information disaggregated at the level of establishment normally excludes all spatial identifiers other than that of the province (*departamento*) where it is located, which gives the data a high degree of spatial aggregation.

However, for this research I was given access to unusually detailed computerised information which includes basic information on all establishments located in the three *departamentos* comprised in the Central Sub-region as well as Bogotá DE for the years 1974, 1980 and 1985. These databases provide consistent information not only on a range of variables about employment and production for all establishment in each year, but also include a spatial identifier at the level of the municipality. Although still fairly large as a spatial unit, the municipality at least does permit a somewhat unrefined analysis of spatial trends. There was no attempt, however, to trace the development over time of each individual establishment located within the area of study as this would have necessitated at the very least a continuous set of surveys covering every year in the period of study and quite complex and time consuming manipulations of the data which would have taken up a fair share of the time allotted for the research, while also shifting it in an undesired direction.⁴

It is also worth noting that DANE's classification of industries shifted from one based on an adaptation of the first version of the United Nations' Uniform International Industrial Classification of all economic activities up to 1969, to one based on the second revision and introduced in 1970 (DANE, 1976). Appendix 2 at the end of this chapter presents a list of the two SIC classifications in order to facilitate the comparison of data across time. This is particularly useful when

³ In the case of Bogotá, *comunas* are statistical areas designated by DANE with the aim of collecting information. In the mid-1980s the city comprised 38 such *comunas*, each of which consists of *barrios* or smaller units many of which were originally private developments often recognisable by the relative homogeneity of their built-environment. In 1985 the average size of a *comuna* was 835 has. with an average population of 103,000 inhabitants (Cuervo, 1993).

⁴ See Barrera (1994) for an example of an analysis relying heavily on a similar procedure.

examining data disaggregated at the industry level and covering the entire period spanned by the investigation, as shown in chapter 5.

3.3 The sample survey

The third major source of manufacturing data used in the research is a sample survey especially designed to gather information so as to help answer the main research question posed in chapter 1. This section describes the different elements and steps involved in the survey, including the sample frame used, the process of selection of the sampled units, the questionnaire design and the interviews. It concludes with some comments on the significance of the survey results.

3.3.1 Sample units

The basis for selecting the manufacturing establishments to be approached in the survey was DANE's 1987 Industrial Register, which provides baseline information for DANE's annual manufacturing survey. This was the most recent Register available at the time of selecting the sample of establishments. It was available only as a computer printout which could be consulted in DANE's documentation centre in Bogotá.

The Register lists manufacturing establishments (rather than firms) with ten or more workers. The entry for every establishment includes its SIC code (five digits), a code for the size of the total workforce (on a range of 1 to 9), a code for the size of the paid workforce (also on range of 1 to 9), the name of the legal owner (*razón social* and *razón comercial*), the addresses of both the establishment and the head office, the telephone number and a postal address if available. Establishments appear ranked by their SIC code.

Despite its shortcomings, the Register provides a useful list of sample units. It is also the closest to a relatively up-to-date listing of manufacturing establishments in the country, listed on a municipality basis. The 1987 Register comprises 2,272 establishments for Bogotá DE, 53 for the municipality of Soacha, six for Funza, 23 for Mosquera and 11 for Sibaté, the municipalities where sampled establishments are located.

3.3.2 Selection of the sample

The aim of undertaking a sample survey was to collect detailed information to complement the data available through DANE's annual manufacturing surveys regarding among others the movements of individual establishments, the reasons their managers had for choosing their present location, their attitudes towards a range of services and their future location and production plans. It was intended that a probability sample would be chosen comprising 50 establishments in total, of which half would be in Bogotá and half in neighbouring municipalities where DANE data and previous studies suggested that manufacturing activity might be growing (what might be termed the city's "manufacturing expansion belt"). A randomly selected sample was thought to adequately complement the detailed statistical analysis based on primary official data which provides the bulk of the empirical material examined in the research. The sample size and spatial distribution were also convenient from the point of view of the logistics involved in the survey, mainly in terms of the time and financial resources available.

The sample was designed to represent two different populations of establishments regularly surveyed by DANE: a large population located in Bogotá DE which, in the context of the central argument of the research and findings from similar research efforts as discussed in chapter 2, might be the source of dispersal as they seek to relocate or to expand through branches located outside Bogotá DE. And a second, much smaller, population consisting of establishments located outside Bogotá DE in what is later described as the "Rest of the Bogotá Metropolitan Area". In order to facilitate the analysis, the same size was chosen for both samples, even if that meant that establishments in Bogotá DE appeared to be under-represented, while the sampling fractions for both samples were very different (i.e. the sample was to include one in 91 listed units in Bogotá DE and one in four in the remaining municipalities).

The selection of establishments to be included in the sample was based on a simple random sampling procedure and followed a number of stages:

a. The first step was to produce a complete list of the units (establishments) in each of the two populations to be sampled. In the case of the first population (i.e. all manufacturing establishments surveyed by DANE in Bogotá DE), the 1987 Industrial Register was used as a base. For the establishments located in the

remaining four municipalities, which together constitute the second population, the full listing found in the Register was copied onto separate sheets in the same order in which they appear in the original, and all entries were assigned consecutive numbers starting with number one. Thus, both lists became suitable collections of sampling units representing the entirety of the two populations (cf. Warwick & Lininger, 1975, pp. 75-76).

b. The second step was to decide on the number of establishments to be included for each of the municipalities outside Bogotá DE. The 25 establishments in the sample outside Bogotá DE would normally be proportionately distributed among the four municipalities according to the number of establishments found in the Register for each of them. In the event it was decided to slightly under-sample Soacha's population on the grounds that manufacturing in this municipality is characterised by a relatively narrow range of industries (especially metal-working and ceramic bricks). The final selection thus included 10 establishments in Soacha, two in Funza, six in Mosquera and three in Sibaté.

c. The next step was to produce a series of random numbers to be used in the selection of the sample from each population. These had to be arrived at in such a way that each sampling unit stood an equal chance of being selected. A series of random numbers was generated for each municipality with a facility provided by the Lotus 123 software package. The sampled units were selected from the numbered lists of the two populations using the numbers thus generated. A total of 46 establishments were included in the two samples, 25 located in Bogotá DE and 21 located in the four municipalities.

3.3.3 Initial approach made to selected establishments

The first attempt to contact the selected establishments was made in writing. In this, the support of the *Fundación para la Educación Superior y el Desarrollo* (Fedesarrollo) proved invaluable. As one of Colombia's most respected independent economic research institutions⁵, Fedesarrollo's backing (consisting of

⁵ Fedesarrollo defines itself as "a private, independent, non-profit foundation, devoted to non-partisan research in the fields of economics, politics, history, sociology, public administration and law. Its main aims are to contribute to the development of adequate social and economic policies, to promote the debate and a better understanding of issues of national relevance, and to publish and disseminate original analyses about national and Latin American economic and socio-political phenomena, aimed at improving the quality of higher education" (taken from the back cover of Fedesarrollo's *Coyuntura Económica*, Vol. XX, No. 2, June 1990).

allowing me to present the research as Fedesarrollo's) provided a useful start in what was throughout 1990 a difficult social and political environment.

Fedesarrollo was approached not merely because of its reputation but also because it regularly conducts opinion surveys among a sample of private sector enterprises and publishes their results as an independent, non-partisan, non-governmental think-tank. This was thought more convenient than the support (which was also sought and granted) from the Centro Interdisciplinario de Estudios Regionales (CIDER) at the Universidad de los Andes, also one of the most respected private sector universities, largely because the name of Fedesarrollo was thought to help minimise distrust among respondents wary of such surveys. As it turned out, even this backing was not sufficient to allay fears among a group of entrepreneurs wary and suspicious in a very tense social, economic and political environment.

In late 1990, the public order situation in Colombia was tense as a result of the combination of a number of assassinations of public figures, including three presidential candidates, an intimidation and bombing campaign by increasingly powerful drug barons intent on persuading the outgoing national administration of Virgilio Barco (1986-1990) and his successor César Gaviria (1990-1994) to shelve all legislation allowing Colombian nationals to be extradited to the US (where those found guilty of drug trafficking were likely to receive heavier sentences), highly publicised guerrilla attacks on army outposts, and a growing number of kidnappings of businessmen (Graham, 1990a and 1990b; Kendall, 1990).

A letter introducing the survey and informing recipients of a follow-up telephone call was signed by Fedesarrollo's deputy director and sent to all head offices of the sample of 46 establishments. This was then followed some days later by telephone calls to set up appointments. There were some difficulties at this stage in establishing a contact with several of the firms. Many of these stemmed from the fact that the most updated DANE Register was already three years old by the time the survey was conducted.

In six cases the telephone numbers had changed, so a new one had to be obtained (either from the local telephone directory or from the Chamber of Commerce register): in three of these cases the head office had moved (and therefore the

telephone numbers had also changed); in one case, the telephone had been disconnected and there was no trace of the establishment (which shared an address with the head office) in other published sources;⁶ in another case, the telephone number and address were correct according to the telephone directory, but there was no reply to telephone calls. In a seventh case, the address and telephone numbers were correct, but the person answering the call claimed that these did not correspond to the establishment which appeared in the DANE Register; our request for an interview was declined.

In four cases where a response was obtained, the letter had not been received so it had to be posted again. At this initial stage four firms declined to be interviewed: apart from the one already mentioned, two gave no explanation for their rejection and a fourth one expressed a "lack of interest in participating in the study".

3.3.4 Questionnaire design

The questionnaire consists of 38 main questions. Two versions were prepared: one was applied to establishments located in Bogotá DE and the other one to all other establishments. The questions were loosely modelled on the questionnaire applied in the World Bank study reported in Lee (1989) and sought to measure mainly past or intended changes in the spatial location of the plant, as well as evaluating the properties of the present site. A list of the questions in the survey is appended to the dissertation.

The questionnaire was designed to be answered in the course of a face-to-face interview, although the final design was such that it could also be left behind to be filled out by the respondent in their own time. However, this was only seen as a last resort and less desirable option given the pressures of time, the fact that most establishments were located many kilometres apart from each other and that not having to respond to a face-to-face interview might lead busy respondents to procrastinate the task indefinitely.

The questions were, in principle, aimed at the head or manager of the firm or the establishment, or their deputy, as they were presumed to be knowledgeable about the history of the firm, the decisions regarding the specific location of the

⁶ At the time of the interviews there was no reliable dial-up telephone directory service in Bogotá to

establishment and some key aspects of the production process and of administrative matters. Clearly, it is easier to find someone with knowledge of these very different aspects of the firm or the establishment in a small firm than in a large company where sheer size and a more complex division of labour inevitably distances high-ranking employees from the minutiae of production, personnel and sales.

3.3.5 Piloting the questionnaire

The questionnaire was piloted on six establishments selected randomly from the DANE Register. Four of these were located within the boundaries of Bogotá DE and two outside. The pilot served to fine-tune and simplify some of the questions (for example, a question which in the pilot survey requested the name and relative size of suppliers and competitors was simplified to indicate merely the location of these) as well as to improve layout and presentation so that, if necessary, it could be left behind to be self-administered by respondents.

The pilot survey was carried out in mid-September and also helped establish the average length of each interview (between 40 and 50 minutes) and helped to fill in gaps in my knowledge about some aspects of local legislation (for example, a requirement that all employers pay a transport subsidy to employees living more than 3km from the plant).

3.3.6 The interviews

The interviews were carried out between 3 October and 28 November 1990, a period of eight weeks. Apart from the difficulties encountered among a group of highly apprehensive entrepreneurs (as most of the Colombian public was at the time) and evidently wary of any contact with outsiders asking questions, the research was also made somewhat difficult by the long distances between establishments, and between some of these and the city's central area; public transport in Bogotá is erratic and streets are often heavily congested, which means that the most one could hope to do was one interview in the morning and one in the afternoon.

Added to this was the vagueness of secretaries and even managers of establishments in fixing suitable times for an appointment, while in some cases

appointments were not kept. In the face of the considerable difficulties encountered in the process, a cut-off point (of 28 November) was set after which it was decided that no further interviews were possible.

In sum, the result of the process was that, out of the sample of 46 establishments a total of 28 interviews were effectively carried out. Of the original 46 in the sample, there were 12 refusals (three within a week of receiving the first letter, six in the six weeks after that and two at the time of visiting the establishment), three instances where a request for an appointment was postponed indefinitely or until after the cut-off point of 28 November, two addresses which were incorrect in the DANE Register and one case where the establishment could not be located (despite an apparently correct address and telephone number). This amounts to a response rate of 61 per cent.⁷

3.3.7 Limitations of the sample

With a response rate of 61 per cent, the sample clearly has some limitations. Luckily for the study, the interviews that could be carried out were divided evenly between Bogotá DE and the other municipalities. This corresponds to one of the aims of the original sample design.

In an attempt to identify non-response bias, table 3.2 presents the distribution of respondents and non-respondents among municipalities as well as by size ranges. In theory, an examination of non-responses is a desirable early step in survey research as it might tell researchers something else about the reasons for non-responses as well as about the possible biases in the sample for which information could be collected. However, as Warwick & Lininger (1975) warn, this exercise faces the almost inevitable problem that usually little is known about the non-respondents, and often, as is the case of this sample, the little that is known is likely to be out of date, based as it is on a list compiled a couple of years before the survey was carried out.

⁷ In a survey involving 1,022 firms in the UK where urban and rural sampled firms were matched in pairs, Keeble & Tyler (1995) had a response rate of only 10.2 per cent. They attribute this low figure to a combination of the recession of the early 1990s and the use of questionnaires sent by post.

Table 3.2
Location and size range of responding and
non-responding establishments in sample
(Number of establishments)

	Respondents	Non-respondents
1. Location (municipality)		
Bogotá DE	14	11
Soacha	10	0
Mosquera	3	1
Sibaté	0	3
Funza	1	1
2. Size of establishments located outside Bogotá DE^a		
10-49	10	3
50-99	1	1
100+	3	3

a. Size range as it appears on the Industrial Register (not necessarily the same as at the time of the interview). Information for Bogotá DE on this variable was incomplete in the Register.

Sources: DANE's 1987 Industrial Register and field survey.

The table shows that Bogotá DE had a 56 per cent response rate, compared with 78 per cent for the combined population of establishments outside it. There were response variations among the municipalities, with Soacha achieving a 100 per cent response rate, and Sibaté obtaining no responses. It is difficult to generalise about non-respondents. Take the case of the municipality of Sibaté, for example. From the little information we have about the three non-respondents we know that two of them had between 10 and 49 workers according to the 1987 Industrial Register, while the third one had over 800 workers. Not much more can be inferred from their industrial specialisation. One of the three establishments was registered as producing carbonic liquid, another one as producing animal feed with high protein content, while the third and largest one manufactured plastic shoes.

A similar examination of the remaining non-responses, including a look at their size distribution in the lower half of table 3.2 does not shed much more light on the pattern of non-responses. It would nonetheless appear that large establishments were somewhat warier of making contact with interviewers compared with smaller ones, which might be explained by the difficult social and political environment at the time of the interviews as mentioned earlier. It is not inconceivable that

managers of larger establishments with higher turnouts, a larger workforce and probably also higher salaries might be unusually sensitive to outside questioning.

Also of interest is the divergence between the size range of each establishment as recorded in the Industrial Register, and the size at the time of the survey, three years later. This shows that out of 14 responding establishments originally selected in the sample, 10 were in the 10-49 worker range, one in the 50-99 range and three in the 100+ range. When questioned in 1990 about the size of their workforce, it transpired that only six could be classified in the lower range, two in the second range and six in the higher range. It thus becomes clear that there was a clear tendency of the workforce to expand towards the end of the 1980s, a fact explored further in chapter 5.

3.3.8 Profile of respondents

The final section of this chapter takes a brief look at the profile of the persons who agreed to be interviewed for the sample survey. This information not only complements the information they provided, but also helps put in context their answers and the potential advantages and limitations they had in responding to the questionnaire. Table 3.4 shows the position interviewees occupied in the firms which own the establishments selected through the sampling procedure.

Table 3.4
Position of interviewees in surveyed firms^a
(Number of respondents)

Present position in firm	Location of establishment ^b	
	BMA Core	BMA Rest
General manager, deputy manager	5	5
Personal assistant to manager	4	4
Administrator, director of personnel	4	1
Other ^c	1	4

a. Interviewees were asked to give their present occupation in the firm running the establishment.

b. This refers to the establishment location rather than that of the firm's headquarters. For further details of the spatial division of the Bogotá Metropolitan Area (BMA) see Appendix 1 of the dissertation.

c. Chief accountant, director of sales or purchases, and chief technician.

Source: Field survey

The majority of respondents were employees high up the firm's hierarchy, but they were not necessarily the person with the highest responsibilities. In the case of

establishments outside Bogotá DE, there was a higher assortment of respondents, and this may be explained by the fact that these tend to be larger establishments where securing an interview with the chief executive was more difficult. It is also likely that some of them felt that, given the nature of the questions, they might be better responded by employees who were more knowledgeable of the day-to-day affairs of production, sales and purchases.

Table 3.5
Period spent by interviewees with the firm and in their present position
(Number of years)

Interviewee status	Location of establishment ^a	
	BMA Core	BMA Rest
1. As a firm employee		
Mean	6.9	7.5
Median	5.5	5.0
2. In present occupation		
Mean	4.7	6.1
Median	3.0	4.5

a. This refers to the establishment location rather than that of the firm's headquarters. For further details of the spatial division of the Bogotá Metropolitan Area (BMA) see Appendix 1 of the dissertation.

Source: Field survey

Finally, table 3.5 provides information on the length of employment of interviewees, both as employees of the firm and in their occupation at the time of the interview. The figures in the table point not only to a set of respondents who in general could be safely assumed to be familiar with the firm's operation, but also suggest a fairly stable workforce among sampled establishments. On average, interviewees had been employed for slightly less than half the number of years that the firm had been in operation.⁸ Given the small difference between the number of years as employees and that in their present occupation it might also be inferred from the table that most interviewees were probably originally hired to fill the jobs they were occupying at the time of the interview.

⁸ The average age of firms was 17.4 years for the Core, and 19.4 for those outside the BMA Core. For more details see table 8.2 in chapter 8.

Appendix 3A

Libraries and Documentation Centres Consulted

Libraries and Documentation Centres Consulted

1. In Bogotá

- Asociación Colombiana de Pequeños Industriales (ACOPI)
- Asociación Nacional de Industriales (ANDI)
- Cámara de Comercio de Bogotá
- Centro de Estudios del Desarrollo Económico (CEDE), Universidad de Los Andes
- Corporación Autónoma Regional de las Cuencas de los Rios Bogotá, Ubaté y Suárez (CAR)
- Corporación Centro Regional de Población (CCRP)
- Departamento Administrativo de Planeación Distrital (DAPD)
- Departamento Administrativo Nacional de Estadística (DANE)
- Departamento Nacional de Planeación (DNP)
- Fondo Nacional de Estudios de Desarrollo (FONADE)
- Instituto Geográfico Agustín Codazzi (IGAC)
- Universidad Piloto de Colombia

2. In the United Kingdom

- British Library of Political and Economic Science, London School of Economics
- Institute of Development Studies, University of Sussex
- Institute of Latin American Studies, University of London
- University College London
- Senate House, University of London

3. In France

- ORSTOM, Paris
- Maison des Sciences de l'Homme, Paris
- Institut des Hautes Etudes de l'Amérique Latine, Paris
- Institut de Géographie, Université de la Sorbonne, Paris

4. In the United States

- Nettie Lee Benson Collection, University of Texas at Austin
- Population Centre, University of Texas at Austin

Appendix 3B

**Key to the
Compatibility
Between Revisions 1 and 2
of the Standard Industrial
Classification (SIC)**

**Key to the Compatibility Between Revisions 1 and 2
of the Standard Industrial Classification (SIC)**

Revision 1 (up to 1969)	Industry	Revision 2 (from 1970)
20	Foodstuffs	311, 312
21	Beverages	313
22	Tobacco	314
23	Textiles	321
24	Wearing apparel	322, 324
25	Wood products, excluding furniture	331
26	Furniture	332
27	Paper and products	341
28	Printing and publishing	342
29	Leather products	323
30	Rubber products	355
31	Chemical products	351, 352
32	Petroleum products	353, 354
33	Non-metal minerals	361, 362, 369
34	Basic metal products	371, 372
35	Fabricated metal products	381
36	Machinery, except electrical	382
37	Electrical machinery	383
38	Transport equipment	384
39	Other manufactured products	356, 385, 390

Source: DANE (1976)

4 The Spatial Distribution of Population and Manufacturing Activity in the Central Sub-Region, 1958-1990

4.1 Introduction

The main concern of this study is to establish the reasons why in the years 1958-1990 Colombia's largest urban agglomeration failed to spread out to its surrounding area in a more pronounced way than it did. A necessary first step in elucidating the causes behind this phenomenon is, therefore, a description of the process of demographic and economic growth of the metropolitan area and its surrounding region. As was argued in the introductory chapter, analyses of the expansion of Bogotá are usually restricted to examining the process either within the core of the metropolitan area (Lee, 1989) or in its immediately adjacent suburban areas (Pineda & Jiménez, 1990).

A more thorough view of the process is afforded, however, by examining a much wider geographical area over a longer period, so all conceivable spill-over of population and economic activities beyond the suburban ring may be detected (Vining & Kontuly, 1978). As was shown earlier, studies in other metropolitan contexts have documented spill-over growth at distances of 150 km or more from metropolitan cores within what have been termed "metropolitan regions" (Dillinger & Hamer, 1982).

This chapter is primarily concerned with tracing the spatial shifts of population and manufacturing activity in the region surrounding the Bogotá metropolitan area in the period covered by this research. For the purposes of this study we have called this area the 'Central Sub-region' (cf. map 1.1 in chapter 1). It must be stressed that this is neither an administrative nor an officially-recognised geographical region but merely a short-hand term of convenience. It encompasses three *departamentos* (Colombia's provincial units), Cundinamarca, Boyacá and Meta, with a combined area of 133,000 km², nearly 12 per cent of the country's territory and one tenth of its 1993 population if Bogotá DE is excluded. If one includes the national capital, the sub-region's demographic weight rises to a quarter of the national population (cf. DANE, 1996a).

It is worth emphasising that the spillover effects that interest us here are not merely of a demographic nature but relate predominantly to the possible dispersal of manufacturing activities outside the metropolitan core. Such dispersal, it was claimed earlier, may be linked to a complex set of elements involving among others, factor costs, availability of labour and infrastructure, and agglomeration and urbanisation economies. Physical distances, population growth, expansion of non-manufacturing activities and a thorough appraisal of manufacturing activities provide an essential background to understanding the ways in which industrial dispersal might proceed.

The chapter describes some of the more salient features of the population in the Central Sub-region including its growth during the inter-censal period 1951 to 1993. The Central Sub-region urbanised rapidly during this period, with the BMA attracting large numbers of rural and urban migrants, especially from the surrounding *departamentos* of Boyacá and Cundinamarca. A model of the spatial growth of a 'metropolitan region' is then used as a reference to describe the spatial and sectoral changes of manufacturing in the Central Sub-region during the period 1958 to 1985; this shows that, unlike the case of metropolitan Sao Paulo (Brazil), manufacturing in the Central Sub-region has tended to concentrate in a narrow ring around the BMA, while distant locations have lost employment both in absolute and relative terms.

4.2 The Central Sub-region: An urbanising population

Throughout most of Colombia's history the area that we have here called the Central Sub-region has lain at the centre of the nation in more than one way. Apart from being its geographical core, it was an important concentration of population, administration and economic activities even in the latter decades of the Spanish colonial era in the late 18th and early 19th centuries (Ospina Vásquez, 1974; Jiménez & Sideri, 1985). This arose out of a number of geographical and political factors which combined to give Bogotá and its surrounding area an undisputed pre-eminence in the economic and administrative life of the country.

Table 4.1
Central Sub-region:
Distribution of population^a by departamento, 1951-1989

Departamento	1951		1964		1973		1985 ^b		1993 ^b	
	Population	Share %	Population	Share %	Population	Share %	Population	Share %	Population	Share %
Bogotá DE ^c	648,324	26.2	1,697,311	42.7	2,861,913	52.7	4,236,490	57.9	5,484,244	59.0
Boyacá	779,349	31.5	991,454	24.9	1,129,008	20.8	1,209,739	16.0	1,315,579	14.2
Cundinamarca ^d	975,720	39.5	1,122,213	28.2	1,176,003	21.7	1,512,928	20.1	1,875,337	20.2
Meta	67,492	2.7	165,530	4.2	261,863	4.8	474,046	6.0	618,427	6.7
TOTAL	2,470,885	100.0	3,976,508	100.0	5,428,787	100.0	6,875,231	100.0	9,293,587	100.0

a. Includes urban and rural components

b. Adjusted for coverage.

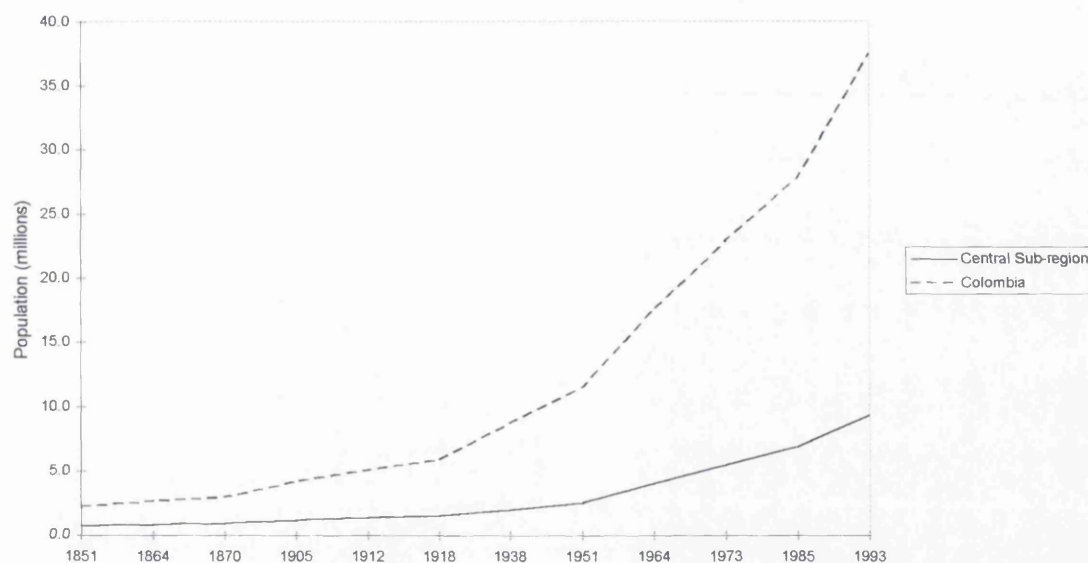
c. Bogotá became a *Distrito Especial* (DE) in 1954 and *Distrito Capital* in 1991. Appendix 1 has a more detailed description of the administrative boundaries of the *Distrito Especial*.

d. Excludes Bogotá DE.

Source: For 1985: Manrique de Linaés, 1990, table IV-2. For other years, DANE, National Population Censuses.

By the middle of the nineteenth century nearly one in three Colombians lived in the area jointly formed by the three *departamentos* (including Bogotá DE). This proportion would gradually decrease in the course of the following century, as the country's economy diversified and other regions and urban centres such as Medellín and Cali developed. By 1905, just under a quarter of the country's inhabitants lived in the Central Sub-region, a share that gradually dropped to around one fifth by 1951. In the decades after the second world war Bogotá's rapid expansion would help increase again the demographic weight of the whole region in the country so that by 1993 one in four Colombians were living there (see figure 4.1).

Figure 4.1:
Population of Central Sub-region and Colombia, 1851-1993



Source: For 1851-1985: Dávila *et al.* (1991). For 1993: DANE (1996a).

Within the Central Sub-region, however, the population has not been evenly distributed. More significantly for our study, as may be seen from table 4.1, in the three decades covered by the research there was a clear trend towards a concentration of the region's population in Bogotá, the region's undisputed administrative, economic and demographic centre. Out of a regional population of 2.47 million recorded in the 1951 census, just over a quarter lived within the boundaries of what in 1954 would become the administrative area of the Distrito

Especial de Bogotá.¹ Considerably larger proportions of the region's inhabitants lived in the *departamentos* of Cundinamarca and Boyacá in 1951 than in more recent years, while Meta's inhabitants only represented a very small fraction of the total. With the swift growth of Bogotá that marked the following decades this state of affairs rapidly changed.

By 1993, while Bogotá's share had more than doubled to reach nearly three-fifths, the relative weights of both Cundinamarca and Boyacá had shrunk to less than half their 1951 levels. The rate of population growth in both of these *departamentos* slowed down considerably. By contrast, the population in Meta, the sub-region's eastern-most *departamento*, grew nine-fold between 1951 and 1993 and by the end of the period represented nearly 7 per cent of the total.

These figures must be examined in the light of the processes of migration and urbanisation that have so profoundly marked Colombia's recent development (Flórez & González, 1983; Jaramillo & Cuervo, 1987). A look at urban population figures (table 4.2) suggests that this region was no exception. Against a background of falling urban and rural growth rates in the two inter-censal periods after 1951-1964 the general tendency was for the sub-region's rural areas to grow at a slower pace than urban districts.

The rural sections of several municipalities, particularly in Boyacá and Cundinamarca, were net losers of population through a combination of falling fertility rates and especially out-migration.² For instance, 73 per cent of migrants of rural origin living in Bogotá in 1964 came from Boyacá and Cundinamarca (Cardona, 1976). By the same token, urban areas in these *departamentos* gained from the process: in Boyacá, for example, some 60,000 people left their rural homes between 1951 and 1964 to settle in the *departamento's* urban districts (*op. cit.*, p. 100). Urbanisation in these two provinces was considerably slower than in Bogotá DE or even Meta.

¹ See Appendix 1.

² These two processes are closely linked: as those in their peak of their reproductive age tend to migrate in larger numbers than older individuals, there is a long term tendency for fertility rates to fall in the area losing population.

Table 4.2
Central Sub-region:
Total and urban^a population growth rates by *departamento*, 1951-1993
(Annual percentages)

Departamento	1951-1964		1964-1973		1973-1985 ^b		1985-1993 ^b	
	Total	Urban	Total	Urban	Total	Urban	Total	Urban ^c
Bogotá DE ^d	7.68	7.68	4.10	4.18	3.06	3.09	2.17	2.17
Boyacá	1.87	5.39	1.00	2.77	0.53	1.75	0.70	2.19
Cundinamarca ^e	1.08	2.52	0.36	2.96	1.96	3.61	1.81	2.81
Meta	7.14	9.11	3.59	5.10	4.67	5.14	2.24	0.90
Total	3.73	6.58	2.42	3.93	2.45	3.13	1.88	2.19
Excluding Bogotá DE	1.73	4.19	0.92	3.19	1.70	3.25	1.47	2.25

- a. Population located in *cabeceras* (seats of municipal government, usually localities with 1,500 or more inhabitants).
b. Based on adjusted census figures.
c. Urban share for 1993 based on unadjusted figures.
d. Bogotá became a Distrito Especial (DE) in 1954. Appendix 1 has a more detailed description of the administrative boundaries of the DE.
e. Excludes Bogotá DE.

Sources: Calculations based on: for 1985: Manrique de Llinás, 1990, table IV-2; for other years, DANE, National Population Censuses.

With rural economies weakened by low productivity, a land unable to accommodate expanding numbers of people and continued subdivision of the land, and a swift shift of the economy towards higher-productivity, more highly-paid employment in urban areas, non-urban Boyacá and Cundinamarca could hardly expect to attract significant numbers of migrants. The 1973 census records that a mere 5 per cent of Boyacá's rural population came from outside the *departamento*, while less than 11 per cent of Cundinamarca's rural inhabitants had been born outside Cundinamarca.³ By contrast, Meta's poor but vast and uninhabited expanses of land attracted proportionately larger numbers: in the same year, 52 per cent of this *departamento's* rural population was born outside its boundaries; two-fifths of migrants came from Boyacá and Cundinamarca and a further 33 per cent from the neighbouring *departamentos* of Tolima and Huila, where 'La Violencia', a period of rural violence fuelled by sectarian partisan politics in the late 1940s and early 1950s, drove large numbers out.⁴

³ These figures are calculations based on unadjusted census figures from the 1973 census (cf. DANE, 1981, table 4A).

⁴ Several hundred thousand are estimated to have died in a space of less than a decade after the late 1940s. Molano (1989) provides a compelling account of the lives and struggle of some of these migrants.

Largely by virtue of its relative size, the rapid growth of Villavicencio, Meta's capital city and largest urban centre, exerted a considerable influence on the *departamento's* high urban growth rates. Bogotá DE's rural population, confined mostly to the southern tip of the Distrito Especial (map), remained almost negligible throughout the period and even showed a decreasing trend. The net overall effect was, therefore, that of a rapidly urbanising population in all four administrative components of the Central Sub-region.

4.3 Growing concentration of population in Bogotá

Bogotá DE was by far the region's largest recipient in the significant population movements that marked the post World War II era in Colombia. A measure of its condition as the nation's most important concentration of public and private services and as a centre rapidly achieving industrial predominance was a capacity to attract migrants from all around the country, and especially from Boyacá and Cundinamarca. In 1964, for example, 71 per cent of males aged 15-64 living in Bogotá were migrants (Simmons & Cardona, 1972, p. 164).

Since colonial times Bogotá has had the dual role of being Cundinamarca's and Colombia's capital city. It has also been the largest urban centre both in the country and the Central Sub-region. The complex set of reasons that lie at the base of the city's growth will be further explored in Chapter 5. Suffice it to say here that very few of the settlements that could be labelled as 'urban' in the Central Sub-region exceeded the city's high rates of growth through this century, particularly since the 1950s. In the early 1900s the city's population was 13 times larger than that of the next largest urban centre, which at the time was Tunja, Boyacá's capital. Half a century later the ratio had climbed to more than 18 times, and now the second largest city was Girardot, a port on the Magdalena river, the longest navigable waterway in Colombia. By 1985, Bogotá's population exceeded that of Villavicencio, Meta's capital and the sub-region's second largest urban centre, by a ratio of nearly 25 times to one (table 4.3).

When referred to a map, the figures on urban and total population also offer a glimpse of the changing nature of regional development in the Central Sub-region (map 4.1). Tunja, an important administrative centre in colonial times, found little stimulus for growth in recent decades from Boyacá, an impoverished *departamento* with a shrinking subsistence peasant population and a modest manufacturing

sector; most of Tunja's meagre growth was sustained by a narrow range of administrative functions and a few other services such as tourism and higher education. A more impressive contribution to Boyacá's urban growth came from Sogamoso and Duitama, which benefited from national government incentives to decentralise manufacturing industry in the 1950s and 1960s, thus giving them the largest steel mill in the country and among the largest cement and car-assembling plants.

Table 4.3
Population of the 22 largest urban centres^a
in the Central Sub-region, 1951-1985

Urban centre	1951	1964	1973	1985 ^b
Bogotá D.E.	660,280	1,670,115	2,845,361	3,974,813
Villavicencio	17,126	45,277	87,690	161,166
Soacha	4,226	11,435	23,997	99,353
Tunja	23,008	40,451	55,166	87,851
Girardot	35,665	66,584	60,882	66,385
Sogamoso	13,574	32,274	50,536	64,437
Duitama	7,723	31,865	38,391	56,390
Zipaquirá	12,708	22,648	33,074	45,676
Facatativá	13,479	20,742	28,692	44,331
Fusagasugá	8,345	18,755	26,100	41,033
Chiquinquirá	10,143	16,926	23,242	27,917
Funza	1,943	3,642	13,584	24,263
Chía	2,698	5,655	9,726	23,598
Madrid	3,162	6,938	13,481	22,366
Granada	--	5,683	10,480	21,317
Acacías	2,712	6,508	10,557	17,335
Sibaté	--	--	8,322	14,335
San Martín	3,094	6,739	9,113	11,911
Ubaté	3,837	6,261	8,448	11,813
Puerto López	--	3,856	5,295	10,366
Mosquera	1,987	4,580	4,108	9,805
Cajicá	983	2,609	4,647	9,516

-- Not yet officially a municipality, so its population is counted as part of another municipality.

a. Population in *cabecera* (seat of municipal government).

b. Unadjusted census figures.

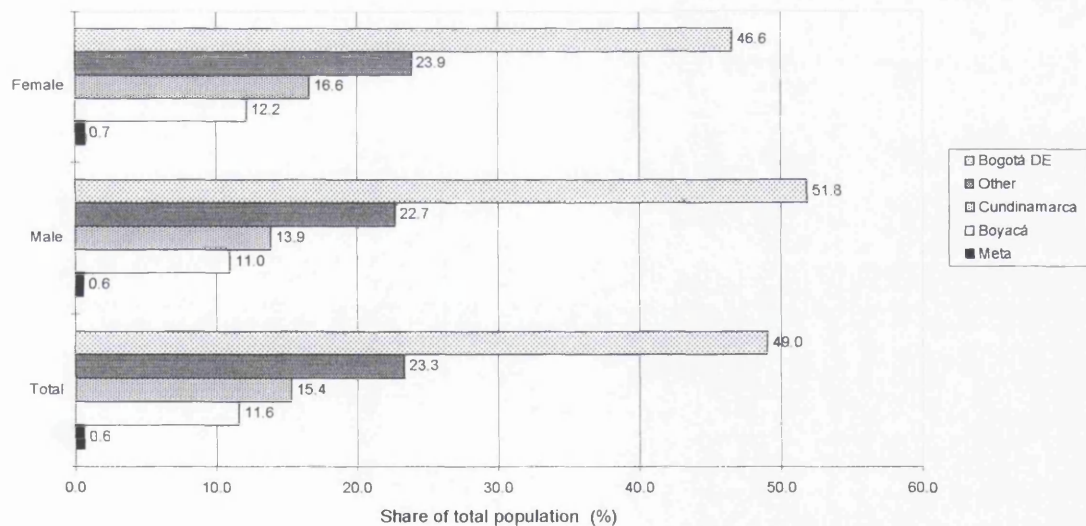
Sources: DANE, National Population Censuses.

The success of a rapidly growing frontier economy is reflected in the growth of urban centres like Villavicencio, Granada, Acacías, San Martín and Puerto López, some of which would not even figure in a 1950s map of Colombia as municipalities in their own right. Meta and the vast uninhabited region of the eastern plains attracted large numbers especially during 'La Violencia'. In subsequent years, a

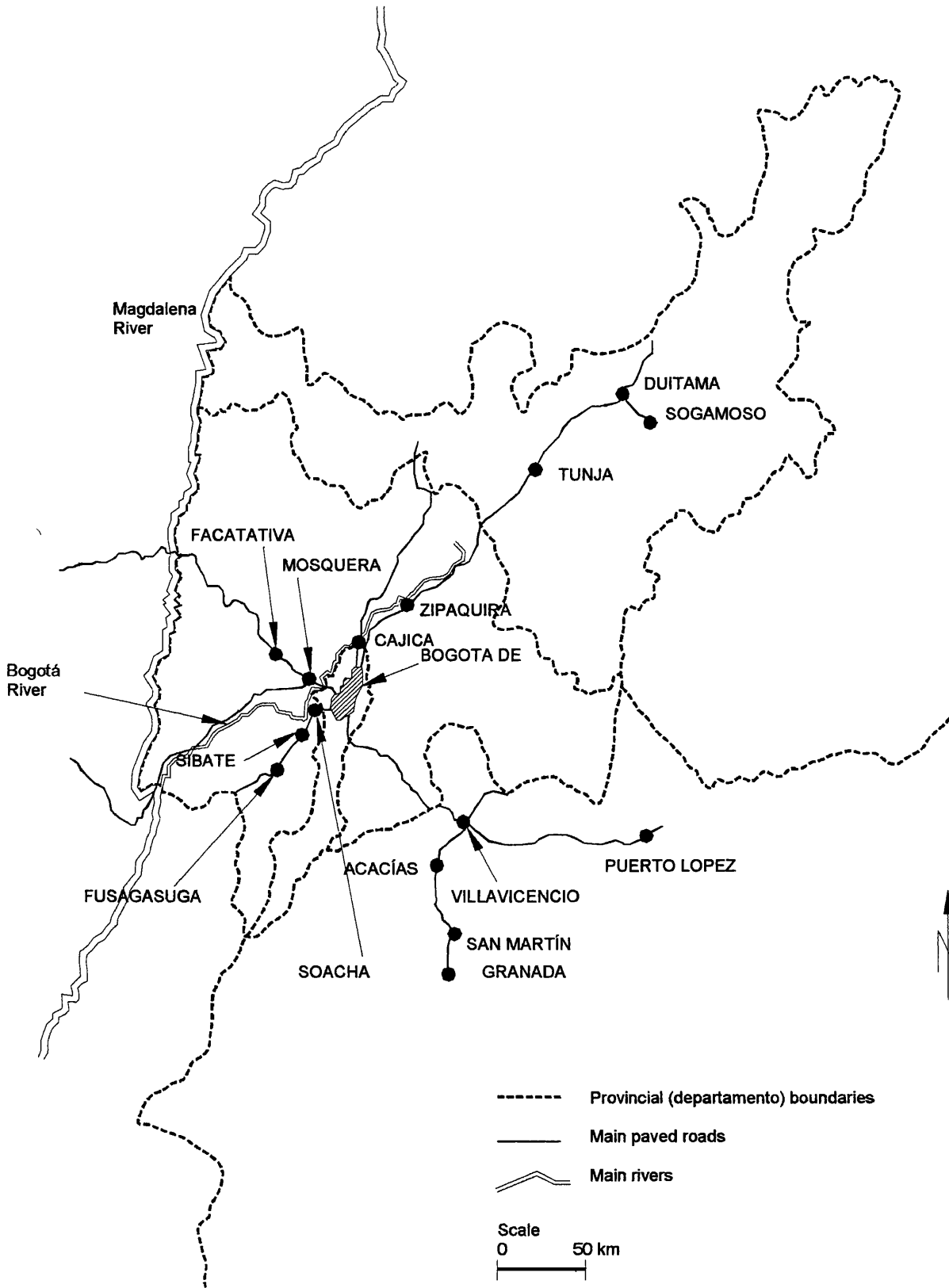
diverse range of activities including cattle ranching, agro-industry (rice and palm oil), commerce and, in the late 1980s, exploitation of nearby oil and gas deposits, some of the largest found in the Americas in recent decades, have continued to fuel the rapid growth of Meta's urban centres.

A final distinctive feature of the figures in Table 4.3 is the growth in the last years of the period covered by this study of urban centres closer to Bogotá DE, such as Soacha, Facatativá, Chía, Funza and Madrid. This is to a large extent a reflection of the process of metropolitan growth of Bogotá DE, which has spilled over beyond the administrative boundaries of the Distrito Especial to nearby municipalities. Some of these, such as Chía and La Calera (not in the table) have become largely dormitory towns, while in others the proximity to the capital has fostered secondary or tertiary sector activities, as in the cases of Soacha and Funza.

Figure 4.2:
Distribution of population in Bogotá DE by birthplace, 1973
(%)



Source: DANE, National Population Census 1973.



Map 4.1 Central sub-region: main urban centres

Migration was the main contributor to Bogotá DE's demographic growth in the 1950s and 1960s. By 1973, as figure 4.2 shows, more than half of the city's inhabitants had been born outside its administrative boundaries. Boyacá and Cundinamarca were the largest 'suppliers' of migrants to the capital, a role that had intensified during the 1960s. In 1973 over a quarter of the city's inhabitants came from these two neighbouring *departamentos*, an increase over the one-fifth recorded in the 1964 census (Cardona, 1972, p. 97).

The majority of men who migrated to Bogotá from Boyacá and Cundinamarca in the 1950s and 1960s were young unskilled labourers coming directly from predominantly rural communities. A 1968 survey of male migrants to Bogotá aged 20 to 54⁵ found that 79 per cent of those born in these *departamentos* had originally come from municipalities with less than 20,000 inhabitants where the largest urban centre had an average population of less than 3,000 (Simmons & Cardona, 1972).⁶ Only 12 per cent had lived in another urban centre (mostly medium-sized) before their arrival in Bogotá. The study also found that migrants from other parts of the country tended to come from larger communities and were generally more skilled. For example, at the time of the survey 38 per cent of migrants from Boyacá and Cundinamarca were working as employees or skilled workers, 57 per cent as semi-skilled or unskilled workers and 5 per cent as professionals; the percentages for migrants from other *departamentos* were 43, 34 and 23, respectively.

Notwithstanding the focus on working-age males chosen in Simmons & Cardona's study, in recent decades Bogotá DE attracted a larger number of female than male migrants from most regions of the country. In 1973, for example, there were over a third more Cundinamarca-born females than males and over a quarter more Boyacá-born females than males living in the city. These figures are partly a

⁵ Why the survey should focus exclusively on males in this age group is not quite made explicit by the authors, particularly as 1964 and 1973 census figures showed that women represented a larger proportion of all migrants to the city than men. Women were only included in the survey as a control group mostly of wives of migrants in order to gauge attitudinal changes towards fertility during the migratory process (Cardona, Simmons & Rodríguez Espada, 1972, p. 125).

⁶ Municipalities in Colombia are administrative units comprising an urban and a rural section; administration is located in the capital of the municipality (*cabecera*), usually the only settlement that may be strictly classified as urban within the municipal boundaries. Simmons & Cardona note that, as a general rule, in the 1950s and 1960s, the larger the municipal population the smaller its rural component as a proportion of the total. Only 22 per cent of Simmons & Cardona's sample of male migrants aged 15-64 said they were living in the rural component of the municipality (*vereda*) before migrating. The authors point to the stark contrast between this figure and the 68 per cent of these *departamentos*' population who lived in rural areas in the mid-1960s (1972, p. 167).

reflection of economic and cultural factors. A rural setting with few income-earning opportunities and poor services impelled a disproportionate number of especially young women to seek employment in the capital city, notably in domestic service but also in other services as well as manufacturing. And since the late 1960s the cut-flower export industry grew considerably in importance as a source of employment for young female labour, particularly in municipalities close to the BMA.

Cultural factors are harder to measure, but they relate to the more limited possibilities of individual development that women face in rural households, as a result of being given a lower priority than their male siblings in access to education and a limited access to inherited land. This reflects a process common to most of the small-holding areas in the country during this period, particularly in areas with low productivity (typically outside the coffee economy): increasing pressure on the land to sustain an expanding population led either to a continuous sub-division of the family property or, more commonly, to the outmigration of some of the family members who did not have customary access to inherited land. Throughout Colombia, including Boyacá and Cundinamarca, these were typically the female members of the household who were forced to look for income-earning opportunities elsewhere.⁷

Table 4.4
Central Sub-region and Colombia:
Literacy rates^a by *departamento*, 1973 and 1985

Departamento	1973		1985	
	Female	Male	Female	Male
Bogotá DE	88.6	90.6	91.8	92.9
Boyacá	65.2	71.2	77.1	81.2
Cundinamarca	73.2	75.0	82.6	83.4
Meta	71.7	73.9	82.5	82.8
Colombia	75.0	75.0	82.4	81.7

a. Percentage of literate population in population over 4 years of age; 1973 rates are based on enumerated population figures rather than on adjusted figures. See DANE, 1981, p. 101-120.

Sources: For 1973, DANE (1981); for 1985, DANE (1986).

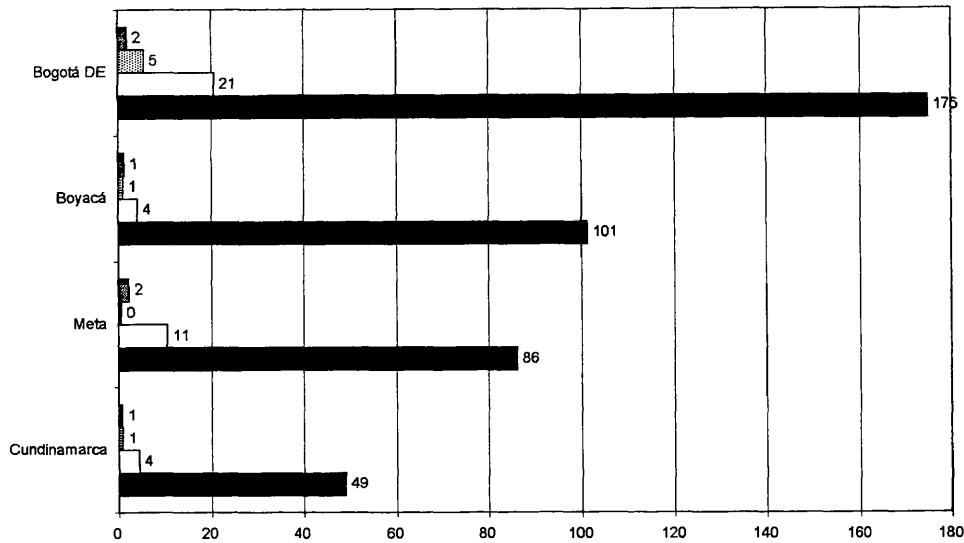
⁷ To my knowledge, the differential access that men and women had to ownership of the land was not well documented at the time of the largest waves of out-migration from rural areas, during the 1950s and 1960s. These reflections arise out of more recent observations of the process.

An indirect measure of the more limited access to education and opportunities that hampered women's development in these areas is suggested by the figures on female and male literacy for 1973 and 1985 summarised in table 4.4.⁸ Overall literacy levels rose between these two census years in all *departamentos* and in Colombia as a whole; literacy among women improved faster than among men nationally, and by 1985 women were on average marginally more literate than men. By contrast, disaggregated figures for the Central Sub-region's subdivisions show that, although the gender gap narrowed, as a rule female literacy rates remained lower than male rates in most regions.

It is not surprising that literacy rates in Bogotá are the highest in the region. In fact, they are the highest in the country, and Bogotá has the best educated labour force if measured in terms of average years of schooling. Average literacy rates throughout the region were not too dissimilar to the national average, with the lowest in the Central Sub-region found in Boyacá. The small disparity with national averages is partially a measure of the region's relative prosperity and of the results of improved provision of educational services in rural areas during the past few decades. In the case of Meta and most of Cundinamarca, it is also a reflection of the comparatively high proportion of population who live in towns well-endowed with educational facilities. But despite improvements, the difference between Bogotá and the other provinces in the Central Sub-region remained high by the mid-1980s, as witnessed by the substantial inter-regional gaps in electricity connections shown in figure 4.3.

⁸ The importance of these figures must not be over-emphasised for they do not necessarily provide an indication of the population's 'functional literacy', its ability to read and write more than simply their name.

Figure 4.3:
Electricity connections per 1,000 inhabitants in Central Sub-region, 1985



Notes: Bogotá DE's figures are for 1983. Cundinamarca does not include Bogotá DE.

Source: DANE (1988).

To summarise, within the Central Sub-region the single most notable feature of the period 1951-1993 was a concentration of population and labour force within the administrative area of Bogotá DE. This was achieved through population movements, particularly high rates of rural out-migration, and the simultaneous fast growth of Bogotá's population and economy, a result of its capacity to attract migrants and capital from all around the country. The canvas we have used in this section had a regional coverage but was limited to describing the more significant population changes. The way in which population and, more specifically, manufacturing activities were distributed spatially and sectorally inside the metropolitan area of Bogotá is a subject discussed in Chapters 6 to 8. In the remaining sections of this chapter we examine whether these intra-regional movements of population bore any relationship with the development and the movements of manufacturing firms within the Central Sub-region.

4.4 The changing location of manufacturing in the Central Sub-region

As described in chapter 2, Dillinger & Hamer (1982) examine the wider regional effects of industrial development in a large metropolitan area by means of a simple model of spatial growth for what they term a 'metropolitan region', the region of greatest industrial output in a nation. For analytical purposes, the model divides the

area outside a national metropolis into a first-order inner ring, a first-order hinterland and a remaining area which includes a variety of sub-regions depending on the degree of national development, ranging from regional metropolitan areas, their second-order inner rings and their second-order hinterlands, to peripheral regions "where development has only recently begun to take place" (p. 16).

According to the model, in a context of continued industrial growth spatial development will consist of a process of sectoral diversification from traditional to semi-modern to modern activities which, starting at the metropolitan core, gradually permeates out towards the periphery. In time, non-metropolitan areas "graduate from one sectoral profile to another" (op. cit., p.17). This leads to an increasingly homogeneous regional space where locations are relatively interchangeable. The model is successfully used by the authors to describe the spatial development of the metropolitan region of Sao Paulo, Brazil, for the period 1960-1975. This region essentially encompasses Sao Paulo state, an area nearly twice the size of the Central Sub-region, and includes Sao Paulo, Brazil's busiest industrial city with a population of 9 million in 1980 (Townroe & Keen, 1984).

The application of the model in the Brazilian metropolis yields interesting empirical evidence and offers some policy lessons. In particular, it shows that some low-income non-metropolitan areas show a comparative advantage in the production of a range of manufactured goods. In the remainder of this section, this model will be contrasted with a description of the spatial development of manufacturing in the Central Sub-region in the period 1958-1985.

As with population, within the Central Sub-region perhaps the most salient spatial feature of the period was the gradual relative concentration of manufacturing employment in and around the administrative area of Bogotá DE. And even though Bogotá DE retained a disproportionate share of manufacturing jobs in relation to the size of its population, this concentration was not as marked as that of the population described in the previous section. The process will now be examined in its separate components.

Manufacturing industry expanded at comparatively high rates in the Central Sub-region as a whole in the period under study. In terms of the number of people engaged in these activities national population census figures indicate that,

between 1951 and 1973, numbers expanded more rapidly than in the construction, agriculture and mining industries (table 4.5). Only the broad sectors classified globally as 'services' and commerce & finance showed faster rates of expansion in the period (there is no disaggregated information for the Central Sub-region covering the period after 1973). As will be seen in chapter 5, national data show a more mixed performance, with most sectors expanding until the end of the 1970s but then experiencing slow-downs or even contractions in the early 1980s. Given the profile of productive activities in the Central Sub-region (and given the disproportionate weight of Bogotá DE in the region's non-agricultural employment) it may be assumed that these trends were followed closely in the region as well. For a spatially disaggregated analysis of manufacturing, the focus of our interest here, we rely mainly on the results of annual surveys of manufacturing industry.⁹

Throughout the period, the bulk of manufacturing employment in the Central Sub-region was concentrated in Bogotá DE; this heavily influenced the overall performance of the sector in the sub-region which thus mimicked closely Bogotá DE's movements. What comes out of the figures in table 4.6 is a fairly stable spatial distribution of manufacturing jobs throughout the period, with Bogotá DE concentrating around four out of five jobs, followed by Cundinamarca with more than one in ten. This is in stark contrast with the population figures examined earlier, which show a marked process of concentration within the administrative area of Bogotá DE, from having one out of four Central Sub-region inhabitants in 1951 to nearly six out of ten of a much enlarged 1993 population.

⁹ Unless otherwise specified, figures before 1970 refer to all manufacturing establishments, as recorded in DANE's annual manufacturing surveys. DANE's figures after 1970 refer to all establishments with 10 or more workers plus those that in 1970 had 10 or more workers but shrank to below this size in subsequent years. See chapter 3 for more details.

Table 4.5
Labour force change in Central Sub-region by economic sector, 1951-1973
(Annual percentages)

	Bogotá DE ^a		Boyacá		Cundinamarca		Meta		Central Sub-region	
	1951-1964	1964-1973	1951-1964	1964-1973	1951-1964	1964-1973	1951-1964	1964-1973	1951-1964	1964-1973
Agriculture, forestry and fishing	-2.1	1.0	-1.7	0.1	-2.5	6.3	-2.7	1.1	-2.1	
Extractive	-7.0	10.2	-7.2	0.6	-8.1	10.1	2.3	6.0	-7.4	
Manufacturing	3.2	1.5	-1.1	-10.3	2.7	5.9	1.8	4.1	2.7	
Construction	3.3	3.4	1.3	-8.6	0.1	5.5	4.2	4.0	2.7	
Commerce and finance	7.6	2.3	2.9	-8.6	2.0	11.3	7.3	4.4	6.5	
Other ^b	3.5	2.4	0.2	-7.9	-0.3	4.0	8.2	4.5	2.8	
TOTAL	4.0	1.5	-1.1	-4.2	-1.4	6.1	1.5	3.0	1.5	

a. Statistics for Bogotá were not published separately from Cundinamarca until after 1964.

b. Includes non-specified activities, electricity, gas & water, transportation and personal and other services.

Sources: Calculations based on DANE, National Population Censuses.

Table 4.6
Manufacturing employment^a in Central Sub-region, 1959-1989

Departamento	1959		1965		1974		1980		1985		1989	
	Number	Share %	Number	Share %	Number	Share %	Number	Share %	Number	Share %	Number	Share %
Bogotá DE ^b	*	--	76,984	80.0	126,710	80.1	148,200	81.0	140,792	81.7	159,720	81.8
Boyacá	4,267	5.4	5,606	5.8	10,462	6.6	11,487	6.3	7,487	4.3	7,459	3.8
Cundinamarca ^c	74,963	94.2	12,880	13.4	20,104	12.7	22,299	12.2	22,786	13.2	26,286	13.5
Meta ^d	366	0.5	728	0.8	838	0.5	877	0.5	1,175	0.7	1,814	0.9
Total ^e	79,596	100.0	96,198	100.0	158,114	100.0	182,863	100.0	172,240	100.0	195,279	100.0

* Included in Cundinamarca.

-- Not applicable.

a. Paid and unpaid employment. From 1970 it refers mostly establishments with 10 employees or more. See chapter 3.

b. Until 1954 Bogotá was administratively part of Cundinamarca, so statistics were rarely published separately.

c. 1959 figure includes Bogotá DE.

d. There would seem to be an error of transcription in the original source in the figure for waged employment in wearing apparel in 1959; this appears as 97 while total employment is only 36. I have consequently used a more consistent figure of 27 for this calculation.

e. The percentage of total waged labour is the weighted average for the four departamentos.

Sources: For 1959 and 1965: CID (n.d.), for other years: DANE data from Annual Manufacturing Surveys.

The impression of a relatively stable distribution of manufacturing among the four major administrative sub-divisions of the Central Sub-region is reinforced by data on spatial distribution of output. Table 4.7 shows that Bogotá DE concentrated the bulk of value added in the region throughout the period 1959-1985. The steady increase in spatial concentration apparent from the figures was not sufficient to bring the concentration of output in Bogotá DE up to the levels seen for employment. Meta *departamento* showed a regular increase, a reflection of the fast growth in consumer goods industries that marked this period, while the other two *departamentos* tended to lose out in the process.

Table 4.7
Distribution of manufacturing value added in Central Sub-region, 1959-1989
(Percentages)

Departamento	1959	1965	1974	1980	1985	1989
Bogotá DE	*	77.2	75.8	76.2	78.4	74.6
Boyacá	10.4	6.8	9.2	8.2	5.7	7.2
Cundinamarca	89.2	15.3	14.2	14.6	14.6	16.3
Meta	0.4	0.7	0.8	1.0	1.3	1.8
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

* Included in Cundinamarca.

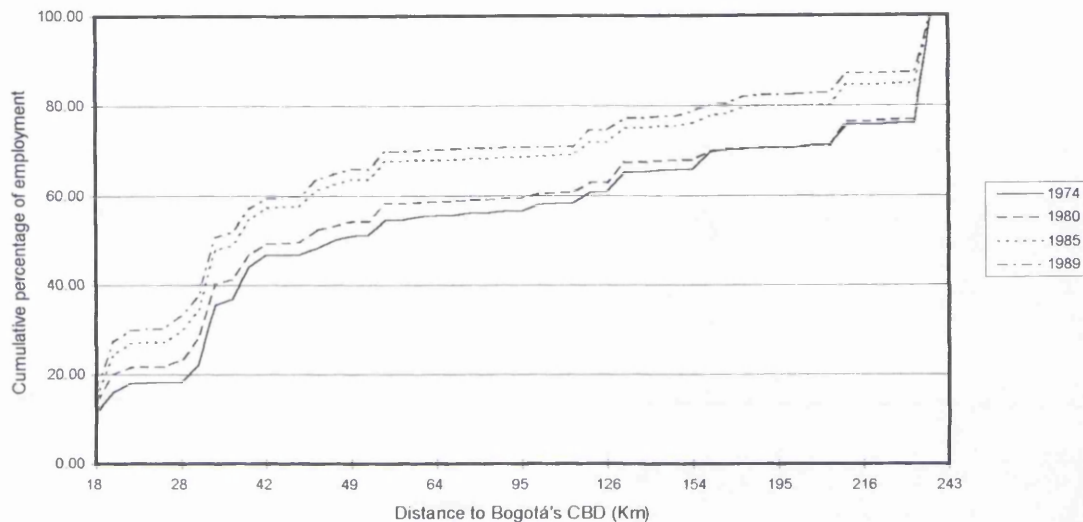
Sources: For 1959 and 1965: CID (n.d.); for 1974 to 1985, DANE Annual Manufacturing Surveys (see chapter 3).

A different picture emerges, however, when employment figures are examined at a higher level of spatial disaggregation, for example by using the municipal scale as the focus of analysis. Figure 4.5, drawn from data in table 4A.2 in the appendix, uses data disaggregated at the municipal level to depict changes in the spatial distribution of employment between 1974 and 1989.¹⁰ Assuming that for any given year the sub-region outside Bogotá DE has a 100 per cent employment, the figure is constructed with all municipalities in the Central Sub-region where manufacturing employment was recorded in at least one of DANE's annual surveys for the period 1974-1985. They are ranked in increasing order according to their distance to Bogotá's CBD, and their share of total Central Sub-region employment is calculated and added to that of all the preceding ones. This produces a list of cumulative percentages which reaches 100 per cent in the municipality farthest from the CBD.

¹⁰ Because of confidentiality rules these highly disaggregated figures at the spatial level are not normally available. However, an exception was generously made for this research by the director of DANE. See Chapter 3.

This simple tool provides a useful visual description of the changes in spatial dispersal around a locality between two points in time (Hammond & McCullagh, 1978).

Figure 4.5:
Central Sub-region (except Bogotá DE):
Location of manufacturing employment, 1974-1989 (%)



Source: Calculations based on table 4A.1 (appendix of chapter 4).

What may be clearly seen from the graph is a trend towards concentration of employment in an area closer to the sub-region's core (i.e. Bogotá DE). In 1974, half of total Central Sub-region employment outside Bogotá DE was to be found at a distance of some 48 km from the city. By 1980, this had dropped to just over 45 km and to slightly under 29 km by 1989. This is visually shown in the graph by a gradual move upwards of the annual curves. It is interesting to note that the trend was maintained throughout the period, but the pace accelerated during the early 1980s. As will be seen in the next chapter, this was a time of slowdown for the Colombian economy and particularly manufacturing (World Bank, 1991), while the number of manufacturing jobs in the Central Sub-region fell in absolute terms.¹¹

A closer look at the figures shows that this trend was partly attributed to rapid increases in the relative weight of a few municipalities close to the core particularly

¹¹ One hypothesis that has been postulated in the literature on population in movements in developed countries contends that recession leads to a decline in the migration to metropolitan areas (Vining & Kontuly,

between 1974 and 1980, notably Soacha and Sibaté, Southwest of the city, Mosquera, Funza and Madrid in the west, and La Calera in the east (cf. map 6.1 in chapter 6). All lie within a 29 km radius of the core and their combined contribution to total Central Sub-region employment rose from nearly 37 per cent in 1980 to close to 48 per cent in 1985 and 51 per cent in 1989. All these municipalities except Madrid are situated within what in this study is called the Bogotá metropolitan area (BMA). Unfortunately, as discussed in Appendix 1, such a concept does not exist officially, either in juridical or statistical terms (although since the 1980s some statistical data are sometimes presented jointly for Bogotá and the neighbouring municipality of Soacha); data are collected and processed separately for all these municipalities. Nonetheless, the concept is considered here to have enough analytical significance to warrant further use and to make it a research device to focus the discussion in the next chapters.

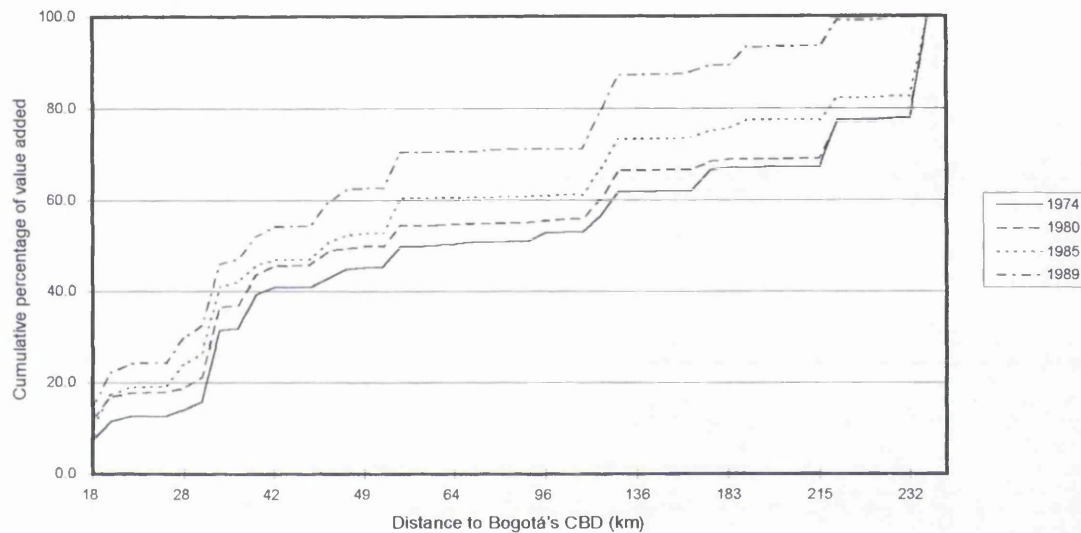
Growth in other municipalities within a circle of between 30 and 50 km from Bogotá's CBD also aided the process of relative concentration, with Facatativá (in the west) and Sopó (in the north) being the most notable cases. Employment beyond the 50 km radius tended to drop, even during 1974-1980, a period of national and regional expansion in manufacturing. In some instances, particularly municipalities with a very small manufacturing base where closure of one plant could wipe out a majority of local jobs, this drop reached alarming proportions. Notable exceptions to this were those municipalities (like Villavicencio in Meta, and Duitama and Tuta in Boyacá) which specialise in industries that experienced growth nationally such as food and beverages, car assembly and some steel products.

The trend towards spatial concentration is confirmed by an examination of another indicator of manufacturing activity, the changing spatial distribution of output (measured as value added, in current pesos) at the municipal level. A similar exercise to that performed with employment earlier is reported in table 4A.2 of the appendix and figure 4.6. These show that manufacturing output was comparatively more dispersed than employment throughout the period. The tendency to cluster near the core is shown by a gradual shortening of a radius out of Bogotá's CBD inside which half total Central Sub-region output is produced, from some 59 km in 1974 to under 39 km in 1989. The process of geographical concentration of output

1978). If one were to argue that the movement of jobs precedes the movement of people, then the evidence presented here would appear to contradict this hypothesis.

was less marked than that of employment, however, and by 1989 output remained slightly more dispersed: an area outside an imaginary circle 39 km in radius around Bogotá would still generate half the Central Sub-region's total output and 43 per cent of its jobs.

Figure 4.6:
Central Sub-region (except Bogotá DE):
Location of manufacturing value added, 1974-1989 (%)



Source: Calculations based on table 4A.2 (appendix of chapter 4).

The figures suggest that, on average, the more highly productive industries tended to concentrate in a relatively small number of municipalities scattered around the Central Sub-region (cf. table 4A.2). As with employment, prominent examples within a 29 km radius include Soacha, Mosquera and Sibaté, whose joint contribution to value added rose from around 27 per cent in 1974 to nearly 32 per cent in 1985. Other locations of high value-added industries were Cajicá, Sopó and Cogua, within a 55 km radius, and Villavicencio, Girardot, Duitama and Sogamoso, all outside a circle of 122 km in radius.

That output should exhibit a higher degree of dispersal than employment is partly explained by the location of a handful of comparatively large and highly productive industries in distant sites. Perhaps the most notable case is Sogamoso (which in the table comprises the nearby municipalities of Nobsa and Paz del Rio): both in terms of production and employment this municipality in Boyacá surpassed all the other municipalities largely on the strength of its large-scale steel and cement

industries, among the largest in the country.¹² Sogamoso's industries were also among the most highly productive in the Central Sub-region, particularly at the beginning of the period; this is shown in a contribution of 22 per cent to value added that greatly exceeded its employment share of less than 9 per cent in 1974 (tables 4A.1 and 4A.2). Both the cement and steel industries had difficulties in subsequent years, especially in the early 1980s, leading to a more than disproportionate drop in employment and output and to lower shares within the Central Sub-region of around 17 per cent and 15 per cent respectively by 1985. Given Sogamoso's significant weight in sub-regional output, these disproportionate drops in the periphery helped speed up the spatial concentration in the core.

The evidence presented so far suggests that, when seen in a high level of aggregation, there was no significant change in the spatial distribution of manufacturing activity among the four administrative divisions of the Central Sub-region between 1958 and 1989. An examination of locational trends using a more detailed municipal scale suggests, however, that there was a tendency towards concentration of employment and output in a roughly crescent-shaped area of some 50 km in radius around Bogotá DE. At this point it is worth recalling the conceptual discussion and empirical evidence from other metropolitan contexts presented in chapter 2 regarding the possible forces influencing metropolitan change. This provides us with some pointers and suggests some questions for furthering our inquiry: what role does Bogotá DE play in the process, or in other words, does the presence of a large and rapidly expanding metropolitan area influence this process of concentration in any significant way? Was this process accompanied by a discernible change in the composition of manufacturing output? These two questions will be the subjects of the next two sections of this chapter.

One way of tackling the first question is to assess the significance of the distance factor in influencing growth; the question could be rephrased to ask whether proximity to the metropolitan core in any way helps induce growth. In statistical terms, a simple test would consist of measuring the degree of correlation between an independent variable, in this case distance to Bogotá DE, and two dependent

¹² This includes a cement plant in the adjacent municipality of Nobsa as well as the steel and cement industries of Paz del Rio in the small locality of Belencito, some 30 kms to the northeast. Paz del Rio's production accounted for 70 per cent of national output in the mid-1970s (Departamento Nacional de Planeación, 1977a, p. 14). For a brief history of the iron and steel industry of Paz del Rio, see Castro Socarrás (n.d.).

variables, namely employment and change over time in the number of jobs. A methodological *caveat* is called for at this point. It was suggested earlier that in municipalities with a small manufacturing base any gain or loss in employment, no matter how small, will often be reflected in large percentage drops or rises thus giving an exaggerated picture of change from one year to the next. In order to minimise the possible bias introduced by this when considering overall growth, only those municipalities which had 75 or more workers in manufacturing in any given year have been included in the second set of statistical tests, involving growth rates.

Relationships between two or more sets of spatially-referred data such as those discussed here may be of a linear or a non-linear nature (Chisholm and Oeppen, 1973, p. 54). Correlation analyses, discussed below, are useful in establishing linear forms of association. A look at tables 4A.1 and 4A.2 in the appendix to this chapter suggest that the relationship between manufacturing employment and its distance from Bogotá follows a non-pattern, with volume of employment falling with distance to a minimum level at a radius of around 135 km, to grow gradually again to a high value at around 250 km of the city centre.

A series of separate correlation analyses was used to confirm whether there is any significant statistical association between these two variables for the years 1974, 1980, 1985 and 1989 for which the data sets we have are meaningfully large. The tests suggest that when all manufacturing jobs in the Central Sub-region are accounted for the association is very weak in all years, though with a tendency to become slightly more meaningful with time. When the correlations are performed only with manufacturing employment located within a radius of 100 km of the CBD, the correlation coefficients appear to be much more meaningful (cf. table 4.8), and become increasingly so with time. The coefficients suggest that distance might help explain 20 per cent of the drop in employment away from the city centre in 1974, and close to 30 per cent in 1989, an outcome that squares well with the gradual concentration process described earlier.

Table 4.8
Pearson correlation coefficients (r) for manufacturing
employment (in number of workers)
against distance to Bogotá's CBD (in km)

Year	All manufacturing employment in Central Sub- region	Employment within 100 km of CBD
1974	-0.03	-0.45
1980	-0.05	-0.49
1985	-0.20	-0.54
1989	-0.23	-0.54

Source: Calculations based on table 4A.1.

A similar exercise for the periods 1958-1965, 1965-1974, 1974-1980 and 1980-1985 suggests that there is no significant linear correlation either between distance to Bogotá and the rate of growth in employment during these periods¹³. Bearing in mind that correlation analysis is not an appropriate tool to detect causal links, this result may be interpreted as meaning that a location closer to Bogotá DE is not necessarily associated with a higher rate of change in the number of local manufacturing jobs. In other words, industries located in a municipality 150 km from Bogotá DE would, in theory, have the same probability of growing as fast as those located a mere 20 km from it.

These results should not necessarily lead us to conclude that locations closer to the metropolitan core benefited more from spillover effects than remote ones. For example, they do not rule out the possibility that there might be some dispersal from the core to all municipalities, distant and adjacent alike. Another plausible scenario might be one where employment grew at different locations in the Central Sub-region independently of the distance to Bogotá DE, but linked to other factors such as the effect of adjacent agricultural activities or sources of raw material. These results do not exclude either the possibility that, as predicted in the model presented by Dillinger & Hamer (1982), in the early stages of rapid industrialisation neighbouring locations will tend to have a similar industry-mix to that of the core,

¹³ Analysis for the years prior to 1974 is hampered by lack of disaggregated data at the municipal level, which is only available for eight municipalities scattered around the sub-region. For years after 1974, separate correlations were undertaken for the municipalities in Boyacá, Cundinamarca and for all municipalities in the sub-region including the six localities within the Bogotá metropolitan area. For the post-1974 period there were 37 observations in total, seven within the Distrito Especial, 20 in Cundinamarca, eight in Boyacá and two in Meta. The regressions generated Pearson 'r' coefficients of 0.01 for 1958-65 and 0.16 for 1965-74. For 1974-80 these were: for Boyacá -0.07; for Cundinamarca -0.03; for all municipios 0.00. For 1980-85 they were -0.02, 0.18 and 0.02, respectively.

with a higher presence of modern or semi-modern industries than more distant locations. These possibilities must be looked at more closely.

The next section will examine the extent to which changes in the sectoral composition of manufacturing within the Central Sub-region may be said to follow a shift from traditional to modern industries in a gradual, outbound, process as predicted in Dillinger & Hamer's model. This requires an examination of possible shifts in the sectoral composition of manufacturing against a background of the changes in spatial location that might have accompanied these shifts.

4.5 The sectoral composition of manufacturing in the Central Sub-region

In discussing sectoral changes in manufacturing Dillinger & Hamer's model draws on a study of manufacturing industries assessing their relative importance in countries with different levels of *per capita* income (a variable implicitly used as a proxy for different stages of economic growth).¹⁴ Some traditional industries such as food products and textiles are classified as 'early' as they require relatively simple production technology; 'middle' industries, such as clothing, rubber products and non-metallic minerals demand varying combinations of such factors as a relatively complex production technology, modern marketing networks and substantial starting capital. 'Late' industries including metallurgy, engineering, paper, wood products and printing "require more sophisticated technology or large amounts of capital and continue to grow more rapidly than the growth of per capita income even at high income levels" (Prakash & Robinson, quoted in Dillinger & Hamer, 1982, p. 11).¹⁵

The use of such categories when examining the composition of industrial output or employment in a regional or national economy is justified both on conceptual and policy terms. Some industries will normally develop only in those national or regional contexts where they can benefit from the appropriate relative factor prices. It is relative factor prices rather than the size of local demand which has been shown to be the main determinant of variations in a nation's 'industry mix' (Chenery, Robinson & Syrquin, 1986).

¹⁴ Prakash, V. and S. Robinson, 1979, "A cross-country analysis of patterns of industrial growth", The World Bank, Washington DC (draft), cited in Dillinger & Hamer (1982).

¹⁵ In this classification the terms 'early', 'middle' and 'late' are not synonymous with 'traditional', semi-modern' and 'modern' respectively, but are rather combinations of these.

By applying the above taxonomies to the case of Sao Paulo, Dillinger & Hamer express their confidence about extending these observations, originally developed for inter-country comparisons, to inter-regional analyses. They trace the development of Sao Paulo's metropolitan core as well as that of its rings and hinterland and add a set of policy conclusions. Their contention is that regions, including parts of a metropolitan region, exhibit comparative advantages in certain productive activities at given points in time. Government support to particular sectors (e.g. electrical machinery or publishing & printing) in a given area is therefore more likely to succeed if the area's particular advantages at that time are taken into account. Thus, for example, programmes "to promote the engineering industries...are likely to yield modest results in an environment where traditional activities are dominant" (Hamer & Dillinger, *op. cit.*, p. 15).

These notions may now be applied to our case study. Table 4.8 summarises the sectoral composition of employment in manufacturing for the four administrative sub-divisions of the Central Sub-region for two years, 1965 and 1980.¹⁶ In 1965, traditional and 'early' products such as textiles and food and beverages represented nearly 28 per cent of all employment in Bogotá DE and between 29 and 58 per cent in the other sub-divisions. In 1980, their contribution had dropped to a quarter in Bogotá DE, to 14 per cent in Boyacá and to 29 per cent in Cundinamarca, while in Meta it had increased from 58 to nearly 97 per cent of the total.

¹⁶ As the model rests on the premise that sectoral changes will radiate out from the metropolitan core under conditions of growth, 1980 was preferred to 1985 and 1989 as 1980 marks the end of a period of continuous growth. The years between 1980 and 1985, by contrast, involved drops in the numbers of jobs in most sectors and in the total manufacturing workforce of the Central Sub-region, while the years 1985-1989 saw slow growth.

Table 4.9
Central Sub-region:
Manufacturing employment by industry branch, 1965 and 1980
(Paid and unpaid workers)

Industry branch	Central Sub- region (%)	Bogotá DE		Boyacá		Cundinamarca		Meta	
		No.	%	No.	%	No.	%	No.	%
1965									
'Early'									
Food and beverages	19.6	13,928	18.1	2,098	37.4	2,406	18.7	421	57.8
Textiles	9.2	7,496	9.7	71	1.3	1,264	9.8	—	
'Middle'									
Clothing	9.5	8,615	11.2	240	4.3	241	1.9	82	11.3
Non-metallic minerals	10.6	5,106	6.6	848	15.1	4,253	33.0	23	3.2
Rubber products	3.1	1,335	1.7	—		1,681	13.1	—	
Chemicals	8.7	6,789	8.8	41	0.7	1,569	12.2	7	1.0
'Late'									
Metallurgy	10.1	7,584	9.9	1,611	28.7	453	3.5	14	1.9
Machinery	7.1	6,316	8.2	1	0.0	465	3.6	13	1.8
Transport equipment	6.9	6,199	8.1	317	5.7	116	0.9	38	5.2
All other	15.2	13,616	17.7	379	6.8	432	3.4	130	17.9
TOTAL	100.0	76,984	100.0	5,606	100.0	12,880	100.0	728	
1980									
'Early'									
Food and beverages	16.1	21,827	14.7	1,629	14.2	5,085	22.8	784	89.4
Textiles	9.2	15,236	10.3	63	0.5	1,461	6.6	63	7.2
'Middle'									
Clothing	9.1	16,654	11.2	—		41	0.2	—	
Non-metallic minerals	7.2	5,544	3.7	726	6.3	6,806	30.5	30	3.4
Rubber products	2.9	3,713	2.5	—		1,516	6.8	—	
Chemicals	8.0	12,260	8.3	75	0.7	2,258	10.1	—	
'Late'									
Metallurgy	13.0	14,115	9.5	7,959	69.3	1,581	7.1	—	
Machinery	9.4	16,267	11.0	18	0.2	882	4.0	—	
Transport equipment	6.8	10,894	7.4	953	8.3	503	2.3	—	
All other	18.3	31,690	21.4	64	0.6	2,166	9.7	0	0.0
TOTAL	100.0	148,200	100.0	11,487	100.0	22,299	100.0	877	

Sources: For 1965, CID (n.d.); for 1980, DANE, annual manufacturing survey

The weight of total employment of semi-modern sectors such as clothing, rubber products and non-metallic minerals dropped in the case of Bogotá DE (from 18 to 16 per cent) and Cundinamarca (from nearly 50 to 44 per cent) but rose substantially in Boyacá (from 44 to 76) during this period. Among the modern sectors, employment in machinery and transport equipment increased not only in Bogotá DE (from 16 to 18 per cent) but also in Boyacá and Cundinamarca, while it disappeared from the statistics in Meta. In the case of Bogotá DE there was an

increase in the 'all other' category; a closer examination does not show substantial changes in any particular industry (at a two-digit SIC classification) to help explain the difference. For Boyacá, the clear drop in this overall category may be traced back to the disappearance of the clothing industry from the statistics, as well as to substantial drops in furniture, printing & publishing, and petroleum products. Similarly, the substantial rise in the 'all other' category in the case of Cundinamarca may be traced to employment gains in printing & publishing and electrical machinery.

Some of the model's predictions seem corroborated in the case study. For example, changes outside the region's core, both in Cundinamarca and Boyacá, point to a shift from traditional to modern industries; in Cundinamarca such changes could also be described as denoting a transition from 'early' to 'late' industries in terms of the classification summarised above. Seen in isolation such shifts could be signalling the way to a 'modernising' wave of industries gradually extending from the region's core. However, no such 'modernisation' process seems to have taken place at the core. The figures clearly show that, in the fifteen-year period after 1965, the sectoral composition of manufacturing employment in Bogotá DE underwent only modest changes particularly when compared to other national or metropolitan contexts.¹⁷

An obvious question that arises at this point is why a process of rapid expansion in manufacturing jobs (at an average of 4.4 per cent per year for the Central Sub-region in 1965-1980, not unlike Greater Sao Paulo's 5 per cent in 1960-75) should not lead to more marked changes in the composition of industrial employment. More specifically, given the premises of the model discussed above, one may also ask why such growth levels have not been accompanied by faster manufacturing growth in areas other than the region's core or its immediately adjacent municipalities. These are, of course, questions that lie at the very heart of this research. There are no simple answers and the search for them is precisely a guiding principle of this dissertation.

¹⁷ Manufacturing in the metropolitan region of Sao Paulo has undergone a much more substantial structural change. In Greater Sao Paulo, for example, the joint share of food processing and textiles in overall employment dropped from 23 to 13 per cent between 1960 and 1975, while metallurgy and machinery rose from 18 to nearly 30 per cent. Even distant locations, such as the 'Western Hinterland', experienced change: there, the share of metallurgy and machinery increased from 5.5 to 15.6 per cent (Dillinger & Hamer, 1982, table I-2).

The rather moderate change in the sectoral composition of employment in Bogotá DE may be due to the fact that the national composition of output did not experience major changes during this period either (World Bank, 1991). Colombia's economy did not undergo the radical structural shifts observed in other developing countries after the 1960s particularly in those nations where export manufacturing spearheaded rapid change such as South Korea, Taiwan, Hong Kong and Malaysia. This will be explored further in chapter 5 which places the recent development of the Bogotá metropolitan area in a national context.

A second factor that may be behind the apparent slow sectoral change is the possibility of an exaggerated impression of change in some municipalities and industrial branches where fluctuations in the number of jobs over a small base are likely to result in large leaps in percentage terms. Such is the case of Meta's transport equipment industry, for example, where the loss of 32 jobs brought down its contribution to total employment in the *departamento* from 5.2 per cent to zero.

Yet another factor to be taken into account in examining the nature of the spatial and sectoral change described here refers to the possible under-enumeration of manufacturing establishments, particularly small-scale industries. For reasons discussed in chapter 3, since 1970 annual manufacturing surveys (on which these observations are based) have collected information largely on establishments with 10 workers or more which inevitably leaves a substantial number of establishments unrecorded. In some cases, as a comparison between the figures in table 4.10 (with figures from the 1990 national economic census) and table 4.6 (where figures refer to the 1989 manufacturing survey) shows, the gap can be substantial. Of the four sub-divisions shown in the tables the largest differences in relative terms are found in Bogotá DE and Meta, where the 1990 census figures suggest that annual manufacturing surveys may be registering just over half and a third of total manufacturing employment, respectively. The majority of this unrecorded activity would, according to the census figures, be taking place in small establishments, those with under 10 workers. It is thus not inconceivable that, if such information were to be included in our preceding analysis, a substantially different picture might have emerged of the shifts in the spatial and sectoral distribution of manufacturing within the Central Sub-region.

Table 4.10
Manufacturing employment in Central Sub-region by size of establishment, 1990

Size category (No. of workers)	Bogotá DE	Boyacá	Cundinamarca	Meta	Central Sub-region
Under 10	62,317	5,781	7,418	3,360	78,876
10-49	67,726	1,515	3,777	1,251	74,269
50-99	30,742	519	2,321	481	34,063
100+	135,041	2,002	17,181	1,154	155,378
TOTAL	295,826	9,817	30,697	6,246	342,586

Source: Provisional figures from the 1990 National Economic Census (DANE, 1991).

The possibility remains, of course, that even if the above set of factors were accounted for, the information does accurately describe the actual spatial and sectoral development of manufacturing in the Central Sub-region. In that case, a different set of explanations must be sought, particularly at the metropolitan scale. This is the subject of chapters 7 and 8.

Appendix 4A

Statistics on manufacturing in the Central Sub-region

Table 4A.1
Central Sub-region:
Manufacturing employment^a in municipalities outside Bogotá DE, 1974-1989

Municipality ^b	Distance to CBD (km)	1974	1980	1985	1989
Soacha	18	3,473	4,719	4,654	5,906
Mosquera	23	1,446	2,116	3,047	3,780
Funza	24	641	528	789	934
Cota	26	8	47	57	84
Chipaqué	27	0	0	12	11
La Calera	28	78	558	834	1,129
Madrid	29	1,158	1,516	1,405	1,409
Sibaté	29	4,183	4,249	4,248	4,700
Chía	31	351	322	388	436
Cajicá	39	2,252	1,866	1,726	1,807
Facatativá	42	765	875	881	827
Tenjo	44	0	26	50	56
Tabio	45	36	66	52	100
Sopó	47	478	933	1,118	1,312
Tocancipá	47	501	290	390	477
Zipaquirá	49	328	336	344	359
Guasca	51	78	0	0	0
Cogua	55	1,001	1,364	1,234	1,362
Subachoque	55	0	0	48	19
Albán	59	252	94	57	58
Fusagasugá	64	61	70	10	79
San Francisco	80	0	0	37	66
Sasaima	80	171	116	63	51
Chocontá	81	14	30	0	18
Pacho	88	130	118	97	53
Villapinzón	95	0	0	15	16
Apulo(Reyes)	96	421	294	49	16
Ubaté	97	101	136	101	13
Tocaima	102	9	7	0	0
Villavicencio	122	744	746	910	1,299
Guaduas	126	78	0	0	0
Girardot	134	1,312	1,518	990	938
Simijaca	136	6	12	0	4
Ricaurte	142	117	93	90	109
Cumaral	149	27	30	39	52
Acacias	154	52	56	189	400
Tunja	159	1,142	657	544	515
Chiquinquirá	183	177	166	142	114
Tuta	186	61	23	433	502
Samacá	188	65	53	75	141
Puerto Salgar	195	6	0	0	0
San Martín	195	15	21	12	47
Sotaquirá	198	135	123	101	127
Granada	215	0	11	25	0
Duitama	216	1,422	1,852	1,320	1,480

Table continues on next page...

Table 4A.1 (continued)
 Central Sub-region:
 Manufacturing employment^a in municipalities outside Bogotá DE, 1974-1989

Municipality ^b	Distance to CBD (km)	1974	1980	1985	1989
Puerto López	216	0	13	0	0
Moniquirá	224	9	36	20	0
Santa Rosa de Viterbo	226	66	81	82	84
Sutamarchán	232	0	29	0	0
Sogamoso ^c	237	7,374	7,831	4,770	4,487
Belén	243	11	16	0	9
TOTAL		30,755	34,043	31,448	35,386

a. Paid and unpaid employment. Includes all municipalities reported in at least one annual manufacturing survey in 1974-1985.

b. Disaggregated data for municipalities indicated wherever available.

c. Includes Nobsa and Belencito.

Source: DANE, Annual Manufacturing Surveys.

Table 4A.2
 Central Sub-region:
 Manufacturing value added^a in municipalities outside Bogotá DE, 1974-1989
 (Millions of current pesos)

Municipality ^b	Distance to CBD (km)	1974	1980	1985	1989
Soacha	18	358	2,643	7,768	30,677.6
Mosquera	23	209	1,031	4,969	15,980.9
Funza	24	57	193	1,206	4,221.6
Cota	26	0	25	85	439.9
Chipaqué	27	0	0	6	11.9
La Calera	28	78	200	3,703	11,296.2
Madrid	29	77	568	1,828	6,215.7
Sibaté	29	788	3,346	10,796	28,034.6
Chía	31	21	105	653	2,393.0
Cajicá	39	371	1,435	2,777	10,301.2
Facatativá	42	75	454	818	4,666.1
Tenjo	44	0	5	26	135.4
Tabio	45	1	14	45	153.0
Sopó	47	101	698	2,813	10,757.2
Tocancipá	47	96	94	1,151	6,010.5
Zipaquirá	49	23	131	317	796.4
Guasca	51	3	0	0	0.0
Cogua	55	227	1,005	5,612	16,157.2
Subachoque	55	0	0	56	128.4
Albán	59	12	16	35	89.2
Fusagasugá	64	11	34	2	181.0
Sasaima	80	19	25	40	247.9
Chocontá	81	2	7	0	727.9
Pacho	88	11	28	119	184.3
Villapinzón	95	0	0	10	15.4
Apulo (Rafael Reyes)	96	93	111	138	0.0
Ubaté	97	10	64	165	8.4
Tocaima	102	0	2	0	135.4
Villavicencio	122	166	916	4,290	17,397.0
Girardot	134	267	1,424	4,672	16,592.5
Simijaca	136	0	3	0	6.5
Ricaurte	142	12	22	69	209.0
Cumaral	149	1	7	15	57.7
Acacías	154	4	19	216	1,100.0
Tunja	159	223	362	1,084	3,049.8
Chiquinquirá	183	25	119	298	21.3
Tuta	186	3	3	1,391	8,202.8
Samacá	188	2	5	43	151.5
San Martín	195	0	5	14	217.3
Sotaquirá	198	3	19	37	169.2
Granada	215	0	9	12	0.0
Duitama	216	512	1,763	3,479	11,810.1
Puerto López	216	0	4	0	0.0
Moniquirá	224	0	8	1	0.0

Table continues on next page...

Table 4A.2 (continued)
 Central Sub-region:
 Manufacturing value added^a in municipalities outside Bogotá DE, 1974-1989
 (Millions of current pesos)

Municipality ^b	Distance to CBD (km)	1974	1980	1985	1989
Santa Rosa de Viterbo	226	16	199	247	1,224.3
Sutamarchán	232	0	4	0	0.0
Sogamoso ^c	237	1,109	4,809	12,897	709.0
Belén	243	0	14	0	6.9
TOTAL		4,986	21,948	73,903	210,891

a. Includes municipalities reported in at least one annual manufacturing survey in 1974-1985.

b. Disaggregated data for municipalities indicated wherever available.

c. Includes Nobsa and Belencito.

Source: DANE, Annual Manufacturing Surveys.

5 Positioning Bogotá in the development of Colombia

5.1 Introduction

The last chapter highlighted the fact that Bogotá DE has a major position in the development of what in this research we have called the 'Central Sub-region'. This position of pre-eminence is not limited to this region but extends to the whole country, and it has been continuously enhanced for several decades. This chapter sketches how the position of Colombia's capital city evolved in the period under study, particularly in terms of its growing contribution to national manufacturing industry. In so doing it briefly reviews the history of industrialisation in Colombia highlighting its changing geography in the second half of the twentieth century. It also focuses on the development of the Bogotá metropolitan area to show how the first administrative centre in the nation also achieved an unchallenged first place in terms of population and diversity and strength of its industrial sectors. Before concluding, the chapter presents a brief sketch of some features of the people of Bogotá.

5.2 An overview of industrialisation in Colombia

During the five decades of import substitution industrialisation that marked Colombia's development from the early 1930s onwards, Bogotá's manufacturing industry not only played a leading role in the city's development but also gradually gained a prominent position in the national economy. The roots of Bogotá's national pre-eminence in this sector may be traced back to a period of rapid expansion after the Second World War and a simultaneous slowdown in the pace of manufacturing growth in Medellín, Colombia's second largest city since the nineteenth century and, until the 1940s, the nation's undisputed manufacturing capital. Before examining Bogotá's industrial development in the next chapter, this section traces the performance of Colombia's manufacturing sector particularly in the period 1958-1990, with some historical references to the origins of the sector in earlier decades.

5.2.1. The early years

Following some isolated and failed attempts to industrialise during the first half of the nineteenth century, the decade of the 1880s finally saw encouraging signs of a longer-lasting industrial growth in a few localities dispersed around the country. After gaining independence from Spain in 1821, the new republican government issued protectionist measures designed to support the establishment of small factories mainly by Bogotá's landed elite. Several small factories producing consumer and intermediate goods (glass, china, paper, cotton fabric, woollen cloth, iron) were established during the 1820s and 1830s in or near Bogotá¹ and Medellín.² The factories set up in these decades complemented the production of consumer goods (and some intermediate goods such as sacks) coming from the hands of hundreds of thousands of mostly rural-based women in the provinces of Santander, Antioquia, Tolima and Nariño. However, the success of most factories set up during this period was seriously limited by the modest size of the internal market and competition from imported goods (Berry, 1983).

Events during the decades of the 1840s to the 1870s dealt a blow to Colombia's incipient manufacturing industry. The new winds of free trade blowing from Britain swept protective tariffs away and steps were taken by policy makers to favour primary exports while lifting protectionist measures for local industry. The small factories set up during this period failed to grow or even to survive while the painfully long series of civil wars that marked this period discouraged local and foreign investment, led to increased interest rates and generally gave way to political and economic instability (Kalmanovitz, 1985; Berry, 1983). Several of the larger factories established in previous decades closed down during this period, with Bogotá suffering most in the process (Poveda Ramos, 1971, pp.12-14).

By contrast, the four decades between 1890 and the Great Depression of 1929 brought about a new flurry of industrial activity and the establishment of thousands

¹. One of the earliest and most important of these efforts was an iron works established in 1824 in the locality of Pacho, 90 km north of Bogotá. Taken over by a French-Colombian partnership in 1827 and with the help of foreign technicians, the enterprise expanded to become one of the few relatively stable firms of the nineteenth century until its closure in 1889. By 1835 the plant in Pacho was producing 7,000 metric tonnes a year (Poveda Ramos, 1971, p.10).

². Another iron works was set up in Medellín in the 1830s (Poveda Ramos, 1971).

of new, larger and more resilient industrial enterprises.³ A favourable combination of political, social and economic factors provided the conditions for the take-off of modern manufacturing development.⁴ According to one commentator, "the middle and late twenties are regarded as the first real 'boom' years of the nonagricultural economy" (Berry, 1983, p.22) and a time when the conditions for the future growth of manufacturing were created. After the considerable shock experienced by the economy during the world depression years of 1929 to 1932, the 1930s inaugurated a period of almost uninterrupted expansion both in employment but especially in output which would continue well into the late 1970s. Throughout this period, the need to satisfy a demand for manufactured goods that had until then been supplied from Europe and the US provided the main stimulus for growth. In the largest Latin American economies, this era became synonymous with the concept of import substitution industrialisation (Gereffi, 1990).

The sources and characteristics of this expansion were to vary throughout this period, as will be shown in the remainder of this section. Between the 1930s and the mid-1940s growth would come mainly from an expanding internal demand and import substitution using domestic capital, with foreign investment starting to play a growing role from the 1940s onwards. The structure of output would diversify from the early 1950s, and increasingly consisted of intermediate and capital goods to complement the production of basic consumer goods that had been a trademark of the process until then. Production largely for the internal market was another salient feature during the decades between 1960 and the late 1980s (when liberalisation measures were introduced), except for a brief interval between the late 1960s and the mid-1970s when exports made a substantial contribution to growth.

³. That this period provided the conditions for sustained manufacturing growth may be seen from figures from the first national industrial census in 1945. These show that of all those establishments included in the census set up before 1901, only 128 still existed by 1945; 169 had been established between 1901 and 1910, 454 between 1911 and 1920, and 809 in 1921-29. The second half of the 1920s were especially prolific, with the establishment of 434 plants which were still in operation in 1945 (Berry, 1983, p.22 and table 2.3).

⁴. Views vary as to the relative importance of these factors (cf. Ospina Vásquez, 1974; Kalmanovitz, 1985; Berry, 1983). Suffice it to highlight here a few as found in different sources: a prolonged period of peace and political stability following the end of the civil wars in 1903; protectionist measures and government incentives to manufacturing, especially during the 1900s; investment in infrastructure mainly during the 1920s; growing volumes of capital accumulation derived from improved trade; availability of foreign exchange originated largely in coffee exports, international loans and the compensation paid in 1921 by the US government after its 1903 forceful annexation of Panama; the expansion of regional markets around the newly emergent industrial centres; and the availability of labour, particularly in Medellín, Bogotá and their surrounding areas.

Finally, although the period up to about 1950 saw a secular increase in the weight of factory employment at the expense of cottage shop and small-scale manufacturing, this trend was somewhat reversed in later years, with a shift from rural-based cottage-shop establishments to a greater weight of urban-based small-scale production.

5.2.2. Sources of manufacturing growth

Between 1945 and the mid-1960s "Colombia's manufacturing sector grew increasingly complex and quite modern" (Berry, 1983, p.36). By providing foreign exchange and capital, coffee (the country's single largest export between the 1920s and the mid-1970s) helped sustain manufacturing expansion during most of this period (Wogart, 1978). For example, in the years between 1945/6 and 1954/5, which were a time of high international coffee prices, the national economy grew at an average of 5 per cent per year. Similarly, a sharp drop in coffee prices in 1957 led to a reduced average annual growth rate of 4.4 per cent between 1954/5 and 1966/7 (table 5.1).

Manufacturing was also affected as a consequence of the drop in prices as this led to a reduction in foreign currency reserves and capital entering the national economy. This is reflected in a fall in the annual average growth rate of manufacturing output from 9.1 per cent in the period 1945/6 to 1954/5 to (a still quite respectable) 5.3 per cent in the second period shown in the table. But despite these high rates, growth in the first half of the 1960s became more erratic and volatile than in the previous decade, with wider variations from one year to the next both in manufacturing production and in national output. For many industries the limited size of the domestic market had become an obstacle to expansion. As the labour productivity of manufacturing continued to rise, the sector's capacity to absorb unprecedented numbers of rural migrants was put into question and urban unemployment became a source of political concern.⁵

⁵ There is a diversity of studies on the parallel development of an urban-based economy, mechanisation of agriculture and the social, economic and political issues that this generated at a time of rapid change from the 1940s to the 1960s. Given limitations of space and time, these complex questions will not be discussed here. See, for example, Kalmanovitz (1985), Ocampo et al. (1987) and Flórez & González Muñoz (1983).

Table 5.1
The performance of the Colombian economy, 1954-1989
(Annual percentage growth rates)

Indicator	Years				
	1954/5- 1966/7	1966/7- 1973/4	1973/4- 1979/80	1979/80- 1984/5	1984/5- 1988/89 ^a
Gross domestic product	4.4	6.4	5.0	2.3	4.5
Manufacturing production	5.3	7.9	4.6	1.0	6.4
Real exports	3.2	5.7	6.3	0.7	11.4
Purchasing power of exports	0.3	8.5	7.9	-0.2	n.a.
Real imports	0.6	6.5	7.3	0.8	4.5
Production for the internal market	4.7	6.5	4.7	2.6	4.1

n.a. Not available

a. Except for GDP, all growth rates are for the period 1984/5-1988. Calculation of GDP growth is based on a provisional 1988 figure.

Sources: For 1954-1985: Ocampo *et al.* (1987, p.259); for 1984-89: DANE (1991a).

As a combined result of a drive towards exports and a continued process of import substitution, manufacturing continued to diversify and reached again high and more stable rates of growth between 1967 and 1974, a period that has been described as being one of "export-led growth" (World Bank, 1991). Production expanded at an average 7.9 per cent per year between 1966/7 and 1974/5, while gross domestic product grew at an average of 6.4 per cent, the fastest growth in the post-war period. Exports of manufactured goods diversified and grew at much higher rates than agricultural exports, reaching nearly 16 per cent per year in 1965-74 (World Bank, *op. cit.*, table 1.9).⁶ The overarching importance that coffee had reached in previous decades gradually receded as the economy grew and diversified. The share of coffee in the value of exports dropped from an average of 74 per cent in 1958/61 to an average of 51.4 per cent in 1970/74, while the weight of manufactured goods in exports rose from a mere 3 per cent to 22 per cent in the same period (Wogart, 1978).

⁶ This excludes agricultural-based manufacturing and petroleum refining. All manufacturing exports grew at 13.3 per cent per year. Morawetz (1982, p.15) has criticised official garment exports figures as over-estimates arising from fraudulent export declarations as a way of legalising ill-gotten foreign exchange (although he fails to specify the sources these would presumably originate in smuggling and an incipient narcotics industry).

The world oil crisis of 1973/74, the ensuing world recession (the deepest since the 1930s until then) and a rapid rise in coffee prices following a drop to their lowest level in 25 years in those same years gave rise to a new economic cycle which lasted until the end of the decade. This cycle was marked by a somewhat slower growth of the economy but especially of manufacturing output which averaged 4.6 per cent annually in the years 1973/4 to 1979/80. In per capita terms, however, output growth between 1975 and 1979 was similar to that of the previous period, largely helped by a drop in the pace of population growth (Ocampo *et al.*, 1987, p. 259). This was reflected in a lower rate of growth of production aimed at the internal market of 4.7 per cent per year, while exports (including manufactured goods) continued to grow until the end of the decade; by 1980, non-durable consumer goods represented over half of all manufactured exports, with chemicals and petrol products representing nearly a fifth of exports (World Bank, *op. cit.*, table 1.8).

The end of the boom in coffee prices contributed to a slowdown in the first half of the 1980s, one of the worst crises faced by the Colombian economy in the post-war period (though milder than that experienced in the years 1995-1998 which fall outside the period of concern of this study). Manufacturing fared worst than any other sector, with contractions in two consecutive years (1981-1982) both in output and in employment, followed by very slow growth rates in the next years; this was reflected in an average one per cent growth in the period 1979/80 to 1984/5 (*cf.* table 5.1). Between 1980 and 1984 the value of exports fell almost continuously to a point below their 1980 level, only to recover in 1985. Despite this, the economy as a whole managed an average growth of 2.6 per cent per year, one of the highest in Latin America during these years, known in Latin America as 'the lost decade'. Per capita GDP rose from \$450 in 1973, to \$1,161 in 1985 and \$1,556 in 1993 (DANE, 1998). The final years of our study period brought a remarkable recovery, as seen in the rapid growth of the economy, in the value of exports and imports and in manufacturing production and productivity, which recovered more quickly than in the rest of Latin America (World Bank, *op. cit.*). Despite this, manufacturing growth rates remained below the high levels achieved in the late 1960s and early 1970s.

5.2.3. From rural cottage shop to urban factory

From the 1960s manufacturing had a relatively stable share in the national economy. Prior to this, and through most of the twentieth century, this dynamic sector had expanded more swiftly than most other sectors. In the 1920s, manufacturing output contributed an estimated 9 per cent of national production. This gradually rose to nearly 11 per cent in the late 1930s, to 15 per cent in the mid-1940s and to over 18 per cent in the late 1950s (Berry, 1983, table 2.1). This share finally stabilised above 21 per cent in the years after 1967, with a short-lived rise to 23.5 per cent in 1974 (World Bank, 1991, table 1.3). Largely due to Colombia's relatively early development, manufacturing initially reached higher shares than similar-sized economies; however, by the late 1980s its contribution was somewhat lower than in other Latin American countries and that of the text-book cases of the newly-industrialising countries (NICs) of Southeast Asia where growth has generally been more dynamic.⁷

The share of manufacturing in total employment, on the other hand, dropped from an estimated 20 per cent in the 1870s to a low of 12 per cent in the late 1940s, only to rise gradually again to 16 per cent in the late 1970s (Berry, *ibid.*)⁸ This fluctuation may be largely explained by the changing fortunes of cottage-shop industries (i.e. those with 5 or less workers) and the relative importance of their production. In the late nineteenth century virtually all manufacturing output came from the hands of rural-based artisans (mostly women), and a not negligible part of it was exported (e.g. coffee sacks, hats).

A characteristic of twentieth century manufacturing development, however, is the rapid growth of urban-based factory production (plants with 5 or more workers) at the expense of rural-based cottage-shop industries.⁹ It is estimated that by the

⁷ In Thailand, with a per capita income of \$1,420 in 1990 (against \$1,260 in Colombia), the contribution of manufacturing to GDP rose from 14 per cent in 1965 to 26 per cent in 1990; similar rises could be seen in Turkey (from 16 to 24 per cent), South Korea (from 18 to 31 per cent) and Singapore (from 15 to 29 per cent). Cf. World Bank, 1992.

⁸ There are no estimates available for the share of manufacturing employment in total employment for later years. The only available information comes from the 1990 economic census, which delivered surprisingly high figures for all forms of manufacturing employment as discussed in chapter 3.

⁹ In his 1983 book Berry defines small-scale manufacturing as those establishments employing between 6 and 24 workers and large-scale manufacturing as those with over 25. A later study to which Berry also contributed used a different classification, by dividing manufacturing establishments

1920s cottage-shop manufacturing employed over 350,000 workers nationally while, by contrast, there were less than 70,000 factory jobs. The volume of cottage-shop employment continued declining until the early 1950s but this was followed by uninterrupted (though modest) growth in absolute terms for the next three decades (table 5.2). The second half of the 1960s and most of the 1970s appear to have been a particularly dynamic time for cottage-shop employment, with growth rates reaching an average of up to 6.2 per cent per year in 1973-78.¹⁰ Factory employment, as reported in DANE's annual surveys, expanded at an average rate of nearly 5 per cent per year between the mid-1940s and the late 1970s. Thus, according to these figures, by the late 1970s it was probably generating more jobs than cottage-shop industries for the first time this century.

The export-orientation of some of the cottage-shop industries was all but exhausted by the 1930s; much of the stimulus for the growth of this sector (or even its survival) had to come entirely from internal demand. However, tough competition from cheaper factory-produced consumer goods supplying a growing urban population was largely responsible for its contraction. Only after the 1950s could it react effectively through shifts in spatial location and structure of production towards more urban-based activities such as clothing, leather, carpentry and repairs of transport equipment. The secular decline in the proportion of cottage-shop manufacturing was reflected in a drop in its contribution to all (manufacturing and non-manufacturing) employment from an estimated 20 per cent in 1870 to 13 per cent in the mid-1920s and to its lowest point in the period examined here of some 7.5 per cent by 1950 (Berry, *op. cit.*). In the next decades this share would rise slightly, to a high of 8 per cent in 1970 and 7.2 per cent in 1978. The contribution of this form of production to total production fell at a faster pace than its employment share largely as a result of the generally lower productivity levels found in these establishments. But by the 1960s, far from competing with factory production, it was complementing it.¹¹

into cottage-shop (less than 5 workers), small (5-49), medium (50-99 workers) and large-scale industries (100 or more). Cf. Cortés et al. (1987, pp. 14 and 40).

¹⁰. The range of figures for 1978 arise from uncertainties about available statistics. Cortés et al. (1987, footnote of table 2-2) note under-reporting of medium- and large-scale employment in DANE's annual manufacturing surveys; this appears to have been confirmed by the 1978 DANE household survey and, more eloquently, by the 1990 economic census as discussed in chapter 3.

¹¹. Because of statistical limitations, the importance of urban cottage-shop production even at the early stages of rapid urbanisation has probably been under-estimated. Flórez & González Muñoz

As the figures discussed here are not devoid of statistical error, it may be advisable at this point to make a short methodological detour. The 1990 data shown in table 5.2 come from preliminary figures of the national economic and multi-sectoral census and should therefore be used with some caution. The information for other years comes from the annual manufacturing surveys applied to establishments with 10 or more employees and from household surveys used to calculate cottage-shop and household manufacturing activity. According to the table, the only category which appears to have grown after 1978 is that of establishments with 100 or more employees; however, some of the other figures may be under-reported.

The 1990 census involved an inventory of existing establishments (through visual surveys and third-party information) within the urban perimeters of municipalities and along routes connecting "important populated centres" (DANE, 1991b, p.15). It is likely, therefore, that this procedure may have led to under-estimates for the smaller (and hence less visible) plants in urban areas and of a good share of all rural establishments.¹² The unrevised 1990 census figures would seem to point to some degree of under-reporting in the annual manufacturing surveys, of the order of 42 per cent for the category of 10-49 workers and of 15 per cent for both the 50-99 and the over-100 categories.¹³ A fuller discussion of these methodological issues is found in chapter 3. With these provisos in mind, we can now return to our main subject of analysis.

(1983, pp.87-88) quote a study by Valenzuela reporting a high incidence of such forms of production in two of Bogotá's largest and most recent working-class districts (*barrios*) in the mid-1960s. In Ciudad Kennedy one in 15 of the dwellings had a workshop (*taller artesanal*) while in Policarpa Salavarrieta one in eleven had a workshop and one in 120 had a factory. Many others had shops or some other form of commercial activity.

¹². It is conceivable that a substantial proportion of the cottage-shop establishments grew fast enough within this period to move out of this category into the next categories, but this would only account for part of the decrease in numbers.

¹³. These figures were obtained by dividing the 1990 manufacturing survey figure shown for each range by the corresponding census figure and subtracting the result from 100 %.

Table 5.2
Colombia: Manufacturing employment by size of establishment
1944/45 to 1990

Size of establishment (in number of workers)	Year							Annual growth rate (%)		
	1944/45	1953	1964	1970	1978 ^a	1990 ^b	1953-64	1964-70	1970-78	1944/45- 1978
Number of workers (Thousands)										
Cottage shop ^c	308.4	287.0	327.5	457.6	523.7-669.1	134.5	1.2	5.7	1.7-4.9	1.6-2.3
5-49	74.5	92.9	125.7	139.2	288.1-322.1	254.6	2.8	1.7	9.5-11.1	4.1-4.5
50-99	17.6	23.6	33.1	46.7	80.0-85.0	83.7	3.1	5.9	7.0-7.8	4.6-4.8
100 or more	63.4	82.6	151.2	210.5	340.0	373.0	5.7	5.7	6.2	5.1
TOTAL ^d	463.9	486.1	637.5	854.0	1,232-1,417	845.8	2.5	5.0	4.7-6.5	3.0-3.4
Distribution by size (percentage of total employment)										
Cottage shop ^c	66.5	59.0	51.4	53.6	42.5-47.2	15.9	--	--	--	--
5-49	16.1	19.1	19.7	16.3	23.4-22.7	30.1	--	--	--	--
50-99	3.8	4.9	5.2	5.5	6.5-6.0	9.9	--	--	--	--
100 or more	13.7	17.0	23.7	24.6	27.6-24.0	44.1	--	--	--	--
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	--	--	--	--

-- Not applicable.

- a. Ranges indicate lower and upper limits of estimates derived from household surveys.
b. Preliminary figures from the national economic census allegedly including all establishments within the urban perimeters of municipalities, as well as those located "along roads linking important populated centres"; the source gives no indication of the degree of under-reporting of urban-based establishments. For other years, non-factory figures are calculated as a residual. For more details, see Appendix 5.
c. Establishments with 1-4 workers (includes household enterprises though these may be under-reported in 1990).
d. Figures for total manufacturing employment are calculated from national population censuses of 1938, 1951 and 1964 and various household surveys of the 1970s.

Sources: For 1944-1978: Cortés et al. (1987, table 2-2); for 1990: DANE (1991b)

5.2.4. Foreign capital in manufacturing

Although foreign investment "is as old as the (Colombian) republic itself" (Wallace, 1987, p.19), it only made its first serious inroads in manufacturing in the mid-1940s. Up to then, foreign capital had been concentrated in agriculture and mining, mostly in tradable goods such as bananas, sugar, coffee, silver, emeralds and oil. In 1943 investment in manufacturing represented an estimated 24 per cent of total foreign direct investment (DFI), while investment in petroleum amounted to nearly 51 per cent (op. cit., table 5). The share of manufacturing in DFI rose very rapidly between 1943 and 1950 with the establishment of local subsidiaries of US multinational companies mainly producing consumer and intermediate goods. It reached a peak in 1950 when it attracted over 42 per cent of the total, but this share dropped considerably in subsequent years, to 37 per cent in 1960 and 1965 and to 34 per cent in 1970.

Foreign investment in manufacturing continued growing at a sustained pace through the 1970s and 1980s (Wallace, op. cit.; Echavarría & Esguerra, 1990). Its share in total DFI increased sharply to 60 per cent in 1973 as a consequence of the world oil crisis and the drastic reductions in the volume of American investment in petroleum that ensued it, but fell again through the 1980s because of much increased DFI flows into mining (coal, platinum and again petroleum), reaching 40 per cent by 1988. In the 1940s and 1950s DFI played a role in the process of import substitution with its concentration in the production of consumer goods (processed foodstuffs, soap, detergents, domestic appliances) and intermediate goods (tyres, paper). Without abandoning these lines, by the 1970s and 1980s new highly capital-intensive industries with more sophisticated technologies had appeared including intermediate goods such as chemicals and capital goods industries such as machinery and equipment (Echavarría & Esguerra, op. cit.).

5.2.5. The changing structure of manufacturing

Shifts in the composition of manufacturing output and rising labour productivity have also been salient features of Colombia's post-war development. Following an examination of structural changes in manufacturing and with the help of a set of categories proposed by Gereffi (1990), we may classify Colombian post-war development as taking place in different stages. The period between 1930 and the early-1950s could be described as one of primary import substitution

industrialisation, where the development of basic consumer goods industries was driven mostly by internal demand.

The period that followed, ending around 1967, was one of secondary import substitution industrialisation, marked by expansion in intermediate and capital goods industries. Although growth in these sectors continued in subsequent years, an important part of the stimulus to growth would come from the external market in the years 1967 to 1974, as we have seen, thus allowing us to classify this period as a combination of primary export-oriented industrialisation and secondary import substitution. The export phase would only resume late in the 1980s, while internal demand continued to play an important role in manufacturing growth in the following years of our study period, which could therefore be described as of continued secondary import substitution.

Table 5.3
Colombia: Manufacturing output growth by product sectors, 1953-1987
(Annual percentages)

Sector	Period					
	1953-60	1960-67	1967-74	1974-79	1979-83	1983-87
Non-durable consumer goods	4.3	4.6	6.5	4.3	-0.5	3.3
Durable consumer and intermediate goods	12.4	7.3	10.7	3.5	0.2	5.9
Capital goods	15.6	10.5	18.1	6.0	-4.0	7.3
Other industries	16.5	12.0	7.9	4.0	4.0	7.1
TOTAL	7.0	5.8	8.6	4.1	-0.5	4.6

Note: Calculations use 1968 constant pesos for the period 1953-67 and 1975 pesos for 1967-87.

Sources: For 1953-67: World Bank (1972); for 1967-87: World Bank (1991).

Thus, by the mid-1940s "import substitution had been largely completed in most of the fairly obvious consumer-good areas" (Berry, *op. cit.*, p.36), while the development of a capital goods sector would yet have to wait almost another decade. Although by 1950 more than 90 per cent of all machinery and equipment was imported (*ibid.*), the early 1950s signalled a period of growth for heavier and more costly industries such as heavy metals and chemicals (Wogart, 1978).¹⁴ The

¹⁴ Although an important part of this expansion originated in foreign investments, the national government made substantial efforts by investing in large-scale, capital-intensive industries in the

1950s were a time of very rapid expansion in the newly-established durable consumer, intermediate and capital goods industries, where the process of import substitution had already begun (cf. table 5.3). Growth in non-durable consumer goods during these years was much slower and largely dependent on expansion in the internal demand.¹⁵ Nonetheless, by 1958 non-durable consumer goods represented nearly two-thirds of all output, while capital goods were a mere 4 per cent of the total.¹⁶ Within these categories, food products and textiles, clothing & leather had a high bearing on total production (cf. table 5.4).

Up to the mid-1970s the growth of non-durable goods as a group would be slower than that of total manufacturing output; growth would come from the durable, intermediate and especially the capital goods industries most of which started from a small base compared to non-durable goods. Among the non-durables, food and textiles were especially dynamic, contributing 17 and 13 per cent of total manufactured output growth between 1958 and 1972 (Wogart, 1978, Table 16). Expansion in these industries relied heavily on exports and by 1974 textiles, clothing and leather on the one hand, and food, beverages & tobacco on the other represented 26 and 21 per cent of the total value of manufactured exports, respectively (World Bank, 1991, table 1.8). Paper, and chemicals and rubber products would be among the most rapidly growing of the durable and intermediate goods industries, with a contribution of over a quarter of total output expansion between 1958 and 1972. Exports also played an important part in this growth, so that by 1974 chemicals, rubber and petroleum products jointly represented over 29 per cent of manufactured exports.

areas of steel, chemicals (specifically soda) and metallurgy. The vehicle for these investments was the Instituto de Fomento Industrial (IFI) founded in 1940. The size and inefficiency of some of these projects have been heavily criticised, including the Paz del Río steelworks in the *departamento* of Boyacá and Forjas de Colombia, in the city of Bucaramanga (cf. Berry, 1983; Mayor Mora, 198?).

¹⁵ Chenery, Robinson and Syrquin (1986, p.349) identify four main factors behind changes in the structure of manufacturing production. These are expansion in domestic demand, expansion of exports, import substitution and changing input-output coefficients.

¹⁶ The category definitions used to describe these sectors vary greatly from one source to another as Berry has noted (1983, footnote of Table 2.12). He has used ECLA's breakdown criteria and concludes, for example, that non-durable consumer goods represented 53.9 per cent of total output in 1968 and capital goods 17 per cent. According to the World Bank, and using DANE's data, in 1967 these sectors represented 60.8 and 4.3 per cent of output, respectively, a large difference even allowing for changes between the two years. There is also some divergence between the Bank's published figures and DANE's three-digit information (as in the case of the 1990 column of table 5.4) but this is generally insignificant.

The contraction suffered by Colombian manufacturing in the years 1979 to 1983 (cf. table 5.3) was felt especially badly in the capital and non-durable consumer goods sub-sectors (which shrank at an average of -4.0 and -0.5 per cent per annum, respectively). Hardest hit were the textiles, basic metals, machinery & equipment and transport equipment industries, with wood industries & furniture and chemicals & rubber products undergoing milder contraction. The slowdown was reflected in 1984 having a very similar industrial structure to those of 1974 and 1980, where the most noticeable change was a drop in the joint output share of textiles, clothing & leather from 16 per cent in 1974 to 12 per cent ten years later (cf. table 5.4).

The economic recovery started in the mid-1980s brought again rapid growth rates in manufacturing, particularly in the capital goods and durable and intermediate goods sectors (cf. table 5.3). This resulted in a substantially altered composition of output by 1990¹⁷ when the share of non-durables was a much diminished 45.6 per cent of the total, while the other two categories had both increased to all-time high levels. When seen in an international perspective, the changes of the late 1980s generated a structure of Colombian manufacturing which closely resembled the average for Latin America as a whole in the mid-1980s (World Bank, op. cit., table 1.6). Notable differences were a smaller capital goods sector in Colombia (10.5 per cent of output compared with an average of 15.4 per cent in Latin America) and comparatively larger paper & printing as well as chemicals, petroleum & products industries (6.3 and 23.3 per cent in Colombia as against 2.2 and 16.1 per cent in Latin America).¹⁸

¹⁷. This is the case even after allowing for the marginal differences between the product categories used by the World Bank in 1958-84 and DANE's three-digit categories as they appear in the 1990 manufacturing survey. See note 16.

¹⁸. In the course of the 1980s, Colombia's printing industry became the Latin American export leader. Mining (notably oil, gas and coal) was another rapidly growing area between 1981 and 1990, as shown in an increase from 1.3 to 4.8 per cent of GNP (Republic of Colombia, 1992) and this before the vast oil fields of Cusiana and Cupiagua in the Eastern Plains started production. This had repercussions in manufacturing, seen more specifically in the growth of the industries mentioned here.

Table 5.4
Colombia: Distribution of manufacturing output by sector, 1958-1990
(%)

Sub-sector	1958	1967	1974	1980	1984	1990
Non-durable consumer goods	64.2	60.8	52.9	53.4	52.4	45.6
Food	30.1	34.8	28.7	31.0	31.6	23.7
Beverages	9.2	6.7	6.2	7.4	7.4	7.7
Tobacco	3.3	2.2	1.9	1.3	1.4	1.2
Textiles, clothing, leather	21.6	17.1	16.1	13.7	12.0	13.0
Durable consumer and intermediate goods	30.5	33.8	38.5	37.4	38.1	42.3
Wood industries & furniture	1.8	2.2	1.8	1.5	1.4	0.9
Paper products & printing	3.6	4.7	6.1	6.5	6.8	6.3
Chemicals & rubber products	9.3	12.4	15.9	15.3	15.6	15.9
Petroleum refining products	5.7	4.9	4.4	3.9	4.7	7.4
Non-metal mineral products	3.6	3.4	3.3	3.6	3.7	4.7
Basic metals	6.5	6.2	7.0	6.6	5.9	7.1
Capital goods	4.1	4.3	7.6	8.2	8.2	10.5
Machinery & equipment	2.3	2.8	4.1	4.4	4.1	4.8
Transport equipment	1.8	1.5	3.5	3.8	4.1	5.7
Other industries	1.3	1.2	1.1	1.1	1.3	1.5
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

Note: The World Bank uses DANE data but breaks down the categories in a slightly different manner from DANE. This may result in small differences between the figures drawn from these sources which have not been eliminated here. Totals may not add up to 100 because of rounding.

Sources: For 1958: World Bank (1972); for 1967-84: World Bank (1991); for 1990: DANE, Annual Manufacturing Survey.

5.2.6. The shifting geography of manufacturing

While much of manufacturing activity before 1900 was dispersed in rural locations and villages mainly in the eastern and southern highlands, the twentieth century has seen the development of manufacturing industry as a largely urban activity, with the bulk of production concentrated in a handful of cities. This process is directly connected with a number of factors, including the growing importance of factory at the expense of cottage-shop production, shifts in the composition of output towards more highly productive forms of production and the rapid growth and development of urban areas and related infrastructure offering conditions more

conducive to the rapid development of factory production. In contrast with other less developed countries, the process in Colombia has been marked by a comparatively high dispersal of manufacturing in a range of urban centres of different sizes and a relatively stable spatial distribution of industry over time, especially during the 1960s and 1970s. This has also been coupled with some degree of territorial specialisation, which may be seen in recent decades particularly in the production of durable consumer and intermediate goods.

Beginning in the last years of the nineteenth century, Medellín and its Valle de Aburrá region led the way in factory production with the establishment there of some of the first plants producing textiles, soft drinks, matches, beer and other consumer non-durable goods. Among the reasons alluded for this early lead, amply debated from different ideological viewpoints,¹⁹ are the high levels of capital accumulation from coffee exports and trade, a higher spread of land ownership and therefore higher levels of individual purchasing capacity than in other regions, the existence of a local entrepreneurial spirit forged through the risk-taking culture of mining in the 17th to the 19th centuries, and a comparatively high population density which ensured a local market for industrial products and abundant labour supplies.²⁰

For many industries access to local outlets for their products was a *sine qua non* condition for rapid development. For until the 1940s Colombia's road and railway networks were largely undeveloped and those that existed tended to link each individual region with overseas markets rather than with other regions within the country, a consequence of centuries of outward-looking growth based on primary exports. But despite the fact that this restricted the size of the domestic market for many of the earlier industries, the first half of the twentieth century was marked by

¹⁹. See Botero Herrera (1984) for a summary of the debate.

²⁰. In the decades of the 1910s to the 1930s, the labour force in Medellín's factories consisted mostly of young women and children. A surprisingly high proportion of the women were literate and a majority of them were single. In the first half of the twentieth century, the percentage of female industrial workers in the *Distrito* of Medellín who were literate ranged between a low of 74.2 per cent and a high of 95.1 per cent (a figure recorded in 1942), with variations between industries: in every year between 1916 and 1928 the totality of the women employed in the city's printing works were recorded as being literate, while literacy among those working in the textile industries grew from 89.4 per cent to 95.5 per cent in the same period. In 1916, 63 per cent of all the female workers were aged 15-24 with 9 per cent under the age of 15, and 16 per cent between the ages of 24 to 35. In later years, these shares would tend to even out slightly but the 15-24 range would retain the highest share by far. For a thorough analysis of the early years of industrialisation in the Medellín area, see Botero Herrera (1984).

some degree of territorial specialisation.²¹ Textiles (and, more specifically, coarse grades of cotton) help lay the foundations of Medellín's early industrial expansion, in the same way that foodstuffs (more precisely sugar processing) predominated among Cali's early industries and tobacco production provided much of Bucaramanga's manufacturing employment. Manufacturing in Bogotá was more diversified, although when seen in terms of numbers employed, breweries and cement production could be said to be among its more prominent industries.²²

After the end of World War II the expansion of manufacturing industry (measured in terms of output and in the number of new firms established every year) in Bogotá outstripped that of Medellín with the result that, by the mid-1950s, the capital city had taken a leading national role. In the absence of annual employment data to trace with some precision the year when this may have taken place, annual industrial electricity consumption figures provide a useful indicator; these show that between 1951 and 1960 electricity consumption increased by 154 per cent in Bogotá and by 132 per cent in Medellín (Gilbert, 1970, p.281). By 1955 industrial electricity consumption was virtually identical in the two cities (when Bogotá's population was of the order of 990,000 and Medellín's was around 634,000). Available employment figures for 1958 show that, with 60,000 workers, Bogotá's manufacturing industries already had a clear lead over Medellín, where some 52,000 were employed (table 5.5).²³ Thus it is safe to assume that Bogotá must have been at the forefront of national industrial production starting some time around the middle of the decade. By contrast, in 1958, the next two largest concentrations of manufacturing employment, Cali and Barranquilla, had between them less jobs than metropolitan Medellín.²⁴

²¹ There was nonetheless an active internal trade of manufactured goods. Statistics from 1923 show that all the large Medellín-based textile factories sold more than 40 per cent of their production outside the *departamento* of Antioquia (of which Medellín was and still is the capital), with one firm selling 70 per cent of its output in locations as distant as Bogotá and Barranquilla, reached then only after several days of hazardous journeys by river and precarious roads. Cigarettes, biscuits, shoes and even beverages produced in Medellín were sold around the country and, in the case of socks, even exported to Venezuela, Ecuador and Chile. See Botero Herrera (1984, table 8).

²² A well illustrated account of the spatial dimensions of Colombia's development up to the 1970s, including manufacturing growth, may be found in Part 2 of Jiménez & Sideri (1985).

²³ For a discussion on the coverage of the annual manufacturing surveys used to construct the table see chapter 3.

²⁴ Employment figures for 1958 were calculated by Jaramillo & Cuervo (1987) using DANE figures at the *departamento* level and assuming a similar share of *departamento* employment for each urban centre as in other years.

Other issues help highlight the spatial dimensions of manufacturing development in Colombia. One such issue is the link between the spatial distribution of production and the size of manufacturing establishments. It was shown earlier that up to the 1950s competition from urban-based, more highly productive factory production generated a contraction in relative and absolute terms in the largely rural-based cottage-shop employment. Its demise is chiefly related to the development of large-city manufacturing at least in the decades up to the 1950s. Subsequent shifts in the patterns of demand and production to more urban-based activities helped the sector grow again in the following decades, as small establishment would often complement factory output as suppliers or sub-contractors. Needless to say, these small establishments were not the same cottage shop industries that had thrived in previous decades. This time, not only were these urban based-suppliers of goods to local consumers and other firms, but they were no longer predominantly employing women.

Lack of spatially disaggregated data, particularly for the earlier years of our study period, hinders an analysis of the possible links between city size and cottage-shop production. There are indications that this form of production may have found adequate conditions for its growth (or survival) at some levels of the urban hierarchy. As we shall see later, Bogotá in the 1970s and 1980s appears to have a disproportionate incidence of small-scale and cottage-shop establishments. Research conducted in the mid-1980s in the ten largest cities found some degree of inverse proportionality between city size and the incidence of cottage-shop and small-scale establishments.²⁵ A study of manufacturing activity in 36 urban centres covering the period 1966 to 1980 found no obvious link between the size of cities and the size distribution of manufacturing establishments (Jaramillo & Cuervo, 1987). The same study found a degree of positive correlation between value added and city size for establishments under 200 workers in 1974 and 1980. Unfortunately, there is no attempt to quantify the contemporary incidence of such establishments in villages nor its continuance in rural areas, its mainstay during most of Colombia's history.

²⁵ The information comes from a June 1984 DANE household survey of the 'informal sector', defined as employment in establishments with less than 10 employees, unpaid family workers, domestic workers and independent entrepreneurs excepting workers with professional qualifications. The cities where the survey was carried out and the corresponding levels of manufacturing employment that may be defined as 'informal' are as follows: Bogotá (44 per cent), Medellín (38), Cali (45), Barranquilla (45), Bucaramanga (64), Cúcuta (57), Pereira (44), Manizales (52), Pasto (84) and Villavicencio (71). Cf. Londoño (1985).

A further spatial dimension worth exploring, even if briefly, to add to our picture of recent manufacturing development is the possible link between city size and the degree of manufacturing specialisation of cities.²⁶ In the case of Colombia, this has been explored at some length in previous research, particularly for the period between the mid-1960s and 1980 (see Reveiz & Montenegro, 1983; Jaramillo & Cuervo, *op. cit.*). We will simply highlight some of the more relevant findings of these studies.

One such finding is the notion that as a general rule and for discrete years, the degree of diversification in manufacturing production increases with population size. There are, however, cases of small- and medium-sized cities which are relatively specialised in one capital-intensive industry.²⁷ Of the large cities, Medellín was more highly specialised than Bogotá, particularly before the severe contraction suffered by the textile sector in the early 1980s. Bogotá, on the other hand, has a more diversified structure than its size would appear to suggest.²⁸ Jaramillo & Cuervo also found that the whole urban system tended towards specialisation during years of rapid growth in output (1966-74) but this was moderated during the next period of slower growth (1974-80).

That the production of non-durable consumer goods tends to be more important in medium and small cities than in large cities is another finding of the Jaramillo & Cuervo study. There are exceptions, of course, as in the case of medium-sized cities with sizable intermediate or capital goods industries. The production of such goods is fairly well spread around the 36 cities examined in the study, and its expansion appears closely linked to population growth. Bogotá, on the other hand, has a proportionally higher share of non-durables than the other three large cities, as will be discussed at more length later.³⁰

²⁶ For a discussion of the notion of urban specialisation using illustrations from the US and Brazil see Henderson (1988).

²⁷ Such are the cases of petroleum refining in Barrancabermeja and steel works in Nobsa and Sogamoso.

²⁸ Based on Isard's work, Jaramillo & Cuervo (1987, p.106) developed a 'specialisation coefficient' which takes into account the relative weight of the four largest industries of each city and thus aims to correct some imbalances they perceive in Isard's original coefficient.

³⁰ A more detailed analysis of the regional dimensions of foreign investment in manufacturing will be found in Jiménez & Sideri (1985, pp.244-273).

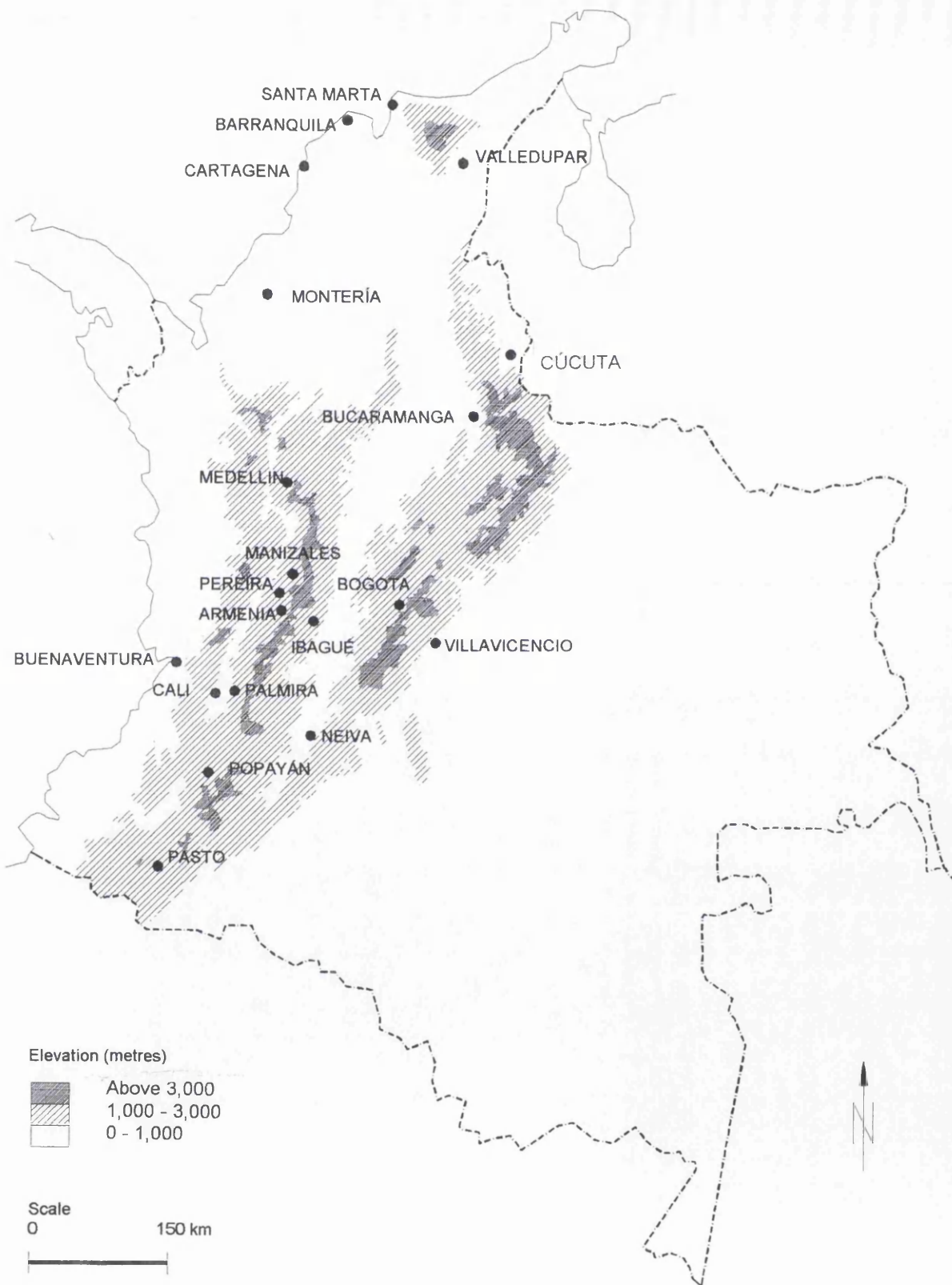
Two final issues which help complete the picture of the spatial differences in manufacturing in Colombia's recent development refer, on the one hand, to the age of establishments and, on the other, to the spatial distribution of foreign investment. In their study of manufacturing in 36 cities, Jaramillo & Cuervo found that more than half the value added in 1980 originated in industries founded before 1958. This, coupled with the fact that more recent establishments tended to be smaller, led them to conclude that Colombia's industrial structure is characterised by a high degree of spatial inertia (op. cit., p.154). Finally, Echavarría & Esguerra have, in turn, noted the tendency to reinforce existing patterns of territorial specialisation of foreign investment in manufacturing, with substantial parts of it going into textiles in Medellín, foodstuffs in Cali and metal industries in Bogotá (1990, p.17).

In the next section we will turn our attention to Bogotá and its recent growth in the context of Colombia's recent economic development. In particular, we will look at the increasing weight that the capital city has been having in the nation's population as a result of comparatively swifter growth rates, at what could be interpreted as the city's increasingly unchallenged economic primacy among the country's cities, and finally, we will present a short sketch of the people of Bogotá with the help of social and economic information available for part of the period of concern to this research.

5.3 The BMA in the national context

5.3.1 From 'quadricephaly' to 'macrocephaly'?

The origins of Bogotá's present political and demographic importance within Colombia may be traced to the pre-Hispanic period. Before the arrival of the Spanish *conquistadores* in the sixteenth century, the 'Sabana de Bogotá' (the fertile plateau on which the city sits, at an altitude of 2,600 m. above sea level) was the site of two of the largest kingdoms of what is today Colombia, both Muisca communities of the Chibcha language (García-Mejía, 1988). Although occupation of the territory by the Muisca took the form of dispersed settlements (Villamarín and Villamarín, 1979), the area was chosen by the Spanish colonisers as the site of government largely on account of its comparatively high population density and its concentration of wealth.



Map 5.1 Colombia: largest urban agglomerations

In more recent decades, and more specifically during the period covered by this study, the relative importance of what we have termed here the Bogotá metropolitan area has increased even further, particularly in relation to other large urban centres in the country (cf. map 5.1). It has often been said that, in terms of the demographic and economic weight of the largest urban centre in comparison with the other urban centres, Colombia stands in marked contrast to other Latin American nations. Without wishing to enter into a conceptual discussion at this point about the relative merits or limitations of concepts from urban geography, it is worth mentioning that in the view of some authors Colombia would not appear to be a case of 'urban primacy' (or 'macrocephaly'). For several decades Colombia has been regarded as somewhat of an exception in the region, where in countries such as Argentina, Chile, Mexico and Venezuela population, output and, more contentiously, government investments in the largest city exceed many times those of all others in the urban hierarchy.

In Colombia, on the contrary, other large urban centres (notably Medellín, Cali, Barranquilla) developed almost at the same time and nearly as fast as Bogotá with the result that the distribution of population and resources at any given point in time has generally not been seen as uneven as in other countries with similar population and average income levels. For some authors, however, this situation of comparative 'equilibrium' in the spatial distribution of urban centres may be coming to an end, largely as a result of Bogotá's ability to concentrate a disproportionate and growing share of the country's population and output. Thus, in terms of the categories often used in the specialised literature to describe such spatial processes, one author has hypothesised that soon Colombia may cease to be a case of 'quadricephaly' (i.e. the demographic predominance of four urban centres) to become a case of 'macrocephaly' much along the lines of its neighbouring countries (Goueset, 1991). Working with earlier data from the 1964-73 period, Linn (1979, pp. 64-65) reached a similar inference and concluded that not only is Colombia not an example of what authors like Harry Richardson have defined as 'polarisation reversal' but it might even be a case of increased urban polarisation in a few urban areas.³¹

³¹ 'Polarisation reversal' is defined as the stagnation of demographic growth in a country's central region (or its largest metropolitan area) and the parallel rapid growth of peripheral areas. Linn quotes a 1977 publication by Richardson ("City size and national spatial strategies in developing countries",

Table 5.5 provides support for the view that Colombia's has not been a case of marked 'urban primacy'. A visual examination of the table shows that the differences between the population of the BMA and that of the country's other large cities have not been dramatic in recent years. Nor has it been so historically (Dávila *et al.*, 1991). In the mid-1800s, for example, the combined population of the three largest towns after Bogotá (Medellín, Socorro and Cali) was 1.37 times the population of Bogotá (excluding all other municipalities within the BMA). Over a century later, in 1985, this gap had narrowed down to 1.14 times (although this time the next three largest urban centres were Medellín, Cali and Barranquilla). This was in marked contrast to other similarly-sized Latin American countries. In the case of Argentina in 1980, for example, the population of Greater Buenos Aires was nearly five times larger than that of the next three largest metropolitan areas, while in the case of Lima, Peru, the ratio was over four times in 1981 (*ibid.*).

In Colombia's case, much of its relatively 'balanced' historical urban development may be attributed to the marked geographical accidents represented by the three high mountain chains and river valleys which cross the country along a north-south axis. The considerable difficulty in establishing regular communications between regions kept them in relative isolation for centuries, thus encouraging their almost independent development largely based on trade within their hinterland, and in the case of some settlements with comparatively better access to coastal areas (e.g. Barranquilla, Cali) or close to mines or areas producing other export commodities (e.g. Medellín, Manizales), trade with the international market.

Table 5.5
Colombia: Population of largest urban agglomerations, 1951-1993

Urban agglomeration ^a	Departamento	1951-1993				
		1951	1964	1973	1985 ^b	1993 ^c
1 Bogotá metropolitana area	Cundinamarca	764,933	1,768,712	2,994,103	4,501,337	6,701,292
2 Metropolitana Medellín	Antioquia	499,756	1,084,660	1,614,450	2,121,174	2,552,078
3 Metropolitana Cali	Valle del Cauca	292,694	659,648	1,028,528	1,484,197	1,850,130
4 Metropolitana Barranquilla	Atlántico	313,222	554,626	799,011	1,151,900	1,348,535
5 Metropolitana Bucaramanga	Santander	148,896	284,339	423,132	607,134	804,618
6 Cartagena	Bolívar	111,291	229,193	311,664	563,949	661,830
7 Metropolitana Cúcuta	Norte de Santander	102,187	187,149	283,702	409,882	648,973
8 Metropolitana Pereira	Risaralda	115,342	203,060	276,272	401,632	506,605 ^d
9 Metropolitana Manizales	Caldas	141,425	238,995	257,231	338,981	420,848
10 Ibagué	Tolima	54,347	125,233	202,850	314,954	386,423
11 Pasto	Nariño	48,853	82,546	130,222	256,846	282,310
12 Santa Marta	Magdalena	37,005	89,161	110,161	233,362	279,958
13 Villavicencio	Meta	17,126	45,277	87,690	191,001	273,511
14 Montería	Córdoba	23,682	70,531	104,129	242,515	266,840
15 Neiva	Huila	33,040	75,886	109,163	199,576	248,008
16 Valledupar	Cesar	9,011	43,553	98,669	228,637	247,942
17 Armenia	Quindío	57,098	125,022	149,078	195,453	231,745
18 Palmira	Valle del Cauca	54,293	106,502	143,092	231,015	220,132 ^d
19 Buenaventura	Valle del Cauca	35,087	70,079	110,713	212,771	201,349 ^d
20 Popayán	Cauca	31,866	58,500	77,884	164,809	200,989

a. With the exception of the Bogotá metropolitan area, information for all metropolitan areas refer to the officially designated areas (DANE, 1986). Figures include a fixed number of municipalities throughout the period, and include the rural component of municipal population.

b. Census figures adjusted for coverage.

c. Preliminary census figures adjusted for coverage.

d. Not adjusted for coverage.

Sources: For 1965, de Linás (1990, table IV-2); other years: DANE, national population censuses.

5.3.2. Increased concentration of population in Bogotá

When measured in terms of population growth, in the second half of the twentieth century, Bogotá was one of the most dynamic Colombian urban centres. During these decades it not only maintained its position as the largest urban agglomeration but it also sustained a rate of population growth that was rarely surpassed by any other large city (cf. table 5.6; map 5.1). Moreover, during most of this period its population grew faster than the rate at which the country was urbanising (table 5.7).

Table 5.6
Colombia: Growth of largest urban agglomerations, 1951-1993
(% per year)

Urban agglomeration ^a	Inter-censal period			
	1951-64	1964-73	1973-85	1985-93
1 Bogotá metropolitan area	6.7	6.0	3.5	5.1
2 Metropolitan Medellín	6.1	4.5	2.3	2.3
3 Metropolitan Cali	6.5	5.1	3.1	2.8
4 Metropolitan Barranquilla	4.5	4.1	3.1	2.0
5 Metropolitan Bucaramanga	5.1	4.5	3.1	3.6
6 Cartagena	5.7	3.5	5.1	2.0
7 Metropolitan Cúcuta	4.8	4.7	3.1	5.9
8 Metropolitan Pereira	4.4	3.5	3.2	2.9 ^b
9 Metropolitan Manizales	4.1	0.8	2.3	2.7
10 Ibagué	6.6	5.5	3.7	2.6
11 Pasto	4.1	5.2	5.8	1.2
12 Santa Marta	7.0	2.4	6.5	2.3
13 Villavicencio	7.8	7.6	6.7	4.6
14 Montería	8.8	4.4	7.3	1.2
15 Neiva	6.6	4.1	5.2	2.8
16 Valledupar	12.9	9.5	7.1	1.3
17 Armenia	6.2	2.0	2.3	2.2
18 Palmira	5.3	3.3	4.1	-0.6 ^b
19 Buenaventura	5.5	5.2	5.6	-0.7 ^b
20 Popayán	4.8	3.2	6.4	2.5

a. With the exception of 'Bogota metropolitan area', wherever relevant figures refer to official metropolitan areas. All data include the rural component of municipal population.

b. Based on unadjusted 1993 figures.

Source: Table 5.5.

Bogotá may not be said to have had a 'disproportionate' demographic weight in Colombia's urban system in recent decades, although an examination of available figures do seem to confirm its growing economic role. The population of the BMA, which includes Bogotá's Distrito Especial and eight surrounding municipalities (see Appendix 1), has had an increasing importance in the national context, as may be

seen from table 5.7. According to figures from the national population censuses, between 1951 and 1993 its share of national population more than trebled, from 5.8 to 18.4 per cent. In a context where the country as a whole was rapidly urbanising (at an average rate of over 4 per cent per year), the weight of the BMA in the country's urban population also grew, although at a somewhat slower pace, to reach over a quarter by the end of the period.

As has been the norm in rapidly urbanising countries, internal migratory population movements (immigration) were a key contributor to urbanisation in the period after the Second World War. Immigration was the main contributor to Bogotá's demographic expansion of the 1950s and 1960s, and a substantial part of this migration was rural in origin. In recent decades, Bogotá has attracted a larger number of female than male migrants. Between 1951 and 1978, for example, the proportion of females dropped only slightly from 54.8 per cent to 53.1 per cent (Mohan, 1986, p. 27), a ratio rising from 82.5 to 88.3 males for every 100 females. In later years this ratio would continue to narrow down gradually, as shown by the 1993 census which recorded a share of 52.6 per cent of females, or 90 males for every 100 females (Cámara de Comercio de Bogotá, 1996, p. 119).

Census figures show that the four largest cities were by far the most favoured destinations of migrants between 1951 and 1973. Due to its sheer size and the dynamism of its economy, the national capital not only attracted people from all regions, but was able to absorb much larger numbers of migrants than any other city: in the two periods 1951-1964 and 1964-1973 it received an estimated 28.6 per cent and 46.4 per cent of all the country's in-migrants, respectively (Dávila *et al.*, 1986, p. 38). This contributed to BMA population growth rates which were more than double those of the country as a whole between 1951 and 1973 (table 5.7).

In both 1964 and 1973, over half of Bogotá's population had been born outside the city, a slightly higher percentage than in most other large cities except Cali and Villavicencio (the medium-sized capital city of the Meta *departamento*, on the Eastern Plains) where over 55 per cent of all inhabitants were classified as in-migrants at the time of the census (Flórez & González, 1983, p.66).

As in many Latin American cities, the high volumes of rural to urban migration (including the higher shares of females) reflect economic and cultural factors.

Social change and widespread poverty in rural districts have compelled a disproportionate number of young women and men to seek a livelihood in large cities. There tended to be relatively higher demand for unskilled women notably in domestic service, but also in other services as well as manufacturing. Such were the opportunities that Bogotá offered to young females in recent decades that, in 1973 among the group of migrants living in the city and born in the nearby *departamento* of Boyacá there were a third more females than males. In later years, the attraction of female labour would continue both in the city and in its surrounding region. As was mentioned in chapter 4, since the late 1960s the cut-flower export industry has grown considerably in importance as a source of employment for young female labour, particularly in municipalities close to Bogotá (this has also made Colombia the second largest exporter of cut flowers in the world after Holland).

Even in the 1980s and 1990s, and somewhat unusually in Latin America for a city of its size, in-migration still represented a very important component of overall growth, as suggested by the difference in growth rates between Colombia and the BMA (table 5.7). Migrants make up a substantial share of annual growth, with an estimated average of 29,000 arriving every year in the city in 1985-1990 (Granados & Rinaudo, 1992).³²

As the city's population continues to age, and the proportion of its inhabitants in child-bearing age decreases, in the next two decades or so a high rate of growth could only be sustained through a high influx of immigrants, rather than natural growth. In 1993, 28.7 per cent of the city's population was under the age of 15, compared to 33.8 per cent in Colombia. Given the evidence that immigrants tend to be individuals of reproductive age, by the time today's children reach a reproductive age around 2010, Bogotá will have a smaller share of child-bearing groups than Colombia. Whether this is actually the case will depend not only on Bogotá's success in providing jobs and services for its fast-expanding population, but will

³² The figure could, however, be considerably higher if adjusted census figures are used. If we were to assume that net international migration makes a negligible contribution to national population growth (de Llinás, 1990: table II-10), Bogotá's natural growth could be assumed to be similar to the country's for the period 1985-93, i.e. 2.2 per cent per annum (a conservative assumption, fertility rates tend to be lower in large cities than in national populations). Migration would, therefore, account for the 3.0 per cent growth differential in the metropolitan area, or an estimated 198,000 new inhabitants in 1993 alone. If this figure appears unexpectedly high, it must be remembered that so was Bogotá's overall population growth rate in 1985-1993, to the extent that it exceeded demographers' forecasts (Cf. Llinás, op. cit. and Granados & Rinaudo, 1992).

also result from the social and economic conditions prevailing in other parts of the country, where increased agricultural productivity and, to a lesser extent, violence have accelerated out-migration. As was noted earlier, violence, political and otherwise, has been a trademark of rural life in Colombia for the last four decades. In the past, this has helped fuel out-migration from many regions, and even by the early 1990s probably continued to be an important factor, as victims of the indiscriminate actions of the paramilitary, guerrilla groups and drug traffickers (who are said to support both) flee to the relative safety of large cities. Between July 1990 and June 1994, for example, it is estimated that political violence (including presumed political killings, 'social cleansing', disappearances, and deaths in military action) claimed nearly 15,000 lives (Colombia Bulletin, 1994).

But despite the continued high influx of migrants arriving in Bogotá in the later years of the period of study, by the early 1990s the city already had a sufficiently large number of second generation residents to surpass those born outside it: in 1993, 43.8 per cent of the city's inhabitants had been born outside Bogotá (including 0.5 per cent of foreigners), a considerably smaller share than the figures recorded in previous censuses (Cámara de Comercio de Bogotá, 1996).

Table 5.7
Population in Colombia and Bogotá metropolitan area, 1951-1993

Census year	Colombia		Bogotá metropolitan area ^a			Annual growth rates (%)		
	Population	Urban population ^b (%)	Urban population	National share ^c (%)	Urban share ^d (%)	Colombia	Urban Colombia	Urban BMA
1951	11,548,172	38.7	672,937	5.8	15.1			
1964	17,484,508	52.0	1,700,487	9.7	18.7	3.2	5.6	7.4
1973	22,862,118	59.3	2,922,485	12.8	21.6	3.0	4.5	6.2
1985 ^e	30,062,200	65.3	4,424,684	14.7	22.5	2.3	3.1	3.5
1993 ^f	35,886,280	72.9	6,613,308	18.4	25.3	2.2	3.7	5.2

- a. BMA comprises Bogotá DE and eight municipalities. Figures refer to urban BMA. See Appendix 1.
b. Population living in *cabeceras* (seats of municipal government); these are generally settlements with 1,500 inhabitants or more.
c. Share of BMA's urban population in national population.
d. Share of BMA's urban population in national urban population.
e. Census return figures adjusted for coverage.
f. Provisional census return figures adjusted for coverage.

Source: For 1985: de Llinás (1990, table V-1); for other years: DANE, national population censuses.

5.3.3 Bogotá: An unchallenged economic primacy

Bogotá's economic weight in the country has paralleled its demographic significance and, particularly since the Second World War, it has even surpassed it on a number of accounts. This was a time when the country's economy expanded at a faster rate than at any other period in its history, with per capita output levels growing at an annual average of 2.2 per cent between 1945 and 1986, a similar rate to the average for Latin American countries (Ocampo *et al.*, 1987, pp.243-244). During this period, Bogotá's economy also grew at a sustained and generally higher pace than the national economy, as may be seen from table 5.8.³³ These higher rates were reflected in a gradual increase in the city's share of gross domestic product, from around one-seventh in 1950 to over a fifth in the mid- to late-1980s. But the city's population tended to grow at a faster pace than its output, so while Bogotá's per capita output was more than twice that of the country in 1950, 39 years later the gap had been reduced to just over 40 per cent.

The sustained growth rates shown in table 5.8 conceal variations which may at times be significant. Bogotá's economic growth has had a cyclical nature and in the 1980s it became comparatively more erratic, with wider differences in growth rates from one year to the next than in the 1960s. Sharp yearly variations were much more of a rarity nationally: growth was much faster in Bogotá in some years (with rates of 15.7 per cent in 1968-69 and 10.3 in 1978-79 as against 5.9 and 8.5 in the country, for example) but also much slower in others (0.6 per cent compared with 3.1 nationally in 1985-86).

City-wide average growth rates also group different sectors of production together, thus masking variations in sectoral performance. Cuervo (1992) has identified three cycles in the city's growth between 1966 and 1989. Between 1966 and 1975 sectors such as finances, transport & storage, and construction clearly gained weight in the economy (measured in terms of value added), while manufacturing

³³ Spatially disaggregated data on economic performance is generally collected and published using *departamento* boundaries. Information on some government and community services (such as banks, educational and health facilities, courts and so on) is regularly published by DANE at the municipal level, while municipal data on manufacturing has only been made publicly available since the late 1980s. Because the Bogotá metropolitan area is not officially regarded as an administrative area, most of the figures on economic growth quoted in this text refer, therefore, to productive activities occurring within the boundaries of the Distrito Especial de Bogotá (abbreviated here as Bogotá DE). See chapter 3 for more details on official data collection procedures and quality of data.

industry, commerce, and personal & community services lost some significant ground. By contrast, in the years between 1975 and 1982, the construction industry, and personal & community services expanded while commerce, transport & storage and manufacturing lost some of their share of total value added. Finally, in the period 1982-89 commerce, manufacturing and once again construction gained ground, while personal services, house rentals and banking saw their share in the local economy diminish.

Table 5.8
Economic growth in Bogotá DE^a and Colombia, 1950-1989

Year	Bogotá's share of national GDP (%)	Bogotá's relative wealth index (Colombia=1) ^b	Average annual GDP growth (%)	
			Colombia	Bogotá DE
1950	13.9	2.3		
			5.4	6.9
1955	15.0	2.1	3.9	4.5
1960	15.4	1.8	4.7	7.5
1965	17.6	1.8	5.9	8.5
1970	19.9	1.7	6.2	7.8
1975	21.4	1.6	5.4	n.a.
1980	20.8	1.6	2.2	2.4
1985	22.0	1.5	4.6	4.6
1989	20.4	1.3		

n.a. Not available

a. Figures refer only to Bogotá DE. See Appendix 1.

b. Per capita GDP in Bogota divided by per capita GDP in Colombia.

c. Constant 1970 pesos for 1950-1975; 1975 pesos for other years.

Sources: For 1950-75, Svenson (1977); 1970-85 GDP growth taken from DANE (1991b, p.117); other years, calculations based on Cuervo (1992, tables 5 and 6) and national population census data.

When sustained over a significant number of years, such variations in performance inevitably lead to changes in the structure of a city's (or a country's) economy, a process that has been associated with economic development (Hunt, 1989; Syrquin, 1988). The ten-sector classification used in table 5.9 shows that, between 1960 and 1989, for example, the joint contribution of housing rentals and commerce in Bogotá's economy dropped significantly (from 31 to 19.3 per cent); this was

compensated by an increase in the joint weight of finance and insurance, personal & domestic services, and government services (from 27.9 to 39.3 per cent). Although with variations in the intervening years, other sectors such as manufacturing, construction and transport generally maintained - or even marginally increased - their overall contribution.

Structural change was also a feature of national economic growth during this period. Even though the choice of end years conceals sharp sectoral variations during the period, at the high level of sectoral aggregation shown in the table, the transformation was considerably less marked than in the case of Bogotá. No doubt the most salient aspect of national economic change was a sharp drop in the participation of the primary sector from nearly a third of total output in the early 1960s to just under a quarter in 1989, a fall for which agriculture was mostly responsible. This drop was compensated for by the growth of other sectors, notably construction, utilities, commerce and services. The contribution of manufacturing, a sector which is of particular relevance to this research, appeared stable throughout (cf. table 5.9). But as was discussed earlier in this chapter, although this contribution remained relatively constant between the late 1960s and late 1980s, manufacturing activity had already expanded very rapidly in the 1940s and 1950s, from a low share of 14.8 per cent of total output in the mid-1940s (Ocampo *et al.*, op. cit., p.245) to reach a peak of 23.5 per cent in 1974 (World Bank, 1991, p.5).³⁴

³⁴ This includes a 2.8 per cent contribution from coffee processing.

Table 5.9
The structure of production in Bogotá DE^a and
Colombia, 1960-1989
(%)

Sector	Bogotá DE				Colombia	
	1960	1970	1980	1989	1960-64 ^b	1989
Agriculture, fishery, mining	1.0	1.2	0.3	0.4	32.0	23.7
Manufacturing	24.1	21.6	23.8	24.6	20.6	20.6
Utilities	1.4	1.5	1.1	2.1	0.6	2.4
Construction & public works	5.8	7.4	4.2	6.6	2.9	6.6
Commerce	18.1	21.5	9.3	11.2	9.8	10.7
Transport and communications	8.8	8.5	8.8	9.4	7.4	8.3
Finance and insurance	5.8	6.6	10.3	11.8	5.0	6.9
Housing	12.9	11.8	11.5	8.1	7.3	4.5
Services ^c	10.8	10.3	14.9	13.7	7.3	8.4
Government services	11.3	9.6	14.6	13.8	7.1	8.2
Other ^d	--	--	1.2	-1.7	--	-0.3
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

-- Not applicable.

a. Figures refer to Bogotá DE only. See Appendix 1.

b. Annual average.

c. Includes personal and domestic services.

d. Difference between income from banking services and import taxes.

Sources: For Bogotá: 1960-1970, Mohan (1986, p.32); 1980-1989, Cuervo (1992, table 7). For Colombia: 1960-64: Ocampo *et al.* (1987, p.245); 1989: Cuervo (1992, table 7).

It was noted earlier how, somewhat unusually in the Latin American context, Colombia's spatial development of the past half century or so was punctuated by the simultaneous growth of a number of urban areas in different geographical regions of the country. But despite having a pattern of development that some commentators would regard as spatially more 'balanced', recent decades have given Bogotá an unchallenged lead over other large cities in a number of respects.³⁵ This is exemplified by the contribution that Bogotá DE makes to some sectors of national economic life, as may be deduced from the figures in table 5.10. Some sectors clearly stand out as providing the capital city with a much larger share of national activity than either its population or its total output would warrant. Notable examples are communications, finance and insurance, house rentals, personal services and government services: at some point in the period 1960-89 at

³⁵ Gore (1984, pp.50-78) has produced an excellent critique of the concept of spatial balance that pervaded much of the activity of regional planners especially in the 1960s and 1970s.

least one third of national activity in all these sectors was located in Bogotá DE.³⁶ And this is due to the fact that many firms in those sectors play a national rather than a local role.

Table 5.10
Contribution of Bogotá DE^a to the Colombian economy
in selected sectors, 1960-1989
(%)

Sector	1960	1965	1970	1975	1980	1985	1989
Agriculture	0.4	0.5	0.8	1.1	0.4	0.1	0.2
Mining	1.3	1.5	1.6	2.4	0.1	n.a.	0.5
Manufacturing	21.5	22.2	23.1	24.2	21.2	23.1	24.4
Electricity and water	21.3	20.2	21.3	21.0	16.8	17.6	17.1
Construction & public works	23.3	27.1	30.9	33.6	18.3	14.8	20.4
Commerce	16.8	19.8	23.5	22.1	20.0	20.7	21.4
Transport and storage	20.5	20.7	22.6	23.8	17.6	18.5	19.4
Communications	37.1	35.6	43.1	45.5	46.9	50.4	40.9
Finance and insurance	37.6	34.9	38.1	40.0	31.6	32.2	35.2
House rentals	39.6	39.3	41.5	43.5	34.1	37.0	37.0
Personal services	21.6	23.8	28.0	31.2	36.2	35.1	33.5
Government services	27.8	34.0	30.0	33.3	39.3	35.9	34.4
Domestic services	n.a.	n.a.	n.a.	n.a.	17.2	n.a.	19.0
Value added	n.a.	n.a.	n.a.	n.a.	20.1	21.3	19.8
Gross Domestic Product	15.4	17.6	19.9	21.4	20.8	22.0	20.4

n.a. Not available

a. Figures refer only to Bogotá DE. See Appendix 1.

Sources: For 1960-75: Thoumi (1983, p.177) using official regional accounts, except percentages for agriculture & mining which are taken from Svenson (1977, p.39); for 1980-89: Cuervo (1992, table 6).

The city's disproportionate lead in such areas is not entirely surprising. In the case of government services, for example, this pre-eminence is explained by the fact that Bogotá is not only the seat of a historically highly centralised national government but also of the provincial government of the Cundinamarca *departamento* and of the largest municipal government in the country. This, coupled with an increased weight of national government in the second half of the twentieth century, has been seen as a factor behind the city's lead in other sectors (Gilbert, 1981, p.68). The

³⁶ Information on regional (or *departamento*) contributions to national GDP come from a series of regional accounts produced by Inandes for the period 1960-75 (see Svenson, 1977, Annex 1) and by DANE for 1980-89. It is important to understand the methodology used to produce regionally disaggregated data (Cuervo, 1992, pp.4-5). An estimation of the spatial distribution of each activity is made for one year in each of the two series. This is a complex task which may not easily be repeated for every year in the series, so the structure for that base year (1985 in the second series, for example) is extrapolated for other years in the series, with amendments whenever this is appropriate. Cuervo warns that this procedure is better suited for short or medium-term time series and its use for long-term projections has many pitfalls.

concentration of specialised services such as communications and finance & insurance may no doubt be partly explained by the advantages of physical proximity to the government and to ancillary services normally associated with these activities, but also in terms of a workforce that demands sophisticated amenities found only in large cities.

Despite fluctuations over the period in other sectors Bogotá shows a lead that is more commensurate with its contribution to GDP. Such are the cases of manufacturing, utilities, construction, commerce, and transport and storage. In very general and aggregate terms and, as Jaramillo & Cuervo (1987) have noted, the more dispersed nature of many of these activities may be explained by their less specialised character serving a local rather than a national market.³⁷ This is particularly true when viewed in the historical and geographical context of Colombia's spatial development, which for several decades was marked by highly restricted means of physical communication among the four or five main physical regions. A more effective spatial integration of these quite diverse and potentially rich regions would have to wait until after 1930, when the national road network expanded substantially to provide a much needed backbone for national development.³⁸

That there was a gradual increase in the economic importance of the national capital is another inference to come out of the figures in table 5.10. When seen in terms of the end years of the 29-year period after 1960, such increase seems particularly striking in the case of personal services where Bogotá's national contribution rose from 21.6 to 33.5 per cent. A closer look at the five-yearly fluctuations in the three-decade span of the table, however, shows that in other respects the city's lead was at times more impressive, particularly in sectors such as communications, construction, finance and insurance, and government services.

³⁷ Like any generalisation, of course, the weaknesses of this proposition will no doubt become apparent when faced with cases of highly specialised services or secondary activities (such as the production and sale of electronic precision equipment, for example) catering for a national or even an international market. Given the focus of this study, with the exception of manufacturing, this proposition will not be tested for the broader canvas of metropolitan economic activities.

³⁸ By 1930 there were 5,743 km of roads considered suitable for the use of motorcars. In the years between 1930 and 1946 alone, an additional 12,227 km of roads were built around the country (Latorre, 1986, p.74).

The first half of the 1970s saw a rapid increase in the city's national share in construction and finance, a fact that may be explained by the strengthening of the financial sector as a key support of urban housing construction during the Pastrana government (1970-44).³⁹ In the case of construction, this share dropped rapidly in subsequent years (to less than half of this peak ten years later, for example), as investment in housing construction fell and that in public works spread more evenly around the country. Shifts in the proportions of financial activity concentrated in Bogotá were not as marked, and the city retained an undisputed lead throughout the period. As with the cases of government services and communication, in this sector proximity to the centres of policy and decision-making as well as to peripheral services were crucial in helping the capital city maintain its national predominance.

There are other well-documented indicators of the city's sustained and even increased prominence in the nation particularly in the service sector (see for example Gouëset, 1991; Jaramillo & Cuervo, 1987). Bogotá's share in the total volume of loans and deposits in banks and other financial institutions rose from around 40 per cent in 1975 to 50 per cent in 1990, with deposits in the city's banks outstripping loans (Gouëset, 1991, p.13). Throughout the 1980s, the capital city provided the headquarters for two-thirds of the 500 largest Colombian companies, as measured in terms of sales turnover (Cuervo, 1992, p.37).

Similarly, on average bogotanos are more spoilt for choice than other Colombians when it comes to specialised retail and service outlets. As table 5.11 shows, in 1990 the city had over twice the proportion of car dealers, finance outlets, estate agents and establishments providing services to firms than its share of national population would appear to suggest. With twice the population of Medellín and three times that of Cali, Bogotá DE had three times more educational establishments and two-and-a-half times more health establishments than Medellín; in number of hotels and restaurants and of retail outlets it outstripped Cali's by a factor of six and four respectively. As with some sectors mentioned earlier, this is largely due to the fact that many Bogotá-based firms tend to have a national and a local role.

³⁹ See Dávila (1984) for an analysis of the impact of Pastrana's "Four Strategies" development plan upon Bogotá's housing construction sector.

Bogotá may not be said to have a prominent position in the international economy in the same way that 'global cities' like New York, London or Tokyo do, but it does have a crucial function as Colombia's foremost link between the domestic and the global economies. Bogotá has more headquarters of multinational companies operating in Colombia than any other city, with even some companies which have no production facilities in the capital choosing to locate there (Goueset, *op. cit.*, p.10). Similarly, despite a disadvantageous location several hundred kilometres from the sea, the city concentrates a growing share of the value of international trade; this may be largely explained by a recent expansion in air freight that outstrips that of sea-borne cargo and the fact that Bogotá has the busiest passenger and cargo airport. An analogous picture emerges from the data on international passenger volumes and communication flows, with 55 per cent of all international telephone calls and 70 per cent of all telex communications passing through the city's systems in the late 1980s (*ibid.*).

In the next section, and before proceeding in chapter 6 with an overview of the growth and spatial development of manufacturing industry in Bogotá during the period of concern to this study, we will briefly sketch out some of the salient features of its population and how these have changed in recent decades. This will complement the picture of the city's economy presented above, as it will provide us with some notion of the human component behind the somewhat cold economic and spatial statistics of earlier sections. Equally importantly, it should provide us with some useful information regarding changes in the city's labour market and people's living conditions. The section will show that Bogotá has concentrated some of the ablest hands and brains in the country, and that opportunities and living conditions are, on average, better for bogotanos than for most other Colombians. However, despite the years of economic growth described earlier, poverty and need as well as a highly skewed distribution of income remained salient features of the city's recent history.

Table 5.11
Tertiary activities in four largest metropolitan areas and Colombia, 1990
(Number of establishments by sector)

Activity	Bogotá DE ^a		Medellín		Cali		Barranquilla		Total four metropolitan areas		Total Colombia	
	No.	National share (%)	No.	National share (%)	No.	National share (%)	No.	National share (%)	No.	National share (%)	No.	National share (%)
Car dealers	13,145	30.3	3,618	8.3	3,216	7.4	1,994	4.6	21,973	50.7	43,377	100.0
Wholesale outlets	10,170	28.2	3,999	11.1	2,148	6.0	1,696	4.7	18,013	50.0	36,051	100.0
Retail outlets	86,705	24.5	26,495	7.5	22,153	6.3	12,594	3.6	147,947	41.7	354,390	100.0
Hotels, restaurants	23,715	23.5	8,357	8.3	4,049	4.0	2,635	2.6	38,756	38.4	100,908	100.0
Finance	2,588	30.0	967	11.2	628	7.3	422	4.9	4,605	53.4	8,625	100.0
Transport and communications	4,318	25.2	1,530	8.9	1,297	7.6	823	4.8	7,968	46.5	17,131	100.0
Estate agents	1,201	39.8	558	18.5	318	10.6	102	3.4	2,179	72.3	3,014	100.0
Services to firms	10,874	33.9	3,519	11.0	3,203	10.0	1,667	5.2	19,263	60.0	32,090	100.0
Education	4,676	22.8	1,481	7.2	1,378	6.7	1,491	7.3	9,026	44.0	20,521	100.0
Health	7,611	25.5	3,151	10.6	2,194	7.3	1,878	6.3	14,834	49.7	29,864	100.0
Other services	12,469	28.0	2,774	6.2	3,587	8.1	1,759	4.0	20,589	46.3	44,464	100.0
TOTAL	177,472	25.7	56,449	8.2	44,171	6.4	27,061	3.9	305,153	44.2	690,435	100.0

a. Figures refer to Bogotá DE only. See Appendix 1.

Source: Gouéset, Vincent, 1992, "La concentration urbaine en Colombie: de la quadricephalie à la primatie de Bogotá: 1930-1990", PhD dissertation (draft), Bordeaux, France, quoted in Cuervo (1992), table 15.

5.3.4 The people of Bogotá

Another measure of the city's success in maintaining growth is provided by employment figures. As table 5.12 shows, unemployment in the national capital between the mid-1970s and the late 1980s was lower than in other cities, even at a time of poor economic performance in the mid-1980s and a parallel increase in the participation rate of both sexes (although particularly women) in the labour market. The marked increases in overall labour participation rates have been partly attributed to rapid increases in the number of people of working age (Gilbert, 1995), and to the increased incorporation of women into the labour market resulting from changing social practices such as pregnancies at an older age, a parallel drop in fertility rates and a growing acceptance of female labour in formerly male-dominated formal employment, especially services.

As the demographic profile of the population changed and the 'baby boom' of the 1960s eased its way in to swell the proportion of the population aged 15-59 (which is the most economically active) this was reflected in a greater weight of economically active population compared to those of working age. As a consequence, the participation rate of this age group in the city's labour market rose from 66 per cent in 1976 to 76 per cent in 1991.

The participation rate of males tended to fall between 1951 and 1973 (table 5.11), largely because a high proportion of those aged 15-24 entered education and left the labour market temporarily, but also partly because some of the older males withdrew from the labour market (Mohan, 1986, p. 185). As the proportion of those in the 15-24 age range gradually fell and those in this group started joining the labour market after a period spent in education, participation rates started rising again in later years, a process aided by the economic upswing of the late 1980s which created new workplaces.

Female participation rates show a more erratic movement, with a tendency to drop in the two decades after 1951 (perhaps also as a result of improved access to education though we have no evidence at hand to confirm this), followed by a marked rise after the mid-1970s. Fluctuations in female participation rates are generally sharper than those of their male counterparts, reflecting a greater flexibility among women to enter and leave the labour market in response to the

economic cycle and to changes in salary levels (Gómez & Pérez, 1992). Education levels are a further determinant of participation; for example, in the mid-1970s, about half of all women with higher education worked, though they represented only some 9 per cent of all females in the labour force (Mohan, 1986, p. 186).

Table 5.12
Bogotá DE and seven cities:
Labour participation rates and unemployment, 1951-1990
(%)

Year ^b	Bogotá DE		Total unemployment rate ^c	Unemployment rate in seven cities ^d
	Global participation rate ^a			
	Female	Male		
1951	38.9	89.0	n.a.	n.a.
1964	37.6	84.5	8.0	n.a.
1973	32.8	68.6	9.9	11.9 ^e
1976	35.6	68.2	9.5	11.2
1985	46.0	75.9	13.7	14.1
1989	46.5	75.0	9.7	11.0
1990	46.6	75.0	8.0	10.1

n.a. Not available.

a. Economically active population/population of working age (defined in 1951 and 1964 as those aged 15-59, and for all other years as those aged 12 or over).

b. March of each year except 1951, 1964 and 1973 which refer to national population censuses.

c. Unemployed/economically active population; refers to both women and men.

d. Figures are based on household surveys conducted regularly since the 1970s in a group of seven cities which, by the early 1990s were not necessarily the largest which include: Bogotá, Medellín, Cali, Barranquilla, Bucaramanga, Manizales and Pasto.

e. Average for Bogotá, Medellín and Cali only.

Sources: For 1951-1973: Mohan (1986, p. 28). For Bogotá: 1976-90: Gómez & Pérez (1992). For seven cities: 1976: Gómez *et al.* (1988); 1985-89: Gómez & Pérez (1992); DANE (1998).

In the twenty years after 1970, the average *bogotano* was more educated and had better access to services and basic infrastructure than most Colombians. Gómez & Pérez (1992) note that while in 1976 52 per cent of the city's workers had completed at least primary education, by 1991 this proportion had risen to 70.6 per cent. These authors also show that the economic sector with the highest average qualifications was that of services, where over half of those employed were classified as 'highly skilled' (i.e. professionals, technical personnel, directors and high-ranking officials). Much lower levels of skill could be found in manufacturing, where a mere 12.3 per cent of those employed in 1991 could be classified as 'highly skilled' (*ibid.*).

Despite the well-known problems of infrastructure supply that besiege cities in developing countries experiencing high rates of population growth, quality of life in Bogotá improved in the period under study (Gilbert, 1996b). Life expectancy rose, infant mortality fell, incomes per capita increased and the quality of the housing stock improved in general terms, with the proportion of homes built of flimsy materials dropping consistently from 9.5 per cent in 1951 to 3.2 per cent in 1985 and 1993. Other housing indicators also show better conditions in Bogotá than the national average, with the proportion of the city's households having access to potable water fluctuating between a low of 85.8 per cent in 1951 and a high of 95.9 in 1985 (subsequently dropping to 88.3 per cent according to the 1993 population census) and those with access to electricity rising from a low of 81.9 per cent in 1951 to a high of 98.4 per cent in 1985 (Gilbert, *op. cit.*).

The incidence of poverty dropped from 57 per cent in 1973 to 17 per cent in 1991. Poverty was comparatively less of a problem than in most other large cities, where its incidence was higher in the 1980s. However, income distribution remained highly skewed during the period, though with some modest improvements measured during a time of rapid economic expansion in the 1970s (Mohan, *op. cit.*, p. 62).

5.4 Conclusions: The foundations of a resilient economy

This chapter has presented an overview of Colombia's recent economic development and of the process of industrialisation since its early years and especially during the period 1958-1990. In so doing, it lays the foundations for a closer look at the city of Bogotá, which was examined in the context of the recent growth of Colombia's urban areas as well as in terms of the city's salient economic and social development.

It was shown that Bogotá has historically had a prominent position among Colombia's cities, and has also played a crucial role in the economic development of the nation. More importantly, the chapter has demonstrated that Bogotá's position as the foremost economic centre was not merely consolidated during the second half of the twentieth century, but also increased in importance, as it surpassed all other urban centres in terms of its contribution to national economic growth, a role that will probably remain undisputed well into the twenty-first century.

The major liberalisation reforms introduced by the national administration of President Gaviria (1990-1994), although beyond the time scope of this study, helped consolidate some of the city's functions, while opening new opportunities to its firms, particularly those which could aspire to compete in the international arena (Dávila, 1996; Gilbert, 1997). At the same time, the city continued to be the preferred first port of call for the growing volumes of capital which entered the Colombian economy as foreign firms invested in both private and newly privatised industries (banks, power generation, oil, telecommunications) and as large volumes of legal capital was repatriated in response to high local interest rates and, in the case of drug money, comparatively more accessible laundering opportunities, especially in construction and consumer goods.

6 Manufacturing industry in the Bogotá metropolitan area, 1958-1990

6.1 Introduction

Chapter five dealt with different aspects of Colombia's development mostly during the period between 1958 and 1990. These were years of rapid change, as it was then that Colombia was transformed from a rural to a largely urban society, from a nation where agriculture predominated to one where other economic activities including services and manufacturing became prime employers and generators of wealth, a period when basic consumer goods ceased being the main focus of manufacturing production to give way to intermediate and capital goods. Many other positive changes could be enumerated, for example in terms of increases in social well-being and much enhanced channels of political participation, though some of these were also accompanied by visible signs of social and political violence and even by non-negligible levels of poverty affecting large numbers of households around the country. Without denying the importance of these issues, we will not enter here into a discussion about them, largely because they lie beyond the remit of this study.

The intention of this chapter is twofold: first, it presents detailed empirical evidence on the relative spatial dispersal of manufacturing industry during the study period within what we have called here the 'Bogotá metropolitan area' (BMA). And secondly, it seeks to put to the test two propositions linking the pattern of manufacturing growth and industrial composition with spatial dispersal. The first of these propositions examines the effect of growth (or contraction) on the spatial dispersal of manufacturing. The second one seeks an explanation for the changes in the growth patterns of manufacturing in the structure of industry in the BMA.

To fulfil the first aim of the chapter section 6.2 uses detailed information from population censuses and from DANE's annual manufacturing surveys broken down at the level of municipality to document the very slow and modest process of dispersal of people, jobs and establishments outwards from Bogotá's established core towards peripheral areas that took place between the early 1960s and late 1980s. This constitutes a very useful exercise in its own right, for not only has

spatially disaggregated information of this nature not been put together covering such a long period before, but it also serves to lay the foundations for the analysis presented in subsequent chapters.

Section 6.3 focuses briefly on the core of the BMA by presenting the results of a detailed study carried out as part of an important World Bank urban research programme in the early 1980s. This study (Lee, 1989) documented the process of dispersal of employment (including manufacturing) in Bogotá DE from the centre out towards the periphery in the period 1972-78. The significance of this study lies in its use of very detailed information at the statistical district (*comuna*) level and in the fact that it found tangible evidence of employment dispersal within this restricted area. While its results are highly enlightening about a process never before documented, they are also coloured by the fact that the research concentrated on a limited period which was also one of very rapid economic expansion in the local and national economies even in the context of the high growth rates of the post-Second World War period, a set of conditions acknowledged by the research authors (Mohan, 1994). In contrast, the present research not only embraces a longer time span covering several decades of fast and slow growth as well as some decline, but also looks at a larger physical area than the World Bank study.

The testing of the two propositions to allow further exploration of the spatial and structural development of manufacturing in the BMA is the subject of the remainder of the chapter. This requires firstly an examination of the BMA's industrial development in the context of Colombia's, a task undertaken in section 6.4. This section shows how, unlike the city's economy and population which increased their national weight uninterruptedly, manufacturing maintained a relatively stable national position in the past few decades.

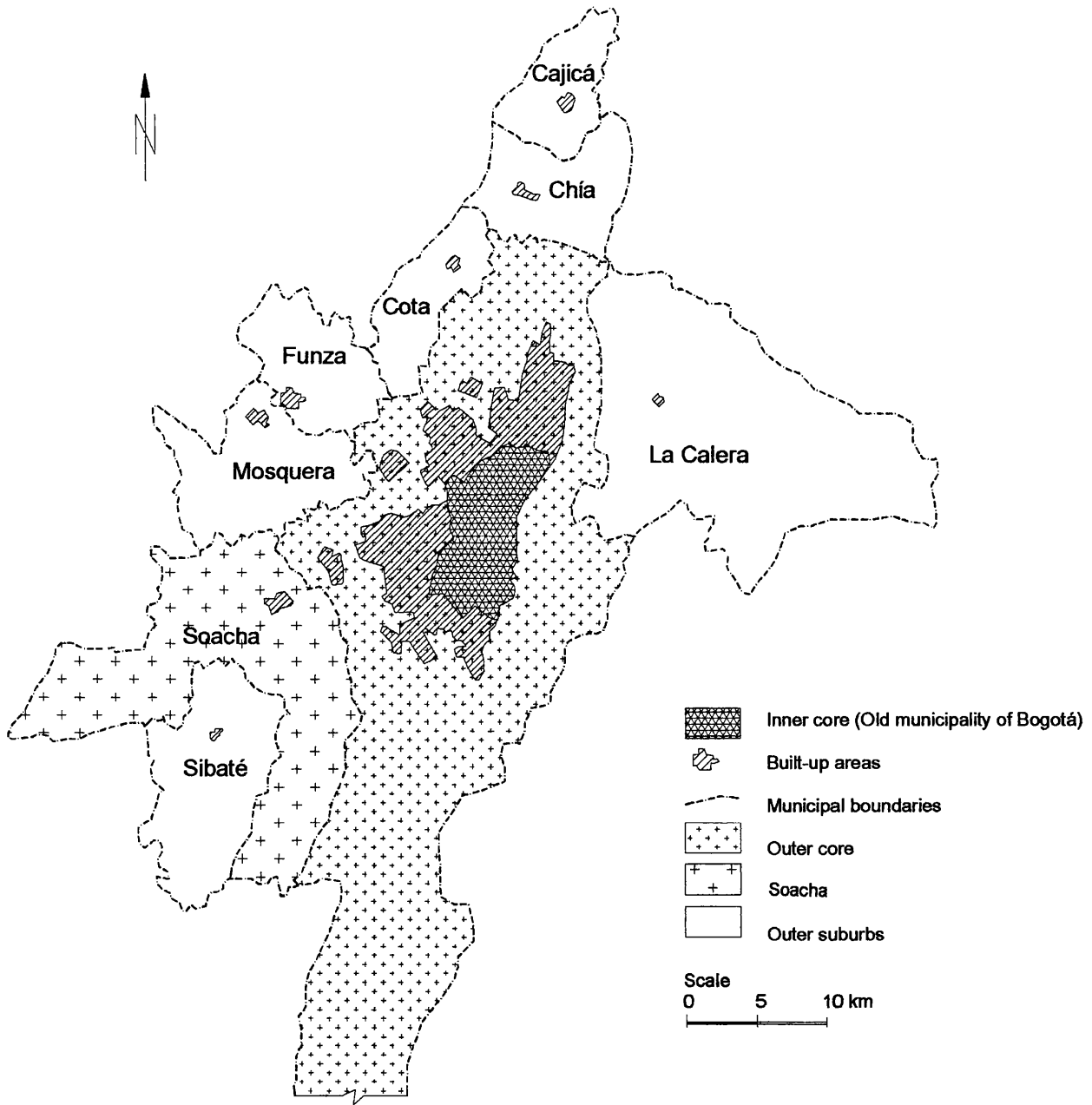
This is then followed by section 6.5 where a correlation analysis is used to probe the first proposition which seeks to establish possible links between manufacturing growth or decline and spatial dispersal. The second proposition, which states that the virtual lack of manufacturing dispersal within the BMA as documented may be explained at least in part by the specific combination of industries that make up BMA's manufacturing sector, is tested in section 6.6. This is done with the help of a shift-share analysis of employment data which seeks to measure the effect that

industry-mix has upon the growth rate of manufacturing employment in the Core and the Rest of the BMA. A few concluding remarks are followed by a statistical appendix.

6.2 Changes in the location of manufacturing within the BMA

This section examines in some detail the changes that took place in the location of manufacturing production and employment within the Bogotá metropolitan area in the period 1958-1989. In so doing, it contrasts manufacturing employment data disaggregated at the level of municipality with data on the changes in distribution of population within the BMA.

In the course of four decades of fast growth after 1951 the population of the Bogotá metropolitan area only very gradually dispersed outwards, from the core to the adjacent municipality of Soacha and to the municipalities in the outer suburbs (cf. map 6.1). As the figures in table 6.1 show, the shift was almost imperceptible up to the early 1970s, but accelerated in the late 1970s and 1980s when the municipalities outside the old established core (which in the table include all those outside Bogotá DE) started gaining population resulting from over-spill from Bogotá and the increased employment opportunities in nearby townships of the Sabana de Bogotá (cf. chapter 4). In the 42 years after the national population census of 1951 the share of the Core (here jointly comprising the Inner and Outer Core as no further disaggregation for population data is available after 1994) dropped from 98.1 per cent to 93.3 per cent. Despite the fact that the population living outside the core increased more than 30 times during this period and grew at an average rate of over 8 per cent per year, this is perhaps best described as a fairly modest dispersal (or suburbanisation) when contrasted with cities of comparable size in countries such as the US, Brazil, UK and Korea, as was documented in chapter 2.



Map 6.1 Bogotá metropolitan area (1980)

Source: Instituto Geográfico Agustín Codazzi, 1982: Map of the Sabana de Bogotá

Table 6.1
Bogotá metropolitan area:
Distribution of urban population, 1951-1993

Area/municipality	Urban population					Share of urban population (%)				
	1951	1964	1973	1985 ^a	1993 ^b	1951	1964	1973	1985 ^a	1993 ^b
BMA TOTAL	672,937	1,700,487	2,922,485	4,162,844	5,860,476	100.00	100.00	100.00	100.00	100.00
Inner and outer core:	660,280	1,670,115	2,854,361	3,974,813	5,469,105	98.12	98.21	97.67	95.48	93.32
Soacha:	4,226	11,435	23,997	99,353	243,597	0.63	0.67	0.82	2.39	4.16
Outer suburbs:	8,431	18,937	44,127	88,678	147,774	1.25	1.11	1.51	2.13	2.52
Bogotá (inner core)	638,562	1,562,774	2,854,361	3,974,813	5,469,105	94.92	91.90	97.67	95.48	93.32
Outer core	21,718	107,341	*	*	*	3.22	6.31	*	*	*
Bosa	1,554	16,540	*	*	*	0.23	0.97	*	*	*
Engativá	216	3,649	*	*	*	0.03	0.21	*	*	*
Fontibón	13,871	45,012	*	*	*	2.06	2.65	*	*	*
Suba	1,489	14,156	*	*	*	0.22	0.83	*	*	*
Usaquén	4,377	27,984	*	*	*	0.65	1.65	*	*	*
Usme	211	--	*	*	*	0.03	--	*	*	*
Soacha	4,226	11,435	23,997	99,353	243,597	0.63	0.67	0.82	2.39	4.16
Outer suburbs	8,431	18,937	44,127	88,678	147,774	1.25	1.11	1.51	2.13	2.52
Cajicá	983	2,609	4,647	9,516	17,169	0.15	0.15	0.16	0.23	0.29
Chia	2,698	5,655	9,726	23,598	45,566	0.40	0.33	0.33	0.57	0.78
Cota	288	507	898	3,106	5,550	0.04	0.03	0.03	0.07	0.09
Funza	1,943	3,642	13,584	24,263	37,883	0.29	0.21	0.46	0.58	0.65
La Calera	532	1,944	2,842	4,055	6,662	0.08	0.11	0.10	0.10	0.11
Mosquera	1,987	4,580	4,108	9,805	19,454	0.30	0.27	0.14	0.24	0.33
Sibaté	--	--	8,322	14,335	15,490	0.00	0.00	0.28	0.34	0.26

* Figures not available separately but included as part of Bogotá.

-- District contained within another administrative unit, so figures are not available separately.

a. Unadjusted census figures.

b. Figures for Bogotá DE have been adjusted for coverage by a factor of 1.1089. Other figures have been adjusted by 1.0945.

Sources: DANE, national population censuses

By far the greatest gains in urban population were observed in the municipality of Soacha. There, population grew 58-fold in 1951-1993, at an average rate of over 10 per cent per annum, with the fastest growth occurring between 1973 and 1985 (12 per cent p.a.) and 1985-1993 (11.9 per cent p.a.). Thus, the bulk of the non-core growth in population in the period took place in this municipality to the Southwest of Bogotá.

In tandem with population, the location of manufacturing employment also very gradually became dispersed in an outward movement away from the Core towards peripheral locations as may be inferred from Table 6.2. It must be noted from the table that the high share shown for 1965 is due to a lack of disaggregated information for the municipalities of the Outer Suburbs, which artificially inflates the share of the Core. A mild process of dispersal is nonetheless observable in the quarter of a century covered by the figures.¹ The share of the Core dropped slightly more than one-and-a-half percentage points between 1980 (when it seems to have attained its highest degree of concentration) and 1989 (when dispersal was highest).

The other observation that one may gather from the table figures is that the dispersal of manufacturing jobs took place at an even slower pace than population. A simple visual inspection of tables 6.1 and 6.2 and of figure 6.1 shows that jobs were from the beginning of the study period considerably more dispersed than population, and they remained so throughout the period. This may be seen especially in the BMA share of employment in the Outer Suburbs, which was over five percentage points higher than its share of population. The difference between the share of jobs and population in the municipality of Soacha was smaller, and tended to narrow down with time.

¹ It must be remembered also that these figures cover mostly establishments with 10 or more workers.

Table 6.2
Bogotá metropolitan area:
Distribution of manufacturing employment, 1958-1989

Area/municipality	Employment							Share of employment (%)						
	1958	1965 ^a	1974	1980 ^b	1985	1989	1958	1965 ^a	1974	1980 ^b	1985	1989		
BMA TOTAL	n.a.	81,529	139,869	162,605	156,535	178,496	n.a.	100.0	100.0	100.0	100.0	100.0		
Bogotá (inner core)	60,146	76,984	117,349	136,547	131,229	149,203	100.0	94.43	83.90	83.97	83.83	83.59		
BMA Rest	n.a.	n.a.	22,520	26,058	25,306	29,293	n.a.	n.a.	16.10	16.03	16.17	16.41		
Outer Core	*	*	9,361	11,653	9,563	10,517	*	*	6.69	7.17	6.11	5.89		
Bosa	*	*	4,100	5,356	4,055	4,637	*	*	2.93	3.29	2.59	2.60		
Engativá	*	*	298	441	861	681	*	*	0.21	0.27	0.55	0.38		
Fontibón	*	*	3,011	4,123	3,414	3,730	*	*	2.15	2.54	2.18	2.09		
Suba	*	*	513	655	356	607	*	*	0.37	0.40	0.23	0.34		
Usaquén	*	*	265	287	167	202	*	*	0.19	0.18	0.11	0.11		
Usme	*	*	1,174	754	710	660	*	*	0.84	0.46	0.45	0.37		
Soacha^c	n.a.	4,545	3,473	4,719	4,654	5,906	n.a.	5.57	2.48	2.90	2.97	3.31		
Outer suburbs	n.a.	n.a.	9,686	9,686	11,089	12,870	n.a.	n.a.	6.93	5.96	7.08	7.21		
Cajicá	n.a.	n.a.	2,252	1,866	1,726	1,807	n.a.	n.a.	1.61	1.15	1.10	1.01		
Chía	n.a.	n.a.	351	322	388	436	n.a.	n.a.	0.25	0.20	0.25	0.24		
Cota	n.a.	n.a.	8	47	57	84	n.a.	n.a.	0.01	0.03	0.04	0.05		
Funza	n.a.	n.a.	641	528	789	934	n.a.	n.a.	0.46	0.32	0.50	0.52		
La Calera	n.a.	n.a.	805	558	834	1,129	n.a.	n.a.	0.58	0.34	0.53	0.63		
Mosquera	n.a.	n.a.	1,446	2,116	3,047	3,780	n.a.	n.a.	1.03	1.30	1.95	2.12		
Sibaté	n.a.	n.a.	4,183	4,249	4,248	4,700	n.a.	n.a.	2.99	2.61	2.71	2.63		

* Included in BMA total

n.a. Not available

a. Total for 1965 refers only to Core, Outer Core and Soacha.

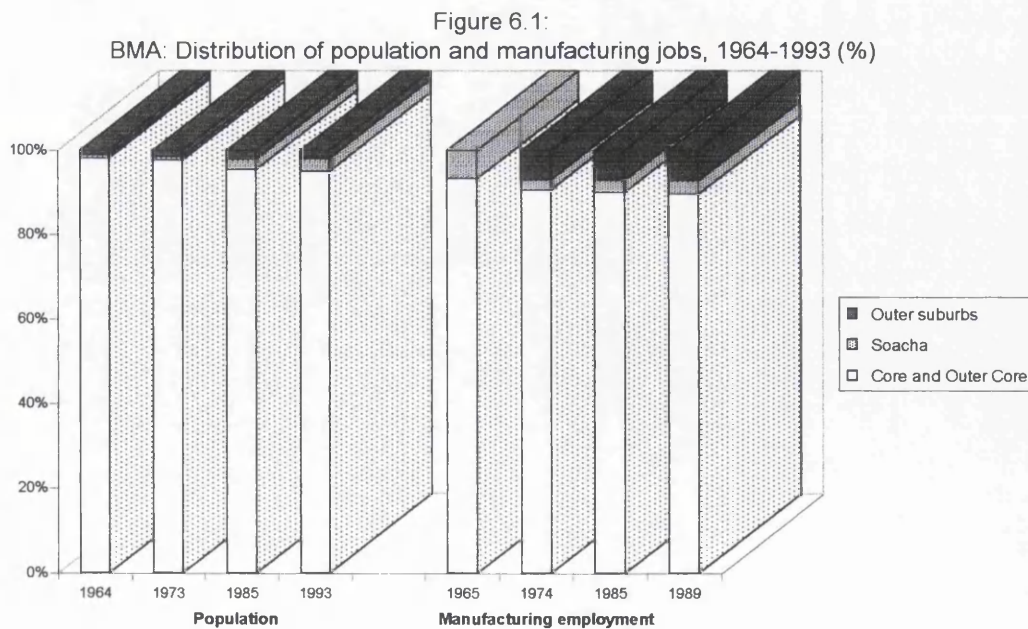
b. Total for 1980 includes one firm with 37 employees but no clearly identified location in the Outer Core.

c. Figure for 1965 includes Sibate.

Sources: DANE, Annual Manufacturing Surveys

In sum, these figures show that, on the one hand, population tended to disperse outwards from the Core especially towards the nearby municipality of Soacha and to a lesser extent to other peripheral areas as well. On the other hand, manufacturing jobs had a head start over population in terms of having a higher presence in the most outlying municipalities from the beginning of the period, but tended to disperse at an even slower pace than population. This is contrary to the experience of large cities in the US and northern Europe as well as elsewhere (e.g. Bombay), where manufacturing employment has moved out of core areas faster than population (Scott, 1980, p. 108).

Thus, a municipality like Soacha, which until the 1970s had been largely an industrial township, increasingly became also an important residential area in its own right, housing a largely low-income population (Dureau *et al.*, 1994). The population in several of the more outlying municipalities of the Outer Suburbs such as Chia, Mosquera and Cajicá continued growing at a comparatively fast rate, as we saw earlier, but their combined share of manufacturing employment remained largely stable. We will now inspect more closely the evidence regarding the spatial changes in the distribution of manufacturing employment.



Source: DANE, National Population Censuses and Annual Manufacturing Surveys.

The number of jobs in establishments with 10 or more workers in the BMA experienced consistently higher rates of growth than other large cities and the country as a whole throughout the period. The pace of change in manufacturing employment in the BMA aped very closely the ups and downs of jobs in its Core, an unsurprising fact given the Core's sheer weight in BMA employment.²

There is no doubting that, in the Colombian context, the BMA and its spatial components represent a very important concentration of manufacturing jobs and enterprises. The Inner Core, for example, represents by far the greatest concentration of industrial jobs contained in any Colombian administrative area: in 1989 there were over 40 per cent more jobs in the Inner Core alone than in the whole Metropolitan Area of Medellín, as will be seen in the next section. In the same year, the 'Rest of the BMA' (which comprises the Outer Core and eight surrounding municipalities) had as many jobs as the Barranquilla Metropolitan Area, the fourth largest conurbation in Colombia (albeit after a decade of severe decline). And yet the BMA has not achieved this position as a homogenous whole, but as a result of individual processes of growth and decline within the discrete spatial entities that we have used in our analysis.

Employment in the Outer Core (i.e. those municipalities which became administratively part of Bogotá DE in the early 1950s and for which separate information is rarely available) grew erratically, and variations from one period to the next were more marked than in the Inner Core (i.e. the old municipality of Bogotá). Between the two end years of the period, the Outer Core made a net employment gain of 1,152 jobs (or 12 per cent) while it contributed with around 7 per cent of BMA jobs (cf. table 6.2). Jobs in this BMA component were mostly concentrated in the old municipalities of Bosa and Fontibón, to the South and Southwest of the city, and that is where the majority of establishments were also located (cf. Table 6.4). By 1985, both of these districts had some form of employment in more than half of the 29 industrial sub-sectors represented in the BMA, though Fontibón seem to have a relatively large concentration of jobs in beverages, fabricated metal products and transport equipment, while in Bosa tobacco, leather and non-electrical machinery were among the largest employers.

² As a way of mapping spatial shifts in a more complete manner, it would be desirable at this point to examine spatial changes for all forms of employment. However, it must be noted that such information is not readily available from DANE or any other official source for the study period.

Table 6.3
Bogotá metropolitan area:
Growth of manufacturing employment, 1958-1989
(Annual percentages)

	1958/65 ^a	1965/74 ^b	1974/80	1980/85	1985/89
BMA TOTAL	n.a.	6.2	2.5	-0.8	3.3
Bogotá DE (inner core)	3.6	4.8	2.6	-0.8	3.3
BMA Rest	n.a.	n.a.	2.5	-0.6	3.7
Outer Core	n.a.	n.a.	3.7	-3.9	2.4
Bosa	n.a.	n.a.	4.6	-5.4	3.4
Engativá	n.a.	n.a.	6.8	14.3	-5.7
Fontibón	n.a.	n.a.	5.4	-3.7	2.2
Suba	n.a.	n.a.	4.2	-11.5	14.3
Usaquén	n.a.	n.a.	1.3	-10.3	4.9
Usme	n.a.	n.a.	-7.1	-1.2	-1.8
Soacha^c	n.a.	n.a.	5.2	-0.3	6.1
Outer suburbs	n.a.	n.a.	0.0	2.7	3.8
Cajicá	n.a.	n.a.	-3.1	-1.5	1.2
Chía	n.a.	n.a.	-1.4	3.8	3.0
Cota	n.a.	n.a.	34.3	3.9	10.2
Funza	n.a.	n.a.	-3.2	8.4	4.3
La Calera	n.a.	n.a.	-5.9	8.4	7.9
Mosquera	n.a.	n.a.	6.6	7.6	5.5
Sibaté	n.a.	n.a.	0.3	0.0	2.6

n.a. Not available

a. Total for 1958 includes Core and Outer Core only; total for 1965 refers to Core, Outer Core and Soacha only.

b. Total for 1980 includes one firm with 37 employees but no clearly identified location in the Outer Core.

c. Figure for 1965 includes Sibaté.

Source: Table 6. 2.

Industries located in the Outer Core would appear to be more sensitive to the changes brought about by re-structuring of manufacturing in the early 1980s than industries outside the Core. With the exception of Engativá, localities in the Outer Core suffered the most dramatic job losses in the whole of the BMA during these years and this was not followed by an equally marked recovery in the following period (1985-89). The figures in table 6.3 show instead modest growth in most localities which, globally, resulted in a net increase of employment to a combined 1989 level below that of 1980. Among these localities, Usme (where most employment is derived from glass making and other non-metallic minerals) shows an unbroken contraction (resulting largely from the loss of one glass-making firm) which meant that its contribution to Outer Core employment was halved from over 12 per cent in 1974 to just over six per cent in 1989.

Yet another finding to come out of table 6.3 is that employment in the municipality of Soacha grew at higher rates and more consistently than the Core, and it suffered less in the sector's contraction of the early 1980s than the Inner Core. This is an area of comparatively large establishments in industries which fared comparatively well throughout the period but especially in the early 1980s. Particularly large employers here include glass and ceramic brick manufactures, transport equipment and industrial chemicals.

Employment growth in the Outer Suburbs tended to pick up with time: after experiencing net zero growth in 1974-1980 (which was a period of considerable expansion both in the BMA and nationally) this was the only component of the BMA to experience net growth during the contraction of the first half of the 1980s, which was followed in the second half of the 1980s by growth at a higher rate than in the BMA and national manufacturing as a whole (cf. tables 6.3 and 6.7).

The greater part of the jobs in this outer-most component of the BMA was to be found in just two municipalities: Sibaté, which had a disproportionate number of large factories (opened mostly in the 1950s and 1960s) especially in the rubber, plastic, iron & steel and ceramic brick industries; and Mosquera with an average size of establishment above that of the BMA especially in the basic food industries, and where employment rose at very high and sustained rates throughout the period. Between them, they had nearly 5 per cent of BMA manufacturing employment in 1989, a higher share than Soacha alone (table 6.2), as well as close to two-thirds of jobs in the Outer Suburbs. These two municipalities (along with Cajicá, though especially in the early 1970s), helped sustain the Outer Suburbs' high share of BMA employment through the period.

In addition to Sibaté and Mosquera, three further municipalities made a substantial contribution to employment in the Outer Suburbs: Cajicá, north of Bogotá, with a large industrial chemicals sector and dwindling textile firms and where there was a downward trend in number of jobs during the period, La Calera (the only municipality in the BMA located east of the Core) with only four establishments in 1985 including a large cement factory, and Funza also with a handful of plants and a high representation of plastics and other chemical and which also maintained an above average rate of growth. Between the three of them, these municipalities

harboured around one third of jobs in the Outer Suburbs in 1974-1989, and a by no means negligible 2 per cent of BMA jobs at the end of this period.

Table 6.4 helps enhance our understanding of spatial change in manufacturing within BMA. A first observation that leaps to the eye is the fact the Inner Core has a much higher share of jobs than establishments (cf. table 6.2), which suggests that it also has a smaller average establishment size than the BMA Rest. This, as will be discussed at some length later (especially in section 6.3), offers an interesting first insight into one of the possible explanations for the main question that concerns this study. This share of establishments tended to drop slightly during the period for which we have disaggregated information, at a similar pace to employment and population discussed earlier.

In the remaining area within the BMA the number of establishments actually rose in net terms, even during the recession years. In the case of the Outer Core, the losses of the early 1980s were not to be reflected in an equally high number of establishment closures, which points to an increase in the average number of workers per establishment. Soacha and the Outer Suburbs, by contrast, show net increases in the number of establishments throughout the period and a trend towards an increased share in the BMA.

A last set of statistical data to come from DANE's manufacturing surveys and which helps complete (at least for the time being) our perception of spatial changes of manufacturing in the BMA relates to the shares of manufacturing output which are summarised in table 6.5 for the years 1974-1985. As with employment and the number of establishments, there was a tendency for the Core to lose out to the periphery in production, at least for the 15 years depicted in the table, though changes were even less marked. Some of the losses were initially picked up by the Outer Core (whose share of BMA rose from 6.96 in 1974 to 7.56 per cent in 1985, but then dropped to 6.49 per cent by 1989), and to some extent also by Soacha (whose share rose from 2.04 per cent in 1974 to 3.54 per cent in 1989).

Table 6.4
Bogotá metropolitan area:
Distribution of manufacturing establishments, 1958-1989

	Number of establishments						Share of establishments (%)					
	1958	1965 ^a	1974	1980 ^b	1985	1989 ^c	1958	1965 ^a	1974	1980 ^b	1985	1989 ^c
BMA TOTAL	n.a.	2,908	2,108	2,304	2,187	2,372	n.a.	100.0	100.0	100.0	100.0	100.0
Bogotá DE (inner core)	n.a.	2,863	1,921	2,087	1,963	*	n.a.	98.45	91.12	90.58	89.76	*
BMA Rest	n.a.	n.a.	187	217	224	n.a.	*	8.87	9.42	10.24	n.a.	n.a.
Outer Core	n.a.	*	95	108	101	*	n.a.	*	4.61	4.69	4.62	*
Bosa	n.a.	*	38	48	46	*	n.a.	*	--	--	--	*
Engativá	n.a.	*	4	6	10	*	n.a.	*	--	--	--	*
Fontibón	n.a.	*	41	41	34	*	n.a.	*	--	--	--	*
Suba	n.a.	*	3	5	4	*	n.a.	*	--	--	--	*
Usaquén	n.a.	*	2	2	1	*	n.a.	*	--	--	--	*
Usme	n.a.	*	7	5	6	*	n.a.	*	--	--	--	*
Soacha^d	n.a.	45	38	54	56	*	n.a.	1.55	1.80	2.34	2.56	*
Outer suburbs	n.a.	n.a.	54	55	67	n.a.	n.a.	2.56	2.39	3.06	n.a.	n.a.
Cajicá	n.a.	n.a.	13	12	14	n.a.	n.a.	--	--	--	--	n.a.
Chia	n.a.	n.a.	9	8	8	n.a.	n.a.	--	--	--	--	n.a.
Cota	n.a.	n.a.	1	3	2	n.a.	n.a.	--	--	--	--	n.a.
Funza	n.a.	n.a.	4	2	5	n.a.	n.a.	--	--	--	--	n.a.
La Calera	n.a.	n.a.	2	2	4	n.a.	n.a.	--	--	--	--	n.a.
Mosquera	n.a.	n.a.	13	15	21	n.a.	n.a.	--	--	--	--	n.a.
Sibaté	n.a.	n.a.	12	13	13	n.a.	n.a.	--	--	--	--	n.a.

- Negligible percentages
 * Included in BMA inner core
 n.a.: Not available
 a. Total for 1965 refers only to Core, Outer Core and Soacha.
 b. Total for 1980 includes one firm with 37 employees but no clearly identified location in the Outer Core.
 c. Total for 1989 includes Core, Outer Core and Soacha; no separate figure is available for any of them.
 d. Figure for 1965 includes Sibate.

Sources: DANE, Annual Manufacturing Surveys.

Table 6.5
Bogotá metropolitan area:
Distribution of manufacturing value added, 1958-1989

	Value Added (Millions of 1975 pesos) ^a								Share of value added (%)							
	1958	1965 ^b	1974	1980 ^c	1985	1989	1958	1965 ^b	1974	1980 ^c	1985	1989				
BMA TOTAL	n.a.	11,459.6	21,532.1	26,793.2	35,570.8	40,365.0	n.a.	100.0	100.0	100.0	100.0	100.0				
Bogotá DE (inner core)	n.a.	10,596.0	17,720.6	21,865.8	29,099.3	32,926.3	n.a.	92.46	82.30	81.62	81.81	81.57				
BMA Rest	n.a.	n.a.	3,811.5	4,927.4	6,471.4	7,438.7	n.a.	n.a.	17.70	18.38	18.19	18.43				
Outer Core	n.a.	*	1,499.6	1,934.4	2,690.2	2,621.7	n.a.	*	6.96	7.22	7.56	6.49				
Bosa	n.a.	*	800.4	837.5	1,494.0	1,263.8	n.a.	*	3.72	3.13	4.20	3.18				
Engativá	n.a.	*	71.5	54.6	117.8	143.5	n.a.	*	0.33	0.20	0.33	0.36				
Fontibón	n.a.	*	398.3	808.2	784.3	869.6	n.a.	*	1.85	3.02	2.20	2.15				
Suba	n.a.	*	57.4	72.3	94.6	132.5	n.a.	*	0.27	0.27	0.27	0.33				
Usaquén	n.a.	*	51.7	52.6	58.0	64.6	n.a.	*	0.24	0.20	0.16	0.16				
Usme	n.a.	*	120.4	105.6	141.5	127.7	n.a.	*	0.56	0.39	0.40	0.32				
Soacha^d	n.a.	863.6	439.7	880.1	919.1	1,429.9	n.a.	7.54	2.04	3.29	2.58	3.54				
Outer suburbs	n.a.	n.a.	1,872.2	2,109.6	2,862.2	3,387.1	n.a.	n.a.	8.69	7.87	8.05	8.39				
Cajicá	n.a.	n.a.	301.7	477.9	328.6	480.2	n.a.	n.a.	2.11	1.78	0.92	1.19				
Chia	n.a.	n.a.	25.8	35.0	77.3	111.5	n.a.	n.a.	0.12	0.13	0.22	0.28				
Cota	n.a.	n.a.	0.3	8.3	10.1	20.5	n.a.	n.a.	0.00	0.03	0.03	0.05				
Funza	n.a.	n.a.	69.7	64.3	142.7	196.8	n.a.	n.a.	0.32	0.24	0.40	0.49				
La Calera	n.a.	n.a.	95.7	66.6	438.2	526.5	n.a.	n.a.	0.44	0.25	1.23	1.30				
Mosquera	n.a.	n.a.	256.6	343.3	587.9	744.9	n.a.	n.a.	1.19	1.28	1.65	1.85				
Sibaté	n.a.	n.a.	968.6	1,114.2	1,277.4	1,306.7	n.a.	n.a.	4.50	4.16	3.59	3.24				

* Included in BMA inner core

n.a. Not available

a. The following GDP deflators (taken from López, 1997) have been used: 1965: 0.265; 1974: 0.814; 1980: 3.003; 1985: 8.452; 1989: 21.454. Cf. also Appendix 3.

b. Total for 1965 refers only to Core, Outer Core and Soacha.

c. Total for 1980 includes one firm with 37 employees but no clearly identified location in the Outer Core.

d. Figure for 1965 includes Sibate.

Sources: DANE, Annual Manufacturing Surveys.

It is worth mentioning at this stage that the output figures shown in table 6.5 provide us with a rich source of analysis for the underlying processes which concern us here and will therefore be the object of further analysis in the next chapter when we examine the issues of capital intensity and productivity. However, suffice it at this stage to point to the quite remarkable increases in value added which the table shows for this period, a fact that suggests that, in overall terms, the BMA went through a process of uninterrupted growth in output (of over 77 per cent in real terms between 1974 and 1985) and, in the face of the information presented in the previous paragraphs, a much increased productivity of labour at the end of the period. This was the outcome of the tightening of the city's labour market and rising wages of the second half of the 1970s, as documented in Mohan (1994).

Virtually all areas of the BMA showed remarkable increases in value added, even during the period of job losses in 1980-85. Between the Inner Core and the Rest of the BMA, the latter experienced greater gains (of 82.6 per cent compared with 76.6 per cent in the Inner Core). And within the components of the Rest, the Outer Core was clearly the greatest winner, with a near doubling (92.9 per cent) in real terms between 1974 and 1985. Among the few municipalities where output failed to grow in real terms were Cajicá where a rise in 1974-80 was followed by a sharp contraction, and La Calera, where a drop in the first period gave way to a remarkable increase in 1980-85.

6.3 Employment dispersal within the Core, 1972-1978

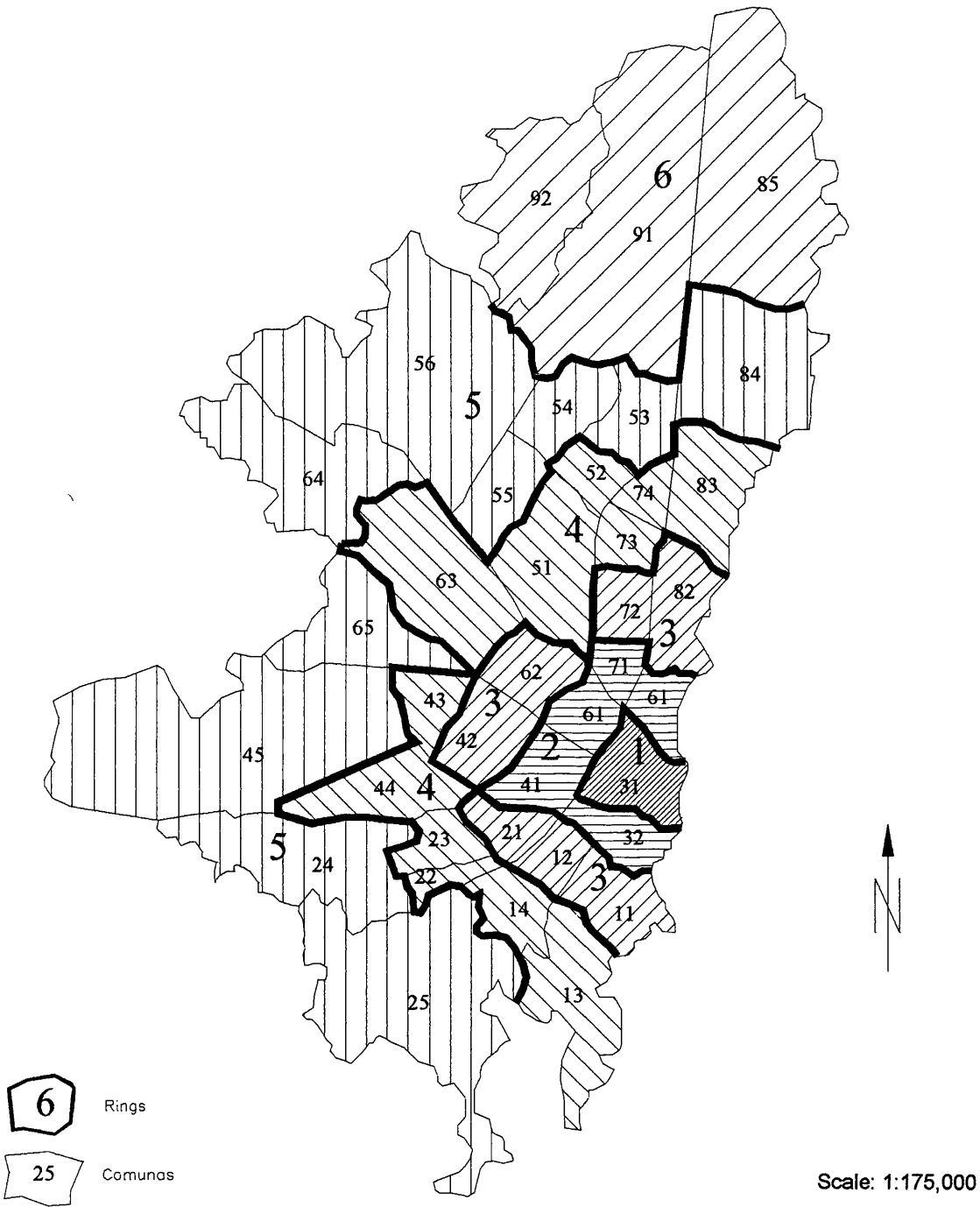
The study of movement of production within cities has been given scant attention in developing countries. As mentioned in chapter 2, there are countless examples in the richer industrialised nations where change was especially dramatic in the 1960s to 1980s as a result of industrial restructuring and deindustrialisation and the issues demanded attention not only from specialists but also from policy makers and planners. There is nevertheless one notable exception in Colombia's case which cannot be ignored here.

In the late 1970s and early 1980s the World Bank undertook one of the most ambitious urban research projects ever carried out in a developing country context. The project, entitled The City Study, looked in detail at five sectors (housing,

transport, employment location, labour markets and public finance) in the cities of Bogotá and Cali. The research focused on the 1970s and drew both on existing research and on empirical information gathered expressly for the project. The results were published by the Bank in a series of working papers, many of which are summarised and given coherence by Mohan (1986 and 1994).

One of the key areas of The City Study was the analysis of patterns and causes of change in the intra-urban location of employment. Like every part of this large research project, this component drew partly on a variety of existing statistical information (DANE's industrial directory, social security data and a 1972 household survey done as part of a development plan for the city) and partly on information collected especially for the project, including a 1978 household survey which unlike most such instruments included questions about the location of respondents' activities (employment, education, etc.) as well as a survey of 126 randomly selected manufacturing establishments in Bogotá DE. This, by all accounts sizeable research effort also produced several excellent outputs, all authored or co-authored by Kyu Sik Lee (e.g. Lee 1985, 1989) who was responsible for this component of The City Study. Given its major significance and relevance for the present study, it is worth spending a few paragraphs simply summarising its major findings. Greater use will be made of them in the next two chapters.

These findings, as was mentioned earlier, relate mostly to a restricted area within the Bogotá metropolitan area, though an area which, as was seen from tables 6.1, 6.2, 6.4 and 6.5, has the largest weight in the BMA: the area within the Distrito Especial (DE) of Bogotá (which in the classification used in this research comprises the Inner and Outer Cores). They also cover a period of rapid economic growth in the city's recent history, particularly in total employment and manufacturing value added as well as a tightening of the labour market (cf. Mohan, 1994). As such, although Lee's research results help to throw substantial light on an incipient and undeniable process of dispersal of jobs (or 'decentralisation' as he prefers to call it), they must also be interpreted in the light of what appear to have been relatively exceptional circumstances of growth in the period of concern to this study.



Map 6.2 Bogotá, DE: the ring system, based on 1973 comunas

Source: Mohan (1986)

For purposes of the collection of statistical information, DANE divides the area within Bogotá DE into 'comunas'.³ These were then grouped together by The City Study team to form six concentric rings, where ring number 1 comprises the CBD and oldest part of the city while the sixth ring contains the outermost neighbourhoods (cf. map 6.2). Table 6.6 summarises part of the data presented in Lee (1985 and 1989). The area contained within rings 1 to 4 very approximately corresponds to the 'inner core' area of this present research (i.e. the old municipality of Bogotá DE) as indicated in the table, while rings 5 and 6 roughly correspond to the outer core. The divergence in the proportion of manufacturing jobs observed between the two sets of figures in tables 6.2 and 6.6 may be attributed to the methodology used in collecting the data. It will be remembered from chapter 3 that since 1970 DANE's annual manufacturing surveys systematically leave out establishments with less than 10 workers, which generate a substantial proportion of total employment. By contrast, to construct this table, the City Study used the results of household surveys (which the present research had no access to) thus providing a more complete picture of all employment and a somewhat more reliable source of information (cf. chapter 7 for more details).

Table 6.6
Changes in employment location in Bogotá DE
by rings, 1972-1978
(%)

Ring	All sectors ^a		Manufacturing	
	1972	1978	1972	1978
1	23.03	13.95	18.20	6.01
2	13.61	17.74	16.07	13.47
3	14.62	16.40	18.94	21.54
4	18.80	20.60	20.27	24.89
(Sub-total inner core:	70.06	68.69	73.48	65.91)
5	18.61	24.94	21.76	28.25
6	1.67	3.43	1.04	2.19
(Sub-total outer core:	20.28	28.37	22.80	30.44)
N.i.e.	9.67	2.96	3.72	3.66
TOTAL	100.00	100.00	100.00	100.00

N.i.e. Not included elsewhere.

a. Includes manufacturing, commerce, finance, services and other unspecified employment.

Source: Lee (1989, table 2-10).

³ 'Comunas' vary considerably in area (from the smallest with 174 Has. to the largest with 3,680 Has.) and in volume of population (25,000 to 400,000). Cf. Mohan, 1994 (p. 72 and Appendix).

The information for this particular part of the research came from two household surveys which included questions about workplace, including location, size of firm and type of business. Lee warns of inconsistencies in the two data sets. For example, economic activity in ring one, which includes the CBD, may have been over-estimated in 1972. This may lie behind the very sharp reduction in employment in ring 1 observed in the table (from 23 to 14 per cent in all sectors). Nonetheless, the data does offer clear evidence of a process of dispersal both in total employment and in manufacturing.

Between 1972 and 1978 Lee finds evidence of employment dispersal in commerce, services and manufacturing, with the extent of relative dispersal decreasing from one to the next in that order. The information reproduced here only shows employment in manufacturing and for all sectors. Employment in the financial sector did not disperse (a not unsurprising finding, given the value this sector places on face-to-face contacts). In contrast, the joint share of manufacturing jobs in the two outer rings, which include the northernmost tip of Bogotá DE and the West and Southwest of the city, rose from 23 to 31 per cent, while that of the three innermost rings dropped from 53 per cent to 41 per cent.

The research also explored the extent to which firms move within the BMA, by asking a question in the 1978 household survey about the present and any previous location of the respondent's workplace. This served to construct an 'origin-destination ratio' which divides the number of jobs moving out of a zone by the number of jobs moving into it. This found that the ratio dropped with distance from the centre, with the CBD having a ratio of 2.37 overall and 2.51 in manufacturing (i.e. for every 100 jobs it received, 251 left). The only net receivers of manufacturing jobs were rings 4 and 5, with ratios of 0.76 and 0.32, respectively, while no firms moved into ring 6.

Finally, the study also found that new jobs (i.e. those created in 1972-78) in manufacturing, commerce and services tended to locate mostly in rings 4 and 5 thus contributing to a generalised movement of dispersal of economic activity. New jobs in the financial sector, in contrast, were located in ring 2, a reflection of the gradual movement of this and related activities north of the CBD to an area close-

by known as the 'Centro Internacional' (though in later years a newer centre of financial activity would spring up further up north).

The City Study research project also conducted a survey among manufacturing establishments to assess the extent and reasons behind their decision to move (or not). This will be used in the next two chapters, as it provides us with an interesting set of data which can be very fruitfully contrasted with that obtained from fieldwork conducted for the present study.

We shall now return briefly to the BMA's role in the nation's manufacturing, as a prelude to our exploration of the two propositions to be tested later in the chapter, which seek a connection between change in manufacturing in the BMA and changes in national manufacturing.

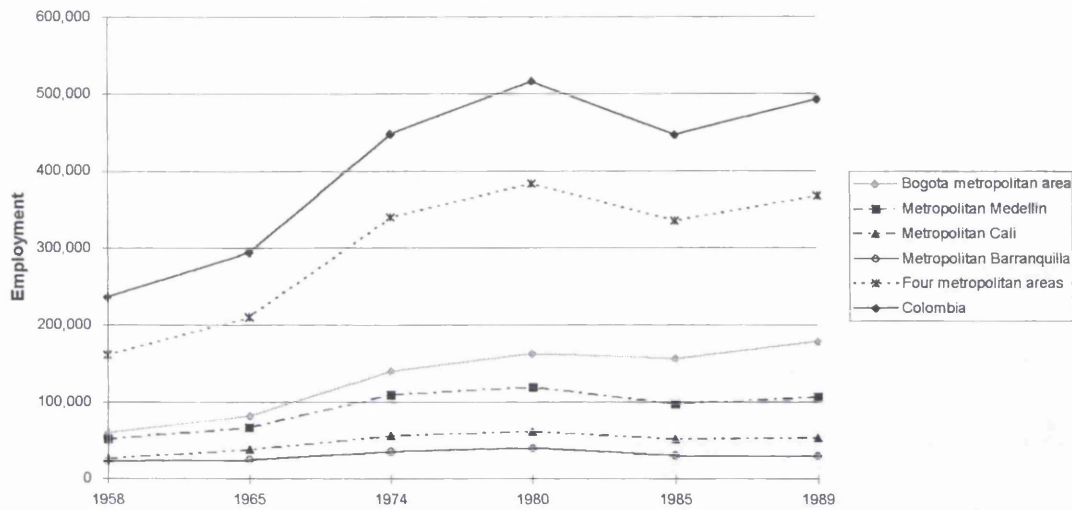
6.4 Development and national significance

Chapter 5 showed how the process of industrialisation in the half a century up to the 1950s entailed a shift of rural-based craft production to urban-based factory production. As table 6.7 and figure 6.2 show, by 1958 over two-thirds of the country's manufacturing jobs could be found in the four largest metropolitan areas.⁴ In that same year, factory employment in the Bogotá metropolitan area represented a quarter of the national total, Metropolitan Medellín contributed with just over one-fifth and Cali and Barranquilla together had less jobs than Medellín, while the next four cities after the big four in the urban hierarchy (Bucaramanga, Cartagena, Manizales and Pereira) together contributed less than 9 per cent of the national total.⁵

⁴ Employment figures quoted in this and the following paragraphs include both paid and unpaid factory workers but exclude cottage-shop employment.

⁵ See Table 3, p. 55 of Jaramillo & Cuervo (1987).

Figure 6.2:
Manufacturing employment in Colombia and
four metropolitan areas, 1958-1989



Source: DANE, Annual Manufacturing Surveys.

Three decades later, in 1989, the only one of the four large metropolitan areas to have significantly increased its national share of manufacturing jobs was Bogotá, with a national contribution of over 36 per cent of employment in establishments having 10 or more employees. However, this rise was not accompanied by commensurate increases in the city's share of output, with the consequence that, when compared with Colombia as a whole, Bogotá's labour productivity gradually dropped between the mid-1960s and the late 1980s.

Table 6.7
Colombia: Manufacturing employment^a in four largest metropolitan areas, 1958-1989

	Employment (Thousands)					Annual growth rate (%)					
	1958	1965	1974	1980	1985	1989	1958-65	1965-74	1974-80	1980-85	1985-89
Metropolitan area ^b	1958	1965	1974	1980	1985	1989	1958-65	1965-74	1974-80	1980-85	1985-89
Bogotá metropolitan area ^c	60.1	81.5	139.9	162.6	156.5	178.5	4.4	6.2	2.5	-0.8	3.3
Metropolitan Medellín ^d	52.0	66.6	109.4	119.5	97.3	106.7	3.6	5.7	1.5	-4.0	2.3
Metropolitan Cali ^e	26.2	38.1	55.7	61.2	51.4	53.1	5.5	4.3	1.6	-3.4	0.8
Metropolitan Barranquilla ^f	23.2	24.4	35.2	40.0	30.2	29.3	0.7	4.2	2.1	-5.5	-0.7
Four metropolitan areas	161.4	210.5	340.2	383.4	335.4	367.6	3.9	5.5	2.0	-2.6	2.3
Colombia	236.7	294.2	447.9	516.3	446.8	492.7	3.2	4.8	2.4	-2.9	2.5

- a. Paid and unpaid workers. Figures after 1969 based mostly on establishments with 10 or more employees. See chapter 3.
b. With the exception of the "Bogotá metropolitan area", figures refer to the officially designated areas wherever figures are available separately for each municipality. The list of component municipalities is given below.
c. Includes the municipalities of Bogotá DE, Soacha, Sibate, Mosquera, Funza, Cota, Chía, Cajicá and La Calera except for 1965 when it refers to Bogotá DE only, and 1965 when total includes Bogotá DE, Soacha and Sibate.
d. Medellín, Bello, Itagüí, Envigado, Caldas, Copacabana, La Estrella, Sabaneta, Girardota and Barbosa.
e. Cali and Yumbo.
f. Barranquilla, Soledad, Malambo.

Sources: For 1958: Jaramillo & Cuervo (1987, p.53); for 1965: CID (n.d.); for 1974-1989: DANE, Annual Manufacturing Surveys.

The unhindered rise in BMA's contribution was largely responsible for an increased joint share of the four metropolitan areas to three-quarters of Colombia's total by the late 1980s, compared with their share of less than two-thirds of national population. The share of employment of the next four largest cities, by contrast, remained unchanged at just over 9 per cent of the total.⁶

In all the periods covered by table 6.7 employment in the BMA grew at a higher average rate than the national total, and generally fared better than any of the other four large metropolitan areas (the reasons for this performance will be discussed at some length later). Medellín maintained a sustained growth rate between 1958 and 1974⁷ largely on the strength of its textile industry which, as we have seen, expanded throughout the period as a response to both internal demand and exports. As this industry had traditionally been Medellín's largest single employer, its ailing health would be largely responsible for below-average growth in 1974-80 and the very drastic contraction of the early 1980s; as it took a comparatively long time to revive, however, it played virtually no role in the city's recovery of the following four years.⁸

Growth was swiftest in Cali between 1958 and 1965, where manufacturing jobs expanded by over 45 per cent, an average yearly rate of 5.5 per cent, with this rate subsequently falling below the national average in the next period. The city saw an increase in diversification in its manufacturing sector, away from foodstuffs and towards higher shares of garments and basic metals. This did not help growth in the following years, however, when much of its industry lost its competitiveness. Finally, Barranquilla, the largest port on the Atlantic where a thriving textile sector had developed in the early decades of the century, showed rates consistently below the national average in the period of study. With lower productivity rates in the textile and garments industries than Medellín, these industries' predicament of the early 1980s deeply affected overall performance and even the generalised recovery

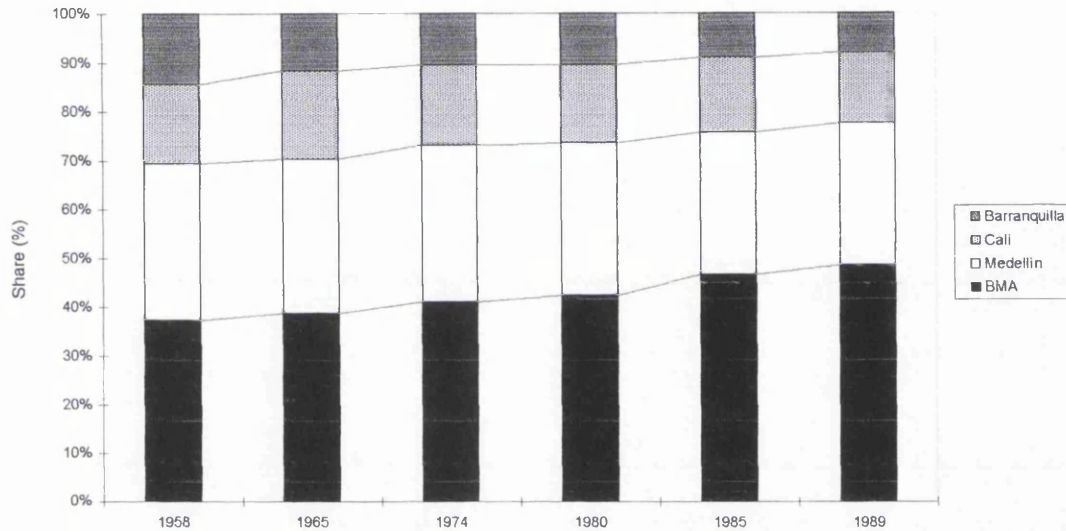
⁶ Cf. DANE's 1989 manufacturing survey.

⁷ An assessment of changes in employment figures between 1965 and 1974 must be done with some caution because of methodological changes introduced in DANE's statistics after 1969, when establishments with less than 10 workers were dropped from the annual surveys, with the exception of those that had more than 10 workers before 1970. For more details see chapter 3.

⁸ Employment in industries such as chemicals and paper grew relatively fast while the textiles and garments industries, which together had generated over half of the manufacturing jobs in the mid-1960s, remained virtually stagnant, a result of modernisation and increases in productivity.

of the late 1980s could not help Barranquilla recoup the severe employment losses suffered in the first half of the decade.

Figure 6.3:
Distribution of manufacturing employment
in four metropolitan areas, 1958-1989



Source: DANE, Annual Manufacturing Surveys.

Figure 6.3 also highlights the growing weight that the BMA has within the group of four largest metropolitan areas, a trend seen also in its contribution to national manufacturing employment which grew consistently throughout the study period, from 25.3 per cent in 1958 to 36.2 in 1989⁹. At this point it would be legitimate to ask questions such as: What factors lie behind Bogotá's rapid rise to national pre-eminence in manufacturing? What underlies an apparent resilience that allowed the city's manufacturing sector not merely to maintain a stable position in the national economy, but also to withstand fluctuations better than other metropolitan areas?

Valid though these questions are, answering them would involve a series of exercises which would divert us from our main objectives in this chapter. To some extent the issues touched upon these questions will re-surface in the next three chapters. Suffice it to mention some of the factors that have been cited in the literature as possible answers. One such set of factors may be summarised in the

⁹ These figures can easily be calculated from Table 6.7.

notion that the city has historically had a unparalleled capacity to generate urbanisation economies, i.e. a critical mass of firms, services and skills which combine together to enhance productivity.

This view contends that the sheer size of the city, the largest concentrated market in the country, gave its industries a comparative advantage in terms of access to both a large (and expanding) labour force and a growing mass of consumers (Gilbert, 1970; Gouëset, 1991)¹⁰, qualities which are reinforced by the proximity of a comparatively large population in nearby towns (Kalmanovitz, 1985, p. 244). This argument takes on particular relevance if seen in the Colombian context of the 1950s and 1960s when, given the country's difficult geography and a notorious lack of adequate roads or a railway network (Latorre, 1986), access to a large local or regional market (in this case that of its own, rapidly swelling population) gave Bogotá's industry a comparative advantage over other cities. This issue will be taken up though in a somewhat different guise in chapters 7 and 8, when we discuss the explanatory value of capital intensity and productivity in the analysis of industrial dispersal within a metropolitan area.

Gouëset (1991) also highlights other reasons, including the city's greater capacity to attract foreign investment (which presumably leads to more establishments settling there), Bogotá's higher degree of industrial diversification (which would ensure a greater capacity to generate employment even during downturns) and a structure biased towards smaller enterprises with lower wages and a larger proportion of family workers (which allow many industries to adapt better to changing conditions as workers are laid off or simply not remunerated for their work in lean times). These factors may help explain why, during the recession of the early 1980s, Medellín lost nearly 20 per cent of its manufacturing employment while Bogotá lost less than 4 per cent.

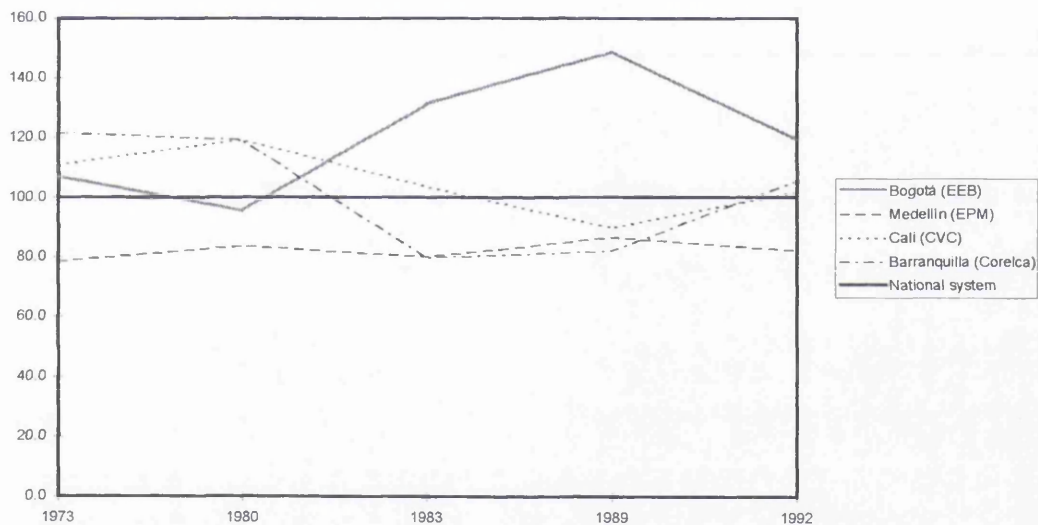
And complementing these, another factor that has been argued to help underpin a comparatively better performance is the availability of a more highly skilled and yet at the same time low-waged labour (Dávila, 1996), both of which contribute to the

¹⁰ Jiménez & Sideri (1985) also attribute some of these features to a few other urban centres in Colombia, but particularly the three largest ones. For these authors, the key factors behind these cities' pre-eminence lay in their existing infrastructure, a large regional market, a comparatively larger pool of more skilled labour force, a location in regions with strong historical links to an external market and a more modern industrial structure which eased the introduction of new products (p. 192).

city's adaptability to a changing environment. The issue of labour cost will be taken up again in chapter 8 but this time in the context of how it may help explain the lack of dispersal of manufacturing industry away from the core in the BMA.

It is worth noting that it is still remarkable that Bogotá's manufacturing sector performed comparatively well in the 1980s despite rapidly increasing electricity rates, particularly while these dropped continuously in the other three large metropolitan areas (figure 6.4). This is a theme that will be taken up again in chapter 8 where the evidence from the sample survey from the BMA is examined in some detail.

Figure 6.4:
Industrial electricity rates in four metropolitan areas, 1973-1992
(National rate=100)



Source: Otero & Avella (1995)

Finally, another factor which has been argued may help explain the city's comparatively more rapid pace of development was the entrepreneurs' need for proximity and ready access to decision-makers in a national government that in the 1950s started to play an increasingly important role in industrial development (Gilbert, 1970, p. 283). In this view, the growing weight of government in decision-making, the introduction of national planning in the 1960s, and the difficulties in transport and communication between localities would be factors supporting the tendency for investment in industry to concentrate in a single urban centre.

6.5 The links between manufacturing growth and spatial dispersal

The issue of the slow and virtually non-existent process of dispersal of manufacturing up to 1990 has not gone entirely unnoticed among researchers on Bogotá. Yet, attempts to examine the process are often limited to mentions of 'sub-urbanisation' (as it is often called) while it is often grouped together with the more evident process of population dispersal (cf. Cuervo, 1993; Pineda & Jiménez, 1990). Only a handful of authors (cf. Lee, 1985 and 1989; Pineda, 1991; Mohan, 1994; Montañez *et al.*, 1990) have gone beyond *en passant* mentions of the issue and even among these, only Lee has explored in any significant manner the links between manufacturing growth and physical changes in the city.

While discussing the location of economic activities in Bogotá in the late 1970s, Cuervo (*op. cit.*, pp. 81-82) has speculated that an explanation for the lack of dispersal may be found in the pace of manufacturing growth. He suggests that in the period 1978-1984 the physical containment of manufacturing within Bogotá's old-established boundaries may be explained by the contraction suffered by manufacturing nationally. It will be recalled from the earlier presentation in this chapter that Lee documented a process of dispersal of employment, including manufacturing jobs, within Bogotá DE during the period 1972-1978. Although it is not explicit in Cuervo's statement, it follows from his argument that, were it not for the aforesaid slowdown, the process of manufacturing dispersal would have continued along the lines documented by Lee. To some extent this line of argument has also been expressed by Pineda (1991) and Pachón (1991) in the case of Bogotá, though in their writings they do not refer to the city's recent past as much as to possible scenarios for its near future (10-15 years or so). They argue that, as the city's economy expands, and as a process of in-filling takes place within existing boundaries, there will be an overspill of population and activities onto nearby towns mostly in municipalities within what we have called here the Bogotá metropolitan area.

That a link may exist between the pace of manufacturing growth and spatial dispersal has rarely been the explicit subject of discussion in the specialised literature, even in contexts such as the US and the UK. Much of the literature on manufacturing dispersal in metropolitan areas up to the early 1970s seems to assume that growth is a precondition for dispersal. Thus, for example, according to

Vernon (1960) in the New York Metropolitan Region of the 1950s growing industries were more likely to leave New York City (the core) than stagnating or contracting industries. Similarly, in his comprehensive review of behavioural explanations of the process, among those authors who refer to 'push factors' as fostering a flight of industry from central areas Scott (1982a) quotes articles published between the 1950s and late 1970s where dispersal is interpreted as being partly or entirely the result of the growth of firms and a consequent lack of space for expansion in central areas. Such a link was also made explicit by Keeble (1980) who in referring to the UK hypothesised that growth is more likely to foster greater dispersal than slow or negative growth.

It was only when large metropolitan areas in the industrialised nations started visibly losing a substantial proportion of their manufacturing base that this connection ceased to be implicit in the discussions about dispersal. Dispersal could also be a result of contraction or recession, forcing firms to cut down on costs or more likely, fostering the closure of centrally located plants, and the relocation or opening of new ones in peripheral areas.

There are two reasons for meriting a brief exploration of this possible link in the case of the BMA in the pages that follow, both on theoretical and empirical grounds. The first one is that the conjecture that such a link may exist in the case of Colombia's capital represents one of the few inroads made by authors working on this topic into the search for an explanation of a lack of dispersal in the particular case that concerns us here. The second reason is that the results of the more concerted effort to illustrate a process of spatial change of manufacturing within the BMA (the World Bank City Study mentioned in section 6.3) used information from a period of unusually high growth.¹¹ The question then remains whether the growth conditions offered by the 1970s were in any way atypical of other periods in the city's recent history, or whether a period of slower growth or contraction would elicit entirely different spatial responses from firms and overall economic activity.

With this end, a series of statistical correlations was performed between dispersal of manufacturing and a number of variables measuring manufacturing growth. The

¹¹ Mohan (1994) concedes that "...the optimistic tone of this study, a reflection of the economic environment of the 1970s, would probably have been tempered if the period of observation had been the 1980s". Yet he adds, "...most of our findings are unaffected by the events of those years" (p. 8).

measure of dispersal used for this exercise was the rate of change in the BMA share of value added in the Inner Core of the BMA for all 29 industries (or manufacturing sub-sectors) represented in it. This measures the difference in its percentage share between the start and end years of a period. Two periods were considered: 1974-1980, which by all accounts was a period of net growth in employment and output in the BMA as well as in Colombia, and 1980-1985 which was a period of net loss of jobs both nationally and locally.

Table 6.8
Inner Core of Bogotá metropolitan area:
Change in manufacturing indicators, 1974-1985
(1985 pesos)

BMA Inner Core value of:	Year			Change ^a (%)	
	1974	1980	1985	1974-80	1980-85
1. Share of BMA value added (%)	82.30	81.62	81.80	-0.68	0.18
2. Value added (millions)	139,255.7	177,669.5	245,947.1	4.1	5.6
3. Employment	117,349	136,547	131,229	2.6	-0.7
4. Establishments	1,921	2,087	1,963	1.4	-1.0

a. Change in percentage share for 1. Annual percentage change for all others.

Source: Tables 6A.1 to 6A.4 (appendix).

The correlations were done for both periods against three measures of manufacturing change (value added, employment and number of establishments) for each of the 29 industrial sectors in the BMA Inner Core. The main values and rates of change of the four variables used in the correlations are transcribed onto table 6.8. The full set of data used for the correlations from which this table has been built will be found in tables 6A.1 to 6A.4 of the appendix. Table 6.9 summarises the results of the correlation exercise.

Between 1974 and 1985, output (as measured by value added) initially dispersed outwards from the BMA Inner Core and then concentrated again though at a slower pace than it had dispersed. During these two periods output in the BMA Centre grew in absolute terms at quite a fast rate, especially compared with employment and number of establishments, both of which contracted in the second period following a relatively modest growth in 1974-1980. There is little doubt from table 6.8 that Bogotá's manufacturing productivity of labour rose during the years shown in the table.

The results of the correlations suggest that spatial dispersal was not significantly related either to changes in value added nor to the number of establishments in the centre of the BMA. None of the associations with the three variables selected explained even half of the changes in the measure of dispersal.

Among the correlation coefficients for the period 1974-1980, which was one of growth in the three variables and of net dispersal of output out of the BMA Centre (table 6.8), the growth in value added would seem to go a longer way than any other in helping explain dispersal. The meagre growth in the number of establishments, at the other extreme, would seem to bear no correlation with this process of dispersal.

Table 6.9
BMA Inner Core:
Results of correlations between spatial dispersal of output^a
and measures of manufacturing change, 1974-1985

Measure of change	Correlation coefficient ^b and level of statistical significance for period:			
	1974-1980		1980-1985	
	r ²	Significance	r ²	Significance
Value added 1974-80	0.36	0.001	--	--
Value added 1980-85	--	--	0.24	0.009
Employment 1974-80	0.27	0.005	--	--
Employment 1980-85	--	--	0.43	0.000
No. establishments 1974-80	0.04	0.283	--	--
No. establishments 1980-85	--	--	0.16	0.036

-- Not applicable

a. Percentage change (for 29 industrial sectors, ISIC Rev. 2) in the Inner Core's share of value added between two end years at 1985 prices.

b. Square of Pearson correlation coefficient.

Source: Calculations based on DANE Annual Manufacturing Surveys.

The period 1980-1985 was one of modest concentration of output in the BMA Inner Core, but also one of losses both of jobs and in the number of establishments as well as of significant expansion in output. The loss in employment during this period would seem to have the greatest explanatory power (with 43 per cent) over the process of concentration of output in the BMA Centre.

In sum, in the case of the Bogotá metropolitan area in the years between 1974 and 1985 there would seem to be no significant correlation between the tendency for

production to disperse out of (or concentrate in) the centre of the metropolitan area and changes in manufacturing output, employment or number of establishments. If anything, one could say that a contraction in the number of jobs may have had a mild positive effect on spatial concentration. This exercise does not therefore offer any conclusive evidence to either reject or confirm the view expressed by some authors regarding the causal links between manufacturing growth and a tendency for manufacturing to disperse.

We may now arrive at a preliminary conclusion. The proposition that the lack of significant dispersal of manufacturing within the BMA in the late 1970s and early 1980s may have been due to the contraction in the industry cannot be proven conclusively. The conceptual discussion summarised earlier in this section has demonstrated that the presumption that such a link exists reflects a somewhat simplistic notion of dispersal. A statistical correlation using data for Bogotá DE for two consecutive periods of growth and decline failed to throw any significant light on such a link.

This stresses the need to disaggregate available evidence much more carefully both along spatial and sectoral lines. The little evidence there is on dispersal must be weighed carefully, and the different forms that manufacturing growth takes measured separately. Thus, while the BMA lost nearly four per cent of jobs in establishments with 10 or more workers between 1980 and 1985, it also had an impressive increase in output of over 38 per cent in real terms during the same period. That the contraction in jobs would seem to bear more significance in reversing the dispersal process than expansion seems to have on dispersal would seem to prove that there is a connection, though an indirect and complex one, between the performance of manufacturing in the BMA and its aggregate spatial location. We can now go on to the second element of the analysis that concerns us in this section, namely the possible effect that the structure of manufacturing may have upon its performance. For this, as was mentioned earlier, a shift-share method will be applied.

6.6 Growth and the structure of manufacturing: A shift-share analysis

The shift-share technique is a descriptive tool used in regional studies to assess the relative weight of different components of change (i.e. growth or decline) in a particular variable (e.g. employment or output). In the case of a spatial unit such as

a city or a metropolitan region it assumes that total employment change in any particular local industrial sub-sector (e.g. garments) is a function of three factors: first, employment change in the national economy (or national manufacturing industry) as a whole; secondly, national employment change in that particular sub-sector; and thirdly, a local or regional residual in employment change which responds to local factors and is unaccounted for by the other two factors.

Thus, for example, employment growth in a particular metropolis may be the result of it having a high concentration of industries (or sub-sectors) growing at a rapid rate nationally (e.g. pyjama production), or it may rather be the result of local factors (e.g. a vigorous incentive programme) and be unrelated to national growth. The technique permits a disaggregation of such factors through the use of relatively simple algebraic manipulation of growth rates.

The equations used in this particular application are based on Johnston *et al.* (1986) and the relevant variables are as follows:

Let E_{j0} be the volume of employment in industry i in region j in the initial time 0. E_{ijt} is the volume of employment at the end of the period of analysis, in year t . The following equations then define, respectively E_j total employment in region j , E_i total national employment in industry i and E_n total national employment.

$$E_j = \sum_i E_{ij}$$

$$E_i = \sum_j E_{ji}$$

$$E_n = \sum_i \sum_j E_{ij}$$

Employment growth in region i is defined as:

$$C = R + S$$

where R is called the Regional share and is the amount by which the region's total employment would have changed if it had changed at precisely the same rate as national manufacturing.

S, the **total shift**, is defined as the difference between actual regional employment change (growth or decline) and its 'expected' growth if it had grown at the same rate as national employment. This is expressed as:

$$S = E_{jt} - E_{jo} \times (E_t/E_o)$$

By definition, the total shift is divided into two components, a proportionality shift, and a differential shift. The **proportionality shift** (PS) measures employment change due to a regional concentration of declining, slow or fast growing industries. For Fothergill & Gudgin (1979) the measurement of this component is the main objective of the technique. This component is often also called the **industry-mix effect** (or **structural component**) and is calculated by applying to each industry (or sub-sector) a growth factor which is the difference between actual industrial growth rate locally and the overall national growth rate. The growth factor for industry *i* is defined as:

$$G_i = E_{it}/E_{io} - E_t/E_o$$

The proportionality shift for region *j* is then calculated as:

$$PS = \sum_i G_i E_{ijo}$$

The **differential shift** (DS), often known as local effect, provides a measure of the degree to which regional industries grow more slowly or faster than their national counterparts. As such it reflects the impact of relative locational advantages, such as regional entrepreneurship, local incentives, and so on. It is generally calculated as a residual:

$$DS = S - PS$$

The technique has been widely used as a tool of analysis especially in the UK and in the US in the 1960s and 1970s (Dennis, 1974; Keeble, 1976 and 1980; Fielding, 1994; Fothergill & Gudgin, 1979; Norton & Rees, 1979), but also more recently (cf. Fingleton, 1994). Its use has not been widespread in Latin American regional or

metropolitan studies, though Townroe & Roseman's 1982 work on Sao Paulo (as part of another World Bank research project) is an exception.

Shift-share has been heavily criticised as being simplistic and inadequate as a policy-making tool. In Richardson's view (1979) it is "the most overvalued tool of analysis in regional economics" (p. 202) and "it tells us nothing about the capacity of a region to retain growing industries or how to attract them in the first place" (p. 205). Its allegedly a-theoretical nature has also come under fire from Holden *et al.* (1986) who, among other criticisms, argue that it implicitly assumes a very restrictive and unrealistic theory of regional growth.

Although many of the criticisms (especially those concerning technicalities about the adequate use of the tool) were successfully answered by Fothergill & Gudgin (1979), the more serious ones concerning the expectation that many researchers and policy-makers appeared to have placed on what is in effect an "accounting exercise" (Holden *et al.*, *op. cit.*, p. 4) appear still unresolved.

Provided it is used with due caution and with explicit recognition of its shortcomings as a tool in policy-making, there would seem to be some degree of agreement as to its usefulness in describing industrial change in a region, and attempting to disentangle some of the effects that different factors would have upon such growth. Fothergill & Gudgin coincide with Richardson in that shift-share is a standardisation technique which, they argue, "like experimental controls in the physical sciences, are an important step in understanding the world" (*op. cit.*, p. 316). Thus, as a first step to describe growth in its different components, shift-share has much to offer, especially if it is seen as a starting point from where the researcher may "begin to test hypotheses in a meaningful way" (*ibid.*). This is precisely the role that this technique will be given in the paragraphs that follow.

Table 6.10 summarises the results of the application of a shift-share method to a set of manufacturing employment data for Bogotá DE in the period 1963-1989. The relevant detailed data from which the results are derived are included in the appendix (Tables 6A.1 to 6A.4). As most of the information used in this chapter, this comes from DANE's annual manufacturing surveys and consists mainly of employment data for establishments with 10 or more workers (see chapter 3). The exercise concentrates solely on Bogotá DE for two reasons: firstly, this is the only

administrative area in the BMA for which data is available on a continuous and consistent manner for the long period (of 26 years) included in the analysis. And secondly, Bogotá DE (which consists of the Inner Core and the Outer Core in our definition of the BMA) contains around 90 per cent of all employment in the BMA, while virtually all sub-sectors of industry (at three-digit level) used by DANE are represented there throughout most of the period.¹²

Table 6.10
Shift-share components of change of manufacturing employment^a
in Bogotá DE^b, 1963-1989
(ISIC Rev. 1)

Period of analysis	Total employment change		Regional share (national effect)		Proportionality shift (industry-mix effect)		Differential shift (local effect)	
	No.	Annual growth rate (%)	No.	Share of change ^c (%)	No.	Share of change ^c (%)	No.	Share of change ^c (%)
1963-1967	1,474	0.5	5,937	402.8	687	46.6	-5,150	-349.4
1967-1974	57,264	9.0	35,161	61.4	-1,002	-1.7	23,105	40.3
1974-1980	21,490	2.6	21,520	100.1	-2,202	-10.2	2,172	10.1
1980-1985	-7,408	-1.0	-19,952	269.3	-501	6.8	13,044	-176.1
1985-1989	18,883	3.2	14,438	76.5	-1,918	-10.2	6,363	33.7
1963-1980	80,228	4.7	62,265	77.6	-3,854	-4.8	21,817	27.2
1963-1985	72,820	3.4	44,732	61.4	-5,154	-7.1	33,243	45.7
1963-1989	91,703	3.3	56,290	61.4	-7,603	-8.3	43,016	46.9

a. Paid and un-paid employment in establishments of 10 employees or more. Data for 1974 comprise only paid employment. Data for 1963 and 1967 include establishments with 5 employees or more.

b. Includes BMA Inner Core and Outer Core only.

c. Proportion of employment change in each period. The three percentages add to 100.

Source: Own calculations based on DANE's annual manufacturing surveys. See appendix 6A for complete tables.

For reasons of comparability over the long period of the analysis, the manufacturing sub-sectors have been standardised across all years by using version 1 of the Standard Industrial Classification, which was in use by DANE until 1970. This groups all manufacturing activities into 20 sub-sectors, while the classification which superseded it uses 29 sub-sectors at three-digit level of disaggregation. The correspondence between the two classification systems is given in chapter 3.

¹² A major exception is sub-sector petroleum refineries (353 in ISIC Revision 2) which had no presence in Bogotá.

During the period 1963 to 1989, manufacturing employment in Bogotá DE more than doubled, from a figure close to 68,000 to nearly 160,000 (cf. Table 6A.1). This represented an increase of nearly 92,000 jobs in 26 years, or an expansion rate of 3.3 per cent per annum. As table 6.10 shows, this was not always uninterrupted growth, but involved periods of fast expansion, such as that between 1967 and 1974 and periods of contraction, most notably 1980-1985. The shift-share exercise suggests that this impressive expansion over nearly three decades happened *despite* Bogotá DE's industry-mix, which in fact seemed largely to work against it. In contrast, the local effect (or differential shift) seems to have fostered growth, with a net contribution of some 43,000 jobs, or 47 per cent of the total increase in the period.

This pattern is repeated for most of the periods in-between the end years, with the exception of those when growth was slow or negative. Thus, the proportions are similar to those of the 26-year period in the years 1967-74, when annual growth was fastest,¹³ and in 1985-89, when growth was also quite vigorous. In these instances, the local effect would seem to explain between 34 and 40 per cent of change, while the regional share (or national effect) would appear to explain between 61 and 77 per cent of it. Industry mix seems to have worked against growth in both of these periods of rapid expansion, though its negative effect was more apparent in the years 1985-1989 than in the earlier period of 1967-74.

In fact, Bogotá DE's own industry mix was a factor working *against* growth in all periods except the first four years of the table.¹⁴ In this early period, the mix of industries was amply favourable to the modest growth shown, while the local effect was strongly militating against it. This impression is reinforced by table 6.11, which reports orders of magnitude of the contribution made by this factor every year. Industrial structure worked in the city's favour only in the mid 1960s, but subsequently held back growth at the rate of between 100 and 480 jobs every year.

Working in the opposite direction to industrial structure in most periods we find then the local effect, that is employment change due neither to national nor industry-mix

¹³ It was even faster in 1967-1971, when jobs grew at a rate of 13 per cent per annum.

¹⁴ This is the case also of the years 1980-85, when it contributed with 501 jobs to the losses of the period. The sign of the percentage share is positive as it is the result of a division between two negative numbers (industry mix by total employment change).

effects. In the years 1963-1967, for example, the local environment would appear to have been detrimental to growth. The reasons behind this are not clear and could well be the subject of a separate investigation in their own right. One may, nonetheless, speculate briefly on their nature with the help of existing studies.

The high negative value of the local effect could well be attributable to the fact that Bogotá was experiencing extremely high rates of population growth (7.3 per cent per annum in 1964-1973), while the authorities were either refusing to recognise and accept the rapid pace of change or were unable to keep up with this growth in the sense of being able to provide adequate infrastructure for the new activities and the large influx of migrants. This rapid process of change in the face of insufficient institutional capacity¹⁵ gave rise to temporary externalities such as lack of adequate services and infrastructure, including transport and reliable supply of water and power, which would nonetheless improve in the following few years.¹⁶ High land prices resulting from high levels of demand in a context of rapid growth may also lie behind the not insubstantial negative value of the local effect: prices in central locations (CBD) and in some of the preferred locations for manufacturing activity were higher in the mid-1960s than a decade later.¹⁷

The conditions that Bogotá as a locality offered to manufacturing in 1967-1974 were the best seen in the years covered by the assessment. These were years not only of fast expansion in employment locally and nationally (with annual growth of 13 per cent locally and 6.6 per cent nationally between 1970 and 1974) but also of substantial investment in infrastructure, housing and services in Bogotá, partly as a result of the national government's 'Four Strategies' development plan, which

¹⁵ This is despite the fact that the staffing of Bogotá's local government increased substantially during these years. Gilbert (1975) reports that "the share of (national) municipal and departmental employees working in Bogotá and Cundinamarca increased from 10.4 percent in 1954, when the (Distrito Especial) was formed, to 17.7 percent in 1969" (p. 255). The number of official employees in Bogotá rose from 2,175 in 1954 to 7,247 in 1964 and 12,113 in 1969. Despite these figures which no doubt benefited Bogotá's economy, a substantial proportion of the rapid expansion experienced by official institutions in Colombia during those years was skewed towards the national government, rather than local government. Gilbert shows that expenditures on national-level institutions rose from 62.7 percent of total government expenditures in 1951 to 70.7 per cent in 1964 and to 80.7 per cent in 1970 (ibid.).

¹⁶ The proportions of Bogotá's population with access to water supply, drainage and electricity rose from 89.5, 87.6 and 88.1 per cent respectively in 1964, to 91.8, 91.7 and 95.3 per cent in 1973 (Gilbert, 1996).

¹⁷ Land values (at 1978 prices) in rings 1, 2 and 3 declined at rates of 2.3, 1.3 and 0.2 per cent per annum between 1964 and 1978 (though the fall in ring 1 may be an over-estimate). In 1970 these rings concentrated 63 per cent of manufacturing employment in Bogotá DE (cf. Mohan, 1994, p. 58).

sought to give cities, and more specifically Bogotá's housing construction sector, a leading role in investment and growth (cf. Dávila, 1984).

The effect of local conditions on employment conditions reached its lowest level in the years 1974-1980, when the difference between national and local rates of job growth was smallest of all in the period under investigation. These were years of rapid expansion in GDP and national investment (respectively 5.5 and 4.9 per cent per annum) and exceptional growth in national employment (4.1 per cent p.a.), though not the same may be said about manufacturing jobs (which grew annually at 2.4 per cent). At the same time, Bogotá's labour market tightened considerably and wages rose in real terms (Mohan, 1994). When the recession hit manufacturing in the early 1980s, this was translated into much increased investment rates and attempts to modernise production and management technologies. This was reflected in increased overall capital-labour ratios.¹⁸

Table 6.11
Shift-share and Bogotá DE:
Annualised contributions of industry-mix
and local effects, 1963-1989
(Average change in employment per year)

Period	Industry mix effect	Local effect
1963 - 1967	172	-1,288
1967 - 1974	-143	3,300
1974 - 1980	-367	362
1980 - 1985	-100	1,482
1985 - 1989	-480	1,591
1963 - 1989	-292	1,654

Source: Calculations based on table 6.10.

The importance of the local effect rose again substantially in the years 1980-1985, a period of receding employment both nationally and locally (cf. tables 6.7 and 6A.5) but also of not insubstantial expansion in the value of Bogotá's manufacturing output (cf. tables 6.7 and 6A.2). It would appear that the trend towards an increased importance of small and medium-sized enterprises nationally, which was

¹⁸ National manufacturing output grew rapidly through the 1970s but labour productivity did not, with the outcome that employment also increased markedly. As a consequence, a tighter labour market in the late 1970s was also a national feature (Cortés *et al.*, 1987).

more pronounced in Bogotá than elsewhere, could have accounted for a sizeable proportion of the local effect during these years (Cuervo, 1992).¹⁹

The last period in this analysis (1985-1989) also brought favourable local conditions, reflected in a high addition of manufacturing jobs (cf. tables 6.10 and 6.11). These years marked a return to rapid growth rates in employment while value added continued growing though at a slower pace than earlier years. Small and medium sized enterprises continued to consolidate their position giving Bogotá an advantage over other large urban centres. The effects of traffic congestion and of the city's diseconomies of scale which appeared in force in the first half of the 1990s (Dávila, 1996) would not yet be felt.

6.7 Concluding remarks

This chapter set out to describe in some detail spatial changes in the distribution of manufacturing employment and output in the BMA during the period of study. It also sought to test two propositions drawn from the literature surveyed in chapter 2 which link spatial shifts with other features of manufacturing industry, notably the nature and rate of its (positive or negative) growth, and its industry composition. It was noted how virtually all previous research on the topic in the case of Bogotá focused on the more evident dispersal of population towards suburban locations, while there was only one notable attempt at tracing and explaining shifts in the location of manufacturing jobs.

A statistical test of the proposition put forward by some authors that the lack of a more pronounced dispersal of manufacturing might be traced to a slowdown in the rate of expansion of manufacturing proves inconclusive. A second proposition was tested using the well-known shift-share technique to seek a possible link between spatial shifts and the structure of manufacturing industry in the BMA.

This suggests that during 1967-1980 and 1985-1989 expansion of jobs in the national capital's manufacturing sector may have been slowed down by its

¹⁹ It would appear that Bogotá offers considerable advantages for small firms, including an important incubation function (Lee, 1989), a role which was also documented for New York in the late 1950s by Hoover and Vernon (1959) and by Struyk and James (1975) for a range of US cities. Although this has been the subject of debate and quite a lot of research, it would appear, nonetheless, that large cities do not necessarily offer the best national conditions for rapid growth of employment in this sector. North and Smallbone (1995), for example, found that compared with rural locations in the UK London-based firms are more likely to achieve output growth in ways which minimise the number of additional workers employed directly by the firm.

disproportionate concentration of industries which were growing more slowly than their national counterparts. In the years when Bogotá lost employment, this factor in effect exacerbated losses. However, the positive (and in the national context high) rates of employment growth over most years are ample proof of a healthy sector which seemed to have expanded largely aided by the conditions offered by their location in Bogotá DE. What exactly these conditions are is difficult to surmise without a proper investigation of the relevant factors. The local factors that may have worked in the industries' favour as suggested by the few available studies on the subject would include a favourable range of small-scale industries and a large concentrated market for industries serving the domestic market. These factors, among others, will be the subject of analysis in the next two chapters of this dissertation.

Appendix 6A

**Statistics on
manufacturing
production
and employment
in the BMA,
1958-1989**

Table 6A.1
 BMA value added in manufacturing by industry:
 Change in the share of BMA Centre, 1974-1985
 (% , 1985 pesos)

Industry (SIC Rev. 2)	Share of BMA value added			Change	
	1974	1980	1985	1974/80	1980/85
Food Products (311)	92.42	91.74	91.82	-7	.1
Food Products (312)	85.76	91.18	80.08	5.4	-11.1
Beverages (313)	94.96	87.55	94.15	-7.4	6.6
Tobacco (314)	83.30	70.85	21.45	-12.4	-49.4
Textiles (321)	84.44	83.37	84.84	-1.1	1.5
Wearing Apparel (322)	100.00	100.00	100.00	.0	.0
Leather Products (323)	25.35	37.46	52.71	12.1	15.2
Footwear (324)	100.00	100.00	100.00	.0	.0
Wood Products (331)	68.66	76.75	79.55	8.1	2.8
Furniture (332)	92.69	92.68	78.91	.0	-13.8
Paper and Products (341)	92.34	86.43	79.11	-5.9	-7.3
Printing and Publishing (342)	98.57	98.09	98.50	-.5	.4
Industrial Chemicals (351)	63.51	31.62	41.58	-31.9	10.0
Other Chemicals (352)	95.50	94.55	93.40	-.9	-1.2
Petroleum Refineries (353)	.00	.00	.00	.0	.0
Misc. Petr. & Coal Prods. (354)	54.50	60.89	68.33	6.4	7.4
Rubber Products (355)	52.44	44.14	46.72	-8.3	2.6
Plastic Products (356)	85.74	79.49	86.09	-6.3	6.6
Pottery (361)	100.00	98.09	60.14	-1.9	-37.9
Glass (362)	16.29	19.28	21.99	3.0	2.7
Other non-metallic (369)	37.71	48.12	30.37	10.4	-17.8
Iron and Steel (371)	56.80	69.51	57.03	12.7	-12.5
Non-ferrous Metals (372)	57.46	57.38	44.93	-.1	-12.4
Fabricated Metal Products (381)	84.79	82.82	78.67	-2.0	-4.2
Machinery, except electrical (382)	79.43	92.93	90.51	13.5	-2.4
Electrical Machinery (383)	84.30	82.98	90.37	-1.3	7.4
Transport Equipment (384)	86.69	85.91	90.75	-.8	4.8
Prof. & Scient. Equipment (385)	98.30	92.73	100.00	-5.6	7.3
Other Manufactured Prods. (390)	94.52	83.01	82.57	-11.5	-.4
TOTAL^a	82.30	81.62	81.80	-0.68	0.18

a. Refers to share of value added of BMA centre as a whole, not to an average of all industries.

Source: DANE, Annual Manufacturing Surveys.

Table 6A.2
BMA Centre: Manufacturing value added by industry, 1974-1985
(Thousands of 1985 pesos)

Industry (SIC Rev. 2) ^a	Value added			Annual change (%)	
	1974	1980	1985	1974/85	1980/85
311	10,643,060	19,317,795	27,060,162	10.4	7.0
312	2,307,026	5,388,636	5,971,684	15.2	2.1
313	20,472,334	26,275,796	53,097,618	4.2	15.1
314	5,837,143	1,148,601	1,852,332	-23.7	10.0
321	10,597,557	11,462,333	13,996,310	1.3	4.1
322	4,384,237	8,726,564	8,593,739	12.2	-3
323	340,372	947,697	1,395,155	18.6	8.0
324	1,114,188	1,716,851	1,949,341	7.5	2.6
331	535,579	499,302	690,549	-1.2	6.7
332	1,803,820	1,771,296	1,999,056	-.3	2.4
341	2,708,340	2,333,337	2,814,330	-2.5	3.8
342	7,649,581	11,250,014	13,723,267	6.6	4.1
351	5,756,653	2,055,005	2,716,644	-15.8	5.7
352	19,176,966	20,964,905	30,109,021	1.5	7.5
353	0	0	0	--	--
354	456,702	1,127,785	2,447,136	16.3	16.8
355	3,617,366	3,758,971	4,269,831	.6	2.6
356	4,930,427	7,131,305	11,870,617	6.3	10.7
361	136,916	229,184	43,652	9.0	-28.2
362	415,766	626,251	768,903	7.1	4.2
369	2,831,908	3,949,111	4,064,552	5.7	.6
371	2,042,111	2,566,458	1,736,650	3.9	-7.5
372	103,519	119,701	186,465	2.5	9.3
381	9,916,888	11,207,060	9,971,771	2.1	-2.3
382	6,097,049	6,552,094	7,589,755	1.2	3.0
383	5,913,310	12,168,976	14,267,436	12.8	3.2
384	6,369,327	10,765,735	16,179,355	9.1	8.5
385	727,364	798,514	1,146,021	1.6	7.5
390	2,370,162	2,810,267	5,435,731	2.9	14.1
TOTAL	139,255,670	177,669,543	245,947,083	4.1	5.6

-- Not applicable

a. See key to industry codes in table 6A.1.

Source: DANE, Annual Manufacturing Surveys.

Table 6A.3
BMA Centre: Manufacturing employment^a by industry,
1974-1985

Industry (SIC Rev. 2) ^a	Employment			Annual change (%)	
	1974	1980	1985	1974/80	1980/85
311	10,272	12,655	13,823	3.5	1.8
312	1,466	1,941	2,301	4.8	3.5
313	4,436	5,560	5,467	3.8	-.3
314	427	445	269	.7	-9.6
321	14,394	14,176	14,443	-.3	.4
322	10,200	14,156	13,108	5.6	-1.5
323	912	2,212	1,967	15.9	-2.3
324	2,401	2,498	2,849	.7	2.7
331	1,233	862	961	-5.8	2.2
332	3,337	3,138	2,962	-1.0	-1.1
341	2,176	1,853	1,661	-2.6	-2.2
342	8,057	9,663	9,942	3.1	.6
351	1,350	779	945	-8.8	3.9
352	10,505	10,955	11,589	.7	1.1
353	0	0	0	--	--
354	199	284	282	6.1	-.1
355	3,235	3,445	2,473	1.1	-6.4
356	4,456	7,385	8,398	8.8	2.6
361	388	356	89	-1.4	-24.2
362	715	1,090	839	7.3	-5.1
369	2,759	2,638	2,376	-.7	-2.1
371	796	1,644	1,024	12.8	-9.0
372	228	236	123	.6	-12.2
381	10,753	10,602	8,929	-.2	-3.4
382	6,110	6,333	5,775	.6	-1.8
383	5,892	8,515	7,698	6.3	-2.0
384	6,630	9,455	7,143	6.1	-5.5
385	1,119	1,024	1,176	-1.5	2.8
390	2,903	2,647	2,617	-1.5	-.2
TOTAL	117,349	136,547	131,229	2.6	-0.7

-- Not applicable

a. See key to industry codes in table 6A.1.

Source: DANE, Annual Manufacturing Surveys.

Table 6A.4
BMA Centre: Number of manufacturing establishments^a by industry,
1974-1985

Industry (SIC Rev. 2) ^a	Establishments			Annual change (%)	
	1974	1980	1985	1974/80	1980/85
311	205	226	202	2.12	-2.13
312	33	39	34	2.47	-.93
313	26	26	25	.59	-.70
314	1	1	1	.00	.00
321	160	181	163	1.94	-2.61
322	163	206	223	3.98	1.60
323	23	38	41	8.23	.00
324	55	54	57	-.31	1.09
331	55	36	36	-6.79	-1.02
332	69	63	55	-1.18	-2.47
341	48	40	44	-2.33	2.48
342	132	147	146	1.80	-.14
351	16	16	20	.00	5.15
352	121	127	130	1.53	.57
353	0	0	0	--	--
354	4	8	7	6.32	-1.59
355	35	38	25	2.08	-5.74
356	68	86	106	3.44	3.96
361	13	11	6	-1.33	-7.79
362	16	19	21	2.15	.79
369	58	50	38	-.63	-1.86
371	18	22	20	1.40	-1.65
372	10	11	4	1.24	-10.59
381	232	239	196	.71	-3.68
382	114	127	122	1.31	-.61
383	75	86	84	3.19	-.82
384	82	92	74	1.75	-2.50
385	27	29	31	1.71	.00
390	62	69	52	1.67	-5.09
TOTAL	1,921	2,087	1,963	1.4	-1.0

-- Not applicable

a. See key to industry codes in table 6A.1.

Source: DANE, Annual Manufacturing Surveys.

Table 6A.5
Manufacturing employment^a in Bogotá DE and Colombia by industry, 1963-1989
(SIC Revision 1)

Industry (SIC Rev. 1)	Bogotá, D.E. ^b					Colombia						
	1963	1967	1974	1980	1985	1963	1967	1974/c	1980	1985	1989	
Food Products (20)	8,046	7,945	12,049	15,016	16,475	19,731	37,160	40,820	59,474	75,185	68,702	78,057
Beverages (21)	5,016	3,943	5,033	6,811	6,322	5,828	16,401	15,247	19,617	28,586	24,696	23,855
Tobacco (22)	491	324	613	921	837	601	3,747	3,295	3,680	4,281	2,982	2,460
Textiles (23)	6,390	7,514	15,315	15,236	15,419	17,798	44,581	46,098	74,428	71,891	51,255	53,873
Wearing Apparel (24)	8,831	7,103	12,601	16,654	15,957	17,922	29,824	26,979	45,622	59,331	56,150	62,917
Wood Prods. Excl. Furniture (25)	939	798	1,457	1,120	1,261	1,701	5,753	5,987	8,353	5,947	5,673	6,827
Furniture (26)	2,053	2,096	3,352	3,263	3,274	4,594	4,588	4,759	7,180	7,713	6,613	9,485
Paper and Products (27)	1,109	1,191	2,288	1,982	1,811	2,010	5,485	6,092	11,769	11,452	10,708	11,126
Printing and Publishing (28)	4,657	5,084	8,057	9,663	9,942	11,775	10,999	11,449	16,541	20,219	18,574	22,114
Leather Products (29)	653	991	1,592	2,794	2,467	3,268	4,272	4,065	6,269	8,192	6,177	7,152
Rubber Products (30)	533	731	3,334	3,713	2,629	1,855	7,005	6,736	9,107	8,359	6,840	6,311
Petroleum Products (31)	5,459	6,994	12,188	12,260	13,102	14,087	18,001	23,480	34,358	38,879	38,565	41,076
Non-metal Minerals (32)	161	167	290	359	372	391	2,049	2,058	4,380	6,156	5,833	6,143
Basic Metal Products (33)	3,501	2,957	5,467	5,544	4,772	4,868	24,397	33,872	30,325	34,298	30,385	33,195
Fabricated Metal Prods. (34)	126	219	1,286	2,168	1,170	1,022	3,490	4,700	14,580	16,841	12,286	12,225
Machinery, except Electrical (35)	5,987	6,344	11,641	11,947	10,168	11,436	17,891	19,627	29,739	33,406	27,121	28,703
Electrical Machinery (37)	1,071	995	7,091	6,575	6,262	7,396	4,355	5,691	15,143	15,142	13,537	16,446
Transport Equipment (38)	4,383	4,505	6,364	9,692	8,086	9,178	8,402	9,329	12,636	19,060	15,268	17,876
Other Manufactured Prods. (39)	5,511	5,481	7,679	10,894	7,888	10,105	13,413	13,373	17,379	24,164	17,990	21,032
TOTAL	3,055	4,064	9,013	11,588	12,578	14,109	7,636	9,326	20,743	27,173	27,416	31,715
	67,972	69,446	126,710	148,200	140,792	159,675	269,449	292,983	441,323	516,275	446,771	492,588

a. Paid and un-paid employment in establishments of 10 employees or more. Data for 1974 comprise only paid employment. Data for 1963 and 1967 include establishments with 5 employees or more.

b. Bogotá's Distrito Especial (D.E.), not including Soacha.

Sources: For 1963 and 1967, CID (n.d.). For 1974-1989, DANE Annual Manufacturing Surveys.

Table 6A.6
Structure of manufacturing employment^a in Bogotá, DE and Colombia, 1963-1989
(Percentage share of employment by SIC Revision 1)

Industry (SIC Rev. 1)	Bogotá DE ^b					Colombia						
	1963	1967	1974	1980	1985	1963	1967	1974	1980	1985	1989	
Food Products (20)	11.8	11.4	9.5	10.1	11.7	12.4	13.8	13.9	13.5	14.6	15.4	15.8
Beverages (21)	7.4	5.7	4.0	4.6	4.5	3.6	6.1	5.2	4.4	5.5	5.5	4.8
Tobacco (22)	0.7	0.5	0.5	0.6	0.6	0.4	1.4	1.1	0.8	0.8	0.7	0.5
Textiles (23)	9.4	10.8	12.1	10.3	11.0	11.1	16.5	15.7	16.9	13.9	11.5	10.9
Wearing Apparel (24)	13.0	10.2	9.9	11.2	11.3	11.2	11.1	9.2	10.3	11.5	12.6	12.8
Wood Prods. excl. Furniture (25)	1.4	1.1	1.1	0.8	0.9	1.1	2.1	2.0	1.9	1.2	1.3	1.4
Furniture (26)	3.0	3.0	2.6	2.2	2.3	2.9	1.7	1.6	1.6	1.5	1.5	1.9
Paper and Products (27)	1.6	1.7	1.8	1.3	1.3	1.3	2.0	2.1	2.7	2.2	2.4	2.3
Printing and Publishing (28)	6.9	7.3	6.4	6.5	7.1	7.4	4.1	3.9	3.7	3.9	4.2	4.5
Leather Products (29)	1.0	1.4	1.3	1.9	1.8	2.0	1.6	1.4	1.4	1.6	1.4	1.5
Rubber Products (30)	0.8	1.1	2.6	2.5	1.9	1.2	2.6	2.3	2.1	1.6	1.5	1.3
Chemical Products (31)	8.0	10.1	9.6	8.3	9.3	8.8	6.7	8.0	7.8	7.5	8.6	8.3
Petroleum Products (32)	0.2	0.2	0.2	0.2	0.3	0.2	0.8	0.7	1.0	1.2	1.3	1.2
Non-metal Minerals (33)	5.2	4.3	4.3	3.7	3.4	3.0	9.1	11.6	6.9	6.6	6.8	6.7
Basic Metal Products (34)	0.2	0.3	1.0	1.5	0.8	0.6	1.3	1.6	3.3	3.3	2.7	2.5
Fabricated Metal Prods. (35)	8.8	9.1	9.2	8.1	7.2	7.2	6.6	6.7	6.7	6.5	6.1	5.8
Machinery, except Electrical (36)	1.6	1.4	5.6	4.4	4.4	4.6	1.6	1.9	3.4	2.9	3.0	3.3
Electrical Machinery (37)	6.4	6.5	5.0	6.5	5.7	5.7	3.1	3.2	2.9	3.7	3.4	3.6
Transport Equipment (38)	8.1	7.9	6.1	7.4	5.6	6.3	5.0	4.6	3.9	4.7	4.0	4.3
Other Manufactured Prods. (39)	4.5	5.9	7.1	7.8	8.9	8.8	2.8	3.2	4.7	5.3	6.1	6.4
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

a. Paid and un-paid employment in establishments of 10 employees or more. Data for 1974 comprise only paid jobs. Data for 1963 and 1967 include establishments with 5 employees or more.
b. Bogotá's Distrito Especial (D.E.), not including Soacha.

Sources: For 1963 and 1967, CID (n.d.). For 1974-1989, DANE annual manufacturing surveys

Table 6A.7
Changes in manufacturing employment by industry in Bogotá DE and Colombia, 1963-1989
(Annual percentage growth)

Industry (SIC Rev. 1)	Bogotá DE					Colombia				
	1963/67	1967/74	1974/80	1980/85	1985/89	1963/67	1967/74	1974/80	1980/85	1985/89
Food Products (20)	-0.3	6.1	3.7	1.9	4.6	2.4	5.5	4.0	-1.8	3.2
Beverages (21)	-5.8	3.5	5.2	-1.5	-2.0	-1.8	3.7	6.5	-2.9	-0.9
Tobacco (22)	-9.9	9.5	7.0	-1.9	-7.9	-3.2	1.6	2.6	-7.0	-4.7
Textiles (23)	4.1	10.7	-0.1	0.2	3.7	0.8	7.1	-0.6	-6.5	1.3
Wearing Apparel (24)	-5.3	8.5	4.8	-0.9	2.9	-2.5	7.8	4.5	-1.1	2.9
Wood Prods. excl. Furniture (25)	-4.0	9.0	-4.3	2.4	7.8	1.0	4.9	-5.5	-0.9	4.7
Furniture (26)	0.5	6.9	-0.4	0.1	8.8	0.9	6.1	1.2	-3.0	9.4
Paper and Products (27)	1.8	9.8	-2.4	-1.8	2.6	2.7	9.9	-0.5	-1.3	1.0
Printing and Publishing (28)	2.2	6.8	3.1	0.6	4.3	1.0	5.4	3.4	-1.7	4.5
Leather Products (29)	11.0	7.0	9.8	-2.5	7.3	-1.2	6.4	4.6	-5.5	3.7
Rubber Products (30)	8.2	24.2	1.8	-6.7	-8.3	-1.0	4.4	-1.4	-3.9	-2.0
Chemical Products (31)	6.4	8.3	0.1	1.3	1.8	6.9	5.6	2.1	-0.2	1.6
Petroleum Products (32)	0.9	8.2	3.6	0.7	1.3	0.1	11.4	5.8	-1.1	1.3
Non-metal Minerals (33)	-4.1	9.2	0.2	-3.0	0.5	8.5	-1.6	2.1	-2.4	2.2
Basic Metal Products (34)	14.8	28.8	9.1	-11.6	-3.3	7.7	17.6	2.4	-6.1	-0.1
Fabricated Metal Prods. (35)	1.5	9.1	0.4	-3.2	3.0	2.3	6.1	2.0	-4.1	1.4
Machinery, except Electrical (36)	-1.8	32.4	-1.3	-1.0	4.2	6.9	15.0	0.0	-2.2	5.0
Electrical Machinery (37)	0.7	5.1	7.3	-3.6	3.2	2.7	4.4	7.1	-4.3	4.0
Transport Equipment (38)	-0.1	4.9	6.0	-6.3	6.4	-0.1	3.8	5.6	-5.7	4.0
Other Manufactured Prods. (39)	7.4	12.1	4.3	1.7	2.9	5.1	12.1	4.6	0.2	3.7
TOTAL	0.5	9.0	2.6	-1.0	3.2	2.1	6.0	2.6	-2.9	2.5

a. Paid and un-paid employment in establishments of 10 employees or more. Data for 1974 comprise only paid employment. Data for 1963 and 1967 include establishments with 5 employees or more.

b. Bogotá's Distrito Especial (D.E.), not including Soacha.

Sources: For 1963 and 1967, CID (n.d.). For 1974-1989, DANE annual manufacturing surveys.

Table 6A.8
Shift-share analysis for Bogotá DE, 1963-1989:
Calculation of proportionality shift (Industry-mix effect) for each industry^a

Industry (SIC Rev. 1)	1963/67	1967/74	1974/80	1980/85	1985/89	1963/80	1963/85	1963/89
Food Products (20)	-90	-179	-1,137	-727	-554	-863	-1,535	-2,192
Beverages (21)	791	-447	-1,446	10	864	868	764	1,874
Tobacco (22)	102	-75	4	155	232	380	423	575
Textiles (23)	341	334	3,123	2,322	794	1,939	3,249	3,960
Wearing Apparel (24)	1,614	515	-1,646	-1,349	-287	-648	-1,984	-2,486
Wood Prods. excl. Furniture (25)	44	-42	667	-99	-127	828	631	602
Furniture (26)	103	2	320	26	-1,086	482	445	-491
Paper and Products (27)	-26	174	450	-138	115	-191	-326	-222
Printing and Publishing (28)	216	-144	-423	-515	-875	362	-143	-850
Leather Products (29)	89	15	-218	311	-136	-1	139	101
Rubber Products (30)	67	-55	840	175	473	385	363	494
Chemical Products (31)	-1,185	-137	466	-1,551	491	-1,331	-2,644	-2,477
Petroleum Products (32)	13	32	-68	-29	18	-175	-191	-188
Non-metal Minerals (33)	-1,054	-1,340	212	-114	48	1,786	1,445	1,637
Basic Metal Products (34)	-33	75	19	295	126	-367	-235	-211
Fabricated Metal Prods. (35)	-58	25	542	639	450	292	851	1,340
Machinery, except Electrical (36)	-235	287	1,205	-188	-703	-1,672	-1,553	-2,087
Electrical Machinery (37)	-101	-335	-2,155	623	-552	-1,545	-697	-1,313
Transport Equipment (38)	498	-579	-1,694	1,317	-525	631	1,746	1,433
Other Manufactured Prods. (39)	-409	871	-1,263	-1,664	-682	-5,018	-5,903	-7,104
TOTAL	687	-1,002	-2,202	-501	-1,918	-3,854	-5,154	-7,603

a. The proportionality shift is calculated as $PS = \sum_i G_i E_{i,t_0}$, where G measures the difference between the actual industry growth rate and the national rate; E_{i,t_0} is the level of employment in industry i in region j in the initial time t_0 .

Source: Calculations based on tables 6A.5 and 6A.7.

7 The metropolitan level I: Establishment characteristics and spatial dynamics

7.1 Introduction

The previous chapter outlined the gradual and modest change in the spatial distribution of manufacturing that took place in the Bogotá metropolitan area (BMA) in the period 1958-1990. This shift was especially marked within the core of the BMA in the 1970s, when it was well-documented by Lee (1989). This was a period of comparatively rapid employment growth, though statistical probing failed to detect a strong correlation between growth and spatial dispersal. A shift-share analysis of the changing structure of manufacturing in Bogotá as compared to Colombia for a 26-year period suggested that growth above the national average occurred despite an unfavourable industry-mix, while local factors appeared to be working largely in support of growth.

The aim of this chapter is twofold: firstly, to probe further the relationship between the dynamics of growth of manufacturing and its tendency to shift spatially within the Bogotá metropolitan area. And secondly, to test in the case of the BMA the proposition advanced by Scott (1982a) and to some extent also Tulpule (1969) that as manufacturing industry in a metropolitan context becomes more capital intensive it will seek more peripheral locations.

The chapter is structured as follows. After the introduction, section 7.2 disaggregates the available evidence on the dispersal of industries away from the core in its different components, namely births, deaths and physical movement of firms. This finds that dispersal in the period when it has apparently been more marked but also best documented for Bogotá DE (the early 1970s) was fostered by a combination of factors and mechanisms, not least of which was its brisk growth rate.

As a prelude to probing the issue of the links between capital intensity and spatial location of industry, and given the proven positive association between establishment size and capital intensity, section 7.3 delves into the matter of the changes over time and space of the size distribution of manufacturing in the BMA.

This is followed in section 7.4 by a test of Scott's proposition mainly by verifying the extent to which manufacturing in the BMA exhibits a spatially structured Heckscher-Ohlin effect. Some concluding remarks end the chapter.

7.2 Births, deaths and movement within BMA

Spatial shifts of employment are the accumulated result of a myriad of individual decisions to close, move, reduce or enlarge an existing plant, to open a new plant, or to branch out elsewhere. As was outlined in chapter 2, contrary to common perceptions the net effect of spatial shifts is only minimally the result of entrepreneurial decisions to move to a different location, while births, deaths and branches jointly provide a much more effective vehicle for the aggregate spatial shift in production facilities (including dispersal) within metropolitan areas.

Bogotá does not appear to be an exception. Despite the fact that it covers only part of the decade of the 1970s, the World Bank's City Study research programme (introduced in chapter 6) yielded a most comprehensive and systematic study of the patterns of manufacturing spatial change in the administrative area defined by Bogotá DE. This is why its findings are briefly summarised here, as a way of introducing the issue of spatial dynamics and how it may be linked to the internal characteristics of firms in the Bogotá metropolitan area. For this research we had no access to DANE's (the Colombian Government's statistics office) industrial directories which would allow us to trace establishments individually across time and space as the World Bank team did. Their availability would have perhaps enabled an update of Lee's (1989) analysis. As said earlier, the sources of official primary information at the disposal of this research comprise mainly the three manufacturing surveys of 1974, 1980 and 1985 comprising a small range of variables disaggregated at establishment level.

Table 7.1 transcribes a table from Lee (1989) showing the changes in the location of manufacturing employment within Bogotá DE in 1970-1975. The divergence with the City Study data presented in Table 6.6 in chapter 6 (where employment appears more evenly distributed between rings 3 to 5) is most certainly attributable to the different sources of information used to construct the two tables. The previous table relies on information collected through household surveys and therefore comprises all manufacturing establishments including those with less than 10 workers.

The table presented here, whose geographical scope is limited to Bogotá DE (i.e. the Inner and Outer Cores in our classification), draws its information from DANE's industrial directories for every year between 1970 and 1975 which, as explained in chapter 1 and chapter 3, include chiefly establishments with 10 or more workers. This suggests that while establishments with 10 or more workers are to an important extent concentrated in ring 5, which contains the area designated in successive urban development plans since the 1940s as the 'Industrial Zone', smaller establishments (including those that could be labelled as being part of the informal or unrecorded sector) are more widely spread around the city. We shall return to the issue of the distribution of employment by size of establishment in the next section.

Despite differences in the coverage of the two sets of data, table 7.1 provides unmistakable support for the evidence of a dispersal trend of establishments away from the city's core towards the more peripheral areas. This is seen in the parallel drop in the share of the innermost ring 1 as well as rings 2 to 4, and a sharp rise in that of ring 5, a crescent shaped area covering the Industrial Zone, the sectors near the international airport, and the southernmost districts, including Usme, Bosa and the area extending towards the neighbouring municipality of Soacha (excluded from the table as it lies outside Bogotá DE's administrative boundaries). Ring 1 was the only one to lose jobs in absolute terms, while in all the others numbers increased at a fast rate, resulting in an impressive aggregate rate city-wide (cf. map 6.2 in chapter 6).

As discussed in chapter 2, spatial changes such as those depicted in table 7.1 are the cumulative effect of numerous individual decisions that affect the location of industrial plants relative to other plants and to other urban activities. The urban economics literature has identified and classified those decisions for the purposes of analysing aggregate movements within metropolitan areas. They consist of new plant openings, closures of existing plants, moves (which may in turn consist of moves within a designated area or outside it) and stationary changes (which may involve *in situ* expansion, contraction or no change).

Table 7.1
Distribution of manufacturing employment
by ring in Bogotá DE, 1970-1975

Ring	1970		1975		Annual growth rate (%)
	Number employed	%	Number employed	%	
1	4,538	5.60	4,102	3.47	-2.00
2	11,767	14.53	14,898	12.59	4.83
3	34,351	42.42	47,858	40.44	6.86
4	18,112	22.37	25,958	21.94	7.46
5	11,548	14.26	24,047	20.32	15.80
6	391	0.48	729	0.62	13.27
N.i.e.	266	0.33	741	0.63	--
TOTAL	80,973	100.00	118,333	100.00	7.88

-- Not applicable.

N.i.e. Not included elsewhere.

Source: Lee (1989, table 3-3).

In his analysis of Bogotá in the early 1970s, Lee (1989) used these categories to disentangle the different contributions that each of these has on the spatial shifts shown in table 7.1. The source of information was again DANE's industrial directory for the years 1970 to 1975, and establishments were classified as 'mature' (if they appeared in the same address in the six annual directories), 'births' (if they appeared for the first time in 1971-1975 and kept the same address), 'deaths' (those that disappeared during 1971-1975 after remaining at one address) and 'movers' (those which relocated sometime during 1971-1975 including new and defunct establishments). The results of the exercise are summarised in tables 7.2 and 7.3.¹

These figures reiterate Lee's earlier findings regarding the trend for establishments to move out of the centre towards more peripheral rings. Thus, while rings 1 and 2 jointly had under 16 per cent of 1970 employment, nearly 40 per cent of the jobs that moved originated in those two rings. By the same token, rings 4 and 5 received nearly half of all jobs that moved within the BMA between 1970 and 1975 while only around 18 per cent of all moving jobs originated there.

¹ Lee notes that 135 firms (out of 2,629 in the industrial directory) could not be classified into any of the four location categories. This helps explain differences in employment totals between tables 6.1 and 6.2 after accounting for stationary growth and flows between the two years shown in the tables.

Table 7.2
Bogotá DE:
Components of manufacturing employment change by ring, 1970-1975
(Thousands)

Ring	Mature ^a		Births ^b	Deaths ^c	Movers	
	1970	1975			At origin	At destination
1	2,364	2,828	1,011	581	1,659	433
2	7,136	8,211	4,310	1,701	2,726	1,772
3	26,291	32,807	8,393	3,663	4,689	4,535
4	14,591	17,701	4,554	1,611	1,697	3,273
5	9,149	13,035	5,332	1,677	358	3,351
6	119	29	487	44	82	66
N.i.e.	191	519	224	29	--	--
TOTAL	59,841	75,130	24,311	9,306	11,211	13,430

- Not applicable
N.i.e. Not included elsewhere
a. Excluding movers.
b. At birth and excluding movers.
c. In 1970 and excluding movers.

Source: Lee (1989, table 3-5).

Table 7.3
Bogotá DE:
Components of manufacturing employment change by ring, 1970-1975
(%)

Ring	Mature ^a		Births ^b	Deaths ^c	Movers	
	1970	1975			At origin	At destination
1	3.95	3.76	4.16	6.24	14.80	3.22
2	11.92	10.93	17.73	18.28	24.32	13.19
3	43.93	43.67	34.52	39.36	41.82	33.77
4	24.38	23.56	18.73	17.31	15.14	24.37
5	15.29	17.35	21.93	18.02	3.19	24.95
6	0.20	0.04	2.00	0.47	0.73	0.49
N.i.e.	0.32	0.69	0.92	0.31	--	--
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00

- Not applicable
N.i.e. Not included elsewhere
a. Excluding movers.
b. At birth and excluding movers.
c. In 1970 and excluding movers.

Source: Lee (1989, table 3-5).

Another dimension that comes out of the information from the City Study reproduced here is the extraordinary dynamics of births and deaths of establishments that characterised the early 1970s in Bogotá. Births of establishments contributed with 61 per cent of new jobs, while stationary growth (in mature establishments) provided the rest. The death rate was also high, with over one in ten jobs that started out in 1970 disappearing at some point before 1976.

Lee notes that Bogotá's birth rate of establishments was, at 8.8 per cent per year, higher than that of any of five US cities examined and that of Cali in Colombia, though considerably lower than in Seoul and its region². The same conclusion could be drawn regarding their annual contribution to Bogotá's employment growth of 5.7 per cent in 1970-1975.³ But the city's high pace of manufacturing change may also be seen in its relatively high death rate of establishments which, at 4.9 per cent per year, was only lower than that of Phoenix and Minneapolis-St. Paul in the late 1960s, though much lower again than in Seoul.⁴ The examination of these vital statistics for establishments also suggests that the pace of change was swifter than a look at employment statistics would imply. This indicates that change was more dynamic among the smaller ranges of establishments which "have a greater propensity to move, start up, and close down" (Lee, 1989, p. 43).

7.3 Establishment size and locational trends in the BMA

Following a well-documented analysis of the process and factors behind the recent changes in the relative location of manufacturing industry in metropolitan areas, Scott (1982a) argues that this will tend to assume the form of a labour intensive core surrounded by a capital intensive periphery. Insofar as it is likely to shed some light into the causes behind the relative changes in the location of

² The five US cities were Cleveland, Minneapolis-St. Paul, Boston, Phoenix and New York and the period was the 1960s; annual birth rates of establishments ranged between a low of 1.99 per cent in Boston to 7.55 per cent in Phoenix. In Seoul, by contrast, the rate was 19.71 per cent in 1977-1978 while in Seoul Region it was an astonishing 22.75 per cent (cf. Lee & Choe, 1985). The comparison also includes Cali, in Colombia, for the period 1970-1975, where births occurred at the rate of 7.44 per cent per annum.

³ According to Lee, it is possible that the figure on births may include some relocations from outside Bogotá DE during the study period (1989, p. 43). The corresponding rate in the five US cities ranged between 0.43 in Boston, to 3.88 per cent in Phoenix, while Cali's was 4.48 per cent and Seoul Region 13.11 per cent per annum (Lee & Choe, op. cit.).

⁴ The annual death rate of establishments ranged between 3.71 per cent in New York and 6.32 per cent in Phoenix, in Cali it was 4.88 per cent, and in Seoul and Seoul Region it was 14.43 per cent and 13.57 per cent, respectively (ibid.).

manufacturing in the BMA, a test of this proposition will provide the central focus of section 7.4. This section will first prepare the ground by examining some additional information about manufacturing development in the BMA which complements that presented earlier, and which in many ways helps to probe more deeply into the process of spatial shift. The main issue to be covered here refers to the association between spatial shifts and changes in the size distribution of manufacturing establishments.

Scott's proposition rests on evidence from previous work showing that shifts in the location of manufacturing industry in large metropolitan areas often involve a gradual relative concentration of small-scale plants in the core and a simultaneous dispersal of larger establishments towards the metropolitan periphery. This in many ways is arguably tantamount to a simplified restatement of Scott's proposition as, in general terms, larger establishments tend to be more capital intensive than smaller establishments. Such is certainly the case of Colombia's industrial sector (Cortés *et al.*, 1987).

In the specific case of Bogotá's recent development, Cuervo (1993) has argued that the weak dispersal of manufacturing outwards from the core may be partly attributed to "the consolidation of small-scale manufacturing which (during the 1980s) has grown at a faster pace than medium- and large-scale industry" (p. 82). Two implications are derived by the author from this initial observation. The first is that, as a result of the relative emergence of small-scale establishments, manufacturing tended to lose its role in furthering the city's economic growth and thereby also failed to maintain previous suburbanisation tendencies. The association between manufacturing growth and spatial dispersal was already discussed for the case of Colombia's capital in the last chapter so there is no need to repeat it here.

Of greater interest to our present discussion is the second implication derived by Cuervo which is that, given the higher dependency on agglomeration economies and greater need for relatively central locations of small-scale industry, its rise is likely to encourage further spatial concentration. By the same token, large-scale manufacturing as a source of suburbanisation "has suffered a crisis which seems to be reflected in its patterns of spatial behaviour" (*ibid.*). In consequence, Cuervo

argues, an eventual revitalisation of large-scale industry is likely to be reflected in a resumption of the process of industrial dispersal.⁵

These views find an echo in the work of other authors reviewed in chapter 2, particularly in the context of industrialised nations. In the now classic study of the New York Metropolitan Region in the 1950s, for example, Vernon (1960) shows that the average size of New York establishments was smaller than in the US as a whole for the same industries. Similarly, other sources quoted in chapter 2 show that small-firm industries are more likely to be found in central areas of large conurbations.

It should now be clear in the reader's mind that there is a need to examine the pattern of development of Bogotá's manufacturing sector from the point of view of the size of establishments. For not only has the association between size and spatial location been often documented in metropolitan contexts, but it has also been postulated for the particular case of concern to this research. This section will therefore probe further into the proposition that the rate of dispersal of manufacturing is low because the BMA has a disproportionate and growing weight of small-scale establishments (which presumably have a greater need for central locations). As was indicated above, this helps us to lay the ground for testing Scott's proposition for the BMA.

We will start this examination with a cross-sectional glance at the distribution of manufacturing according to establishment size categories (as measured in employment terms). We will look initially at different features of this distribution in 1985 and this will be subsequently complemented with an examination of the changes in this distribution in 1974, 1980 and 1985, the three years for which we have detailed information disaggregated at the establishment level.

⁵ The full passage in Spanish reads thus: "De otro lado, es evidente que el desarrollo industrial de los últimos 12 años se ha basado en la consolidación de la Manufactura en Pequeña Escala que ha crecido a ritmos más acelerados que la industria mediana y grande. Esto significa no solamente que la industria tendió a perder su papel económico motriz, sino que su dinamismo empezó a basarse en nuevas formas que dieron cierta prelación a la Manufactura en Pequeña Escala que, como se sabe, es más dependiente de las economías de aglomeración y necesita de localizaciones relativamente céntricas. La gran industria como fuente de suburbanización ha sufrido una crisis que se estaría reflejando en sus pautas de comportamiento espacial. Por consiguiente, todos aquellos factores que contribuyan a reanimarla, se verán reflejados en la revitalización del proceso de suburbanización industrial" (Cuervo, 1993, p. 82).

It is worth stressing that, as explained in chapter 3 the data used here covers only a marginal proportion of those establishments with less than 10 workers in the BMA. The purge of establishments with less than 10 workers from DANE's database explains that in the information presented in this section for 1974 and 1980 the proportion of establishments with less than 10 workers is at times (especially regarding employment) significantly higher than in 1985.

Another short methodological note must be added regarding the size categories shown in the figures and tables that follow. There is no universally agreed cut-off point or even method to classify firms, plants or establishments according to their size. To a large extent, the break variable (usually, though not always, the number of workers), cut-off points and the number of categories are chosen to suit the needs of each individual research. In Colombia data availability and structural differences suggest a distinction between household or cottage-shop industries on the one hand, and small, medium and large factories on the other (Cortés *et al.*, 1987, p. 36).

The choice of size categories used in this study is limited by the official sources of primary information (i.e. annual manufacturing surveys). With the aim of achieving some comparability, the range of categories seeks to conform to DANE's own choice of break points as presented in the provisional results of the 1990 economic census⁶ (cf. DANE, 1991b) as well as to those used for 'factory employment' (i.e. establishments with five or more workers) in Cortés *et al.*'s study of small- and medium-sized manufacturing in Colombia in the 1970s (*op. cit.*). For convenience, the categories are labelled small (up to 49 workers), medium (50-99) and large (100 or more).⁷

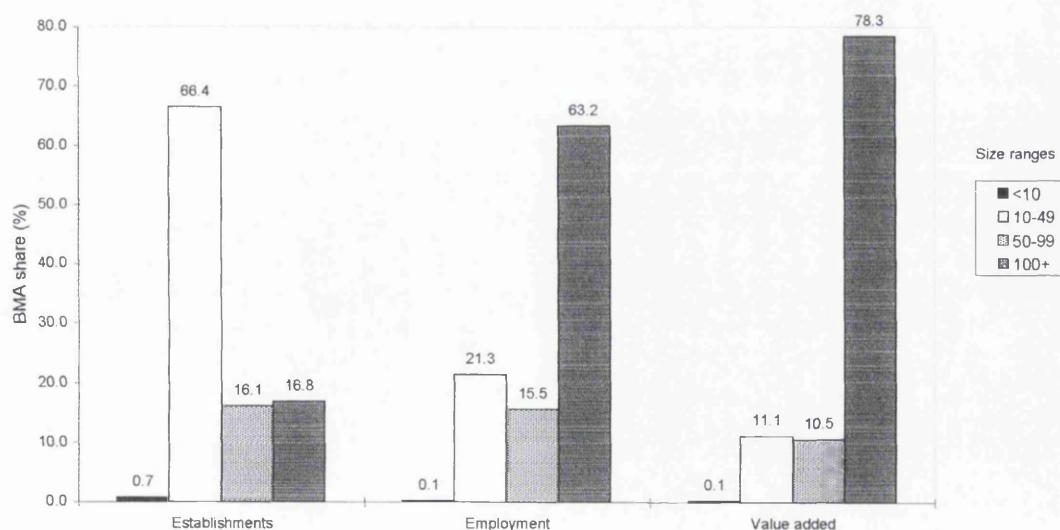
Finally, a few words must be added to remind the reader about the limitations of the official database used regarding our possibility to trace with some precision the spatial shifts in individual establishments or even industrial branches. As was said

⁶ In DANE's publications reporting on the returns from annual manufacturing surveys, the largest category used here (100+) is broken down into a further seven categories.

⁷ Yet another possibility considered was the search for some comparability between the findings in this and those of other similar research works on Bogotá. Cuervo (1993) transcribes the results of DANE's 1990 economic census and later makes reference to small-scale industry, though in the context of the relevant discussion (mentioned at the beginning of this section) it is not clear precisely what size range this refers to. In his study of employment location in Bogotá in the 1970s, Lee (1989) uses three different classifications according to the source of data and the use it is given in the text. Small-sized establishments are defined as having less than 10 employees in chapter 2 and as having less than 25 employees in chapter 4. In a third classification used in chapter 3, there is a 5-19 category and a 20-49 category, though neither of these is given a label.

in chapter 3, the databases available to this research, although detailed at the level of establishment for three separate years, do not include information on their precise location, nor is it possible to follow the trajectory of individual establishments over time or space. The smallest spatial subdivision available is the municipality (or former municipality, as in the case of the Outer Core), a fairly large scale when it comes to tracing short-distance movements. Later in this section we use the notion of distance from the populated centre of each municipality to the CBD as a parameter to measure spatial changes in the average establishment size within the BMA. On the whole and given the fact that factories are spread around different parts of municipalities, it is not unlikely that, outside the Outer Core, this may not be such a distortion of reality. But it is nonetheless a simplification which must be reported, for it assumes that this variable represents the average of the distance to the CBD of all individual establishments surveyed in the municipality. Following these clarifications we may now return to an examination of the data.

Figure 7.1:
BMA: Size distribution of manufacturing, 1985 (%)



Source: DANE, 1985 Manufacturing Survey.

In 1985 large-scale establishments generated a disproportionate share of output and employment in the BMA (figure 7.1). With one sixth of BMA's establishments, their share of employment was close to two-thirds while output represented nearly four-fifths of the total. As a result, average size of establishment in this size

larger than that of the 10-49 worker size category (cf. table 7.4).⁸ Shares in the 50-99 category were less dissimilar, with close to one-sixth of establishments and employment and one-tenth of the BMA's output, while average establishment size was close to that of the BMA.

Some two-thirds of all establishments were clustered in the 10-49 workers range, though this also showed much smaller shares of employment and value added and an average establishment size of 23 workers. For purposes of comparison, the smallest category in figure 7.1 and table 7.2 (less than 10 workers), is perhaps best regarded as a residual for in DANE's annual manufacturing surveys its share in employment and output appears to be virtually negligible.⁹

Table 7.4
Bogotá metropolitan area:
Average establishment size by size category, 1965-1989
(%)

Size category	1965 ^a	1974	1980	1985	1989 ^a
<10	n.a.	7.1	6.9	6.5	n.a.
10-49	n.a.	23.1	24.0	22.9	n.a.
50-99	n.a.	69.4	69.5	68.7	n.a.
100+	n.a.	265.0	279.4	269.4	n.a.
TOTAL	28.0	66.4	70.6	71.6	69.8

n.a. Not available

a. Comprises Bogotá DE and Soacha only

Sources: For 1965: CID (n.d.); for 1974-1989: DANE, Annual Manufacturing Surveys

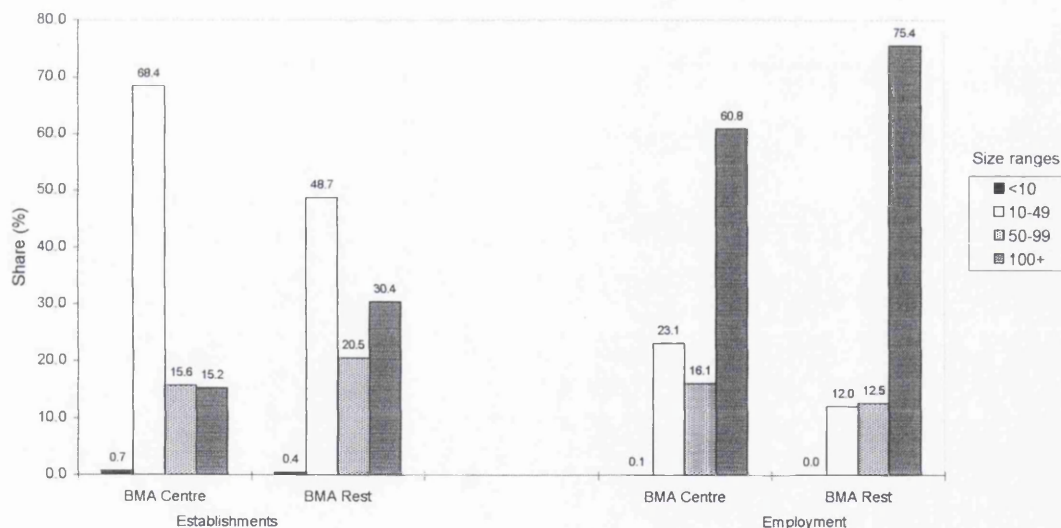
More insight into the effect of establishment size can be gained from further disaggregating the information into smaller spatial units. The result is found in figures 7.2 and 7.3 which, like the previous figure, are based on information from the 1985 manufacturing survey. Figure 7.2 supports the notion that the majority of establishments in the centre of the BMA (which comprises the Inner Core in the classification used in this study) are best classified as small (under 49 workers), as

⁸ The low average size shown for 1965 in table 6.2 is partly the result of the inclusion of a comparatively large proportion of establishments with less than 10 workers in DANE's survey. These were dropped altogether from annual surveys after 1970.

⁹ It is worth highlighting from the discussion in chapter 3 that the smallest-scale of establishments does represent a substantial share of overall employment both in the city and nationally. According to DANE's 1990 Economic Census (DANE, 1991b) the establishments with less than 10 workers represented 80.4 of surveyed units and employed 21.1 per cent of Bogotá DE's manufacturing employment; in Colombia, they represented 84.8 of surveyed units and employed 24.4 per cent of workers. On average, units had 2.9 workers in the capital city and 2.6 nationally.

they represent over two-thirds of all establishments. The same may not be said about the rest of the BMA as (even with the inclusion of the marginal category of the under-10-workers) the small establishments make up less than half of all establishments. The significant disparity between the centre and the rest in their relative shares of employment, particularly among the large establishments seems to confirm the proposition that smaller establishments do tend to cluster in the centre while larger ones tend to locate closer to the periphery. At this point it is worth stressing that this finding must be treated with some caution, as it does not mean to imply that smaller establishments necessarily choose to locate in the centre, but that at least a proportion of centrally located establishments will be small precisely because they lack the space to expand. And we may now look at a somewhat finer and more disaggregated picture.

Figure 7.2:
BMA Centre and Rest: Size distribution of manufacturing, 1985 (%)



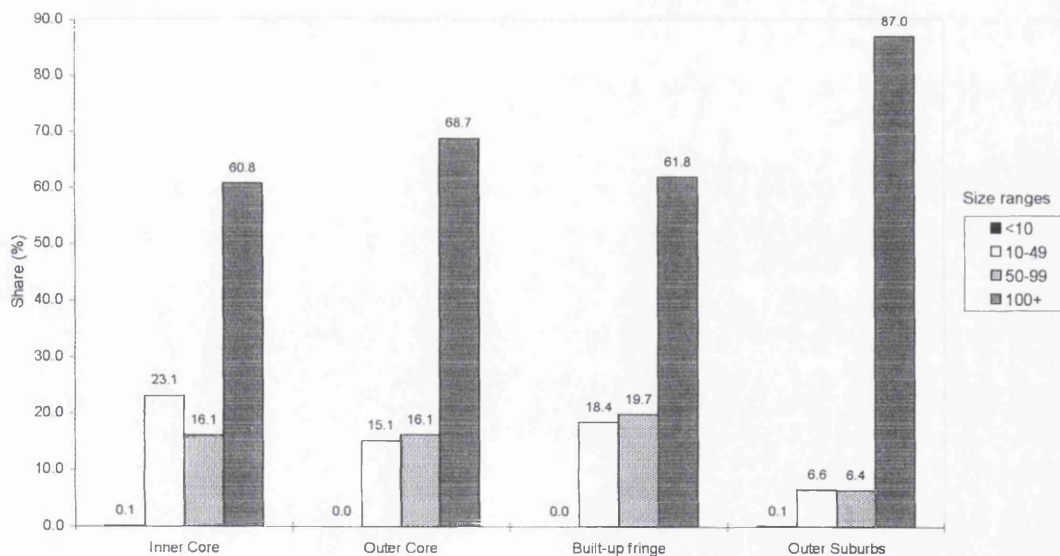
Source: DANE, 1985 Manufacturing Survey.

Figure 7.3 provides an interesting breakdown of manufacturing data by size categories for the smallest spatial components of the BMA available to us. Already a distinction between the Inner and Outer Core is visible, with the employment share of large-scale establishments in the latter outweighing that of the former by eight percentage points. Thus the Outer Core (which it may be remembered from the previous chapter had close to 10,000 jobs or over six per cent of BMA employment in 1985) is an area of location for relatively large-scale industry, with

employment in 1985) is an area of location for relatively large-scale industry, with an average of 95 workers per establishment, or fully a third larger than the BMA average size.

Out of 101 establishments surveyed in the Outer Core (cf. table 6.3), 80 are located in just two spatial sub-divisions (former municipalities), Bosa (with 46 and over 4,000 workers) and Fontibón (with 34 establishments and 3,400 workers) where some 78 per cent of jobs in this BMA component are generated.¹⁰ One-fifth of Bosa's 46 establishments employing two-thirds of its workers fall within the 100+ category; with an average size of 270 workers per establishment. Nine of Fontibón's establishments fall in the 100+ category and provide 72 per cent of its jobs. Thus, in effect 19 establishments alone generate over half (54 per cent) of all jobs in the Outer Core and they are no doubt largely responsible for the hump in the Outer Core shown in figure 7.3.

Figure 7.3:
Size distribution of employment by BMA components, 1985 (%)



Source: DANE, 1985 Manufacturing Survey.

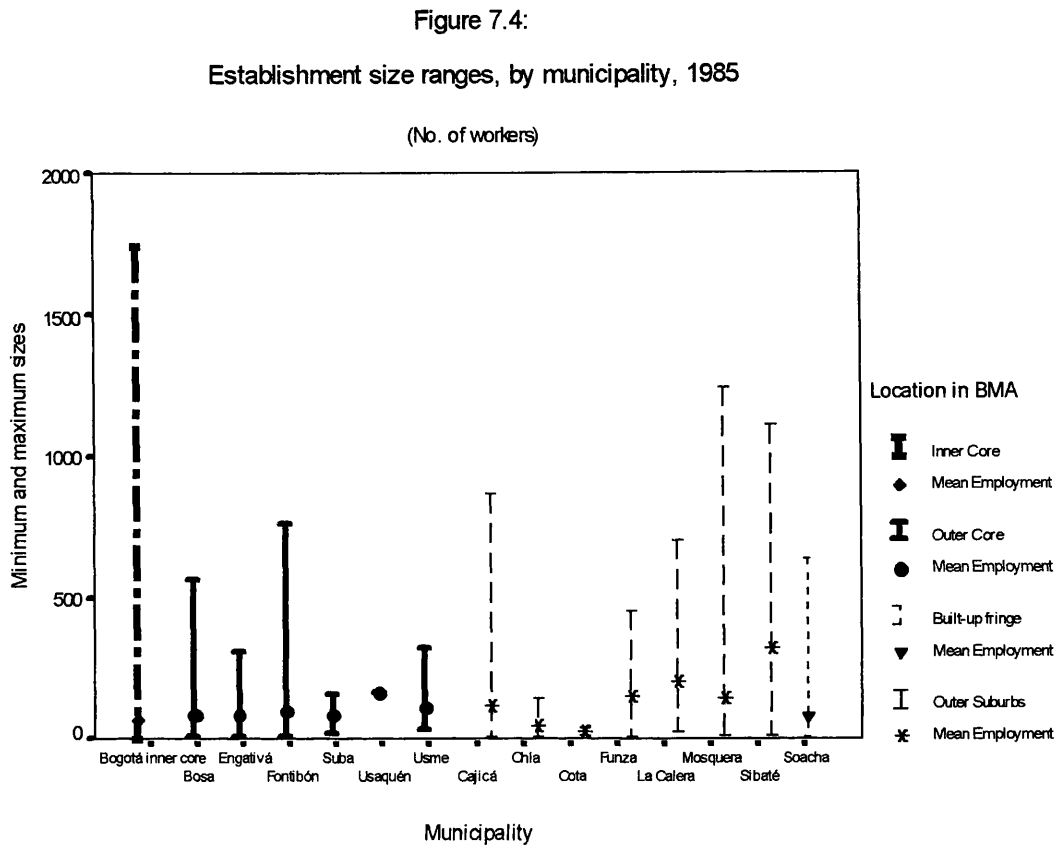
Moving further to the right of the figure, and hence further out in the BMA, we can see that the size distribution in Soacha (with half the jobs of the Outer Core and close to three per cent of the BMA total) shows a similar profile to that of the Inner Core. By contrast, that of the Outer Suburbs (with 11,000 jobs or seven per cent of

¹⁰ The detailed information may be consulted in the statistical appendix of chapter 5.

jobs distributed among establishments with less than 99 employees, and the rest concentrated in large-scale ones. With an average size of 166 workers per establishment (2.3 times the BMA average), this area may be regarded as a haven for large plants.

As in the Outer Core here jobs tend to be concentrated in a few of the seven municipalities that comprise this BMA component. Sibaté, Mosquera and Cajicá jointly generate over 81 per cent of all employment and all provide a fertile environment for large establishments. The largest are located in Sibaté, where a mere eight of them in the 100+ category and an average size of 505 workers each provide 36 per cent of all jobs in the Outer Suburbs (and nearly 2.6 per cent of all BMA jobs in 1985). The remaining five establishments in this municipality fall in the 10-99 categories but together employ only 207 workers.

Large-scale establishments are also an important feature of Mosquera, where nine of them in the 100+ category and an average size of 281 workers jointly generate 2,530 jobs, while twelve establishments in the smaller categories of 10-49 and 50-99 jointly employ 517 workers. In the case of Cajicá's 14 establishments, five fall within the 100+ category and employ 84 per cent of workers in this municipality or over 13 per cent of all workers in the Outer Suburbs. Finally, La Calera is another municipality in the Outer Suburbs which stands out on account of the large average size of its 100+ category, but this is attributable to a single factory employing 709 workers, while the remaining three establishments fall within the 10-99 categories and jointly employ 125 workers.



Source: DANE, 1985 Manufacturing Survey.

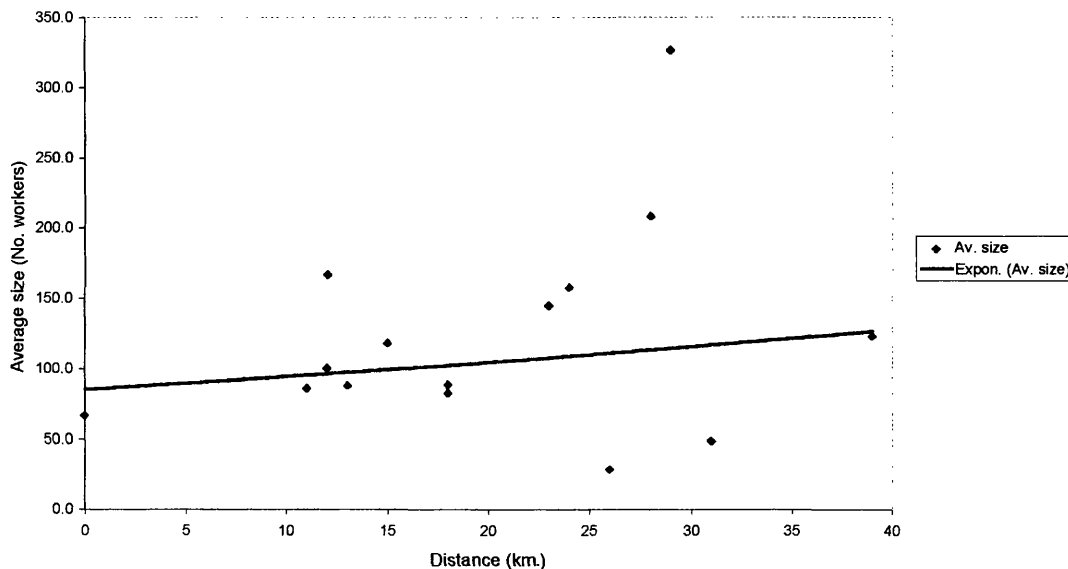
From the above discussion it would appear that manufacturing in some municipalities is almost exclusively dominated by large-scale establishments. Although a look at tables 6A.1 to 6A.6 in appendix 7A would no doubt dispel this impression, this is cumbersome and may even be somewhat misleading unless one inspects the data carefully. Figure 7.4 gives instead a much more concise impression of the wide variations in the size ranges of establishments in each municipality of the BMA area. In this figure, a line style and a symbol has been assigned to each of the four main areas of the BMA with all municipalities in every location sharing a particular line style and symbol. The top and bottom ends of each line represent respectively the largest and smallest size of establishment found in each municipality, while the location of the symbol gives an idea of the average establishment size in each municipality.

Not surprisingly given its size and the number of establishments in it, the Inner Core has the widest range of all, with sizes ranging from 2 to 1,741. Sizes in Mosquera and Sibaté (in the Outer Suburbs group, towards the right-hand side of the chart)

also cover a wide range, though the number of establishments in these two municipalities is only a fraction of the Inner Core. Other municipalities with comparatively wide size ranges include Soacha (which makes up the Built-up Fringe), Fontibón (Outer Core), Cajicá and La Calera (both located in the Outer Suburbs).

Another illustration of how size changes with distance is provided by figure 7.5 which plots average establishment size for every municipality against the distance of the municipality to Bogotá's central business district.¹¹ This scatter plot seems to confirm the impression that greater distances from the metropolitan centre might be associated with larger average establishment size. Although with notable exceptions, larger averages do seem to cluster towards the right-hand side of the image where distances from the centre are larger; an exponential line shows the general trend. It must be said, however, that despite having the correct sign this visual impression is not entirely confirmed by a statistical correlation between the two variables depicted in the figure (distance and average size of establishments outside the Inner Core), which gives a Pearson r coefficient of 0.22 (in other words, distance only seems to explain 5 per cent of the increases in the mean size of establishment).

Figure 7.5:
BMA: Average establishment size in 1985, by distance to CBD



Source: DANE, 1985 Manufacturing Survey.

¹¹ These are official distances between the core of the municipality (the 'cabecera') and the centre of Bogotá (DANE, 1985b). See the beginning of this section for a brief discussion of the implications of this choice of parameter.

Having gained some understanding of the static dimensions of establishment size in the BMA, we can now turn our attention briefly to a dynamic view of it. The short conceptual discussion at the beginning of this section suggested that the situation in a metropolitan context is likely to change in ways which make the possible links between the size distribution of manufacturing and its spatial location evolve over time. However, no studies are available for the period of concern to this study on the development of Bogotá's manufacturing sector with an explicit interest on the size distribution of establishments. A few allusions to the subject may be found in some of the references quoted earlier including Lee (1989), Mohan (1994) and Cuervo (1992 & 1993), but also in DAPD (1990) especially as part of a discussion on policies towards the informal sector. Although in no way offset by studies on the subject with a focus on Colombia (particularly Cortés *et al.*, 1987, but also Pinto & Arango, 1986 & 1989, and Córdoba, 1988), this gap in the literature on Bogotá's development may be partially (and modestly) filled for the purposes of this research with an examination of some of the national trends and a closer look at the primary and secondary data available to us.

In the specific case of Colombia, we know from Cortés *et al.*'s research on the development of small- and medium-sized manufacturing in the 1970s that the average establishment size has shown a secular tendency to grow (as indeed it does in most countries as their economy develops) while the distribution of total employment and output among fixed size categories constantly changes (see also World Bank, 1991, pp. 73-78). Nationally, the average size of establishments with five or more workers increased from around 18 workers in 1953 to an estimated 55 workers in 1975 (Cortés *et al.*, 1987, p. 24). It subsequently dropped to 32 workers in 1990 (DANE, 1993, p. 237), a not entirely unsurprising fact given the rapid growth of cottage-shop activities that characterised the late 1980s (Montes *et al.*, 1992a).¹²

In the 1960s, employment in small-scale manufacturing nationally (in Cortés *et al.*'s classification this includes establishments employing 5-49 workers) grew at a rate of around 2 per cent per year, while medium-sized manufacturing (50-99 workers)

grew at about 6 per cent per annum.¹³ The joint share of these sectors expanded mainly at the expense of that of cottage-shop production (under 5 workers) during the early part of the period though this share was somewhat reduced towards the end of the decade as a consequence of gains in the large-scale sector (100+ workers) which grew at an average of 7 per cent per year. By 1970, large-scale industry and small- and medium-sized industry each had about a quarter of national manufacturing employment, while the other half was generated by cottage-shop establishments (see table 4.2 in chapter 4).

In the 1970s employment growth rates in the small- and medium-sized sectors rose dramatically, to around 15 and 8 per cent per year respectively, while large-scale and cottage-shop grew at more modest rates.¹⁴ In the views of Cortés *et al.* (op. cit.), "manufacturing employment grew even faster than total urban employment" while within the manufacturing aggregate establishments with 5-49 workers appear "to have been the most dynamic source of new jobs" (p. 212). These were boom years for small- and medium-sized enterprises. Not surprisingly, by 1978 the shares of each size category in national employment had changed, with cottage shop activities losing ground (to somewhere between 43 and 47 per cent) and both large-scale and the joint group of small- and medium-sized establishments gaining some three or four percentage points each.

The recession of the early 1980s hit manufacturing hard (see chapter 4), though the rates of investment in the sector in 1981-1983 were the highest in the period 1970-1989. This was perhaps a reaction to the impending risk of bankruptcy in an attempt to modernise management and production procedures (Montes *et al.* 1992a) but in the views of at least one observer it was too little too late as Colombian manufacturing was a decade behind its competitors in introducing new production technologies (Chica, 1990; see also Echavarría, 1990). The ensuing restructuring process led to the introduction of more flexible practices, including an increase in the use of temporary workers (at an annual rate of 25 per cent in 1985-

¹² Writing some four years before the census was carried out, Cortés *et al.* warn that there are no reliable estimates for years after 1975. However, as DANE have acknowledged, the 1990 economic census may have under-estimated household-based employment (DANE, 1993, p. 189).

¹³ Figures from Cortés *et al.* refer to the period 1964-1973.

¹⁴ Growth rates are estimates by Cortés *et al.* (1987) for the period 1973-1978. These authors provide ranges for their estimates in the smaller categories thus: cottage-shop: 1.1-6.2 per cent p.a.; small-scale employment: 14.1-16.7; medium-scale: 7.0-8.3. The figure for large-scale establishments is more precise as it is derived from DANE's annual manufacturing surveys, where coverage is better.

1989), to reach 18 per cent of all production workers by 1989.¹⁵ Although heavily concentrated in labour-intensive (and therefore mainly small-scale) establishments, many temporary workers were also employed by large-scale industry (especially in sub-sectors like chemicals and machinery). This was also a period of fast growth of 'informal' sector activities, with employment in establishments with under 11 workers growing at 5.5 per cent annually in 1984-1988 (Montes *et al.*, *op. cit.*) compared with less than 1 per cent for the rest of manufacturing establishments.¹⁶

The second half of the 1980s saw a return to a highly dynamic manufacturing sector: birth rates of new establishments were very high during the period, with the outcome that by 1990 nearly 42 per cent of all establishments had started operating within the four previous years (compared with 43 per cent which opened five to 20 years previously and 7 per cent with more than 50 years of operation). Birth rates were especially high among establishments employing less than 11 workers, with 45 per cent of those surveyed in 1990 having been founded less than five years earlier (compared with 40 per cent in the under 11 worker range and 54 per cent in the 11-200 worker range which were founded five to 20 years previously).¹⁷ More significant perhaps is the fact that the youngest group of establishments tended to have considerably lower labour productivity indices than more established ones and consequently contributed proportionately less to overall output.¹⁸ The rapid rate of births and the lower productivity of newly-opened establishments are a reflection of the restructuring witnessed during the 1980s, when medium- and large-scale enterprises resorted to lay-offs and more capital-intensive production practices (Montes *et al.*, *op. cit.*; World Bank, 1991).

¹⁵ The use of temporary workers has also been attributed to attempts by employers to avoid legal commitments after a 60-day probationary period. Such practices were widespread in the 1980s even in the capital goods sector, where skilled workers would be hired from specialised agencies to do specific tasks (World Bank, 1991, p. 105).

¹⁶ This is my own calculation based on the numbers of paid workers in establishments included in DANE's annual manufacturing survey, which were 457,398 in 1984 and 475,326 in 1988 (DANE, 1991c).

¹⁷ All figures taken from Montes *et al.*, 1992a and b using 1990 census data. The breakdown of sizes used in these two DANE publications (a report commissioned by DANE from a team at the National University) differs slightly from that used in DANE (1991b).

¹⁸ The 31,009 establishments polled aged five years or less in the under 11 worker range generated 19.2 per cent of total income in the range, while the 27,680 establishments with five to 20 years of operation generated 79.2 per cent of it. This is reflected in income/employment ratios of 0.68 and 2.84, respectively (Montes *et al.*, 1992a).

With a better understanding of the trends in the size composition of manufacturing nationally under our metaphorical belt, we may now come back to the case of Bogotá. Table 7.5 shows the evolution of manufacturing for the years 1974, 1980 and 1985, the three years for which we have detailed data from DANE's surveys.¹⁹ As was mentioned earlier, the marked shifts in the under-10-worker range are explained by DANE's 1983 purge of most of these establishments. Of greater significance to us is the fact that while the number of small establishments (i.e. 10-49 workers) decreased in the first period, it subsequently rose and it did so at a significant rate given that the number in BMA as a whole and among large-scale establishments dropped in 1980-1985.

Table 7.5
Bogotá metropolitan area:
Size distribution of manufacturing establishments,
employment and value added, 1974-1985

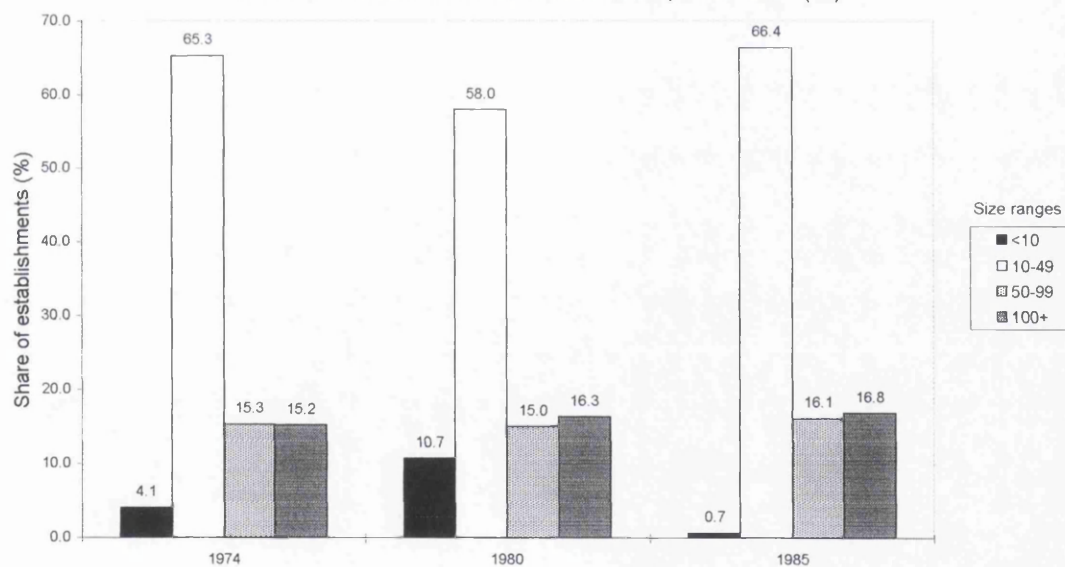
Size category	Number			Annual growth rate (%)	
	1974	1980	1985	1974/80	1980/85
1. Establishments					
<10	87	247	15	19.0	-42.9
10-49	1,377	1,336	1,452	-0.5	1.7
50-99	323	346	353	1.2	0.4
100+	321	375	367	2.6	-0.4
Total	2,108	2,304	2,187	1.5	-1.4
2. Employment					
<10	620	1,712	97	18.5	-43.7
10-49	31,766	32,055	33,304	0.2	0.8
50-99	22,421	24,052	24,253	1.2	.2
100+	85,062	104,786	98,881	3.5	-1.2
Total	139,869	162,605	156,535	2.5	-0.8
3. Value added (1985 pesos)					
<10	314	1,033	242	22.0	-25.2
10-49	19,986	25,125	33,317	3.9	5.8
50-99	19,304	22,199	31,623	2.4	7.3
100+	129,604	169,325	235,462	4.6	6.8
Total	169,208	217,682	300,643	4.3	6.7

Source: Calculations based on DANE, Annual Manufacturing Surveys

¹⁹ No estimates on manufacturing establishments with less than 10 workers are available for Bogotá or its surrounding municipalities, other than the residual collected by DANE as part of its annual surveys.

The second half of the 1970s was a period of retrenchment for small-scale establishments, of very slow growth in the employment they generated but also of expanding output. This stands in stark contrast to the situation nationally where, as was shown earlier, the 1970s were boom years when, in the views of Cortés *et al.* (1987), establishments with 5-49 workers could be seen as “the most dynamic source of new jobs” (p. 220). We know from these authors that 1978-1980 was still a period of fast job creation in small- and medium-sized establishments before the slump of the early 1980s. There remains only one possible explanation for this difference between Colombia and the BMA, and it is that in the case of the latter the 5-9 worker range was possibly particularly active and the main source of new jobs; but in the absence of data we have no way of proving this conclusively. Yet a final possibility is to assume that small-scale establishments in the BMA were not in fact as dynamic as they were nationally during this period.

Figure 7.6:
BMA: Size distribution of establishments, 1974-1985 (%)



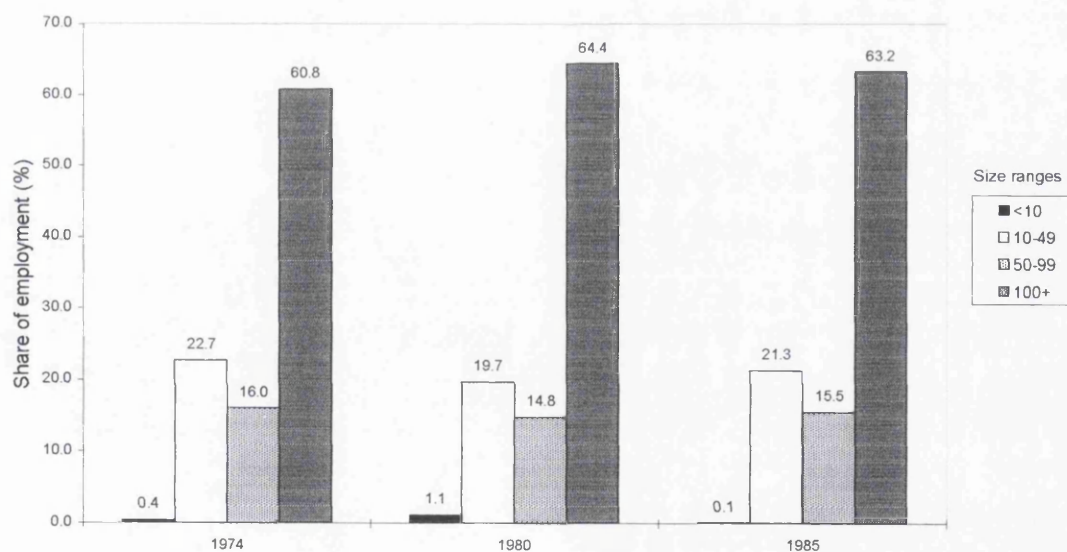
Source: DANE, Annual Manufacturing Surveys.

The first half of the 1980s were, in contrast, years of growth for BMA's small-scale establishments, with the number of establishments expanding by nearly 9 per cent (or an annual rate of 1.7 per cent) while those in the larger size categories remained stable (cf. table 7.5). This resulted in a net overall increase in the share of establishments in the smallest range by the end of the period (figure 7.6). Employment in this range also grew both in absolute and relative terms while in the BMA as a whole it fell. Output expanded in all size ranges, as it did in the

aggregate of Colombian manufacturing. The underlying process was one of substantial labour productivity increases in the BMA, also resulting from capital investments, substantial shedding of labour especially in the larger (100+) establishments (which by 1985 had lost close to 6 per cent of their 1980 employment) and changes in administrative and productive procedures, much in the same way as was described for Colombia earlier.

The net effect of the changes between 1974 and 1985 was a distribution of employment where the share of the 100+ worker range tended to grow, though particularly in the first period and then at the expense of both categories in the 10-99 worker range (figure 7.7). By 1985 the group of establishments in the 10-49 range had regained some of the ground they had lost in the first period, when their share dropped below one-fifth of the total number of BMA jobs, and ended up with 21.3 per cent of them in 1985.

Figure 7.7:
BMA: Size distribution of employment, 1974-1985 (%)



Source: DANE, Annual Manufacturing Surveys.

Table 7.6
Distribution of manufacturing employment and establishments
within BMA by size categories, 1974-1985
(Horizontal percentages)

Size category	Inner Core	Outer Core	Soacha	Outer Suburbs	Total number
1. Employment					
1974					
10-49	93.5	3.1	1.5	2.0	31,766
50-99	87.4	7.3	2.9	2.4	22,421
100+	79.3	7.9	2.8	10.0	85,062
Total	83.9	6.7	2.5	6.9	139,869
1980					
10-49	91.5	4.2	2.5	1.8	32,055
50-99	88.2	6.0	3.1	2.8	24,052
100+	80.5	8.4	3.0	8.1	104,786
Total	84.0	7.2	2.9	6.0	162,605
1985					
10-49	90.9	4.3	2.6	2.2	33,304
50-99	86.9	6.4	3.8	2.9	24,253
100+	80.7	6.6	2.9	9.8	98,881
Total	83.8	6.1	3.0	7.1	156,535
2. Establishments					
1974					
10-49	93.7	3.2	1.3	1.8	1,377
50-99	87.6	7.1	2.8	2.5	323
100+	81.9	8.4	3.4	6.2	321
Total	91.1	4.5	1.8	2.6	2,108
1980					
10-49	92.4	3.7	2.0	1.8	1,336
50-99	87.6	6.4	3.2	2.9	346
100+	82.1	8.8	3.7	5.3	375
Total	90.6	4.7	2.3	2.4	2,304
1985					
10-49	93.3	3.7	1.9	1.9	1,452
50-99	92.5	6.2	3.7	3.1	353
100+	81.5	7.1	4.1	7.4	367
Total	89.8	4.6	2.6	3.1	2,187

Source: Calculations based on DANE, Annual Manufacturing Survey

A final insight into the changing distribution of manufacturing between size categories and within the BMA is provided by table 7.6, which shows the spread of establishments and employment across the different BMA components for the three size categories. While there is little doubt that the Inner Core towers over all the

other sections of the BMA in terms of its shares of employment and establishments in all categories, the degree to which it does varies across categories. Throughout the period of analysis, it concentrated a much larger proportion of employment and establishments in the small-scale category than in the large-scale one, with the medium-scale somewhere in between.

And yet, there is a modest but unmistakable tendency for the Inner Core to lose some of its share of employment in the smallest range (10-49 workers), from 93.5 per cent in 1974 to 90.9 per cent in 1985, thereby favouring especially the Outer Core which made the greatest gains. By contrast, the centre's share of establishments in this range dropped slightly by 1980 but overall remained largely stable. Conversely, the Inner Core share of employment in the large-scale category tended to rise slightly, from 79.3 per cent in 1974 to 80.7 per cent in 1985, while here again the share of establishments rose in 1980 but dropped marginally by 1985 to 81.5 per cent.

In sum, it seems that enterprises in the Bogotá metropolitan area adapted well to the major changes that affected Colombia's manufacturing in the early 1980s. In the aggregate, and when seen in the national context, establishments in the small- and medium-size categories fared relatively well in terms of their capacity to maintain their jobs or generate new ones, as well as to achieve increases in productivity, while the larger establishments resorted to lay-offs as one of the ways of riding the crisis. Despite the differences in performance, the first half of the 1980s saw a drop in the average establishment size in all size categories (cf. table 7.2).

The evidence for the period 1974-1985 does not support Cuervo's conjecture that the continued expansion in small-scale manufacturing fostered an increased spatial concentration of industrial activities. On the contrary, while there was a mild dispersal of establishments and output in the aggregate of all size categories, the metropolitan centre's share of employment in the small-scale range tended to fall (cf. chapter 5). Similarly, the presumption that an expansion in large-scale manufacturing is likely to lead to greater dispersal is not borne out by the evidence presented here either. The growth in the number of establishments, employment and output of the period 1974-1980 in this category (cf. table 7.5) was not

accompanied by a process of suburbanisation but rather by a slight tendency to concentrate in the central area of the BMA.

Having examined the spatial trends and performance of different size categories of manufacturing in the BMA, we are now in a position to redirect our attention to Scott's proposition as presented earlier, and thereby return to the discussion on the links between forms of production and their spatial location within metropolitan areas.

7.4 Capital intensity, technology and space: Application of the Hecksher-Ohlin hypothesis

The secular tendency for manufacturing to leave the central areas of cities, and more specifically of metropolitan areas, is well documented in the literature. The different approaches to explaining the process were reviewed in some detail earlier. Here the interpretation put forward by Scott (1982a) as outlined in chapter 2 will be used to examine the case of the BMA in the period 1974-1985. This will involve operationalising the factors that enter into play in the relationships described in the metropolitan version of the Hecksher-Ohlin hypothesis as outlined by this author: capital (or labour) intensity and dispersal.

A good measure of capital intensity is provided by the value of capital stock for each firm. As such information at plant level is not available in the Canadian context because of disclosure rules, both Scott (1980 & 1982a) and Norcliffe & Stevens (1979) use aggregate measures at industry branch level. The former defines the capital-labour ratio as estimated fixed capital depreciation plus circulating capital divided by wages and salaries, while the latter get around the problem of lack of availability of capital stock information by subtracting wages from value added data which leaves the value added attributable to capital investment and entrepreneurship which they then divide by the corresponding employment figure.

In the case of the BMA, the capital-labour ratio has been measured by dividing the book value of fixed assets by the total number of workers in each establishment and then grouping the results by industry at three-digit level. This measure is on

the whole adequate for our purposes.²⁰ Using 1977 annual manufacturing survey data Cortés *et al.* (1987) have shown that, except for the smallest establishments (some of which have abnormally high ratios due perhaps to coverage problems), this variable is positively associated with size of workforce. Thus it is likely to accurately reflect the continuum of establishments to be found in the BMA. But it has one problem.

The problem is that, ideally, the denominator in the ratio should only include production workers rather than all employees as our data does. That means that the capital-labour ratio will tend to be underestimated as one moves up the scale in establishment size, a function of the fact that in Colombia (as in most countries) the share of production workers in a firm's total employment varies with size: paid white-collar workers represent less than 10 per cent of the workforce in the smaller establishments (when measured in terms of output) and nearly 30 per cent in the largest ones while the share of paid blue-collar workers ranges between 72 and 79 per cent (Cortés *et al.*, 1987, p. 63).²¹

At a two-digit level of analysis of industry capital-labour ratios, though quite varied across industries, the capital-labour ratio tends to increase equally with establishment size across all industries (*op. cit.*, pp. 60-61). And because with only three exceptions²² the 29 industrial sub-sectors are well represented both in the core of the BMA and in the Rest it is unlikely that the variations in capital-labour ratios among sizes will be a major distorting element in our analysis.

In order to test the Hecksher-Ohlin hypothesis for the BMA we need a second variable which measures the tendency for establishments to disperse. For this, we use the same measure as Scott, that is, the change in the share of output (measured as value added) of the BMA Centre (Inner Core) over total BMA output for three-digit industries. The test of Hecksher-Ohlin is then a statistical correlation of the two sets of data by industry at three-digit level for the two periods, 1974-1980

²⁰ And because it uses data at establishment level (and therefore we are able to hold industry constant), this is arguably a somewhat more powerful test than Scott's.

²¹ The share of unpaid family workers is inversely proportional to size with the smallest establishments having 10 per cent and the largest ones negligible shares. The same pattern holds though it is less marked when the measure used is size of workforce as opposed to output.

²² The three exceptions are wearing apparel and footwear, neither of which had any employment in the Rest of the BMA, and petroleum refineries which had 25 jobs in two establishments in the Rest of the BMA in 1974 only.

and 1980-1985: *i*) percentage change in the metropolitan capital-labour ratio; and *ii*) change in the ratio of BMA centre output to total BMA output. The first set of data appears as table 7.8 and the second one as table 7.10 (and also as table 6A.1 in the appendix to chapter 6).

Table 7.7
BMA: Results of correlations (r coefficient)
for Hecksher-Ohlin hypothesis, 1974-1985

Industries in correlation	1974-1980	1980-1985
29 industries ^a	+0.14	-0.15
20 industries ^b	-0.13	-0.04

a. All industries represented for at least one year in the BMA.

b. Does not include petroleum refineries and industries with agglomeration economies.

Source: Calculations based on DANE, Annual Manufacturing Surveys.

The results of the first round of correlations, summarised in the upper half of table 7.7, are not encouraging. When all 29 industries represented in the BMA are included in the exercise the coefficients for both periods (1974-1980 and 1980-1985) are too low to support the idea that spatial shifts in output are significantly correlated with changes in capital intensity. Moreover, the sign of the first correlation suggests that even the direction of change is not as predicted in the theory.

Table 7.8
BMA: Average capital-labour ratios^a by industry, 1974-1985
(1985 pesos)

Industry (SIC Rev. 2)	1974	1980	1985	Annual change (%)	
				1974/80	1980/85
Food Products (basic)	499,376	485,368	425,388	-0.5	-2.6
Food Products (sundry)	585,062	763,186	659,510	4.5	-2.9
Beverages	862,508	444,711	713,783	-10.5	9.9
Tobacco	1,266,906	921,511	1,309,915	-5.2	7.3
Textiles	652,700	482,462	419,841	-4.9	-2.7
Wearing Apparel	169,014	184,295	157,088	1.5	-3.1
Leather Products	349,499	978,801	262,106	18.7	-23.2
Footwear	148,569	178,274	257,001	3.1	7.6
Wood Products	277,072	230,490	346,922	-3.0	8.5
Furniture	216,244	318,378	177,557	6.7	-11.0
Paper and Products	527,470	528,060	448,216	0.0	-3.2
Printing and Publishing	580,890	463,410	624,988	-3.7	6.2
Industrial Chemicals	1,023,781	1,395,419	919,310	5.3	-8.0
Other Chemicals	527,803	357,977	425,860	-6.3	3.5
Petroleum Refineries	849,802	0	0	--	--
Misc. Petr. & Coal Prods.	766,018	981,038	2,469,616	4.2	20.3
Rubber Products	482,538	298,541	398,196	-7.7	5.9
Plastic Products	732,020	630,226	832,009	-2.5	5.7
Pottery	227,640	214,846	215,128	-1.0	0.0
Glass	563,618	515,448	281,863	-1.5	-11.4
Other non-metallic	602,164	571,510	1,270,197	-0.9	17.3
Iron and Steel	807,694	659,334	552,414	-3.3	-3.5
Non-ferrous Metals	583,266	402,116	678,739	-6.0	11.0
Fabricated Metal Products	431,486	391,565	356,686	-1.6	-1.8
Machinery, except electrical	412,523	344,481	351,699	-3.0	0.4
Electrical Machinery	413,468	794,899	418,946	11.5	-12.0
Transport Equipment	383,329	372,846	580,342	-0.5	9.3
Prof. & Scient. Equipment	265,424	357,033	229,544	5.1	-8.5
Other Manufactured Prods.	358,838	328,450	303,947	-1.5	-1.5
BMA AVERAGE	536,784	503,265	554,718	-1.1	2.0

-- Not applicable

a. Book value of fixed assets per worker.

Source: Calculations based on DANE, Annual Manufacturing Surveys

Before branding the theory and the case study data as incompatible as oil and water and look for other possible explanations, a slight modification of the hypothesis is tested. Following Norcliffe & Stevens (1979) we recast the theory to take account of the fact that some industries are not as flexible in their location as others, either because they are resource-bound or because they are highly market-oriented. An examination of the list of industries suggests eliminating petroleum

refineries from the correlations, not simply because they are typically bound to the proximity of a pipeline, but also because of the simple fact in the case of the BMA that this industry was present only in 1974 with two establishments (and 25 workers) and subsequently disappeared altogether.

In his analysis of spatial shifts in Bogotá's manufacturing in the 1970s Lee (1989) concluded that eight industries (or branches of industry) presented agglomeration economies as could be inferred from their greater tendency to cluster as they grew than other industries. Together, they represented 32 per cent of total manufacturing employment in Bogotá DE in 1975. They are: plastic products, textiles, beverages, electrical machinery, leather, paper, professional & scientific equipment and 'other manufacturing'. In an attempt to test the modified hypothesis for the BMA, these eight industries (along with petroleum refineries) will also be excluded from the second round of correlations.

The results of the second round are, if anything, even less encouraging than the first one, as the second line in table 7.7 shows. Although now the sign of both correlations is in accordance with the predictions in the hypothesis, the coefficient in the second period is much lower than before. The change of sign supports Lee's findings about the character of the eight industries showing agglomeration economies, and it is therefore likely that they would exert a centralising pull for the industrial aggregate.

The lack of significant results from this exercise is in itself highly significant. As the Hecksher-Ohlin hypothesis has been corroborated by the authors mentioned earlier using empirical data from Canada in the period between the 1950s and the 1970s and also by others in the US context (see for example Blackley & Greytak, 1986), we must now look for an explanation in the nature of the data itself. We will start by eyeing more closely the information on capital intensity.

Table 7.8 provides a breakdown of the average capital-labour ratios for the 29 industries in the BMA in 1974, 1980 and 1985. Contrary to what the hypothesis as presented by Scott predicts, there is no generalised tendency for BMA's manufacturing to become more capital-intensive, least of all in the first period shown on the table. In the years 1974-1980, in 18 out of 28 industries (if we discount petroleum refineries) there was a drop in the average capital intensity,

while in the second period this was the case in 14 of them. The net effect was one of aggregate decrease in the industry average ratio in the first period, and a net increase in the second period.

The declining tendency of capital intensity was part of what Chica (1990) calls "the crisis of 1974-82" when referring to Colombia's manufacturing industry, which included drops in profitability margins, in capital utilisation and in productivity, though not in output (which grew at an average of 4.7 per cent per year in 1974-1982). While employment and wages were generally growing (up to 1980), capital investment and the introduction of new technologies were lagging behind. Manufacturing in the BMA clearly did not escape these national trends.

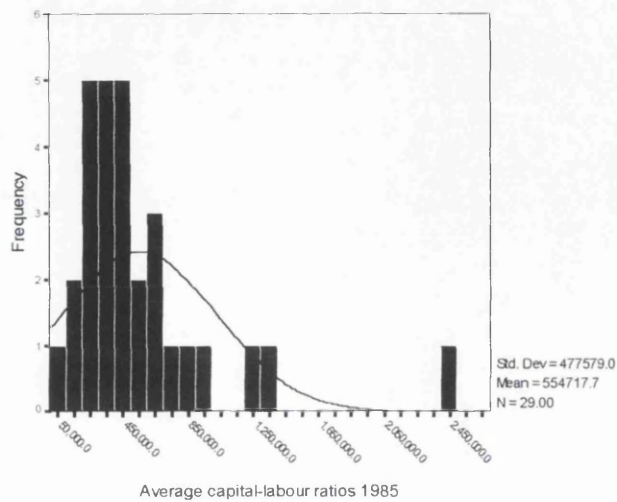
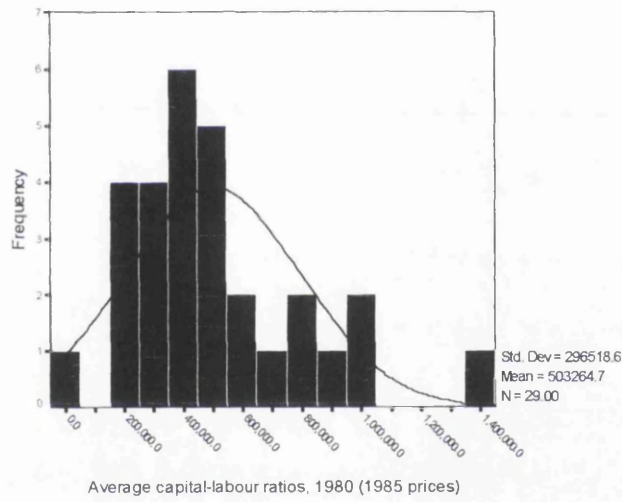
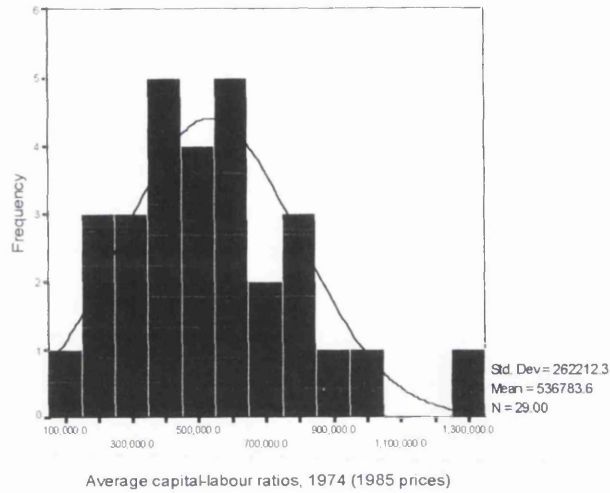
Table 7.9
Dispersal measures for capital-labour ratios
in BMA industries, 1974-1980
(1985 pesos)

Measure of dispersal	1974	1980	1985
BMA mean	536,784	503,265	554,718
Median	527,470	444,711	419,841
Lower quartile	358,838	328,450	281,863
Upper quartile	652,700	630,226	659,510

Source: Calculations based on DANE, Annual Manufacturing Surveys.

A more detailed analysis of the nature and trends of capital intensity in the BMA lies beyond the scope of the present study. This would probably merit a separate investigation in its own right. We might nonetheless find further insights into the process from briefly glancing at the data in hand. Table 7.8 shows that, although there was a general trend for capital intensity to drop in the first period and to rise in the second in the aggregate of industries, this was not an entirely homogeneous process. Capital intensity grew during both periods only in footwear, and petroleum & coal products, which jointly produced 1.6 per cent of BMA value added in 1980. In contrast, the capital-labour ratio fell consistently in basic food products, textiles, glass, iron & steel, fabricated metal, and other manufactured products, which together generated a third of BMA output in 1980. Trends were mixed in the remaining industries.

Figure 7.8
 BMA: Histograms of capital-labour ratios
 by branch of industry, 1974, 1980 and 1985



Source: Calculations based on DANE, Annual Manufacturing Surveys

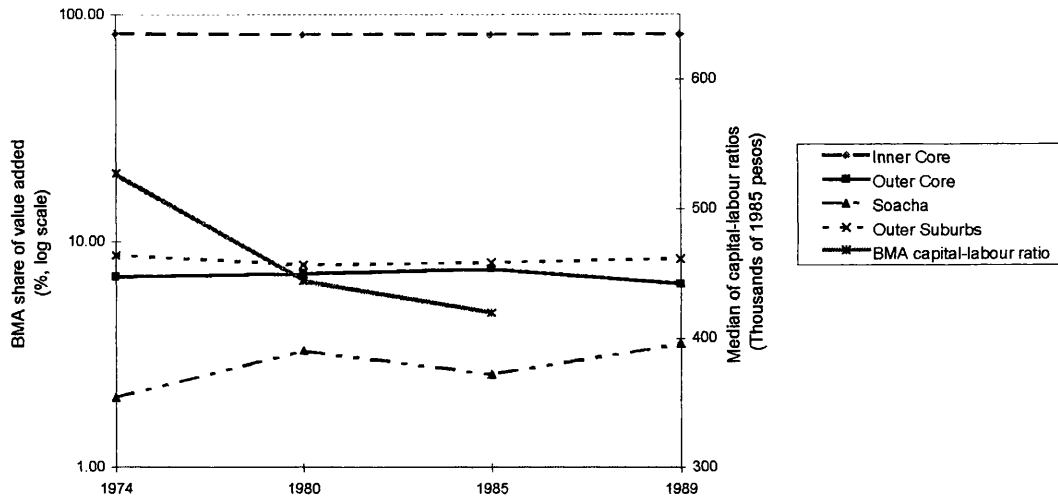
Table 7.9 and the first two histograms in figure 7.7 suggest that the generalised decline in the capital-labour ratio in the first period led to a bunching-up of the various industries around a lower mean value by 1980 so that differences in capital intensity were smaller than in 1974. The rapid increase in capital intensity in industrial chemicals during these years turned this branch into an outlier in the 1980 graph, but one that was not too distant from the mean. In the five years that followed the drop in capital intensity continued in half the industries so that by 1985 there was a greater dispersal at either end of the spectrum, with the lower quartile of industries starting at a much lower break point than in 1974, and the upper quartile starting at a higher point than in 1974 (table 7.9).

But as figure 7.8 shows, although the tendency to cluster continued (around a higher average) there was one clear outlier, petroleum & coal products, whose capital intensity in 1985 was over four times the BMA average. Two further industries seemed to tower above the rest by virtue of higher capital intensity, tobacco and other non-metallic industries.

An attempt to systematically compare tables 7.8 and 7.10 by picking a few industries individually confirms the results of the correlations: there seems to be no association between an industry's tendency to shift outwards from the BMA core and changes in its capital intensity. Taking for example the three industries mentioned in the preceding paragraph illustrates this point: capital intensity increased in both periods in petroleum & coal products and yet in both of them it showed a concentrating tendency. Tobacco and other non-metallic industries each had a period when capital-labour ratio rose and one when it dropped, and yet tobacco tended to disperse in both periods while the other non-metallic industries did seem to follow a pattern of simultaneous dispersal and increased capital intensity as suggested by Scott.

Similarly, there did not seem to be any systematic tendency to disperse or concentrate among the industries identified by Lee (1989) as exhibiting agglomeration economies in the mid-1970s, nor in the changes in their degree of capital intensity.

Figure 7.9:
Manufacturing value added of BMA components (LH-scale)
and BMA-wide capital intensity (RH-scale), 1974-1989



Source: Calculations based on DANE, Annual Manufacturing Surveys

This lack of systematic shift in the two variables simultaneously is seen graphically in figure 7.8 which contrasts the shifts in the relative share in manufacturing output of the four spatial components of the BMA between 1974 and 1989 (shown in a semi-log scale to compress the vertical axis) and the changes in the median of the average capital-labour ratio for the aggregate of BMA industries (though only for the period for which we have information). The gradual decrease in the point below which half of the 29 industrial branches (at three digit level) represented in the BMA can be classified stresses the tendency for capital intensity to fall with time. And yet, this cannot be systematically associated with a gain or loss in the relative share of any of the components of the BMA.

The chart shows that the process of gradual increase in the share of BMA output of Soacha and the Outer Suburbs in 1974-1980 and continued in the Outer Suburbs in 1980-1985 was accompanied by an uninterrupted drop in the median value of the capital-labour ratio. If anything, then, the combination of the two sets of data would appear to suggest that in the case of the BMA a modified version of the proposition put forward by Scott would instead tend to be valid, and one which would point in the opposite direction. In the course of a period involving a sequence of expansion of employment in manufacturing followed by a severe contraction, especially in the larger-scale sector, and characterised by disparate industrial trends in capital-

intensity, the case of the BMA does not support the notion that the core offers a comparative advantage to labour-intensive industries while the periphery has a comparative advantage for capital-intensive industries. In other words, the development of manufacturing in the BMA in the period 1974-1985 does not exhibit a spatially-structured Hecksher-Ohlin effect between core and periphery.

Table 7.10
BMA manufacturing value added:
Change in the share of BMA Centre, 1974-1985
(%, 1985 pesos)

Industry	Share of BMA value added			Change	
	1974	1980	1985	1974/80	1980/85
Food Products (basic)	92.42	91.74	91.82	-.7	.1
Food Products (sundry)	85.76	91.18	80.08	5.4	-11.1
Beverages	94.96	87.55	94.15	-7.4	6.6
Tobacco	83.30	70.85	21.45	-12.4	-49.4
Textiles	84.44	83.37	84.84	-1.1	1.5
Wearing Apparel	100.00	100.00	100.00	.0	.0
Leather Products	25.35	37.46	52.71	12.1	15.2
Footwear	100.00	100.00	100.00	.0	.0
Wood Products	68.66	76.75	79.55	8.1	2.8
Furniture	92.69	92.68	78.91	.0	-13.8
Paper and Products	92.34	86.43	79.11	-5.9	-7.3
Printing and Publishing	98.57	98.09	98.50	-.5	.4
Industrial Chemicals	63.51	31.62	41.58	-31.9	10.0
Other Chemicals	95.50	94.55	93.40	-.9	-1.2
Petroleum Refineries	.00	.00	.00	.0	.0
Misc. Petr. & Coal Prods.	54.50	60.89	68.33	6.4	7.4
Rubber Products	52.44	44.14	46.72	-8.3	2.6
Plastic Products	85.74	79.49	86.09	-6.3	6.6
Pottery	100.00	98.09	60.14	-1.9	-37.9
Glass	16.29	19.28	21.99	3.0	2.7
Other non-metallic	37.71	48.12	30.37	10.4	-17.8
Iron and Steel	56.80	69.51	57.03	12.7	-12.5
Non-ferrous Metals	57.46	57.38	44.93	-.1	-12.4
Fabricated Metal Products	84.79	82.82	78.67	-2.0	-4.2
Machinery, except electrical	79.43	92.93	90.51	13.5	-2.4
Electrical Machinery	84.30	82.98	90.37	-1.3	7.4
Transport Equipment	86.69	85.91	90.75	-.8	4.8
Prof. & Scient. Equipment	98.30	92.73	100.00	-5.6	7.3
Other Manufactured Prods.	94.52	83.01	82.57	-11.5	-.4
TOTAL^a	82.30	81.62	81.80	-0.68	0.18

a. Refers to share of value added of BMA centre as a whole, not to an average of all industries.

Source: DANE, Annual Manufacturing Surveys.

7.5 Conclusions

This chapter set out to find out whether the causes of a very slow and minimal dispersal in manufacturing activities in the Bogotá Metropolitan Area described in an earlier chapter can be found in two important attributes of the aggregate of manufacturing establishments in the BMA: the range of different sizes which they encompass, and any observed tendency for capital-intensity (or its converse, labour-intensity) to increase or decrease in the metropolitan context. The literature describes a variety of associations found in other metropolitan contexts or hypothesised for the case of Bogotá between these attributes and spatial shifts in manufacturing activities. The proposition tested here which helps connect these two parameters posits a relationship between scale of operation and location in the metropolitan space, with small-scale, labour intensive establishments tending to locate in central areas and large-scale, capital-intensive ones seeking peripheral locations.

The chapter found some support for the notion that small-scale establishments have tended to locate disproportionately in the Inner Core of the BMA, while larger ones tend to be disproportionately represented in the outer-most areas of the BMA. There is a heuristic tendency for the average size of establishment (measured in number of workers) to rise with distance from Bogotá's CBD, though this is not supported statistically. And yet a wide range of establishment sizes is represented in most of the municipalities that comprise the BMA.

Since the mid-1970s there was a slight tendency for average BMA establishment size to rise, though the high rate of births particularly in the smaller scales in the first half of the 1970s and the late 1980s probably helped to stabilise and even to reduce it by the end of the 1980s. Employment in small-sized establishments has tended to disperse slightly outwards from the core, while the Inner Core's share in the number of small-scale establishments has remained largely stable. Conversely, the number of large-scale establishments has shown a tendency to concentrate in the Inner Core, while the jobs they generate concentrated only very slightly.

Analysis of the BMA data for 1974-1985 found no support for the Hecksher-Ohlin hypothesis as stated by Scott (1980 & 1982a). There is no statistically significant association between shifts in the spatial distribution of manufacturing output within the metropolitan core and its surrounding areas, and changes in the capital-intensity

of manufacturing industries. This is perhaps attributable to the absence of distinctly marked general trends over time in these two parameters across the diversity of industrial branches. There was a general tendency for capital-intensity to fall in 1974-1980 and to rise in 1980-1985, with some industries making dramatic gains while the majority tended to bunch up at lower values than those they started out with. Similarly, as was seen in more detail in chapter 5, there was a mild dispersal in output out of the BMA Inner Core between 1974 and 1980 which was followed by a partial reversal of the process in 1980-1985.

The analysis presented in this chapter suggests that the changes in capital intensity in manufacturing do not offer a satisfactory explanation for the very slow locational shifts in the aggregate of manufacturing in the Bogotá metropolitan area as they had done in other metropolitan or regional contexts in industrialised nations. If anything, the converse of the association proposed by Scott would seem to be true in the case of the BMA.

It may well be, then, that the unusually high share of small-scale establishments in the BMA compared to similar metropolitan areas has precluded any further movement out of the Core. Thus, for example, in the US and Canada, where the Hecksher-Ohlin hypothesis was successfully tested at a regional level, the distribution of manufacturing employment was much more skewed towards larger establishments than in Colombia or Bogotá. Large manufacturing establishments (100+ workers) generated 76.6 per cent of all manufacturing jobs in the US in 1967 and 65.6 per cent in Canada in 1959 (Cortés *et al.*, 1987), while in the BMA they generated 45.6 per cent in 1990.²³ This contrasting situation could be pointing to a potentially fertile area of enquiry though alas, given time and space constraints, it is not one which can be explored here.

If proven, this difference might suggest that Cuervo (1993) was in the right track when he pointed to a potential recovery in the large-scale category as a catalyst which could further spatial dispersal in the BMA. But this assumes that establishments would, in the aggregate, shift outwards from the metropolitan centre regardless of their market orientation, the costs and availability of space and labour

²³ Provisional information from the 1990 economic census (DANE, 1991b) which includes all establishments, including those with under 10 workers.

and other attributes of different locations within a metropolitan area. And it is precisely to these factors that we turn our attention in the next chapter.

But it is also possible that, as Chapman & Walker (1991) show, part of the dispersal of manufacturing in metropolitan areas of industrialised countries may be attributed to a process of vertical integration of smaller establishments under a single firm (or perhaps even a larger conglomerate). This allows firms to internalise production processes and costs while also facilitating the relocation of plants out of the centre of the metropolitan area where they previously benefited from agglomeration economies. In Colombia, it may well be that such a process of vertical integration was still in its early stages in the period covered by this analysis, and that it had taken place in the scale required for dispersal to occur. It might instead be a case of a vast majority of manufacturing establishments being small enough to require proximity to each other, to their main buyers and suppliers and to their labour force, thus requiring both urbanisation and localisation economies to survive.

Appendix 7A

**Bogotá metropolitan area:
Manufacturing establishment
characteristics by municipality,
1974, 1980 and 1985**

Table 7A.1
Median of establishment size in BMA by municipality
and size categories, 1974

BMA component/ municipality	Size category (No. of workers)			
	<10	10-49	50-99	100+
Bogotá Inner Core	8.0	21.0	67.0	182.0
Bogotá Outer Core	6.0	21.0	69.0	195.0
Bosa	6.0	24.0	81.0	195.0
Engativá	--	15.0	84.5	114.0
Fontibón	--	17.0	57.0	173.0
Suba	--	--	--	171.0
Usaquén	--	23.0	--	242.0
Usme	--	30.0	57.0	331.0
Soacha	--	25.0	68.0	148.0
Outer suburbs	8.0	18.0	64.0	269.5
Cajicá	--	18.0	78.0	196.0
Chía	--	31.5	60.0	--
Cota	8.0	--	--	--
Funza	--	29.0	--	550.0
La Calera	--	15.0	--	790.0
Mosquera	--	14.5	71.0	209.0
Sibaté	--	27.5	--	320.5

Source: Calculations based on DANE, 1974 Manufacturing Survey

Table 7A.2
Median of establishment size in BMA by municipality
and size categories, 1980

BMA component/ municipality	Size category (No. of workers)			
	<10	10-49	50-99	100+
Bogotá Inner Core	7.0	21.0	68.0	176.0
Bogotá Outer Core^a	9.0	26.0	62.5	183.0
Bosa	--	29.5	60.5	178.0
Engativá	--	27.0	77.5	199.0
Fontibón	9.0	18.0	68.0	171.5
Suba	--	34.0	68.0	170.0
Usaquén	--	18.0	--	269.0
Usme	--	23.0	61.5	304.0
Soacha	8.0	31.0	59.0	157.0
Outer suburbs	4.0	23.0	56.5	258.0
Cajicá	--	24.5	56.0	131.0
Chía	--	24.0	53.0	--
Cota	4.0	21.5	--	--
Funza	--	14.0	--	514.0
La Calera	--	31.0	--	527.0
Mosquera	--	21.0	75.0	235.0
Sibaté	--	32.0	57.0	356.0

a. Figure in the 10-49 column includes an establishment with 37 workers but unidentified location in the Outer Core.

Source: Calculations based on DANE, 1980 Manufacturing Survey

Table 7A.3
Median of establishment size in BMA by municipality
and size categories, 1985

BMA component/ municipality	Size category (No. of workers)			
	<10	10-49	50-99	100+
Bogotá Inner Core	6.4	22.5	68.7	266.8
Bogotá Outer Core	--	27.3	70.2	252.8
Bosa	--	28.9	68.6	269.7
Engativá	--	20.8	80.0	199.0
Fontibón	--	26.4	66.3	274.9
Suba	--	22.0	87.5	159.0
Usaquén	--	--	--	167.0
Usme	--	35.0	65.3	239.5
Soacha	--	30.6	70.7	191.8
Outer suburbs	8.0	26.0	64.5	357.1
Cajicá	8.0	21.3	70.5	289.8
Chía	--	25.4	55.0	151.0
Cota	--	28.5	--	--
Funza	--	13.0	--	254.3
La Calera	--	35.5	54	709.0
Mosquera	--	28.5	72.2	281.1
Sibaté	--	30.7	57.5	505.1

Source: Calculations based on DANE, 1985 Manufacturing Survey

Table 7A.4
Number of establishments in BMA by municipality
and size categories, 1974

BMA component/ municipality	Size category (No. of workers)			
	<10	10-49	50-99	100+
Bogotá Inner Core	85	1,290	283	263
Bogotá Outer Core	1	44	23	27
Bosa	1	17	9	11
Engativá	--	1	2	1
Fontibón	--	23	10	8
Suba	--	--	--	3
Usaquén	--	1	--	1
Usme	--	2	2	3
Soacha	--	18	9	11
Outer suburbs	1	25	8	20
Cajicá	--	5	3	5
Chía	--	6	3	--
Cota	1	--	--	--
Funza	--	3	--	1
La Calera	--	1	--	1
Mosquera	--	6	2	5
Sibaté	--	4	--	8

Source: Calculations based on DANE, 1974 Manufacturing Survey

Table 7A.5
Number of establishments in BMA by municipality
and size categories, 1980

BMA component/ municipio	Size category (No. of workers)			
	<10	10-49	50-99	100+
Bogotá Inner Core	241	1,235	303	308
Bogotá Outer Core^a	3	50	22	33
Bosa	--	22	10	16
Engativá	--	3	2	1
Fontibón	9.0	21	7	10
Suba	--	1	1	3
Usaquén	--	1	--	1
Usme	--	1	2	2
Soacha	2	27	11	33
Outer suburbs	1	24	1	5
Cajicá	--	6	1	5
Chía	--	5	3	--
Cota	4.0	2	--	--
Funza	--	1	--	1
La Calera	--	1	--	1
Mosquera	--	6	3	6
Sibaté	--	3	3	7

a. Figure in the 10-49 column includes an establishment with 37 workers but unidentified location in the Outer Core.

Source: Calculations based on DANE, 1980 Manufacturing Survey

Table 7A.6
Number of establishments in BMA by municipality
and size categories, 1985

BMA component/ municipio	Size category (No. of workers)			
	<10	10-49	50-99	100+
Bogotá Inner Core	14	1,343	307	299
Bogotá Outer Core	--	53	22	26
Bosa	--	28	8	10
Engativá	--	5	2	3
Fontibón	--	18	7	9
Suba	--	1	2	1
Usaquén	--	--	--	1
Usme	--	1	3	2
Soacha	--	28	13	15
Outer suburbs	1	28	11	27
Cajicá	1	6	2	5
Chía	--	5	2	1
Cota	--	2	--	--
Funza	--	2	--	3
La Calera	--	2	1	1
Mosquera	--	8	4	9
Sibaté	--	3	2	8

Source: Calculations based on DANE, 1985 Manufacturing Survey

8 The metropolitan level II: Factor costs and locational trends

8.1 Introduction

The previous chapter examined the incidence on spatial shifts within the Bogotá metropolitan area (BMA) of two factors, namely the size distribution of manufacturing establishments and the changes in the capital-intensity of production. The analysis concluded that there is a moderate tendency for small-scale establishments to locate in the core of the BMA while more peripheral locations have a disproportionate share of large establishments. However, the examination offered no conclusive link between changes in the capital intensity of production and the mild and gradual shifts of industry away from the BMA core.

This chapter investigates a different set of factors which have been identified in the theoretical literature and empirically in other geographical contexts as influencing changes in the location of manufacturing industry in a metropolitan environment. This investigation is largely, though not exclusively, based on the results of a field survey specifically undertaken to test these factors by examining potential differences between establishments located in the core of the BMA and those located in its periphery. The survey was applied to 28 randomly-selected establishments in the BMA area, half of which were located in the BMA Core (i.e. Bogotá DE) and half in three municipalities outside it (Soacha, Mosquera and Funza).¹ The survey was used to collect information on a range of variables on, among others, workers, production, market orientation, and features of the present location (including an evaluation of the degree of satisfaction with it) and plans for future expansion or relocation. A full description of the rationale behind the sample selection procedure, as well as some of the basic findings from the survey will be found in the methodology chapter.

The analysis of the survey findings consists largely of a set of cross-tabulations, graphs and frequency tables of the different factors as they occur in the

¹ The survey targeted establishments as opposed to firms. However, a few of the interviews referring to establishments located outside the Core were actually conducted in the premises of the head office

establishments of the two main divisions of the BMA. This is occasionally complemented with statistical correlations to test the degree of association between two variables. The analysis is thus chiefly of a two-dimensional (bivariate) type, with descriptive variables and location factors arranged according to their BMA location. Given the relatively small size of the BMA sample, and the fact that the self-evaluation of the site occupied by establishments at the time of the survey was only a comparatively small component of the questionnaire, more sophisticated techniques to analyse the responses to the questions on location decisions such as multivariate analysis are not warranted in this study.²

After this introduction, the next section briefly recaps and summarises some of the main characteristics of the sampled establishments. With the help of the survey findings, section 8.3 assesses the extent to which export-oriented firms in the BMA are more likely to locate in peripheral areas as compared to firms producing for the local market. This is followed in the next section by an investigation into the role of space, a factor traditionally regarded in the theoretical and empirical literature as highly influential in the decision to move out of the metropolitan core; the section compares and contrasts the relevant features of the surveyed establishments in the BMA Core and the Rest and examines the responses to survey questions about present and future space requirements, expansion and relocation plans and satisfaction with the present site.

The fifth section in the chapter investigates the issue of labour, another factor which has also been found in the theoretical and empirical literature to affect firms' locational decisions as both a 'push' and a 'pull' factor (though it is generally credited to have a lesser effect in either than space); after an overview of the main features of workers, it examines the potential explanatory effect of labour-intensity and wage differentials in influencing the location of establishments within the BMA. The influence of policy factors is examined in the sixth section, when respondents' views on a range of services and government services are contrasted for the two main sections in which the BMA has been divided for the purposes of the analysis. A summary and a set of concluding remarks end the chapter.

located in Bogotá DE. The terms 'establishment' and 'firm' are sometimes used interchangeably in this chapter, particularly when answers to questions or variables are applicable to both.

² Townroe (1985) has extolled the advantages of the use of a multivariate technique such as discriminant analysis to classify and analyse a large set of answers to an industrial location survey.

8.2 The sample survey: Summary of findings

The sample of establishments interviewed was drawn from the 1987 Industrial Directory of the Colombian Government's Statistics Office (DANE), the latest Directory available at the time of the survey (October-November 1990). As explained in greater detail in chapter 3, the units of the sample were drawn using separate systematic random sampling procedures for the establishments listed in the Directory as being located in the BMA Core (Bogotá DE) and for those in a group of four of the 14 municipalities comprised in our classification of the 'BMA Rest', Soacha, Mosquera, Funza and Sibaté³. The sampling targeted establishments rather than firms. The final tally of 28 establishments is the result of a relatively low response rate (as the original sample comprised a total of 46 establishments), in turn a possible result of factors discussed in chapter 3.

Other than the separate selection of sample units for each of the two BMA divisions, the sampling procedure did not include any further stratification of the sampling frame represented by the Industrial Directory. Thus, although in practice not statistically representative of either the BMA Core on account of its small size or of the BMA Rest as a whole due to the prior exclusion of ten municipalities from the sampling process, the sample was intended to cover the whole spectrum of Industrial Directory establishments in terms of industry branch (defined by a five-digit SIC code), size (measured in number of workers) and location.

The random selection and the process of contacting establishments (cf. chapter 3) generated a set of two samples with the number of establishments distributed in a fairly uniform manner across the three size categories introduced earlier (cf. table 8.1). This is a significantly different distribution from that of the population from where the sample was drawn, with small establishments under-represented in the sample.⁴ However, the size distribution of the units sampled in the three municipalities outside Bogotá DE is not so different from that seen in the BMA Rest as a whole during the 1980s (cf. figure 7.2 in chapter 7), especially when compared

He illustrates his argument with results from a 1980 survey in Sao Paulo, Brazil (see also Townroe, 1983).

³ None of the three establishments from Sibaté included in the sample could be interviewed (see chapter 3).

⁴ The size distribution of establishments for the BMA as a whole in 1985 was: 10-49: 66.4%; 50-99: 16.1%; 100+: 17.1% (cf. chapter 7).

to that of the Core (where small establishments made up a much larger proportion of the total). The difference in average establishment size between the two BMA components is not as marked as that between the two populations from which the sample is drawn: according to DANE's 1985 manufacturing survey, the average size in the Core was 62.9 workers and 116.6 in the Rest, compared to 61.9 and 103.9 in the sample. As average sizes did not change significantly in the second half of the 1980s (cf. chapter 7), it is encouraging to note the proximity between the two set of figures.

Table 8.1
Number of establishments surveyed
by size categories and location in BMA

Size category (Number of workers)	Core		Rest		Total	
	No.	%	No.	%	No.	%
10-49	5	35.7	6	42.9	11	39.3
50-99	7	50.0	2	14.3	9	32.1
100+	2	14.3	6	42.9	8	28.6
TOTAL^a	14	100.0	14	100.0	28	100.0
Average establishment size	61.9		103.9		82.9	

a. Percentages may not add up to 100 because of rounding

Source: Field survey.

On average, the surveyed establishments, the firms which run them, and the buildings in which they operate tend to be older inside the BMA compared to those located of it (cf. table 8.2). This is in accordance with research findings in metropolitan areas of some industrialised countries, where central areas tend to house the older establishments, and suburban locations have a greater proportion of newer (and larger) ones.⁵ In the BMA, the degree of variance among sampled establishments in the Core (that is, Bogotá DE) is considerably wider than in the other municipalities, a reflection of the greater variety offered in most respects by the population from which the sample is drawn.⁶ Another interesting feature of the sample is that in the Core and in the municipality of Soacha (which makes up the Built-up Fringe in our definition of the BMA), firms tend to be on average over three

⁵ Working on the New York Metropolitan Region in the 1950s, Hoover & Vernon (1959) found a negative association between the age of establishments and their distance to the core.

⁶ For example, the standard deviation of the age of the 14 surveyed firms in Bogotá is 12.3 years, with age ranging from a minimum of one year to a maximum of 52 years. In Mosquera, the standard

years older than the establishment in which they operate. This suggests that, at some point in their early history, the firms represented in the sample relocated all or part of their production to the establishment registered by the survey. This evidence would seem to support Lee's findings regarding the high rate of relocations and moves that characterised the industrial economy of Bogotá in the 1970s (Lee, 1989).

Table 8.2
Average age of surveyed firms and establishments,
by municipality of location

	Core	BMA Rest			Total
		Soacha	Mosquera	Funza	
Age of firm (years)	17.4	17.4	30.0	8.0	18.4
Age of establishment (years)	14.0	13.8	30.0	8.0	15.4
Age of main building (years) ^a	19.8	14.6	31.3	11.0	18.9
Number of establishments in sample	14	10	3	1	28

a. Because of a missing answer to this question, the average for the Core is based on 13 responses and the row total on 27 responses.

Source: Field survey.

Interestingly, the average age of the main building used by the surveyed establishments is older than the average age of both firms and establishments, which suggests that many firms started operating in buildings which had been converted from another use or acquired from another manufacturing firm. A closer look at the data (cf. table 8A.1 in appendix 8A) shows that such was the case in nine of the 28 establishments, with the extreme case of one firm starting production in a building that was already 39 years old. In contrast, the main building in seven of the sampled units was younger than the firm itself, suggesting that these firms made a decision to add what they currently regard as a 'main building' a few years after starting operations. Finally, the age of the building coincides with that of the firm in 11 cases (with one case providing no answer to the question).

As table 8A.1 in the appendix shows, half of the firms interviewed were founded in the 1970s, a quarter were founded before 1970 and the remaining quarter in the 1980s (of which five in 1980-1985, a difficult period for Colombia's manufacturing industry, as explained in earlier chapters). In the case of 15 out of 27

deviation is 23.8 years in a sample of three, spanning a minimum of 12 years and a maximum of 57 years.

establishments who answered the question the main building they used at the time of the survey was built between 1970 and 1979. In seven cases (a quarter of the sample) the main building had been built prior to 1970, while only two had been built in the five years prior to the interview. These findings support the idea examined in an earlier chapter and further illustrated by Lee (1989) and Cortés *et al.* (1987) that the 1970s were a dynamic time for manufacturing activity in Bogotá and in Colombia, with a high birth rate of firms (though also accompanied by a high death rate, as Lee has shown).

Another dimension of the sample which merits a brief mention is the range of industries covered by it.⁷ Table 8A.1 in the appendix lists the names of the interviewed firms, along with their main products at the time of the survey. Figure 8.1 compares the distribution of employment among the industry branches represented by the sample with the same industry branches in DANE's 1989 annual manufacturing survey (the latest available at the time of writing, covering solely Bogotá DE and Soacha which together accounted for nearly 93 per cent of all BMA manufacturing jobs). With the exception of the two peaks in the sample histogram produced by industries 369 ('Other non-metallic industries' largely attributable to the disproportionate incidence of ceramic brick factories in Soacha) and 390 ('Other manufactured products'), the two profiles delineated by the bar chart do not in fact appear too dissimilar.⁸

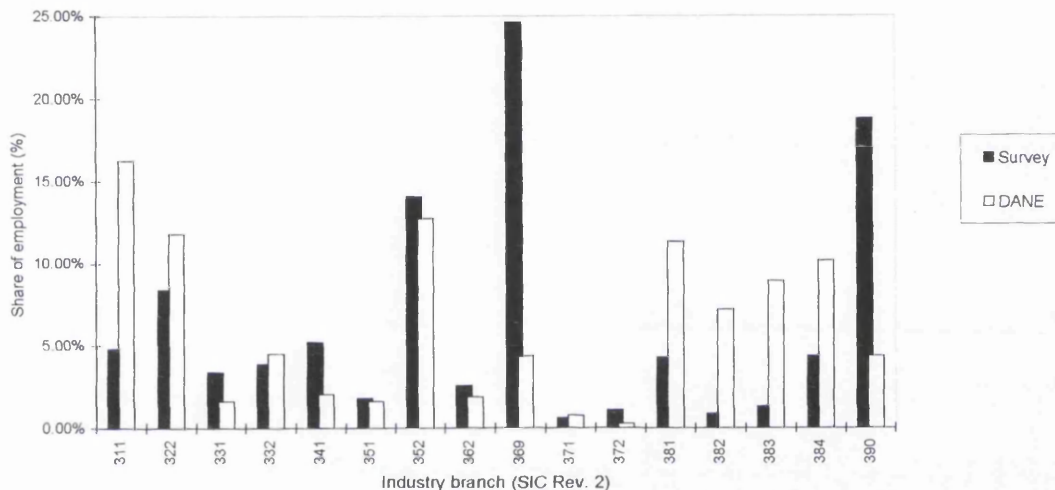
The group of industries represented by the sampled establishments jointly accounted for 62.3 per cent of BMA's total manufacturing employment (in establishments with 10 or more workers) in 1989. At the time of the interviews the sampled units jointly employed 2,320 workers, with an average of 83 workers per establishment, of which 25 were skilled, 36 unskilled and 22 were administrative staff. Of the total employed, 866 were in establishments located in the Core and 1,454 in the Rest. It must be mentioned that, while the surveyed establishments

⁷ In the research on spatial shifts of manufacturing employment in Bogotá DE in the early 1970s (Lee, 1989 and Mohan, 1994), introduced in an earlier chapter, the World Bank team deliberately limited the sampling to textiles, apparel and fabricated metals (which Lee inaccurately claims jointly "accounted for 50 percent of total manufacturing employment in Bogotá" (p. 70), when in fact the 1974 figure was closer to 31 per cent). This allowed the research team "to minimize the cost of sampling while obtaining a sufficient number of observations for econometric estimation" (*ibid.*). The final sample comprised 126 establishments, all within the administrative limits of Bogotá DE.

⁸ The similarities between the two distributions may also be measured using a more objective statistical tool. A correlation between the two complete sets of data produces a Pearson coefficient (r)

represented a negligible proportion of manufacturing jobs in the Core, their weight in the Rest, but more particularly in their respective municipalities, was somewhat more significant, with the 14 establishments jointly contributing nearly 14 per cent of the total number of manufacturing jobs in the three municipalities.⁹

Figure 8.1 :
Employment distribution in surveyed industries:
Survey results and official statistics compared
(% of total employment in industries shown)



Sources: Field survey and DANE, 1989 Manufacturing Survey.

The survey results also confirm the views of earlier research studies about Bogotá's role as a prime location for administrative functions of manufacturing production (see, for example, Gilbert, 1970; Jaramillo & Cuervo, 1987; Cuervo, 1992). As figure 8.2 shows, half of the sampled establishments located in the BMA Rest were either branches or production plants with the firm's headquarters located in Bogotá DE. Only one was the head office of a firm with branches located elsewhere, and one a multinational subsidiary. The other five, as well as 12 out of the 14 in the BMA Core, were single-establishment firms.

That such a high incidence of branches (or production plants) should occur outside the BMA Core is not entirely surprising given the fact that four of the surveyed

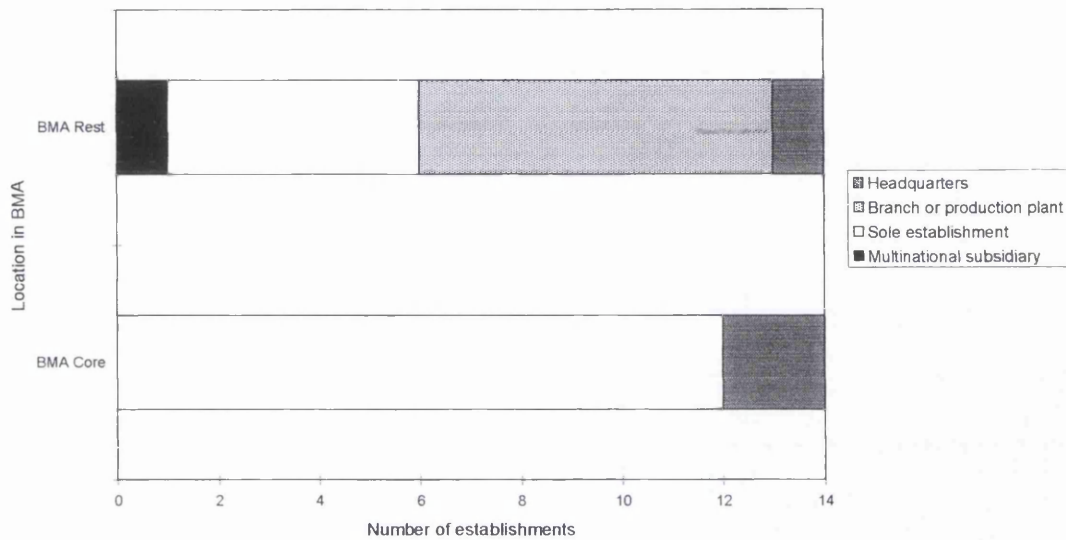
of 0.144. When the two outlier industries 369 and 390 are left out, however, the coefficient rises dramatically to a more significant 0.566.

⁹ Although at the time of writing no spatially disaggregated figures are available from DANE's 1990 Manufacturing Survey, these may be extrapolated from the previous year. Assuming that employment in the municipalities outside the Inner Core grew at the same rate as that published for the conurbation Bogotá DE-Soacha in 1989-1990, or 0.09 per cent (DANE, 1992a), total manufacturing

establishments in the municipality of Soacha are ceramic brick factories and two are mineral-extracting or mineral-processing industries. Their disproportionate location in this area may be largely explained by the fact that it is endowed with abundant clay mines and other mineral materials such as sand and gravel (Government of Cundinamarca, 1986; CAR, 1981). The surveyed establishments of these largely extractive industries are thus tied to the sources of their main inputs but need to have either the head office (or at least a sales outlet) in Bogotá as it is there that the vast majority of their market (the housing and office/commercial building construction industry) is located.

An outlet in Bogotá would not seem to be a requirement in six of the units sampled in BMA Rest, five of which are single-establishment firms and one is a branch of a multinational company. Four of these are located in Soacha's main industrial estate (Cazucá) which despite having occasional problems with public services, notably waste collection (Government of Cundinamarca, *op. cit.*) has a comparatively good infrastructure and a convenient location close to the main road linking Bogotá with the South and West of Colombia. A further two are located in Mosquera, to the West of Bogotá, a municipality where, during the period covered by this study, agro-industry (notably cut flowers) co-existed side-to-side with manufacturing and service activities, underpinned by a comparatively sound infrastructure (which owes much to its proximity to Bogotá), and good road communications with the centre of the national capital and the West of Colombia (Benavides & Gómez, 1988).

Figure 8.2:
Status of surveyed establishments by BMA location



Source: Field survey.

8.3 Market orientation and locational trends

In their now classical study of the New York Metropolitan Region (NYMR), Hoover & Vernon (1959) sought to gauge the impact of the changes in transportation infrastructure (notably the shift from rail to road) upon the spatial development of the Region. They identified two separate groups of industries which they classified as 'national market industries' and 'local market industries'. The first group consists of "industries especially sensitive to transportation considerations - those that ship a low-value product extensively to markets outside the Region" (p. 40). More specifically, these industries ship half or more of their products (measured by weight) outside the region. Because of the high relative transport cost per unit produced, these industries tend to locate in the more outlying counties of the metropolitan region, where they benefit from faster and more efficient access to the roads that will take their products to other parts of the country.

The second group is comprised, on the one hand, of "industries which ship to local consumers" with closely timed deliveries and for which "the cost of transport must be held to a minimum because of the comparatively low value of the delivered product" (ibid.). They included newspapers, bakeries, breweries, bottling works and milk plants, among others. The nature of their products thus dictated comparatively central, least-cost locations, where the negative effects of road congestion may be minimised. These industries are only tied to central locations inasmuch as the

consumers of their products are, on the whole, also centrally located. In fact, in the case of the NYMR in the 1950s they tended to move out as consumers spread out from the centre of the agglomeration.

The other type of local market industries "sell all or a considerable part of their product to other manufacturers rather than to final consumers" (p. 43). As the speed of product delivery of these industries is not such a constraint as in the previous case they have a lower proclivity for central locations and are in consequence found more homogeneously spread around the region. By definition, the two groups of local-market industries ship less than half their tonnage outside the metropolitan region.

The notion that the market orientation of an industry may influence its intra-metropolitan location is also taken up by Pred (1964) and Wood (1974). Commenting on the NYMR study,¹⁰ Pred used the criterion of intra-metropolitan location to propose an alternative seven-type classification of industries which, he argued, corrects some of the shortcomings of the one mentioned above¹¹ while being more universally applicable to other US metropolitan areas. The seven types are listed in table 8.3. Without wishing to enter into a critique here of the adequacy of Pred's categories, particularly as they might be applied to the BMA case, suffice it to highlight that this typology, derived empirically from an examination of the historical evolution of ten US metropolitan areas, supports the notion that industries which are oriented towards a national market tend to locate "on the side of the metropolis facing towards the most important regional or national market" (p. 179). Such is the case of type 7 in the table. Conversely, industries whose market area is "essentially coextensive with the metropolis or a portion thereof, are usually highly concentrated near the perimeter of the central business district, especially if the basic raw materials are of a non-local inland origin" (p. 174), as is the case of type 1 in the table.

¹⁰ And more specifically on the work of Chinitz, another NYMR study team member, who in addition to national and local market industries mentions a third type of industrial plant, "localized by external economies and by definition not subsumed" under the first two categories (Pred, 1964, p. 173).

¹¹ In Pred's views the NYMR classification "yields a result which is unquestionable in its penetration" (1964, p. 173), yet it has several gaps: "No appraisal is made of the role of raw material sources and linked wholesaling functions in influencing the location of certain local-market industries; there is little elaboration upon those external-economy industries which frequently exhibit tendencies toward non-central clustering; waterfront industries are neglected as a single cohesive entity; and specific industries, or groups of industries, are not cartographically plotted" (p. 174).

In an impassioned call for a redressed view of the metropolitan fringe as a source of industrial dynamism in its own right rather than as an extension of processes originated in the urban core, Wood (1974) also perceives a degree of association between an industry's location and its market orientation. "Around the edges of cities", he writes, "firms are usually oriented towards wider markets horizons than the local metropolis", while many old-established built-up areas "contain industries which serve local markets" (p. 132).

Table 8.3
Pred's typology of metropolitan industries
based on location requirements criterion

Industry type	Features and location tendencies
1. Ubiquitous industries concentrated near the Central Business District	Linked to wholesaling. Location near perimeter of CBD (e.g. food processing).
2. Centrally located 'communication economy' industries	Time and face-to-face contacts important (e.g. printing & publishing; fashion garments). Central locations.
3. Local market industries with local raw material sources	Sources of raw materials may be: nearly-ubiquitous (e.g. water for ice), by-products of other industries (e.g. meat packing, steel) or locally processed semi-finished goods (e.g. metal plating & polishing). Random location though tend to be central.
4. Non-local market industries with high-value products	High value products with market much larger than metropolitan area. Random location (e.g. computers, pharmaceuticals, jewellery).
5. Non-centrally located 'communications economy' industries	High value-added, serving national markets, such as scientific or technical industries. Clustered but not centrally located (e.g. electronics).
6. Non-local market industries on the water front	Distant sources of raw materials and bulky outputs. Location strongly affected by transport costs (e.g. petroleum refining, coffee roasting, sugar refining).
7. Industries oriented towards national markets	Extensive markets for bulky finished products. Location close to transport facilities (e.g. iron & steel).

Source: Pred (1964).

Insofar as the propositions advanced by these authors might offer some insight into the locational tendencies of manufacturing, in the remainder of this section we will examine the possible links between the market orientation of the surveyed industries and their location within the BMA. By way of introduction, we will start in

a slightly roundabout manner by briefly reviewing the evidence on exports out of Bogotá. There does not appear to be a source of information on Bogotá's trade flows with other Colombian cities. This sadly precludes a presentation of the results of the survey on this particular issue in the wider context of city-wide trends.

There are, however, data on flow of overseas exports covering a substantial part of the period of concern to us. Table 8.4 shows the changing structure of such exports through the period 1974-1989 in Bogotá DE (no statistical data are available for the BMA). Excluding agricultural products (most of which consist of cut flowers grown in adjacent municipalities, including some within the BMA), the city's main export products are manufactures. Exports in some of these industries grew very fast during the second half of the 1980s, as table 8.5 shows, with rates ranging from a modest 2.9 per cent per year in the case of foodstuffs, to an astonishing 38 per cent for footwear production.

Table 8.4
Bogotá DE: Structure of exports, 1974-1989
(Percentage of exports by value)

Export product	1974	1980	1985	1989
Agricultural products	12.0	16.4	17.4	14.7
Printing & publishing	--	9.3	13.1	14.3
Textiles	0.6	3.4	3.4	12.4
Leather goods (excl. footwear)	3.6	4.5	6.8	11.3
Garments	5.5	5.5	3.9	7.3
Metal products	0.0	1.3	0.4	3.0
Footwear	0.4	2.7	1.0	2.6
Industrial chemicals	3.1	2.3	1.4	1.9
Foodstuffs (except beverages)	5.7	2.7	1.9	0.0
Other exports	69.1	51.9	50.7	32.5
TOTAL	100.0	100.0	100.0	100.0

Source: Cuervo (1992).

Bogotá DE played a central national role in most of these sectors, both in terms of its contribution to national exports, as table 8.5 suggests, and in terms of national employment, with its participation in the latter in 1989 ranging from a tenth of Colombia's manufacturing workers (in the case of industrial chemicals) to a hefty 53.2 per cent in the printing and publishing industry (cf. table 6A.8 in chapter 6). In value terms, the joint economies of Bogotá and Cundinamarca (which includes all the BMA municipalities outside the Inner and Outer Core) were the principal

contributors to Colombia's exports in printing & publishing and leather goods, while they had major roles in footwear and textiles.

Table 8.5
Bogotá DE and Cundinamarca^a:
Structure and growth of exports
(US\$ millions)

Export product	1989 value	1989 share of national exports (%)	Average annual growth, 1985-1989 (% per year)
Agricultural products	217.7	10.4	9.5
Printing & publishing	29.5	61.3	4.4
Textiles	63.7	42.2	25.1
Leather goods (excl. footwear)	46.8	51.2	23.0
Garments	18.5	6.3	17.4
Metal products	n.a.	n.a.	n.a.
Footwear	23.0	49.3	38.0
Industrial chemicals	13.6	8.0	15.7
Foodstuffs (except beverages)	3.3	3.3	2.9
Other exports	120.0	n.a.	n.a.
TOTAL	555.8	9.7	10.1

n.a.: Not available.

a. No information is available separately for the BMA.

Sources: For Bogotá and Cundinamarca: Pineda & Trejos (1992); for national figures: own calculations based on DANE, 1991a.

However, our group of sampled establishments will not be competing for the "Best Exporter of the Year" award: overseas exports represent but a very small percentage of their total sales. In fact, only four of the interviewed firms export part of their products abroad, none more than a quarter of the total volume of sales (table 8.6). Overseas exports in the group are limited to products such as motorcar parts, industrial glue and toys, none of which even figures in the list of Bogotá's major exports displayed above.

On the contrary, Bogotá is the main market for the vast majority of sampled firms: 18 of the 28 sampled establishments sell 75 per cent or more of their products (in value terms) in the national capital, and half sell more than 85 per cent there. In contrast, the average volume of sales elsewhere in Colombia was just over a quarter of the total, with half of the sampled firms selling under 15 per cent nationally. It is not unlikely that this state of affairs would have perceptibly changed following the liberalisation reforms introduced after 1990 by the national government (Roda, 1994; Dávila, 1996; Gouëset, 1996) as this provided a boost for

some exporters (while clearly disadvantaging other producers who could no longer compete with the cheaper imports). But as this subject lies beyond the time horizon covered by this study, it is better left aside.

Table 8.6
Destination of sales of surveyed establishments
(Number of establishments)

Share of total sales of establishment (%)	Sales in Bogotá and hinterland	Sales in Colombia	Sales abroad
None	0	7	24
0-24	2	10	4
25-49	1	7	0
50-74	7	2	0
75-100	18	2	0
TOTAL	28	28	28
Average share (%) ^a	76.2	22.7	1.1
Median share (%) ^b	85.0	15.0	0.0

— Not applicable

a. Average share over total sales of each destination.

b. Median share over total sales of each destination.

Source: Field survey.

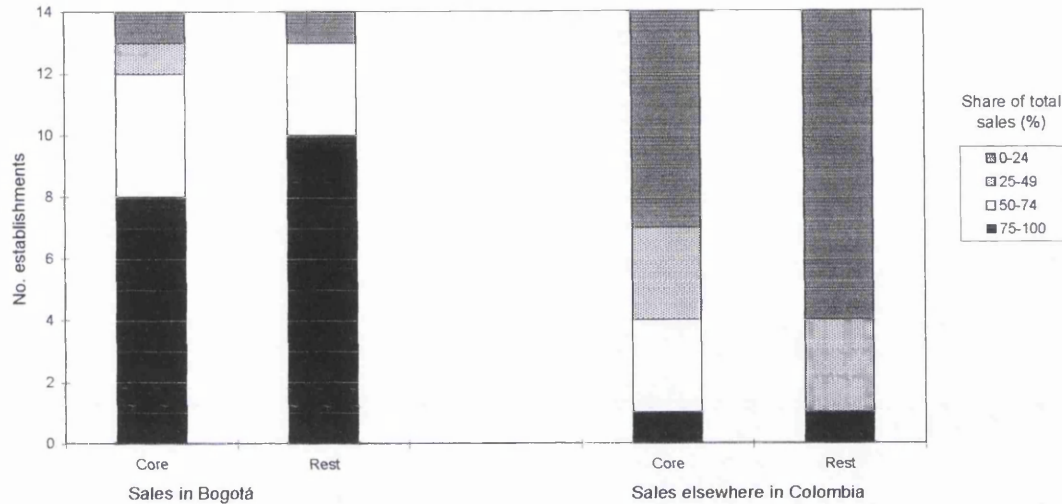
The slight diversion we have taken here of looking at Bogotá's overseas exports is not an entirely irrelevant exercise. As was stressed in chapter 2, any industry has specific and changing location requirements which are linked to a complex host of factors, be they inputs, labour or sales. And industries producing for the overseas market are no exception. In cities such as Sao Paulo, Hong Kong, Cartagena or Hamburg the sea port has a crucial role in the import-export process and, as Pred's typology suggests, some industries are clearly dependent on it. In Bogotá's case, being landlocked and hundreds of miles from the sea as it is, the airport takes the significant role of connecting the city with overseas markets. A substantial volume of Bogotá's imports but especially exports pass through the gates of its international airport (Gouëset, 1991). For many exporting industries, accessibility to the airport becomes an important requirement, and an essential one for industries producing perishable products such as cut flowers and industries for which a less than swift delivery of a product could elbow them out from a highly demanding international market (Harris, 1996).

Having briefly noted the small role played by overseas exports in our sample, we are now at liberty to return to the argument put forward by Hoover & Vernon (1959)

regarding the extent to which the location of the surveyed establishments may be explained by their market orientation within the country. The first step in the examination is shown in figure 8.3. The bars concisely but eloquently demonstrate that, contrary to the findings of the New York study in the 1950s and other US cases cited by Pred (1964), firms located outside the Core have a greater affinity with Bogotá as a market for their products than those located in the Core itself. Over two-thirds of the former sell more than 75 per cent of the total value of their products in Bogotá, while over half the sales in nine out of ten of them find buyers in the national capital. No doubt Bogotá is also the most important market for the surveyed establishments located in the Core, albeit to a lesser extent. Conversely, four out of 14 establishments in the Core shipped over half the value of their products elsewhere in Colombia, compared to only one in the Rest.

The absence of the kind of association between market orientation and location found in US metropolises gets further confirmation from two sets of statistical correlations using survey data for sample units outside the Core. The establishment's distance to Bogotá's CBD was separately correlated with, on the one hand, the share of establishment sales shipped to Bogotá and, on the other, with its share of sales elsewhere in Colombia. In both cases the association was weak, with Pearson's 'r' coefficients of 0.25 and -0.25, respectively. That in the first case there was a positive association suggests that the closer the establishment to the CBD, the lower the share of sales that is likely to be shipped to the national capital. Conversely, the negative sign in the second coefficient seems to imply that the shorter the distance the higher the value of sales shipped elsewhere. The two correlations suggest, therefore, that of the establishments located outside the Core, those which are farther from it have stronger trade links with it than those physically closer to it.

Figure 8.3:
Share of total sales in Bogotá and elsewhere in Colombia
(Number of establishments per range of percentage sales)



Source: Field survey.

The particular combination of market orientation and intra-metropolitan location of BMA's industries, as illustrated by the evidence presented here, therefore suggests that the development of Bogotá's peripherally located industries is closely tied to the development of the city as their principal market. There is little sign of development of the metropolitan fringe taking roots independently from events in the Core as Wood (1974) finds elsewhere. The peripheral location of the surveyed establishments (and, given the weight of their employment in their respective municipalities and the random nature of their selection, perhaps also of many other establishments outside the Core not included in the sample) would appear to be tied more to particular factors affecting each industry in its search for more effective ways of supplying the country's largest single market, rather than as a way of reducing transport (or other) costs to supply markets outside the national capital or, indeed, overseas.

Interestingly, there would seem to be a clearer BMA-wide association between the age of surveyed establishments and their market orientation. As table 8.7 shows, the younger ones are markedly more inclined to serve almost exclusively the local market, while older establishments appear to find it comparatively easier to dispatch part of their products elsewhere in Colombia or even abroad, a finding which

coincides with Lee's own results on Bogotá in the early 1970s.¹² This might be due to the fact that in Colombia older firms also tend to be larger¹³ and therefore better prepared to compete in markets beyond their immediate environment (Wogart, 1978).¹⁴

Table 8.7
Sales destination of surveyed establishments, by age of establishment
(Average share of total sales, in percentage)

Age of establishment (years)	Sales in Bogotá and hinterland	Sales in Colombia	Sales abroad
0-8	95.0	5.0	0.0
9-15	72.3	26.6	1.1
16-25	74.4	25.0	0.6
Over 25	73.5	21.5	5.0

Source: Field survey.

New light is shed on the issue when the information is broken down according to establishment size (cf. table 8.8): smaller establishments (i.e. in the 10-49 worker range) are predisposed to selling in Bogotá, while the largest ones (100+) tend to be better at exporting their products outside the country. But it is the intermediate-sized establishments that manage to place the largest average share of sales elsewhere in Colombia.

Table 8.8
Sales destination of surveyed establishments, by size of establishment
(Average share of total sales, in percentage)

Size of establishment (No. of workers)	Sales in Bogotá and hinterland	Sales in Colombia	Sales abroad
10-49	85.0	14.5	0.5
50-99	69.7	30.1	0.2
100+	71.5	25.5	3.0

Source: Field survey.

¹² In a sample of 126 establishments, Lee (1989, table 4-5) found that 83 per cent of "new firms" (i.e. those created sometime between 1971 and 1975) sold over half their product in Bogotá, compared to 65.6 per cent of "mature firms" (i.e. those that appeared in all annual directories used as a database for the years 1970-1975).

¹³ While true in the case of Colombia, this association is somewhat weaker among sampled establishments: a statistical correlation between age of the firm and total number of employees generates a value of +0.41 for the Pearson 'r' coefficient.

¹⁴ Such appears to be also the case in the medium-sized Brazilian city of Joinville studied by Kipnis (1984).

The impression that establishments located in the Core tend to have a broader range of action going beyond their immediate environment than their counterparts outside the Core is again confirmed by the answers to a set of questions on the origin of establishment supplies (table 8.9). Firms were not asked to specify a single source, so it becomes apparent from the table that several get their supplies (raw materials, spare parts, intermediate products) from a variety of sources. Although the most frequent source of supplies for both sets of establishments is undoubtedly Bogotá, a slightly larger proportion of those in the Rest of the BMA (12 out of 14) use this as their source compared to those in the Core (11 out of 14).

Table 8.9
Main origin of inputs
by BMA location of surveyed establishments
(Number of establishments)

	Core	Rest
1. Suppliers in Bogotá DE		
10-49	4	4
50-99	6	2
100+	1	5
2. Suppliers in Cundinamarca		
10-49	0	0
50-99	0	1
100+	0	4
3. Suppliers elsewhere in Colombia		
10-49	4	2
50-99	2	1
100+	1	3
4. Suppliers abroad		
10-49	1	1
50-99	2	0
100+	0	1

Source: Field survey.

None of the establishments in the Core have their supplies sent from Cundinamarca, the *departamento* surrounding Bogotá DE, but five in the Rest do of which four were in the large-sized (100+) group of firms. The small number of establishments supplied from abroad are more homogeneously distributed across the metropolitan division, but it is interesting to note that there does not seem to be a size or industry-bias in this respect: the 11-strong flour mill located very close to

the CBD, the highly specialised steel gauging business in Soacha's industrial estate and the 400-worker local branch of the multinational 3M all have suppliers abroad. Finally, it is interesting to note that (although no detailed input-output analysis was undertaken for the BMA) the results summarised here are in accordance with Kipnis's findings for the city of Joinville in southern Brazil and small- and medium-sized cities in Israel, where "small size (average 12 employees) and medium size (averaging 350) plants showed higher levels of dependency on local resources for the supply of their intermediate inputs compared with other sizes of plants" (1984, p. 53).

On the issue of their range of operations a final question was put across to respondents with a view to cross-tabulating the location of their main competitors and their own location. The results appear on table 8.10. As with the market for their products, the vast majority of respondents identified Bogotá as the location of their main competitors. The range of competition for establishments outside the Core is wider than for those inside, however, perhaps because the former include a number of industries, such as ceramic bricks, which are tied to main sources of raw materials (e.g. clay) outside Bogotá and where they are therefore likely to find their competition.

Table 8.10
Location of main competitors of surveyed establishments,
by BMA location
(Number of establishments)

Location of main competitors	Core	Rest
Bogotá and hinterland	14	11
Cundinamarca	0	5
Elsewhere in Colombia	5	5
Abroad	0	1

Source: Field survey.

Interestingly, only one respondent (in this case the branch of the multinational company) pinpointed overseas firms as sources of competition, a frequency of response which incidentally might have drastically increased had the survey been carried out some months after economic liberalisation measures were introduced by the national government at the end of 1990.

8.4 Space as a location factor

Of all the factors believed to be behind shifts in the location of metropolitan manufacturing industry, space probably rates as the one most frequently mentioned in the literature. It is not the intention of this section to enter into a discussion on this particular issue as this was done in chapter 2. Suffice, however, to stress that space (or the lack of it) has conventionally been perceived in industrial location studies as impelling firms to move outwards from the metropolitan core towards peripheral or suburban locations, and at times even locations beyond the metropolitan area, in search of larger quantities and lower costs of this non-renewable resource. In this section we will review the replies to the survey questions dealing with different dimensions of this important location factor.

The main focus will as usual lie in trying to find significant differences between the two divisions of the BMA, in order to seek possible explanations for the central issue of concern to this study. The section attempts, on the one hand, to examine some basic findings regarding the present use of space, including the incidence of rental among respondents and the degree of satisfaction with the site of the surveyed establishments. And, on the other, it reviews the expansion and relocation plans of the sampled units.

Table 8.11
Selected site attributes of surveyed establishments,
by location in BMA

Attribute	Core	Rest
1. Workspace area (m ²)		
Mean	2,307.6	4,924.6
Standard deviation	2,962.8	6,083.3
Median	1,000.0	3,000.0
2. Workspace as share of site (%)		
Mean	80.7	46.4
Standard deviation	33.4	31.0
3. Age of main building (years)		
Mean	19.8	17.9
Standard deviation	9.3	13.8
4. Share of site owned by firm (%)		
Mean	66.4	87.2
Standard deviation	47.3	32.1

Source: Field survey.

On average, the area devoted to production is over twice as large outside the Core as inside it (the total area of the site is, on average, 23 times larger outside the Core though this is highly skewed due to the particularly large site owned by one firm). The degree of variation among the different establishments is also smaller in the Core as shown by its considerably smaller standard deviation (table 8.11). The median value of this variable also provides some idea of the somewhat more restricted availability of space in the Core: half of the establishments operate in less than 1,000 m² compared to 3,000 m² in the establishments outside the Core.

Workspace uses up a considerably larger proportion of the site in the surveyed establishments of the Core. On average, for those outside the Core over half of the site is still free, which they could conceivably use in future expansions (an issue to which we shall return shortly). The main building in which establishments operate is on average of a more recent construction outside the Core, albeit with greater degree of variation between establishments than in the Core.

Table 8.12
Average share of site owned by surveyed establishments,
by age group and location in BMA

Age of establishment (years)	Core		Rest	
	Average share (%)	Number of valid answers	Average share (%)	Number of valid answers
0-8	0.0	2	100.0	1
9-15	71.7	6	87.5	8
16-25	83.3	6	66.5	2
Over 25	--	--	100.0	2
TOTAL	66.4	14	87.2	13

-- Not applicable.

Source: Field survey.

Ownership of the site is more widespread among establishments outside the Core. On average, two-thirds of the area of the site where they work belongs to the sampled firms in the Core while firms outside the Core own over 87 per cent of theirs (table 8.11). When the information is broken down by age groups (cf. table 8.12) some interesting results come out including the fact that, in the Core, age of establishment is positively associated with share of ownership of the site. Indeed, the two youngest establishments in the sample are renters, a finding in accordance

with those of Hoover & Vernon (1959) in New York. Outside the Core no clear pattern seems to emerge, with the incidence of site rental tending to increase with establishment age but disappearing altogether in the case of the two oldest establishments.

Table 8.13
Average share of site owned by surveyed establishments,
by size category and location in BMA

Size category (No. workers)	Core		Rest	
	Average share (%)	Number of valid answers	Average share (%)	Number of valid answers
10-49	100.0	5	66.6	5
50-99	32.9	7	100.0	2
100+	100.0	2	100.0	6
TOTAL	66.4	14	87.2	13

Source: Field survey.

The same information on rental may also be broken down into size categories, as has been done in table 8.13. This shows that renting is entirely concentrated in two groups: the medium-sized establishments in the Core, and also in the small-sized ones in the Rest, although to a lesser extent. Thus, the overall impression left by these two tables is that the importance of site rental tends to be higher among younger, medium-sized, centrally located establishments as well as among small, 'middle-aged' establishments outside the Core.

Respondents were also asked about their degree of satisfaction with their present location. They were asked whether they found each of a set of factors very satisfactory, more or less satisfactory, or unsatisfactory. They were also given a fourth option (apart from a non-response, that is) which was to label any factor as unimportant. Table 8.14 reports on the percentage of respondents who were very satisfied with a set of site attributes. The degree of satisfaction was unanimously high for several factors, including the present levels of rent or cost of land,¹⁵ plant capacity and access to suppliers and attitudes of neighbours of the establishments.

¹⁵ Unfortunately, there is a degree of ambiguity in this factor. In retrospect, I believe that the question should have been restricted to rental levels and addressed to renters only. As it is, a high degree of satisfaction from site owners might be suggesting that they are quite happy to have seen the price of their land rise so that they can eventually sell up and go!

In general terms, respondents outside the Core seemed more satisfied than those inside it.¹⁶

Table 8.14
Degree of satisfaction with site attributes of
surveyed establishments, by location in BMA

Site attribute	Core		Rest	
	Share of those very satisfied (%)	Number of valid answers to question	Share of those very satisfied (%)	Number of valid answers to question
Rent or cost of land	78.6	14	78.6	14
Cost of nearby land for future expansion	15.4	13	50.0	12
Present plant capacity	71.4	14	76.9	13
Access to suppliers	78.6	14	78.6	14
Access to customers and product distributors	64.3	14	64.3	14
Proximity to sub-contractors & other services ^a	78.6	14	57.1	14
Convenient neighbourhood for employees ^b	50.0	14	78.6	14
Attitudes of neighbours towards the plant	78.6	14	92.9	14

a. The question included the following: "repair and maintenance services and other legal and commercial services (photocopies, accountancy, etc.)".

b. The question specifically mentioned accessibility and shopping facilities.

Source: Field survey.

There was less satisfaction with the cost of nearby land for expansion particularly among respondents in Core establishments, six of whom thought it unsatisfactory. This is not surprising as there is a premium to pay on more centrally located land, which is more expensive and scarcer than in the periphery (Mohan, 1986; Lee, 1989). However, four each in the Core and the Rest saw this factor as being unimportant, though not for a single common reason: one of them is a renter (but would like to expand within the space rented by the firm), three have no expansion plans and the rest would like to expand and either already have the land or can presumably afford it.¹⁷

¹⁶ The results from the World Bank sample in the early 1970s (restricted to the area within Bogotá DE) also suggest that the level of satisfaction with a similar set of site attributes to those reported here rose with distance from the centre (Lee, 1989). Notable exceptions were quality of public services (e.g. electricity and water supply) and of municipal services (e.g. police and fire protection), factors which are reviewed later for the sample in this study.

¹⁷ No follow-up question was asked regarding their capacity to pay for additional space

It is perhaps not surprising that the degree of satisfaction with the site's accessibility to sub-contractors and local facilities (such as repair and maintenance services and other legal and commercial services) was higher among Core establishments. Their location in central areas carries with it the sort of economies of urbanisation from which small firms especially can benefit. To some extent the surveyed establishments were no exception: all five in the under-50-worker range in the Core declared themselves very or moderately satisfied, while outside the Core three were very satisfied, two found this factor unsatisfactory and one found it unimportant.

More puzzling, however, is the lower degree of satisfaction reported in the Core with regard to the convenience of the neighbourhood for employees. Central areas are generally better endowed with facilities such as restaurants or cafés, and have better transport access to different parts of the city. Bogotá is no exception. A closer look at the data broken down by size categories offers no further clues except for the observation that there was some parity across the two BMA components regarding the perception of this factor as being 'unsatisfactory'. Four establishments were agreed on this: one of the 100+ establishments in each of the Core and the Rest, an establishment in the 50-99 range in the Core and one in the 10-49 range in the Rest. Similarly, four establishments in the Core perceived this factor as 'moderately satisfactory' (all under the 100-worker range) while only one outside the Core (in the 10-49 worker range) thought so.

As with the other site attributes, answers to this question were not followed-up with further questions, so we can look no further for explanations. Given the small sample size not much is gained either by looking at the position of respondents¹⁸: for example, six of the ten general/deputy managers perceived this factor as 'satisfactory', two as 'moderately satisfactory' and two as unsatisfactory. There was a similar response from other respondents. In sum, we are not in a position to surmise what the roots of moderate satisfaction/dissatisfaction to the plant's environment are.

The final issue covered in the survey pertaining to the present site refers to the establishment's plans to expand or relocate elsewhere. This is, of course, the stock-in-trade of industrial location surveys for, among other things, it allows

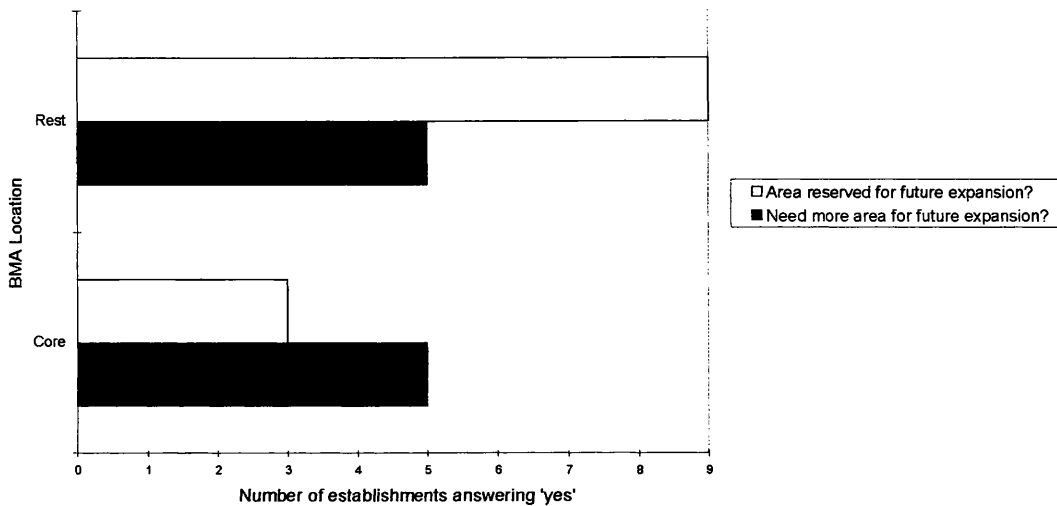
¹⁸ See chapter 3 for a breakdown of respondents' positions.

researchers and policy makers to gauge firms' intentions and (*ceteris paribus*) project them into the future. In the particular case of the BMA, such a set of questions serves the same purpose although limitations regarding the statistical representativeness of the selected sample no doubt somewhat restrict the potential of the exercise as a planning or policy-making tool. More plainly, however, it does shed some light on future intentions regarding the use of space by a group of randomly-selected establishments in both components of the Bogotá metropolitan area.

A summary of the future intentions of surveyed firms is offered by figure 8.4. The questions shown in the graph were asked in sequence, with the question on whether the establishments had reserved some area for future expansion in the same site where they presently operate (cf. questions in the survey questionnaire in Appendix 2) asked first. Those who answered in the affirmative were asked to give the size of the area (in square meters) they had reserved. All were then asked to answer the question on whether they needed more area for a future expansion.

That there is a substantial difference between the establishments located in the Core and those in the Rest is immediately apparent from the bars in the graph: only three among the former have some area in the site they occupy reserved for future expansion, while nine located outside the Core do. This is clearly a function of the greater abundance of space in the latter, as pinpointed earlier, which is on average twice that of the former, as well as the lower occupancy ratios and greater propensity to ownership of the site among establishments located in the Rest (cf. table 8.11).

Figure 8.4:
Future expansion plans of surveyed establishments
(Number of positive answers)



Source: Field survey.

Of the 12 respondents who have reserved some area for a future expansion, five believe they are likely to need even more area than what they have already reserved. Similarly, of the 16 who have not reserved any area, five believe they will at some point need some.¹⁹ Finally, it is interesting to note that the same number of establishments on either side of the metropolitan division responded affirmatively to the question about their needs for a future expansion, as this might be suggesting that they share the same degree of optimism (or perhaps one should say pessimism given the low proportion involved) about their future prospects.

A separate set of questions in a later section of the questionnaire was aimed at gauging establishments' intentions to expand or relocate within a period of five years. The questions on expansion were intended partly as cross-checks to the earlier set of questions summarised above and partly as a way of finding more about the location of an eventual expansion. The frequency of the replies appears on table 8.15.

Answers are consistent with those presented earlier: half the establishments in the Core and eight in the Rest intended to expand within five years following the

interview.²⁰ When asked about their intention to relocate, only four of the sampled establishments in the Core and one in the Rest replied in the affirmative, with a BMA average of 17.9 per cent.²¹ This suggests a relocation rate of some 3.3 per cent per year, lower than the rate of 4 per cent calculated by the City Study for Bogotá in the late 1970s though similar to that of Boston in the 1960s and Cali in the 1970s (cf. Lee, 1989; Struyk & James, 1979).

Table 8.15
Expansion and relocation plans of surveyed establishments,
by BMA location and size category
(Percentage of total in each horizontal category)

	Plans to expand in next five years (%)	Plans to relocate in next five years (%)	Number of establishments
1. By BMA location			
Core	50.0	28.6	14
Rest	57.1	7.1	14
2. By size category (No. workers)			
10-49	54.5	18.2	11
50-99	33.3	33.3	9
100+	75.0	0.0	8
Sample total	53.6	17.9	28

Source: Field survey.

When the responses are classified by establishment size, the picture shifts slightly, with six out of eight of the largest firms (100+) intending to expand, followed by over half of the small firms and only a third of the medium-sized ones. Of those intending to relocate, medium-sized establishments showed a greater propensity with one in three expressing their desire to do so, and 45 per cent in the two under-99 worker categories combined. These results are broadly in agreement with Lee's

¹⁹ Unfortunately, no time dimension was given at this point of the questionnaire to the question on future expansion so answers are imprecise.

²⁰ It is interesting to note that this shows higher aspirations to grow than the establishments interviewed in Bogotá DE by the World Bank's City Study team in the late 1970s, where 44 per cent of sampled firms expressed their desire to do so. The figure of 44 per cent is an average for all 126 interviewed firms, which were broken down into four categories: 'mature' (40 per cent had plans to expand), 'new' (33 per cent), 'movers within Bogotá' (50 per cent) and 'movers from outside Bogotá' (100 per cent). See Lee (1989, p. 85).

²¹ This is a lower percentage than the City Study's (see previous note), where 22 per cent of the 126 sampled firms intended to move, with a breakdown as follows: 'mature' firms 22 per cent; 'new firms' 17 per cent; 'movers within Bogotá' 23 per cent; and 'movers from outside Bogotá' 50 per cent.

findings in the late 1970s, when 59 per cent of firms in the 100 plus-worker range and 35.4 per cent in the under 99-worker range said they intended to expand, and 38 per cent of the under-99 range willing to relocate (Lee, 1989, p. 85).²²

Table 8.16
Locality and form of expansion plans of surveyed establishments
(Number of establishments)

	Core	Rest
1. Locality of expansion plans		
On this site	3	7
Elsewhere in this municipality	2	0
In a different municipality	2	2
2. Form of expansion plans		
Use of unused space	4	5
Construction of new buildings	2	2
Purchase of more space/land	2	2
Hire of more space/land	0	1
Establishments planning to expand	7	8

Source: Field survey.

Establishments showing a desire to expand were pressed for further details. This again showed interesting differences between those in the Core and those outside it (table 8.16). Not surprisingly, most of the latter intend to do so in the present site, not an inconsistent reply as they do have the space (and certainly on average more than in the Core). Answers in the Core are less categorical, with four (out of seven) considering the possibility of opening branches. The next set of replies for those outside the Core is also in line with the information presented earlier, showing that the majority intend to put to good use vacant space in the site, with some combining that with the purchase of additional space and construction of new buildings.

8.5 Labour as a location factor

The next factor investigated in our attempt to assess the incidence of different factors on the location decisions of the sampled establishments in the Bogotá metropolitan area is labour. Like space, from the very beginnings of this branch of

²² Lee disaggregates replies into three size categories: 'less than 25', '25-99' and '100 or more'. To make replies on plans to expand comparable with our own findings, the first two categories (which had 30 and 40 per cent of positive answers over 40 and 42 establishments, respectively) were combined

applied economics labour has received ample coverage in industrial location studies, though not much has been done on its effects on spatial shifts at the intra-metropolitan level (Scott, 1982a). The reasons for its importance are not difficult to surmise, for apart from the merely economic dimension embodied in firms' search for lower production costs and higher profits, there is the elementary notion that no industry however technically advanced can operate, let alone generate profits, without workers.

Whether it arises or not out of the debate reviewed in chapter 2 on whether capital follows labour out of metropolitan cores towards the periphery or the other way around, the issue of the spatial effects of labour in its different aspects cannot be overlooked. Regardless of the conceptual position from which one chooses to examine intra-metropolitan shifts in employment location, labour will always have to enter into the analysis, be it as a factor cost in conventional industrial location studies (cf. section 2.6), in its human dimension in anthropological studies (Holmström, 1993), as a powerless majority in political economy approaches (Storper, 1984; Massey, 1984), as a crucial element in the organisation of production in organisational approaches (Marshall, 1982), or as a passive element in managers' decisions in behavioural approaches (Townroe, 1982).

Workers featured in a number of different points in the BMA survey. As with space, their presence is examined from various angles in the hope of finding further clues to help explain the locational trends of industries in the metropolitan area of Colombia's capital. We start with an overview of the range of workers employed by the sampled establishments. In order to capture the richness of difference across establishment sizes, table 8.17 presents the distribution of workers among the three main types of occupation layered according to establishment size categories. It is important to note that, to facilitate processing of data, respondents were asked to classify employees in their establishment into the three occupations shown in the table rather than to provide their own classification (an option which might have yielded unwieldy results). The outcome may be as much a function of the inevitably simplified nature of the classification as of respondents' perceptions of their work colleagues.

into one using their weighted averages, i.e. combined average = $(0.30 \times 40 + 0.40 \times 42) \times 100/82=35.36\%$. The same procedure was used in the case of the present research.

Table 8.17
Type of workers in surveyed establishments,
by size category and BMA location
(Average number of workers)

Establishment size and type of worker	Core	Rest	Total	
			Number	Share of each type (%) ^a
1. 10-49				
Administration	3.6	5.2	4.5	15.1
Skilled workers	11.8	6.7	9.0	30.3
Unskilled workers	10.4	21.2	16.3	54.9
Total	25.8	33.0	29.7	100.0
2. 50-99				
Administration	21.4	8.5	18.6	27.1
Skilled workers	15.9	14.5	15.6	22.7
Unskilled workers	31.7	44.5	34.6	50.3
Total	69.0	67.5	68.7	100.0
3. 100+				
Administration	56.5	49.3	51.1	29.7
Skilled workers	55.5	55.8	55.8	32.5
Unskilled workers	15.0	81.7	65.0	37.8
Total	127.0	186.8	171.9	100.0

a. Percentages may not add up to 100 because of rounding.

Source: Field survey.

The results shown on the last column to the right of table 8.17 are broadly consistent with other studies on Colombia's manufacturing industry, but most notably with that by Cortés *et al.* (1987, pp. 63 & ff.). These authors' finding that the relative weight of occupations varies across plant sizes, with the share of white-collar (i.e. executive, technical & clerical) employees over total employment rising with firm output and size, receives confirmation from the survey data presented here.²³ In particular, on the assumption that the term 'white-collar' may be assimilated to 'administrative' employees in the table (which includes executive staff), and leaving aside the small average weight of unpaid workers recorded by these authors,²⁴ they find that the share of paid white-collar workers increases from 19.5 per cent in small-sized plants (5-49 workers) to 25.9 per cent in large-scale plants (100+), figures which are not too different from those collected by the present research.

²³ Allowances must be made for the fact that the level of detail collected by the BMA survey was considerably lower than that of Cortés *et al.*, for example. The present survey made no difference between paid or unpaid workers, neither did it sub-divide white collar or blue-collar workers into smaller categories.

The figures in table 8.17 show that the average establishment size is considerably larger outside the Core than inside it in the small and large size categories, and only slightly smaller in the middle-size range. The weight of both administration and of skilled workers (in absolute and relative terms) tends to be higher among Core establishments than outside it, while the share of unskilled workers is concomitantly lower (and in all cases noticeably so). The planning and policy implications of this result may not be overlooked and indeed will be taken up, along with other findings, in the final conclusions to this study.

The survey data summarised in the next set of figures also have planning implications. Table 8.18 shows the place of residence of workers in relation to the location of the manufacturing establishment where they are employed, as well as the transport mode they use in their daily commuting. Here again, there are considerable differences across space and workers' occupation. In general terms, administrative employees (which it must be remembered include executive staff) in establishments outside the Core tend to commute longer distances than their counterparts in the Core; in fact, the majority live in Bogotá, a not unsurprising fact given the greater and more varied supply of housing and other services (such as schools, health, entertainment and shopping facilities) which the city has to offer in comparison with nearby municipalities. As discussed in chapter 2, the attraction exerted by these factors upon managers and other white-collar workers has received some attention in the literature on industrial location and is confirmed by studies in Europe and the US. Conversely, only a handful of administrative personnel in establishments located in the Core live outside the limits of Bogotá. Executive suburban living is not an option in Colombia's capital.

Non-administrative (i.e. mainly production) workers in establishments outside the Core, by contrast, tend to live much closer to their workplace, the majority within a 3 km radius, the distance beyond which employees are entitled to receive a transport subsidy.²⁵ As regards the main mode of transport used in their daily commuting,

²⁴ The relative weight of unpaid workers in Cortés *et al.*'s research drops as size and output increase, from 5.62 per cent of the total in small-sized plants (5-49 workers) to 0.21 per cent in large-scale ones (100+).

²⁵ This was mentioned in the piloting stage of the survey by one respondent outside Bogotá. Unfortunately, it was not possible to collect further information on this legal requirement, particularly regarding its existence (and enforcement) within Bogotá itself.

there are marked differences between the two divisions of the BMA. Within the Core, nearly 83 per cent of the workers resort to public transport²⁶, while one in ten can afford to commute by car (no doubt mostly firm managers or their deputies). In contrast, outside the Core only a third of workers use public transport, a lower proportion than those who walk or cycle to work. Yet another significant proportion (of nearly one-fifth) benefit from the services of a company bus, a necessary expense (and a case of internalised economies of scale) that must be incurred in by some of the larger establishments in remote locations.

Table 8.18
Place of residence and main transport mode in journey to work of workers
in surveyed establishments, by BMA location
(Average percentage of workers^a)

	Core	Rest
1. Place of residence of administrative employees		
Within a 3 km radius in same municipality	46.1	30.7
Outside a 3 km radius in same municipality	51.9	16.4
In another municipality	2.0	52.9
2. Place of residence of non-administrative workers		
Within a 3 km radius in same municipality	42.4	60.4 ^b
Outside a 3 km radius in same municipality	56.6	34.2 ^b
In another municipality	1.0	5.5 ^c
3. Main mode of transport of all workers		
Foot/bicycle	3.2	38.6 ^c
Public transport	82.9	33.8 ^c
Company bus	2.2	19.3 ^c
Private car	11.7	8.7

a. Count base is 14 valid answers in each case unless otherwise indicated.

b. Based on 12 valid answers.

c. Based on 13 valid answers.

Source: Field survey.

When it comes to the use of the day for production as a response to changes in product demand, there would not seem to be appreciable differences between establishments located in either section of the BMA divide (table 8.19). The

²⁶ In the case of Bogotá this is largely limited to privately-owned buses covering a wide range of routes, most of which radiate out from the CBD. Shared taxis (*colectivos*) are more expensive but sometimes serve remote areas not covered by bus routes. Despite several plans put together since the 1950s, there is no rapid mass transport system in Bogotá, and given the powerful lobby of private bus operators and an enormous reluctance from successive mayors and national presidents alike to

majority of establishments operate on the basis of a single eight-hour shift both in the Core and the Rest, with only a handful stretching their work through the 24 hours of the day. Perhaps the only significant difference lies in the fact that establishments in the Core would appear to be more flexible and more predisposed to move from one or two to a three-shift day.²⁷

Table 8.19
Number of eight-hour work shifts per day
of surveyed establishments, by BMA location
(Number of establishments)

	Core	Rest
1. Shifts per day in normal periods		
One	11	10
Two	2	2
Three	1	2
2. Shifts per day in high season		
One	9	8
Two	1	3
Three	4	3

Source: Field survey.

A look at the disaggregated data in its finer detail (not shown in the table) suggests that there is a moderate but positive association between establishment size and increased intensity in the use of plant and equipment: while eight out of 11 establishments in the 10-49 worker range work during only one shift in high season, six out of eight large (100+) establishments extend their work over two or three shifts. The data also suggest that two and three work-shifts a day tend to be associated with the production of intermediate goods rather than with consumer goods.²⁸

acquire the large burden of debt this involves, the prospects of starting its construction in the next few years are remote to say the least.

²⁷ The limited flexibility of the organisation of production in the surveyed establishments is seen also in the fact that only one reported having part-time employees, and they only represented 3.7 per cent of total employment in the establishment. Again, this may have changed after 1990 following labour reforms by the government of President Gaviria.

²⁸ The products of those working three shifts a day in high season include: glass containers, flour, metal door frames & doors, oils & fats, industrial chemicals and industrial glue. To these must be added the match factory, which is consumer oriented.

Table 8.20
Average wages^a of BMA industries, 1974-1985
(1985 pesos^b)

Industry branch	1974		1980		1985	
	Core	Rest	Core	Rest	Core	Rest
Food Products (basic)♣	190,165	244,228	222,934	249,870	391,342	491,442
Food Products (sundry)	237,470	298,271	288,500	448,117	526,559	558,807
Beverages	263,391	513,653	300,993	424,955	734,506	761,243
Tobacco	416,437	--	423,978	--	1,225,141	--
Textiles	190,136	205,515	224,279	207,922	354,681	460,807
Wearing Apparel♣	140,746	--	173,900	--	282,974	--
Leather Products	139,501	143,227	178,862	252,844	301,185	388,560
Footwear	156,357	--	195,065	--	294,019	--
Wood Products♣	144,511	189,364	212,455	232,734	313,894	266,486
Furniture♣	165,219	160,605	197,056	239,791	302,236	370,171
Paper and Products♦	262,088	265,776	270,704	297,954	413,958	483,267
Printing and Publishing	211,510	336,713	226,065	297,808	393,236	457,130
Industrial Chemicals♦	336,125	427,268	404,340	463,694	656,021	725,985
Other Chemicals♣	326,036	314,596	312,468	266,703	631,137	554,863
Petroleum Refineries	--	433,872	--	--	--	--
Misc. Petr. & Coal Prods.	343,742	265,293	291,661	208,345	638,087	480,014
Rubber Products	204,820	340,160	237,970	327,480	430,228	627,918
Plastic Products	213,711	182,259	234,379	270,185	404,947	554,427
Pottery	130,136	--	174,246	238,108	248,811	300,609
Glass♣	177,480	316,691	207,549	370,215	364,754	718,478
Other non-metallic♣	199,694	263,439	257,671	313,948	422,336	542,115
Iron and Steel♦	216,463	350,210	238,828	368,118	390,761	649,775
Non-ferrous Metals♦	153,084	250,638	203,052	269,706	427,281	312,628
Fabricated Metal Prods. ♦	206,326	257,772	255,144	305,566	364,285	537,983
Machinery, except electrical♣	236,118	256,064	251,458	310,666	402,550	310,648
Electrical Machinery♣	250,638	259,684	276,949	265,471	510,309	475,132
Transport Equipment♦	201,084	200,698	242,662	266,581	459,158	466,013
Prof. & Scient. Equipment	223,037	103,781	243,549	235,919	353,066	--
Other Manufactured Prods. ♦	170,297	192,106	214,032	250,595	376,284	433,630
AVERAGE^c	205,901	263,797	236,014	293,371	400,419	433,630

♣ Industry with sampled establishments in the Core only.

♦ Industry with sampled establishments in the Rest only.

♠ Industry with sampled establishments in both the Core and the Rest.

-- No establishments in this industry branch.

a. Average wage for establishments in the industry branch; calculated as the establishments' annual wage bill divided by the total number of workers.

b. Calculated using producer price index deflators published by DANE (1996): for 1974, 9.6540; for 1980, 2.7058. See Appendix 3.

c. Average across all establishments.

Source: Calculations based on DANE, Annual Manufacturing Surveys.

With the next block of data we move into a different dimension of labour as a location factor in the relative location of manufacturing: remuneration. The relationship between establishment size, wage and shifts in intra-metropolitan location of industry was included in the conceptual discussions of chapter 2. In a nutshell, and drawing mostly on examples from industrialised nations, the

discussion concluded that wages vary within metropolitan areas (with wages in certain occupations rising moderately from the centre outwards) that they tend to increase with plant size and city size, and that suburban manufacturing tends to be more capital intensive and less demanding of skilled labour.

We will examine the issue of wages and capital intensity by drawing on data from DANE's annual manufacturing surveys. Table 8.20 shows average wages for all BMA industries at a three-digit level of disaggregation and split by their location within the BMA. But first a cautionary methodological note. An initial impression to come out of the table is the significant increase in wages over time, particularly between 1980 and 1985. Although there is evidence that this was the case in Colombian manufacturing as a whole (cf. Sanín Angel, 1981; Chica, 1990; World Bank, 1991), it is possible that the rise shown is overstated, a result of different definitions of variables in the computerised databases used for the analysis (though particularly between 1974 and 1980 on the one hand, and 1985 on the other). As I have no practical means of conclusively establishing where the precise difference might lie, it is more prudent to interpret the figures as being consistent within any given year, but perhaps not entirely comparable across time.

An added difficulty lies in the fact that trends in remuneration levels are sensitive to the choice of deflator (World Bank, *op. cit.*, p. 99).²⁹ For the figures shown in the next two tables and the figure, DANE's producer price index (DANE, 1996) has been used but results would have been slightly different if a GDP deflator had instead been applied.³⁰

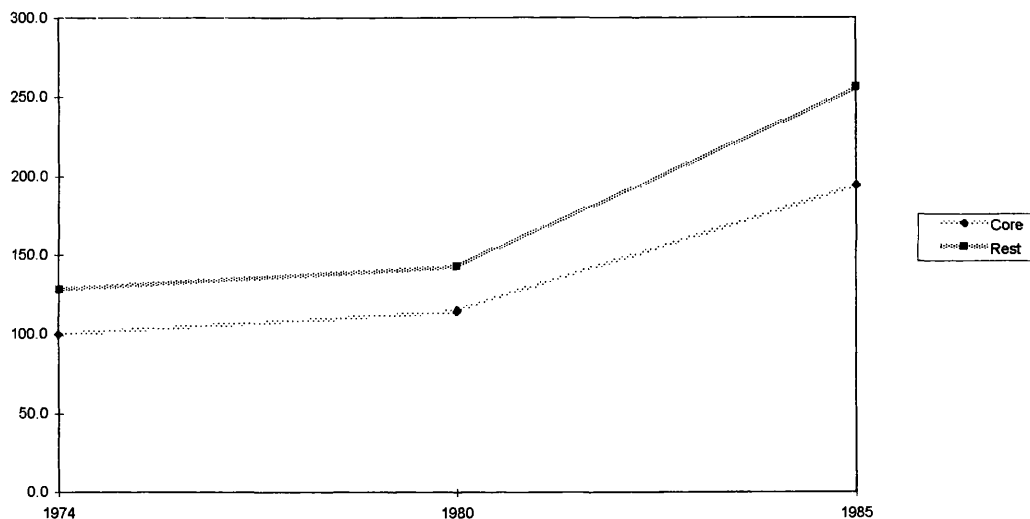
The main point to highlight from table 8.20 concerns then the differences not only across industries, but also between the two BMA locations. Although a three-digit industry level is far too aggregated, the table shows that average wages in the municipalities outside Bogotá were consistently higher than those in the Core for the three years (cf. figure 8.5). Of the sixteen industries represented by the

²⁹ In referring to Colombian manufacturing a World Bank study shows, for example, that "real wages across all types of industrial workers were about 13% lower in 1986 than in 1970 and were at approximately the level of 1980, when deflated by the GDP deflator including coffee prices. When coffee prices are excluded from the calculation, real wages show more stability, though in 1986 were still below their 1970 levels" (1991, p. 99).

³⁰ Growth rates of wages differ with the deflator. For example, wages for the Core grew 10.9 per cent in 1974-1980 and 63.1 per cent in 1980-1985 using a GDP deflator taken from López (1997). Using DANE's producer price index, growth rates were 14.6 and 69.7 per cent, respectively.

establishments included in the sample survey, for example, 1985 wages were higher in the Core in only five of them. In the three years shown, wages across all industries outside the Core were, on average, 20 per cent higher than inside it. Although the information available from DANE's database does not allow us to identify wages according to occupation or skill levels (let alone more detailed job descriptions) these figures appear to be consistent with some evidence quoted by Scott (1982).³¹

Figure 8.5:
BMA average manufacturing wage in constant 1985 pesos, 1974-1985
(1974 Core=100)



Source: Calculations based on DANE, Annual Manufacturing Surveys.

Short of launching a separate investigation, we can only use the scant evidence at hand to conjecture on the reasons behind this systematic gap between wages in the centre of the metropolitan area and those outside it. Evidence from a range of countries, including Colombia, point to the fact that manufacturing wage levels are closely associated with the size of plant (whether this is measured by output or number of workers). In Colombia, Sanín Angel (1981) finds that average wages for the period 1970-1979 in establishments with 200 or more workers were nearly three times higher than those in establishments with 10 to 14 workers. The differences can be better appreciated when comparing similar occupations. Cortés *et al.* show,

³¹ More specifically, in a 1962 paper Evans notes that wage rates of stenographers and key-punchers in Boston increase moderately from the centre of the city outwards (quoted in Scott, 1982a, p. 116). Similarly, Harrington & Warf (1995) note that in their fast food outlets McDonald's Corporation pay different wages at different locations within the same metropolitan area, on the grounds that workers are unlikely to commute across long distances for low-paid jobs.

for example, that blue-collar workers in small-scale (5-49 workers) metal-working and food processing industries on average earn 53 per cent less than those in large establishments (100+), and those in medium-sized establishments earn 42 per cent less (1986, p. 62). The difference in manager's wages is more marked, with those in small-scale establishments earning 71 per cent less than those in large establishments.

Table 8.21
Average establishment size^a of BMA industries, 1974-1985
(Number of workers)

Industry branch	1974		1980		1985	
	Core	Rest	Core	Rest	Core	Rest
Food Products (basic)♣	50.1	88.3	56.0	89.8	61.2	124.6
Food Products (sundry)	44.4	72.2	49.8	51.6	59.0	96.8
Beverages	170.6	298.5	213.8	417.0	210.3	298.3
Tobacco	427.0	186.0	445.0	476.0	269.0	568.0
Textiles	90.0	124.0	78.3	118.4	79.8	99.5
Wearing Apparel♣	62.6	--	68.7	--	63.6	--
Leather Products	39.7	192.2	58.2	164.3	51.8	106.3
Footwear	43.7	--	46.3	--	52.8	--
Wood Products♣	22.4	87.8	23.9	70.8	26.7	75.0
Furniture♣	48.4	50.3	49.8	62.4	47.0	112.0
Paper and Products♦	45.3	45.0	46.3	49.0	41.5	59.5
Printing and Publishing	61.0	98.0	65.7	140.0	67.6	184.0
Industrial Chemicals♦	84.4	121.6	48.7	147.3	59.1	155.8
Other Chemicals♣	86.8	82.4	86.3	78.0	91.3	90.3
Petroleum Refineries	--	12.5	--	--	--	--
Misc. Petr. & Coal Prods.	49.8	36.4	35.5	28.4	35.3	31.2
Rubber Products	92.4	411.0	90.7	337.6	65.1	319.2
Plastic Products	65.5	59.8	85.9	90.8	97.7	130.6
Pottery	29.8	--	32.4	18.0	8.1	65.0
Glass♣	44.7	318.8	57.4	294.7	44.2	172.7
Other non-metallic♣	47.6	157.3	52.8	118.5	47.5	146.2
Iron and Steel♦	44.2	209.2	74.7	192.3	46.5	162.7
Non-ferrous Metals♦	22.8	32.0	21.5	47.3	11.2	54.7
Fabricated Metal Prods. ♦	46.3	91.8	44.4	101.8	37.4	79.5
Machinery, except electrical♣	53.6	131.9	49.9	84.8	45.5	111.3
Electrical Machinery♣	78.6	94.4	99.0	121.0	89.5	51.8
Transport Equipment♦	80.9	121.9	102.8	163.4	77.6	128.8
Prof. & Scient. Equipment	41.4	64.0	35.3	46.0	40.6	0.0
Other Manufactured Prods. ♦	46.8	73.8	38.4	49.8	37.9	63.6
TOTAL^b	61.1	120.4	65.4	120.1	62.9	116.6

♣ Industry with sampled establishments in the Core only.

♦ Industry with sampled establishments in the Rest only.

♠ Industry with sampled establishments in both the Core and the Rest.

-- No establishments in this industry branch.

a. Average establishment size in the industry branch; calculated as number of establishments divided by total employment.

b. Average across all establishments.

Source: Calculations based on DANE, Annual Manufacturing Surveys.

This suggests that a further piece of evidence to be considered is the average size of establishments according to industry branches and BMA location. This is also drawn from the annual manufacturing surveys and presented in table 8.21. Here the differences between the Core and the Rest are immediately apparent, with average establishment size considerably larger in the latter. On average, establishments in the Rest are close to 90 per cent larger over the three years shown here.³² In sum, in the absence of more detailed evidence to compare earnings within the same industry (at the highest possible level of disaggregation) and across the spatial divide, this difference in size would seem to provide the main (though admittedly not sufficient) explanation for the observed difference in wages between the Core and the Rest of the BMA.

Hoover & Vernon (1959) showed how, as long as the bulk of manufacturing industry was concentrated in the core of the NYMR, earnings of production workers tended to be lower in peripheral locations, with a fairly marked and consistent drop with distance away from the centre. As industry started to disperse over time, and especially with the advent of truck transport and highways after the 1920s, suburban wages started to rise and by the mid-1950s they had reached considerably higher average levels than those in Manhattan.

In his state-of-the-art review of intra-metropolitan manufacturing in advanced economies, Scott argued that "much suburban manufacturing is routine, capital intensive, and highly automated, and these qualities are frequently associated with a marked decrease in the demand for skilled labour" (1982a, p. 116). And yet, plants in inaccessible locations must pay premium wages to attract the skilled workers that they do employ.

These ideas prompt us to look at the next evidence we have collected which comes out of the survey questionnaire. This takes us back to respondents' expression of satisfaction with the present state of affairs in their establishment. From their responses summarised in table 8.22 it would appear that respondents outside the Core are fully satisfied with the availability of skilled workers, a sharp contrast with

³² By comparison, the average sizes of the establishments surveyed in this research are 61.9 and 103.9, a difference of nearly 68 per cent between them.

those in the Core, where just over half said so. Responses also show a gap, though smaller, in their respective views of the cost of these skilled workers.

Table 8.22
Degree of satisfaction of respondents with labour attributes
in surveyed establishments, by location in BMA

Attribute	Core		Rest	
	Share of those very satisfied (%)	Number of valid answers to question	Share of those very satisfied (%)	Number of valid answers to question
Availability of skilled workers	57.1	14	100.0	14
Cost of skilled workers	78.6	14	92.9	14

Source: Field survey.

Given the similarities between the sample and the populations from which it is taken (as discussed in the methodology chapter and earlier in this chapter), it is not unreasonable to believe that the figures on wages presented in table 8.20 reflect, at least in terms of orders of magnitude, real differences between the sampled establishments located in the Core and those outside it.³³ The findings presented above lead us to infer then that the higher average wages paid in establishments outside Bogotá DE reflect not only the larger sizes of establishments there but quite possibly also higher wages for equivalent jobs. Although again in the absence of a detailed survey to that effect we can only speculate, the indirect evidence offered by the use of a company bus to transport workers in some establishments, the higher proportion of unskilled workers (who are presumably paid less than skilled ones within the same establishment), and a concomitantly lower share of skilled workers in most establishments outside the Core, seems to give support to this proposition. It is also quite possible that higher wages in the larger establishments reflect the effect of pressure from trade unions, which by law could be formed in those with 20 or more workers.

8.6 The role of governments

The final factor to be reviewed in our analysis of the differences between BMA locations which also comes out of the literature reviewed in chapter 2, relates to location attributes which are external to the establishment. Some, like the attitudes

³³ As this is a sensitive issue, no question on wages or wage levels was asked. The sensitivity of divulging commercial information which might be used not only by competitors but also for illegal and potentially dangerous actions such as blackmail or even kidnap, both rampant in the Colombia of the

of neighbours towards the plant, were included in earlier sections. In this section the analysis will be limited to those factors which may be, directly or indirectly, connected to at least one level of government or supplier of public service.

Respondents were asked to express their degree of approval of a range of items which could be collectively described as 'government actions', as at the time of the survey most were the responsibility of state bodies whether at the municipal, provincial or national levels.³⁴ Of all factors on which respondents' opinions were requested, the group of items shown in table 8.23 collectively attracted the highest rates of disapproval.

Table 8.23
Degree of satisfaction of respondents with government actions
in surveyed establishments, by location in BMA

Action	Core		Rest	
	Share of those very satisfied (%)	Number of valid answers to question	Share of those very satisfied (%)	Number of valid answers to question
Quality of municipal services ^a	50.0	14	53.8	13
Cost of public utilities	28.6	14	28.6	14
Collection of industrial waste	50.0	14	57.1	14
Security	64.3	14	71.4	14
Pollution controls	71.4	14	76.9	13
Fiscal incentives ^b	14.3	14	0.0	14
Other government incentives ^c	0.0	14	7.1	14

a. The question mentioned fire brigade and police.

b. The question mentioned trade and industry, and property taxes as examples.

c. An open question which asked respondents to specify one. Only one establishment mentioned one (import tariff exemptions for mineral exploitation).

Source: Field survey.

Interestingly, there was no appreciable difference across the BMA in perceptions about most of them, with official incentives, cost of public utilities and the quality of municipal services receiving the highest disapproval rates.³⁵ Six respondents in the Core and seven outside the Core said they were very dissatisfied with the cost of utilities, though they were not asked to specify which in particular. The context of

1990s, is reflected in the refusal of 18 of the 28 respondents to supply any information whatsoever on sales levels, the only question to attract a significant number of straight refusals.

³⁴ With the exception of waste collection which was privatised in Bogotá DE in the mid-1980s, all public services serving industrial areas were state-owned and run throughout the period of analysis.

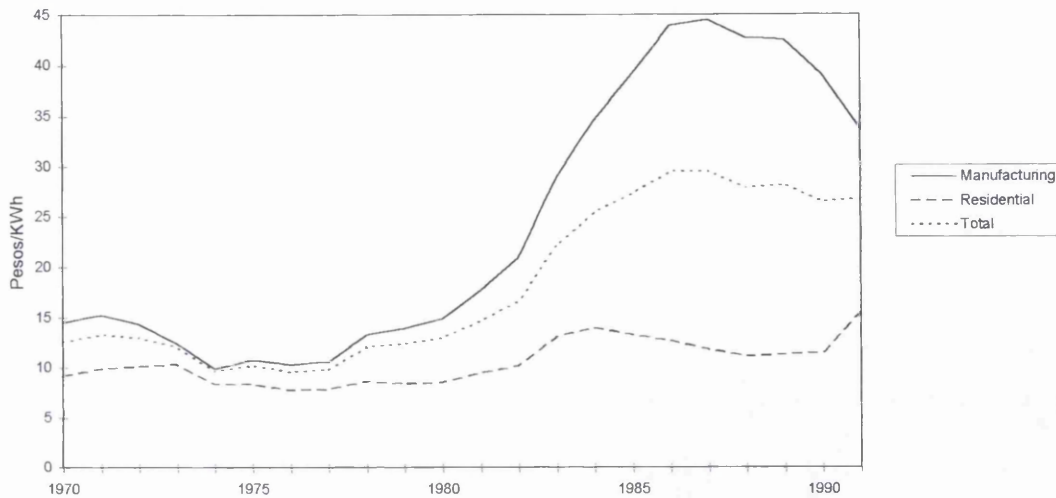
rapid and significant rises through the 1980s in the cost of energy supply (Otero & Avella, 1995) and water supply and sanitation services (Nassar *et al.*, 1995) make these the possible main culprits. It is worth noting, however, that had the survey been conducted in the late 1970s, it is likely that most of the blame would have gone to water and sanitation services, whose tariffs were then comparatively higher than in 1990 (Mohan, 1994, p. 262).

At the time of the survey electric power in all municipalities covered in the survey was supplied by Bogotá's Electricity Board (Empresa de Energía de Bogotá). Rates were uniform for all industrial users across the BMA. The survey was conducted following several years of steep rate rises for industrial users (figure 8.6): in real terms, rates increased by over three times between 1970 and 1987, compared to 21 per cent for the average residential user, and 2.2 times for the city average (Otero & Avella, *op. cit.*).³⁶ As the figure shows, the period of steepest rises were the years 1983-1987, when manufacturing industry was coming out of the recession that affected it in the late 1970s and early 1980s (*cf.* chapter 6). And as was seen in chapter 7, Bogotá's manufacturing was worse affected by these rises than any of the country's four largest metropolitan areas.

³⁵ The question mistakenly mentioned "fire brigade" as being a municipal service (along with police services): this service is in fact supplied by a semi-autonomous voluntary body.

³⁶ Commercial users were the worst hit by the rises, with rates rising nearly 3.5 times in real terms between 1970 and 1987.

Figure 8.6:
Electricity rates in Bogotá and its hinterland, 1970-1992
(1990 pesos)



Source: Otero & Avella, 1995.

Such disproportionate rises for industrial (and commercial) users were aimed at complementing the cross-subsidies, which had become insufficient by the early 1980s, arising from higher charges to better-off residential users to benefit poorer households (Otero & Avella, *op. cit.*).³⁷ This was in the context of a need to stave off an impending financial crisis for the Empresa de Energía de Bogotá³⁸, a result of excessively optimistic projections for the 1980s of growth in the city's population and in the national economy and correspondingly large investments, as well as increased electric fluid losses from 'technical' (i.e. losses in transmission) but especially 'non-technical' causes (e.g. illegal or un-metered connections).

It is worth noting that through most of the period of study public utility rates were regulated by a central government body (the Junta Nacional de Tarifas) which prepared a general framework and ought in theory to approve the level and composition of rates (for example, the use of cross-subsidisation) proposed by local suppliers. In practice, up until February 1987 when a new national decree to

³⁷ Residential cross-subsidisation has been in use by public utility companies in Colombia since the 1960s. It consists of a sliding-scale system (comprising six strata) whereby different areas in the city are charged different rates, according to property values and volume of consumption (Mohan, 1994, pp. 260 & ff.). The management of such a system is of course easier in a city with a high degree of spatial segregation along income lines, as is Bogotá (Mohan, 1986).

³⁸ As it widened its remit to supply forms of energy other than electricity, the Board changed its name accordingly in 1988 from 'Empresa de Energía Eléctrica de Bogotá' (Otero & Avella, 1995).

reinforce this function was issued, public utility companies had a fair degree of autonomy to set their rates (Nassar *et al.*, *op. cit.*).

Through the 1970s and 1980s waste collection in Bogotá and its neighbouring municipalities was also often the object of public criticism and complaints from users. Even official suppliers of the service were prepared to admit to the inadequacy and inefficiency of the service. In the case of Soacha's main industrial estate of Cazucá (where a number of our respondents are located) an official document admitted that "the service is rarely if ever supplied because of a lack of equipment and its insufficient capacity compared with the volume of waste produced in the area". The document goes on to add that "the average volume of waste collected (in Cazucá) is over 43 tonnes per day, which is equivalent to a 47 per cent coverage" (Government of Cundinamarca, 1986, pp. 44).

Finally, the absence of official incentives (fiscal or otherwise) to industrial enterprises was clearly a main gripe of respondents, the vast majority of whom found them unsatisfactory (albeit to a lesser degree in the Core). Only one of the 28 surveyed establishments believed fiscal incentives to be an unimportant factor in their assessment of the attributes of their establishment, while another one said that as a mineral transforming industry it benefited from an import tariff exemption.

Separate interviews with officials in the three municipalities outside the BMA revealed, however, that there are a few incentives which respondents failed to report. For example, the municipality of Mosquera charges manufacturing industries a 'trade and industry' tax which is 2.3 per cent lower than Bogotá's.³⁹ Similarly, the municipality of Soacha gives a reduction of 15 per cent to those who pay their trade and industry tax on time.⁴⁰ It is difficult to know why these were not mentioned by survey respondents. It might be because respondents are not aware of the existence of these incentives, or because the incentives have a negligible impact on their business, or else because respondents may fear having them reduced or eliminated if they are openly acknowledged.⁴¹

³⁹ Interview with Mr Carlos Alfonso Pabón, Planning Department, Municipality of Mosquera (5 November 1990).

⁴⁰ Interview with officials from the Planning Department, Municipality of Soacha (8 November 1990).

⁴¹ Harrington & Warf (1995) express their scepticism about relying solely on opinion surveys for industrial location studies highlighting the unreliability of this data collection method. They note,

8.7 Summary and conclusions

With a focus on the Bogotá metropolitan area (BMA), this chapter has examined a series of factors at the level of the establishment that are perceived in the literature as fostering changes in the spatial location of manufacturing industry in a metropolitan context. It made use of the results of a survey of 28 randomly-selected establishments and some secondary data to measure these factors and compare the differences between establishments located in the Core of the BMA and those outside it.

Half the establishments in the sample are located in the Core and the other half in three municipalities outside the Core. Although not strictly statistically representative, the sample does resemble in several ways the two populations from which it was taken, notably the profile of industries it represents and the average establishment size in either side of the BMA division. The survey results seem to confirm earlier findings from other studies on Bogotá's and Colombia's industry, such as Lee's observation that the 1970s were a dynamic time for manufacturing, as reflected in the high proportion of sampled establishments founded in that decade, or Cortés *et al.*'s that establishments' share of white-collar employees tends to rise with firm size.

Among the main differences between surveyed establishments in the Core and those outside it is the finding that the firms running the establishments and the buildings in which they operate tend to be older and smaller in the Core, a finding in accordance with similar studies in industrialised nations. Manufacturing activity (measured in terms of births, deaths and moves) in the centre of the metropolitan area tends to be more vigorous than outside of it. A larger proportion of firms in the Core appear to have relocated some or all their production at some point in their early history before settling in the premises they occupied at the time of the survey. Renting is not a widespread phenomenon, but tends to be more frequent among younger, middle-sized, centrally located establishments, as well as among small, 'middle-aged' ones outside the Core.

among other things, that managers will tend to exaggerate the importance of low taxes in their decisions to locate or shift location.

Respondents' opinions on a series of attributes of their present site tended to be more positive outside the Core. And so are their intentions to expand or relocate in the future. This is largely a consequence of the fact that land for expansion is less scarce and less expensive away from the centre, but is also partly linked to the nature of the goods they produce (such as ceramic bricks which require proximity to clay deposits).

Establishments outside the Core have lower shares of skilled and administrative employees, though evidence from annual manufacturing surveys in the 1980s shows that their wages are on average 20 per cent higher. This may be attributed at least partly to BMA-wide establishment sizes which are on average 90 per cent larger than in the Core across all three-digit industries.

Administrative personnel in establishments outside the Core commute longer distances than their Core counterparts, partly a function of the large proportion of firms based in Bogotá and partly a result of the greater range of services and amenities that the city has to offer compared to neighbouring municipalities. By contrast, workers outside the Core tend to commute shorter distances, and to do so predominantly by walking or cycling, or using public transport or to a lesser extent a company bus. The vast majority of workers in the Core resort to public transport.

A comparatively low approval rate of the quality and the cost of state-supplied services and utilities expressed in both sides of the inner metropolitan boundary is partly rooted in rapid and steep rises in electricity and water supply and sanitation rates in the 1980s as well as in deficiencies in the service, particularly waste collection. Official incentives to production received similar levels of disapproval among respondents in the Core and those outside it.

Bogotá represents both the main market and main source of supplies for the vast majority of sampled establishments. But contrary to evidence from US metropolitan areas, establishments located outside the Core have stronger commercial ties (i.e. market and suppliers) with Bogotá DE than establishments located in Bogotá itself. All evidence points to a majority of establishments outside the Core as being highly dependent on Bogotá in most respects, even more so than those in the Core. Wood's proposition that metropolitan peripheries are autonomous in relation to the core partially describes phenomena in the BMA: establishments in the BMA's

industrial periphery arise mostly out of births of new enterprises but, contrary to metropolitan areas in more developed nations, they have very little 'autonomy' from the Core. Establishments in the periphery are best described as being tied to a peripheral location by virtue of their specialised sphere of production and their need for larger production scales and newer premises, as being prepared to pay higher wages for more specialised labour, and being largely geared to interacting chiefly with Bogotá, the main domestic market in the country.

Appendix 8A

**List of surveyed
establishments**

Table 8A.1
Surveyed establishments:
Main products, year of foundation, year of construction of main building and years of operation in present establishment

Municipality of establishment	Name of firm	Main products	Firm founded (year)	Main building built (year)	Years of operation in establishment	
Bogotá DE	Casa Márquez de Diseño Interior Ltda	Wooden desks, dinner tables, doors and cupboards	1960	1970	10	
	Central de Mezclas SA	Concrete and mortar	1938	1979	18	
	Coltricot Ltda	Knitwear and ladies garments	1984	n.a.	6	
	Confeciones Oscar's	Ladies and children apparel	1981	1981	9	
	Envasar Ltda	Glass beakers and jars	1978	1960	10	
	Industria Molinera La Victoria Ltda	Wheat flour and bakery products	1972	1972	18	
	Indpuertas Ltda	Wooden doors, cupboards and metal door frames	1974	1985	14	
	Industrial Barrero Ltda	Ladies and children apparel	1990	1950	1	
	Laboratorios Erma SA	Pharmaceutical products and medical drugs	1975	1965	15	
	Laboratorios Kresserfor de Colombia Ltda	Pharmaceutical products and medical drugs	1973	1973	17	
	Manufacturas Pop y Cia. Ltda	Ladies and children apparel	1977	1965	13	
	Metalúrgicas Industriales	Agricultural machinery and tools	1965	1965	25	
	Proder Ltda	Animal and vegetable oils and fats	1968	1975	22	
	Protecovit Ltda	Voltage stabilisers, electrical transformers	1962	1972	18	
	3M Colombia SA	Adhesive tape, industrial glue, dental products	1987	1989	3	
	Arcillas de Soacha Ltda	Ceramic bricks for façades	1977	1977	13	
	Concretos Industriales - CICSICA	Concrete posts	1979	1979	11	
	Empresa Colombiana de Minerales Ltda, ECOMIN	Calcium carbonate, industrial talcum and other	1972	1970	10	
	Soacha	Industria Ladrillera El Porvenir SA	Ceramic bricks	1975	1975	15
Industrias Vernig Ltda		Aluminium pipes	1960	1960	30	
Ladrillera El Salitre Ltda		Ceramic bricks	1970	1972	18	
Ladrillera Las Tapias		Ceramic bricks	1980	1980	10	
Servicios San José Ltda		Plumbing and heating products	1975	1975	15	
Talleres Díaz Ltda		Parts for motor vehicles	1971	1977	13	
Funza		Steel gauging	1982	1979	8	
Mosquera		Matches	1933	1930	57	
		Corrugados Colombiana SA	Cardboard boxes	1969	1968	21
		Triotry Ltda	Wooden toys and teaching materials	1978	1978	12

n.a.: No answer given.

Source: Field survey.

9 Conclusions

9.1 Spatial manufacturing shifts in the BMA: Assessing the evidence

This dissertation has been guided by two main aims: firstly, to document the shifts in manufacturing production and employment within the Bogotá metropolitan area in the period 1958-1990; and secondly, given the evidence on manufacturing dispersal from other metropolitan contexts, to examine the reasons behind the lack of a more marked spatial dispersal of manufacturing jobs and output within the BMA than that recorded in the study period. In short, the study set out to answer the question: Why, despite Bogotá's sustained economic and demographic growth in the period 1958-1990, did manufacturing industry disperse only very moderately within the Bogotá metropolitan area?

The research covers a period of structural change but especially rapid demographic, economic and physical expansion of Bogotá and several of its neighbouring municipalities. Bogotá is the capital city of a country which, unusually for Latin America, has a fairly dispersed pattern of urban development. A large territory with two long sea coasts marked by strong geographical accidents forged the historical development of four relatively isolated regions, each one dominated by one or more urban centres growing in parallel with each other. In the twentieth century this pattern of spatial development continued as cities like Medellín, Cali and Barranquilla grew and developed almost as rapidly as Bogotá, the national capital and main administrative centre.

In the 1970s and 1980s, however, Bogotá's rates of population and economic growth tended to exceed those of the other large urban centres, thus leading it to concentrate a growing and disproportionate share of the country's population and output. In effect, while in 1951 Bogotá's population represented 5.6 per cent of Colombia's, by 1985 this had risen to 14.1 per cent. Similarly, Bogotá's share of national output rose from 15.4 per cent in 1960 to 22 per cent in 1985 (with the rise appearing even more pronounced in both cases when figures refer to the Bogotá metropolitan area).

In some economic sectors, such as communications and government services, the increase in Bogotá's national contribution was more clearly marked while its contribution to manufacturing fluctuated between one-fifth and one-fourth of the national total. The comparative strength of Bogotá's economy was reflected in lower unemployment rates than the average for the largest cities in the 1970s and 1980s, while its population was on average more educated and had better access to basic services and housing than in other large cities. This, coupled with a more diversified economy, prepared the city successfully to face at least the initial rigours of an economic liberalisation process started in 1990 (and lying outside the scope of this study).

Rapid demographic growth was accompanied by an even faster process of physical expansion. While the population in Bogotá DE grew by 50 per cent between 1962 and 1985, its built-up area expanded by 77 per cent. The difference in growth is larger when the eight municipalities comprised in the BMA are counted alongside Bogotá: a population growth of 56 per cent in the period was paralleled by an expansion in the BMA's built-up area of 83 per cent. In the 1970s and in subsequent years this gave rise to serious concerns about the growing urbanisation of large sections of the *Sabana de Bogotá*, the highly fertile plateau on which the city sits, and a consequent loss of valuable agricultural land.

A sequence of studies in the 1970s and 1980s documented a simultaneous process of suburbanisation of the city's population and a growing integration of neighbouring municipalities into its economic sphere of influence. This integration was already apparent in the early 1980s, when a study found that, in the context of a surprisingly vigorous exchange of workers and other daily commuters among the *Sabana* municipalities, some 30,000 workers commuted daily to Bogotá from neighbouring municipalities.

Suburbanisation of Bogotá's population, on the other hand, was especially marked in the north of the city where the more affluent (and more mobile) strata of population live. The city's physical expansion was also evident towards the west and especially the south-west where a growing share of the city's low-income and lower-middle income population live. These are also the areas with the larger shares of manufacturing employment in the city.

However, in the main the physical expansion documented by several authors in the period refers to a dispersal of population, and therefore to a continuous shift in land use from rural to urban residential and commercial functions. There is, by contrast, little evidence that this was matched by increased suburbanisation of manufacturing jobs as has been the case in other contexts such as early twentieth century New York and London, and more recently in Latin American metropolises like Mexico City and Sao Paulo.

Research on Bogotá in the 1970s did show, however, a clear spatial shift of manufacturing employment from the CBD towards a range of budding employment sub-centres within the built-up area of Bogotá DE (which for the purposes of this research includes only the inner and outer cores of the BMA). It appears that during a period of particularly rapid economic growth of the city in the early 1970s new firms tended to prefer locations away from the CBD (which lost employment in absolute and relative terms), though still within the administrative area of Bogotá DE. However, despite the continued expansion in residential areas and a more moderate (though by no means negligible) economic growth in the 1980s, manufacturing jobs did not disperse in either relative or absolute terms to any significant degree outside the administrative area of Bogotá DE.

This dissertation has attempted to fill some gaps in our knowledge of the spatial shifts of manufacturing in Bogotá in the period 1958-1990. One such gap is the lack of systematic documentation over time of changes in manufacturing employment not merely in Bogotá DE but also in a wider region surrounding the city. This gap has been filled partly by drawing on lessons from studies of metropolitan regions in other national and historical contexts where it has been shown that the growth of a large metropolis can influence the birth and development of industrial activities in smaller townships within a range of distances of the metropolitan core.

Thus one of the first steps of the empirical analysis summarised here was a systematic assessment of the development of manufacturing industry in a wide area surrounding Bogotá and encompassing three *departamentos* (provincial units) with a combined area representing 12 per cent of the country's territory and a quarter of its 1993 national population. This area, which does not exist as an

officially designated region, was given the short-hand name of 'Central Sub-region' for the purposes of this research. With the help of detailed statistical information collected annually by DANE and exceptionally disaggregated by establishment at the level of each municipality, the research found that manufacturing employment was scattered in towns throughout the Central Sub-region though it was most heavily concentrated in the area within Bogotá DE.

In the period 1974-1989 Central Sub-region employment in establishments with 10 or more workers (as noted in chapter 3, no information on smaller establishments has been collected by DANE on a regular basis since the early 1980s) tended towards an increasing spatial concentration in a limited area around Bogotá: while in 1974 a crescent-shaped area containing half of all Central Sub-region manufacturing employment outside the city could be contained within a radius of 48 km around Bogotá's core, by 1989 the radius had dropped to 29 km. And although manufacturing output in the Central Sub-region remained more spatially dispersed than employment this also showed a tendency to concentrate spatially, with the radius of the area containing half the Central Sub-region value added decreasing from 59 km to 39 km of Bogotá's core between 1974 and 1989.

The growing absolute weight of Bogotá over time would also appear to have some influence on the size of manufacturing employment in neighbouring municipalities. A series of correlation analyses suggests that within a radius of 100 km from the core might help explain 20 per cent of the drop in the volume of manufacturing employment away from the core in 1974, and close to 30 per cent in 1989. However, there would appear to be no significant correlation between proximity to the city's core and the rate of growth of manufacturing employment during the period 1958-1985. In other words, locations closer to the Core are likely to have larger average establishment sizes but the number of workers there will not necessarily grow faster than more distant locations.

9.2. In search of explanations

In attempting to explain the process of limited dispersal of manufacturing industry in the Bogotá metropolitan area, the research put forward a number of hypotheses. These hypotheses, which are best regarded as partial answers to the research question posed at the beginning of this chapter, sought to measure at different levels of analysis the incidence of a number of factors in shaping the spatial

development of manufacturing employment and output in and around the BMA. The three scales of analysis were, in the order in which they were considered, the regional, the national and the metropolitan levels

The **first scale of analysis** was the regional level and consisted of an application of a strand of the 'incubation, product cycle and hierarchical filtering theory of dispersal' as described in chapter 2. The particular strand chosen was developed by Dillinger & Hamer (1982) and posits a hypothetical relationship between sectoral diversification of manufacturing and its location relative to the core of a metropolitan region; as a region's industry grows and develops it will tend to shift from traditional to semi-modern and to modern activities, with core areas leading the way followed by their inner rings, their hinterlands and finally the regional periphery. Over time, these areas graduate from one sectoral profile to another, so that in the most advanced economies space becomes increasingly homogeneous.

Some of the model's predictions are corroborated in the case of the Central Sub-region in the years 1965-1980, a period of rapid growth in manufacturing employment. For example, changes outside the region's core, both in the *departamentos* of Cundinamarca and Boyacá, point to a shift from 'traditional' to 'modern' industries. Seen in isolation, these shifts might suggest a 'modernising' wave of industries gradually extending from the region's core. However, no such 'modernisation' process seems to have taken place in the regional core, Bogotá DE: there the sectoral composition of manufacturing employment experienced only modest changes, particularly when compared to other contexts such as Greater Sao Paulo in 1960-1975 where the model was successfully applied by Dillinger & Hamer.

The data point to the fact that, despite relatively high rates of growth (with jobs growing at an average of 4.4 per cent per year in 1965-1980), the sectoral structure of manufacturing industry in Bogotá DE remained largely unchanged. Application of the model therefore suggests that a first explanation for the lack of dispersal of manufacturing employment outside the core could lie in the fact that Bogotá's industries failed to 'modernise' at the rate seen in other metropolitan contexts, and that therefore the environment afforded by the city was such that it simultaneously accommodated 'early' and 'late' industries throughout the period, while providing little or no particular stimulus for innovating, more capital intensive, establishments

in modern industries. An examination of national figures for the period indicates that this was also the case in Colombia, where structural changes in manufacturing were relatively modest and certainly much more so than in more dynamic economies like the so-called Newly Industrialising Countries (NICs) of Southeast Asia and even Brazil and Mexico during the same period.

This result led to an attempt to examine further the performance of Bogotá's manufacturing industry particularly in the national context, the **second scale of analysis**. The aim of this examination was to gauge the possible incidence of a combination of national and local factors in slowing down or accelerating manufacturing growth in Bogotá. A shift-share technique was applied using employment figures of the 20 industrial sub-sectors (two-digits, SIC revision 1) in Bogotá DE (i.e. comprising the Inner and Outer Cores of the metropolitan area, as information for these is more consistent over a longer period) for the years 1963-1989, when manufacturing jobs more than doubled from 68,000 to 160,000 (this was not always uninterrupted growth but involved periods of contraction, notably 1980-1985).

The analysis shows that expansion occurred despite Bogotá DE's somewhat unfavourable industry-mix. In addition, during 1967-1980 and 1985-1989 expansion of jobs may have been slowed down by the city's disproportionate concentration of industries which were growing more slowly than their national counterparts. Moreover, in the years of employment contraction (1980-1985) this factor appears to have accelerated losses. By contrast, the positive net rates of employment growth in most years of the period suggest that Bogotá offered a propitious local environment for job expansion which more than compensated for its unfavourable industrial profile.

The focus of analysis returned to the issue of spatial dispersal of manufacturing with an exploration of a possible causal association between manufacturing growth and spatial dispersal. Such an association has been hypothesised by authors writing about the city's recent (or future) economic and spatial development. In this view, outward shifts in manufacturing employment were higher in the 1970s when growth was more vigorous but were halted in the economic slowdown of the early 1980s; dispersal may therefore become more pronounced in the eventuality of a rapid expansion in the city's economy. This proposition was tested by statistically

correlating spatial shifts of output within the BMA with changes in output, employment and number of establishments in the BMA for a period of manufacturing growth (1974-1980) and a period of contraction (1980-1985). For the correlations, the data was disaggregated into the 29 industrial branches (at a three-digit disaggregation of SIC revision 2) represented in the BMA.

The results suggest that a modest spatial dispersal in 1974-1980 was not significantly correlated to changes in either value added or in the number of establishments in the BMA core. None of the statistical correlations with the three variables helps explain even half of the changes in the measure of dispersal. And yet a somewhat surprising result not predicted in the literature is that a loss of jobs in the BMA core in the period 1980-1985 may explain 43 per cent of the modest spatial re-concentration of output there. So the case offers no conclusive evidence of the existence of causal links between manufacturing growth and spatial dispersal in the case of the BMA but it does suggest the converse, that a contraction in jobs might be associated with spatial concentration of production.

The **third scale of analysis** in the search for answers to the research question is the 'metropolitan area' itself which, for the purposes of this study, is taken as a 'functional urban area' comprising Bogotá DE and eight neighbouring municipalities. Here the research draws on a range of information sources including primary and secondary data and interviews with academics and officials, but relies principally on two sources of data. The first source (which was used in most of the preceding analysis) is DANE's annual manufacturing surveys which provide detailed information on establishments with 10 or more workers. The second source is a sample survey of 28 establishments selected randomly and distributed equally between two groups of 14 representing the Inner Core and the Rest of the BMA, respectively, and complemented by interviews with selected local government officials.

A number of propositions are tested at this scale as possible answers to the research question. The first proposition propounds a causal link between the size distribution of manufacturing establishments and industrial dispersal. This link has been posited in the case of Bogotá by Cuervo (1993) who hypothesises that a disproportionate growth of small-scale industries (which in Cuervo's view benefit more from agglomeration economies and central locations than larger ones) may

have discouraged spatial dispersal during the 1980s. By the same token, the contribution of large-scale manufacturing to dispersal may in this view have been limited by its comparatively poor performance, though an eventual revitalisation of large-scale industry is likely to be reflected in a resumption of dispersal.

A test of the proposition requires a more detailed look at the weight and development of different size categories of manufacturing establishments as reported in DANE's annual manufacturing surveys. The average establishment size rose from 66.4 workers in 1974 to 70.6 in 1980 and 71.6 in 1985, but subsequently dropped to 69.8 in 1989. In 1985 large-scale establishments (those with 100 or more workers) represented 17 per cent of all establishments in the BMA, but generated 63 per cent of manufacturing employment and 78 per cent of value added. By contrast, small-scale industries (those with 10-49 workers) represented two-thirds of all establishments but generated 21 per cent of jobs and 11 per cent of value added. When measured in terms of number of establishments, small-scale industries were shown to be disproportionately represented in the Inner Core of the BMA while the Outer Suburbs tended to have a comparatively higher incidence of large-scale establishments (when measured both in output and employment).

The evidence for the period 1974-1985 does not support Cuervo's conjecture that the continued expansion in small-scale manufacturing fostered an increased spatial concentration of industrial activities. On the contrary, while there was a mild dispersal of establishments and output in the aggregate of all size categories, the metropolitan centre's share of employment in the small-scale range tended to fall. Similarly, the growth in the number of establishments, employment and output of large-scale establishments in 1974-1980 was not accompanied by a process of suburbanisation as posited by Cuervo, but instead by their slight tendency to concentrate in the central area of the BMA.

A second proposition tested at the metropolitan scale is developed by Scott (1982a) who argues that, as the process of capital accumulation advances and manufacturing industry becomes more capital intensive, a Hecksher-Ohlin effect will develop in metropolitan areas whereby the core area will have a comparative advantage for labour intensive industries while peripheral areas will tend to have a comparative advantage for capital intensive ones. As in the case of Colombia (as well as in many other national contexts) small-scale industries tend to be associated

with lower capital intensities in production, Scott's proposition involves testing the degree to which small-scale establishments are disproportionately concentrated in BMA's core while large-scale ones tend to be located predominantly in the periphery.

A test of the hypothesis involved two sets of statistical correlations between changes in capital-labour ratios (as a proxy for capital intensity) and measures of output dispersal for the periods 1974-1980 and 1980-1985. The first set, involving all 29 three-digit industries (at SIC revision 2) represented in the BMA, suggests a very weak association between the two variables as well as the opposite mathematical sign to that predicted in the theory. When resource-bound industries (such as petroleum refineries) and industries showing agglomeration economies in the 1970s in Bogotá are temporarily excluded from a second round of analysis, the correlations appear even weaker especially in the period of negative growth (1980-1985) though this time they show the correct theoretical sign.

A closer inspection of the information shows no unequivocal evidence of increases in capital intensity over time as predicted in the theory. On the contrary, average capital-labour ratios dropped and tended to converge between 1974 and 1980, a time of output expansion nationally but also of drops in profitability margins, in capital utilisation and in productivity. In contrast, between 1980 and 1985, when employment levels fell and productivity tended to grow both nationally and locally, capital-labour ratios became more dispersed around a higher average value. In sum, and in the face of a weak tendency for manufacturing industry to disperse and quite diverse trends in individual capital-labour ratios, there seems to be no association between an industry's tendency to shift outwards from the BMA core and changes in its capital intensity as hypothesised by Scott.

It is by now apparent that the examination of metropolitan-wide trends as summarised in the previous paragraphs provides no unequivocal explanations for the absence of a more marked spatial dispersal of BMA's manufacturing industry in the years under scrutiny. The research focus therefore switched scale and to some extent also epistemological approach to examine responses to the 1990 survey of a sample consisting of 14 establishments located in the BMA Core and 14 in the municipalities outside the Core.

The scale change consisted of moving from a metropolitan- or municipal-wide level using official statistics to the micro-level provided by the sample survey. Epistemologically, there was a shift from using the tools of what Chapman & Walker (1991) define as the 'manufacturing in regional development theory and planning' approach to a 'behavioural' approach (it must be noted, however, that in this research boundaries between these approaches are neither strictly nor narrowly defined, and both draw on elements from the 'normative location theory').

Although not strictly representative of all establishments in either the Core or the Rest of the BMA, the randomly-selected establishments covering 16 of BMA's 29 three-digit industrial sub-sectors and consisting of a combination of single-establishment firms, branches and headquarters distributed in four municipalities (including Bogotá DE), offer a highly illuminating insight into the different factors that impinge upon a firm's choice of location and its perception of alternative sites. The survey sought to measure the incidence of **four sets of factors** (market orientation, space, labour and attributes of the site influenced directly or indirectly by government policies) on the performance as well as on past and future decision locations of the surveyed establishments.

Many of the survey results are consistent with official metropolitan-wide information and results from other studies. For example, average size among sampled establishments in the BMA Core not only is very close to that found in DANE's annual surveys but also smaller than outside the Core (as DANE's databases also show). Half of the sampled firms were founded in the 1970s, a dynamic time for manufacturing industry in Bogotá and nationally. As is often the case in metropolitan areas, sampled firms and the buildings in which establishments operate tend to be older in the metropolitan core, while there is evidence that production started out in a different establishment to the one they occupied at the time of the survey and that they subsequently moved, a result consistent with Lee's (1989) findings in his analysis of 1970s Bogotá. Similarly to findings in other metropolitan contexts, site rental tends to be more prevalent among young, medium-sized, centrally located establishments but also among small, 'middle-aged' establishments outside the Core.

The survey results also confirm earlier findings about Bogotá's important role as a prime location for administrative functions of manufacturing production: half the

sampled establishments located outside the BMA Core were either branches or production plants with the firm's headquarters located in Bogotá DE. Results also show that six of the establishments located outside the Core belong to resource-bound industries, notably ceramic bricks and mine-processing industries, which explains their particular choice of location.

Still with the aim of seeking an insight into the locational decisions of sampled establishments, the research tested a proposition put forward by Hoover & Vernon (1959) in their study of New York's economy (and further advanced by Pred, 1964) linking market orientation with spatial location. In broad terms, the proposition suggests that industries catering for the local metropolitan market will tend to locate closer to the metropolitan core, while those catering for a national (or international) market will tend to locate closer to the periphery, where externalities (such as congestion) and transport costs to destination markets are lower.

Although Bogotá DE and its surrounding area (which includes the *departamento* of Cundinamarca) is a major national exporter of printed material (notably books), leather goods, footwear and textiles (as well as the largest exporter of cut flowers), at the time of the survey in late 1990 overseas markets were not important for any of the sampled establishments. An interesting finding, however, is that contrary to Hoover & Vernon's proposition industries located outside the Core were largely oriented to Bogotá as a market rather than the country, while to some extent the converse was true of those located in the Core: over two-thirds of those outside the Core sell more than 75 per cent of the value of their products in Bogotá, while four out of 14 establishments sampled in the Core shipped over half the value of their products elsewhere in Colombia (compared to only one outside the Core). Bogotá was also the main source of production supplies (raw materials, spare parts, intermediate products) for establishments in both locations.

In sum, when it comes to market orientation the peripheral location of the surveyed establishments would seem to be linked more to particular factors affecting each firm in its search for more effective ways of supplying the country's largest single market, rather than as a way of reducing transport (or other) costs to supply markets outside the national capital. Suburban manufacturing in the BMA appears to be clearly and intricately linked in more than one way to the development of the metropolitan Core: as a source of capital, inputs, expertise (particularly seen in the

share of administrative personnel and also skilled workers that commute daily from there) and as the main market for its products. There is little sign of a metropolitan fringe developing independently from the Core as described by Wood (1974).

Space and site attributes are also differentiating factors between establishments located in the Core and those outside it. The former typically use half the production space but also have considerably less room for the future expansion for which over two-fifths of all respondents have reserved some space. In the case of some respondents in the Core, future expansion might involve opening a branch elsewhere. Respondents outside the Core seem to be generally more satisfied with their present site's attributes than those in the Core. Behind this view would seem to be the fact that land is more expensive in centrally located sites and that peripheral sites enjoy a more favourable attitude of neighbours. It seems, however, that urbanisation economies have something of a counteracting effect as small establishments in the Core appear to be more satisfied than those outside the Core with the access to sub-contractors and local facilities afforded them by central locations.

The survey also found differences in the characteristics of labour between establishments in the Core and those outside it. The latter have lower shares of skilled and administrative employees, which confirms evidence from other metropolitan contexts that suburban manufacturing is routine, capital intensive and automated (Scott, 1982a). Evidence from DANE's annual manufacturing surveys in the 1980s also seems to confirm findings elsewhere that suburban workers are comparatively better paid, as wages in establishments located outside the BMA Core are found to be on average 20 per cent higher than those in the Core. However, insofar as in Colombia's manufacturing industry average wages tend to increase with establishment size (measured in number of workers) and establishments outside the Core are on average 90 per cent larger than those in the Core, the evidence could be at least partly attributed to establishment size (though only a systematic comparison of equivalent jobs might offer a more unequivocal view), and perhaps to the effect of trade union pressure in the larger firms.

Not surprisingly, administrative personnel in establishments outside the Core commuted longer distances to work than their Core counterparts, partly a function of the large proportion of firm headquarters based in Bogotá DE and partly a result

of the greater range of services and amenities that the city has to offer compared to neighbouring municipalities. By contrast, production workers outside the Core tended to commute shorter distances, and to do so on foot, cycle, public transport or even company bus while the vast majority of workers in the Core used only public transport.

The final set of factors examined with the help of the sample survey consists of those site attributes which are directly or indirectly influenced by government policies. In this respect there are no appreciable differences between responses in the Core and those outside. There was widespread dissatisfaction with the cost of public utilities, while the quality of municipal services (including fire and police) fared only a little better in respondents' estimation. Electricity was supplied by a single supplier in the BMA so tariffs and the quality of service were relatively invariant for industrial users across the metropolitan area. However, a lack of more detailed information about respondents' perceptions of each individual utility service somewhat restricts a more conclusive inference in this respect. Similarly, there was uniform disapproval across the BMA of the lack of official incentives both to increased production and to the choice of particular locations.

9.3 Putting the arguments together

Having summarised the findings from the research we are now in a position to briefly present an overview of the issues at hand. There are clearly no simple answers to the research question which the study set out to explore: there does not seem to be an unequivocal explanation for the relatively modest dispersal of manufacturing jobs and output outside the Core of the Bogotá metropolitan area in the period 1958-1990. The research has, nonetheless, singled out some factors which may have had a bearing on the process. Some of these were explored fairly intensively in the research but others call for further exploration.

It seems that the fact that the industry mix in the BMA changed only marginally during the period of study (especially when compared to other metropolitan contexts such as Sao Paulo or New York) may have had an incidence on the relative spatial inertia of manufacturing output and jobs. As Dillinger & Hamer (1982) and Macedo (1983) have shown, dispersal of jobs in Sao Paulo was accompanied by substantial shifts in the structure of manufacturing industry.

When it comes to availability, reliability and cost of business services and utilities, the territory contained within the BMA may be considered as relatively homogeneous. As far as these factors are concerned, and taking account of the differences in average establishment size between different locations, establishments would appear to draw similar benefits from most locations in the BMA. Labour supply, even of skilled labour, does not seem to pose a major problem either in the different BMA locations.

Another important factor in containing dispersal within the Core of the BMA appears to be the sheer presence of Bogotá DE. Bogotá DE remains the main source of product demand, of skills and of inputs for most establishments regardless of their location in the BMA. Proximity to the large market embodied in Colombia's capital city is without doubt very important to all establishments, though it is perhaps even more pressing for larger establishments located in the periphery of the BMA. This suggests that, in the face of the increasing road congestion reported in Bogotá and its surrounding municipalities during the 1990s and the consequent inefficiency of transport (both for workers and freight), further dispersal away from this centre of gravity may imperil returns on firms' capital investment by generating intolerably high additional costs.

The research also points to other variables as potentially important factors in helping contain spatial dispersal. One factor which was explored in the study but could be the subject of further examination is the contribution made to total output by unregistered ('informal') enterprises located in different parts of the BMA. DANE's 1990 economic census reported the existence of an otherwise unrecorded economy involving thousands of manufacturing establishments with less than 10 workers. However, as has been pointed out before, the information available to this study (and most studies) refers to those establishments with 10 or more workers. And while cottage-shop establishments would appear to benefit more from central locations, there is little information on their performance in other metropolitan locations including the municipalities outside the BMA Core.

It may well be that the unusually high share of cottage-shop and small-scale establishments in the BMA compared to metropolitan areas in places like Canada, the US or Northern Europe was instrumental in holding back dispersal out of the

BMA Core. Insofar as small-scale establishments have a greater affinity for central areas (as they appear to benefit more from agglomeration economies as available evidence including the survey reported here suggests), a large concentration of these would tend to exert a clustering effect towards denser and more central areas of the city. But this is an issue which would merit further exploration perhaps through more systematic analysis using information gathered from establishments of all sizes, including those with less than 10 workers.

Yet another factor which was not examined in the present research is the issue of corporate strategies of development, which has been shown to be an important contributing factor in the spatial dispersal of manufacturing activity out of metropolitan cores in developed countries (cf. Chapman & Walker, 1991). The process of vertical integration of smaller establishments under a single large firm (or conglomerate) often allows establishments and firms to internalise production processes and costs thereby facilitating the relocation of at least some part of production to peripheral locations and even green-field sites.

Although not examined systematically here, Colombian evidence of vertical integration and the formation of large conglomerates in the scale reported in developed countries would seem rather scant. With the advent of liberalisation, however, and an increase in world trade, conglomerates appear to be breaking up, while concentrating on a specialised area of production and sub-contracting the rest. This is, nonetheless, a potentially fruitful area for future research as it may well be that, other things being equal, a process of integration might have resulted in a more pronounced dispersal of industry, and conversely, disintegration might lead to further spatial concentration.

APPENDIX 1

TOWARDS A DEFINITION OF THE BOGOTÁ METROPOLITAN AREA

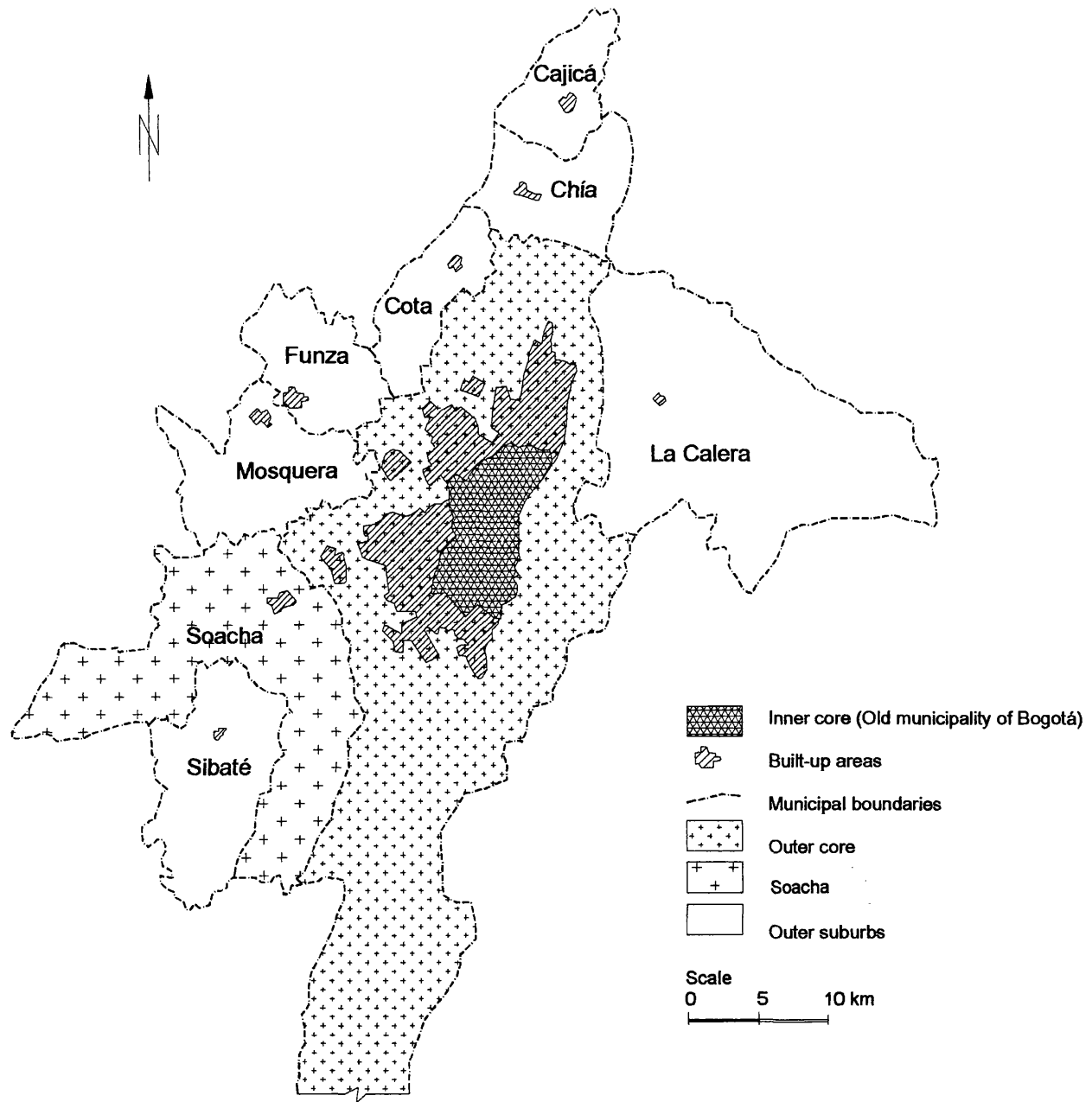
Towards a definition of the Bogotá metropolitan area

In this dissertation the expression 'Bogotá metropolitan area' is taken to mean a functional area as proposed by, among others, Hall & Hay (1980), rather than an administrative or juridical one. This is because, unlike several of the other large Colombian conurbations, there is no officially designated administrative area encompassing Bogotá and the neighbouring townships with which it has close interactions.

The functional area may be defined as an invisible boundary inside which the volume and frequency of regular exchange of goods, people and information is similar to that which happens within a much more neatly defined space such as a central business district. Administrative boundaries often artificially leave out such exchanges, which must be taken into account if the city is to be perceived as an economic unit and planned for accordingly. Another consequence of the artificiality of such administrative boundaries is that statistics are often collected, processed and published separately for different administrative units such as municipalities or districts, even if in practice they belong to the same functional area.

The administrative boundaries which help define Bogotá as a territorial entity date back to 1954 and include a vast area of mostly rural land to the south of the built-up area (cf. map A.1). The need to extend the administrative boundaries of the nation's capital city so as to help coordinate the administration and planning of what is a rapidly growing conurbation extending into neighbouring municipalities has been the subject of much debate in the past three decades (see, for example, Cárdenas, 1979; Parra Gómez, 1979; Forero *et al.*, 1995; Castro, 1996).

Some *ad hoc* attempts have been made at defining a 'metropolitan area'. As Gore (1984) notes, however, drawing the boundaries of a region is an arbitrary process: a region is after all a construct, a device used for a particular aim, be this political, analytical or merely descriptive. The aims of this research require such an analytical device to provide the spatial and conceptual backdrop to the study of economic change contained in the previous chapters. Therefore, the criteria for determining such an area ought to be both economic and spatial, whilst also fitting the available data.



Map A.1 Bogotá metropolitan area (1980)

Source: Instituto Geográfico Agustín Codazzi, 1982: Map of the Sabana de Bogotá

A useful attempt at defining Bogotá's metropolitan area (henceforth and in much of the text abbreviated BMA) was proposed by Grupo de Consultoría URBE Ltda., a consultancy firm active in the early 1980s. URBE's definition (1984) is based on a set of five criteria used to classify municipalities around Bogotá: level of urbanisation, percentage of non-agricultural workers in the labour force, percentage of workers commuting to Bogotá, distance to Bogotá, and population growth rate. These criteria provide "an indication of the predominantly urban character (of the selected municipalities) and show a high inter-dependency with the central city" (p. 248). Through multi-variate analysis, URBE designated a 'metropolitan area' which includes eight municipalities around the built-up area of Bogotá, and a 'metropolitan region' comprised of a further seven municipalities.

Because of its validity in the early 1980s and the methodological rigour with which it was developed, URBE's definition was used as a starting point for defining the boundaries of the BMA for the present research project. This was complemented with a 1982 detailed map for the region and the results of a household survey carried out in a range of municipalities close to Bogotá in 1982 (also reported in Grupo de Consultoría URBE, 1984) which among other indicators estimated the volume and type of trips to and from Bogotá. A 'metropolitan area' was defined which consists of three more or less concentric segments: a core (further sub-divided into an inner core and an outer core), a rapidly growing 'fringe' (the municipality of Soacha), and a ring of outer suburbs (map A.1; table A.1).

Thus, the BMA encompasses the administrative area of Bogotá (known throughout the period of analysis as 'Distrito Especial de Bogotá') and eight neighbouring municipalities with which the city exchanges a substantial volume of goods, people and information on a daily basis. In some cases these municipalities are part of the conurbation, they are a physical extension of the built-up area of Bogotá, so much so that it might become difficult to identify any visible separation between the two in the form of, for instance, substantial tracts of rural land.

The inner core of the BMA in 1980 was the most densely built part of the Distrito Especial, which in fact largely corresponds to the area within the old municipality of Bogotá. The outer core covers the remaining area within the Distrito Especial.

The fringe comprises the municipality of Soacha, on the Southwest of the city. Its proximity to the core, the fact that even by the early 1980s the area between the two was rapidly being built up, and its very swift population growth (cf. table A.1), mean that by the late 1980s Soacha was effectively part of the conurbation. Its close economic interaction with Bogotá could already be seen in the fact that an estimated 52 per cent of Soacha's workers commuted daily to Bogotá in 1982.

The outer suburbs comprise the municipalities of Chía, Funza, Mosquera, Cajicá, Sibaté, La Calera and Cota. Together they form a ring around the western part of the city. With the exception of Cajicá, most of them had comparatively high shares of urban population in 1985 (table A.1). The administrative centres of these municipalities all lie within a 45 km radius of Bogotá's central business district. In 1982, at least 25 per cent of all workers living in these municipalities commuted daily to Bogotá.

Table A1
Bogotá metropolitan area:
Total and urban population, 1951-1993

Area/municipality	Total population					Urban population				
	1951	1964	1973	1985 ^a	1993 ^b	1951	1964	1973	1985 ^a	1993 ^b
BMA TOTAL	764,933	1,768,712	2,994,103	4,232,721	5,937,738	672,937	1,700,487	2,922,485	4,162,844	5,860,476
Core:	698,394	1,672,608	2,861,913	3,982,941	5,484,244	660,280	1,670,115	2,854,361	3,974,813	5,469,105
Soacha:	20,441	32,600	39,405	109,051	252,102	4,226	11,435	23,997	99,353	243,597
Outer suburbs:	35,124	58,878	92,785	140,729	201,392	8,431	18,937	44,127	88,678	147,774
Core	709,368	1,677,234	2,861,913	3,982,941	5,484,244	660,280	1,670,115	2,854,361	3,974,813	5,469,105
Bogotá DE	648,324	1,568,101	2,861,913	3,982,941	5,484,244	638,562	1,562,774	2,854,361	3,974,813	5,469,105
Fontibón	16,468	45,872	--	--	--	13,871	45,012	--	--	--
Usaquén	11,207	30,282	--	--	--	4,377	27,984	--	--	--
Bosa	16,613	23,970	--	--	--	1,554	16,540	--	--	--
Suba	--	--	--	--	--	1,489	14,156	--	--	--
Engativá	5,782	4,383	--	--	--	216	3,649	--	--	--
Usme	10,974	4,626	--	--	--	211	--	--	--	--
Soacha	20,441	32,600	39,405	109,051	252,102	4,226	11,435	23,997	99,353	243,597
Outer suburbs	35,124	58,878	92,785	140,729	201,392	8,431	18,937	44,127	88,678	147,774
Chia	9,514	15,793	21,500	36,956	50,014	2,698	5,655	9,726	23,598	45,566
Funza	5,346	10,659	18,391	27,229	41,344	1,943	3,642	13,584	24,263	37,883
Mosquera	4,180	7,396	7,991	12,344	22,372	1,987	4,580	4,108	9,805	19,454
Cajicá	6,351	10,049	12,996	20,749	32,292	983	2,609	4,647	9,516	17,169
Sibaté	--	--	14,527	20,049	23,276	--	--	8,322	14,335	15,490
La Calera	7,319	10,933	12,326	15,322	19,539	532	1,944	2,842	4,055	6,662
Cota	2,414	4,048	5,054	8,080	12,555	288	507	898	3,106	5,550

-- District contained within another administrative unit, so figures are not published separately.

a. Unadjusted census figures.

b. Figures for Bogotá DE have been adjusted for coverage by a factor of 1.1089. Other figures have been adjusted by 1.0945.

Sources: DANE, national population censuses

APPENDIX 2

QUESTIONS INCLUDED IN THE SURVEY OF MANUFACTURING ESTABLISHMENTS

Questions included in the survey of manufacturing establishments

NB: The wording of questions marked with an asterisk varies according to whether the surveyed establishment is in the BMA core or outside it.

0. Introduction

- 0.1 Name and position of person responding
- 0.2 Years with the firm
- 0.3 Years in present position

1. Characteristics of the establishment

- 1.1 Name
- 1.2 Address
- 1.3 This establishment is: Headquarters, branch, single-establishment
- 1.4 Name and address of headquarters
- 1.5 Years of operation of the firm and the establishment (this question may lead to section 2, which opens the possibility for exploring further the reasons and characteristics of plants that had shifted location within the eight years prior to the interview; in the event none of the surveyed establishments fell in this category)
- 1.6 When did the establishment enter into operation?
- 1.7 Major products manufactured in the last year
- 1.8 Are these products different from those of five, ten years ago? Similar?
- 1.9 If products have changed why have they changed?
- 1.10 List major products produced by the firm five, ten years ago
- 1.11 Can you give me approximate production figures for 1989 in sales, total cost of raw materials and intermediate inputs?
- 1.12 What is the approximate area of this site? How much do you rent? How much is owned?
- 1.13 What is the approximate work area available to you: Rented? Owned?
- 1.14 How old is the main building in this plant?
- 1.15 Have you reserved any area here for future expansion? If so, how much?
- 1.16 Do you need any additional area for future expansion?
- 1.17 Do you store finished products in a warehouse? If so, where is the warehouse located: In this location? Elsewhere in this municipality? In another municipality (state which)?*
- 1.18 Approximately how many people work in this establishment part-time and full-time? Administrative personnel? Skilled workers? Unskilled workers?
- 1.19 Is it difficult to find workers to do certain specialised jobs? If so, can you specify what sort of jobs?
- 1.20 On average, how many 8-hour shifts are run at the plant: in normal periods? In periods of high demand?
- 1.21 Where do the majority of your employees live? Please indicate approximate percentages next to each category: management and non-management. Within a radius of 3 km; outside a radius of 3 km; outside 3 km and in another municipality.*

- 1.22 Approximately what percentage of your employees typically commute daily: on foot or bicycle? With public transport? In a company bus? By car?
- 1.23 How stable is your staff: Very stable? More or less stable? Unstable?
- 1.24 Approximately what percentage of the total value of your products are sold in the following regions: Bogotá and its hinterland? Other Colombian regions? Abroad?*
- 1.25 Where are your main suppliers located: In Bogotá and its hinterland? In Cundinamarca? In other Colombian regions? Abroad?
- 1.26 Where are your main competitors located: In Bogotá and its hinterland? In Cundinamarca? In other Colombian regions? Abroad?
- 1.27 Assessment of the present location of this establishment: Please rank the following location factors (1=highly satisfactory, 2=more or less satisfactory, 3=not satisfactory, 4=not important): Rent level or price of land. Plant capacity. Cost of skilled workers. Availability of skilled workers. Cost of public utilities (e.g. power and water). Quality of public utilities. Access to suppliers. Access to clients and product distributors. Proximity to sub-contractors, repair and maintenance services, and other legal and commercial services (e.g. photocopying, accountancy, etc.). Municipal services (fire brigade, police, etc.). Collection of industrial waste. Security. A convenient neighbourhood for employees (access, nearby shops, etc.). Attitudes of neighbours towards the plant. Pollution controls. Tax incentives (e.g. exemption on industry and commerce tax, rates). Other incentives related to the location of the plant (please specify).

2. Comparison with previous location (aimed at those establishments which moved in the eight years prior to the interview)

- 2.1 Address of previous location, including municipality
- 2.2 List five factors which weighed most heavily in your decision to move the plant to its present location, in order of importance
- 2.3 In hindsight, do you believe that moving here was the adequate decision? Why?

3. Future expansion and relocation plans

- 3.1 Does the firm have any plans for expanding operations within the next five years by means of any of the following: Buying additional space? Renting additional space? Adding more buildings? Using now vacant space? There are no expansion plans?
- 3.2 If you have expansion plans, this would take place: In this site? Somewhere in Bogotá? In another municipality? (In the last two, please specify where).*
- 3.3 Does the firm have any plans to relocate the whole plant elsewhere in the next five years?
- 3.4 If the answer to 3.3 is yes, what is the most likely next location of the plant: Bogotá? Another municipality? (Please specify where).
- 3.5 Please list the advantages of the new location over the present one.

APPENDIX 3

**COLOMBIAN CONSUMER AND
PRODUCER PRICE INDICES
AND CONVERSION FACTORS,
1970-1995**

Colombia:
Consumer and producer price indices
and conversion factors, 1970-1995

Year	Consumer price index (%) ^a	Conversion factor ^b	Producer price index (%) ^a	Conversion factor ^b
1970	6.6	1.0000	6.14	1.0000
1971	14.01	1.1401	15.59	1.1559
1972	14.03	1.3001	20.99	1.3985
1973	24.04	1.6126	32.89	1.8585
1974	26.34	2.0373	36.18	2.5309
1975	17.77	2.3994	19.64	3.0280
1976	25.74	3.0170	27.26	3.8534
1977	28.71	3.8832	19.17	4.5921
1978	18.43	4.5988	21.58	5.5831
1979	28.8	5.9233	28.99	7.2016
1980	25.85	7.4545	25.39	9.0301
1981	26.36	9.4195	23.53	11.1549
1982	24.03	11.6829	24.59	13.8978
1983	16.64	13.6270	17.96	16.3939
1984	18.28	16.1180	21.19	19.8678
1985	22.45	19.7365	22.98	24.4334
1986	20.95	23.8713	24.38	30.3902
1987	24.02	29.6052	25.17	38.0394
1988	28.12	37.9301	29.52	49.2687
1989	26.12	47.8375	25.62	61.8913
1990	32.36	63.3177	29.9	80.3968
1991	26.82	80.2995	23.1	98.9685
1992	25.13	100.4788	17.84	116.6245
1993	22.6	123.1870	13.19	132.0073
1994	22.59	151.0149	20.73	159.3724
1995	19.46	180.4024	15.4	183.9157

a. Measured in December of each year.

b. This is the amount by which a figure for a given year must be divided to calculate its value in 1970 prices.

Source: DANE (1996b).

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