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The development of an early suburban industrial district: *The Montreal ward of Saint-Ann, 1851–71*

Robert D. Lewis

Abstract:

The conventional description and explanation of industrial location in the nineteenth century emphasizes the concentration of production in the city core. In contrast this paper finds that for mid-nineteenth century Montreal a significant number of firms were locating on the urban fringe. In a case study of Saint-Ann ward between 1851 and 1871, it is shown that the Lachine canal was a powerful magnet attracting large-scale, technologically-advance industries. Other factors accounting for the development of this peripheral industrial district were cyclical change, new technologies, large capital investments, inter-industry linkages, and changes in the organizational structure of firms.

Résumé

Les études sur la localisation des entreprises aux dix-neuvième siècle font habituellement ressortir leur concentration dans la ville centrale. Il apparait toutefois qu'au milieu du siècle la frange urbaine montréalaise a attiré un nombre de firmes assez important. La présente étude, consacrée au quartier Sainte-Anne (1851-1871), montre que la canal de Lachine a exercé un puissant attrait sur les établissements industriels de grande taille et faisant appel à une technologie avancée. D'autres facteurs expliquent le développement de ce quartier industriel périphérique: les cycles économiques, le progrès technique, l'importance des capitaux investis, les liens inter-industriels et l'evolution organisationnelé des entreprises.

Introduction

The primary concern of the historiography of 19th and early 20th-century suburban development has been the movement of the middle class from the city core to the periphery. The suburbanization of the working class and industry are seen as phenomena that followed later. The movement of industry to the fringe has been perceived as a subsidiary event compared to the concentration of production in the city core. For most writers the decentralization of industry only becomes an important feature of the city suburbs after World War I.[1] Recent work, however, suggests that we have neglected the degree to which the formation of industrial suburban areas were important components of the city-building process in this period.[2]

The purpose of this paper is to examine that interpretation of the location of industry. After a brief overview of the two conventional explanations of industrial location in the 19th-century city, I will present a reformulation of the argument for industrial decentralization. Next, a discussion of Montreal's industrialization within the context of this reformulation is presented. This is followed by a case study of the Lachine canal district in the Saint-Ann ward of Montreal between 1851 and 1871. The Lachine canal district was a major pole of industrial development in the early 1850s and constituted the city's first industrial suburban area.[3] The growth of industry on the urban periphery, far from being a characteristic of the 20th century, was a product of the restructuring of industry and the rearrangement of the city's geography at mid century.

Perspectives on Industrial Suburbs

The decentralization of industry from the core to the suburban fringe has generally been viewed within the framework of two models: the transportation and the transactional. According to the transportation position, industrial location in the nineteenth century was determined by the location of transportation nodes and the cost of intrametropolitan transportation. The location of railway terminals and harbours in or adjacent to the central core is seen as decisive in attracting industry to the city centre.[4] This was reinforced by the fact that intraurban freight transportation was expensive and inefficient compared to the transportation of people.[5] Other factors such as the dependence on economies of agglomeration, the small size of the urban market, and the lack of housing compounded the need for industry to seek a central location.[6] It was only with the introduction of transportation innovations at the turn of the century that industry was freed from a central location. These innovations—the trolley and the truck—in conjunction with increasing external diseconomies (rising land values, traffic congestion, and escalating taxes), and new production techniques broke the ties of industry to the central core and allowed industry to move to the periphery.[7]

The second interpretation of the centralization of production has come from Allan Scott.[8] While arriving at the same conclusion as Warner and others regarding the location of production in the 19th-century city, his explanation is more penetrating and provides some valuable leads to a reformulation of the industrial structure of the city. He distinguishes two different types of industry in the 19th century. The first type—small-scale labour-intensive industry—lacked internal economies of scale and involved a fragmented labour process. This resulted in small, specialized units making up a complex of independent and 'vertically disintegrated' producers.[9] The resistance of these industries to

mechanization and the ensuing fragmentation of labour resulted in centrally located complexes of economic activity linked together by external economies of scale. The second type was large-scale, materials-intensive manufacturing in which inputs were heavy and/or voluminous in comparison to outputs. These firms sought locations close to rail and water transportation facilities where they could minimize the costs of transactions. In Scott's view both types of industry located centrally, although for different reasons.

Although there is little doubt that the city core was the locus of industry and employment throughout the 19th century, recent research by historians and geographers raise questions concerning the validity of a core-dominated locational model. A striking example of this is a study of Baltimore in 1860. While it had six major industrial districts, only two of which were centrally located, four were "located on the edge of the city's built-up area." Montreal in 1871 was also characterized by the existence of peripheral industrial districts.[10] What these studies suggest is that the mid-19th century city had a more complex structure than is generally assumed. It also implies that there are problems in the explanations provided by the transportation and the transactional models. I argue that the 19th-century city was characterized by a fragmented and cellular industrial geography. The massive expansion of the world economy alongside the fundamental reorganization of manufacturing generated a powerful set of impulses for the restructuring of intra-urban manufacturing location. One aspect of this altered landscape was the emergence of peripheral industrial districts which co-existed alongside the dominant centrally-located district.

A common failing of the two models is their inability to make explicit the connection between the internal structure of cities and external pressures.[11] This is particularly evident with regard to the changes associated with the long wave (Kondratieff cycle).[12] An important aspect of the locational base of urban development is the manner in which long-term waves of industrial change flow through the landscape. In periods of economic growth the large-scale flow of capital into urban areas takes the form of large fixed capital outlays as new technologies are introduced, existing plants expanded, and new firms created. The result is larger firms which are more vertically integrated and less dependent on agglomeration economies. Alongside these are changes in the political and social contexts.[13] Especially important here is the capacity of local growth alliances to construct a built environment which is conducive to the development of industrial growth. This takes place within a competitive environment with each city attempting to outdo the others.[14] Thus, at the local scale, the ability to tap growth was critical not only to the viability of the city's long-term economic growth but also to the form its spatial structure would take. For those cities, such as Montreal, that were able to capture some of the growth impulses there would be important changes to both the organizational and spatial structures of industry.

Associated with major economic expansion is the growth of new industries. Commonly, these new industries lead all others in rates of growth, technological innovation, capital investment, segmentation of the production process and the labour force, and the introduction of new strategies to control labour.[15] During any period, a group of industries are the dominant ones around which industrial acceleration takes place. It is from these that growth pulses to other industries often originate: the impact of new technologies in leading industries can spill over into others. At the same time, each round of change in technology and the composition of industrial structure, produces a modification of the relative importance, and of the place of industries within the economic structure.

A second problem with the models is that they assume a degree of organizational homogeneity which did not exist in the 19th century. The transportation model takes for granted that industry was all of one type and functioned according to the same rationale. Its neoclassical economic foundations ensure that those cases which do not fit into the centralized model are seen as marginal. Scott, on the other hand, reduces organizational diversity to two types of industry. Although an advance on earlier work, all industries which do not fall into one of his two categories are, by definition, excluded from analysis. The picture he paints of industrial organization is one characterized by mutually exclusive spheres where large and small firms function in different worlds.

A fundamental feature of 19th-century industry, however, was the diversity of organizational structures between and within industries.[16] A formative element of this is that "(d)ifferent products have different production methods with divergent potentials for standardization, mechanization and other forms of rationalization".[17] Each industry follows a different growth path with its own choice of technology, labour process, labour force, and scale. Throughout the 19th century a number of factors were responsible for the slow and uneven application of technology to production. They included the abundance of labour, the increasing division of labour,

technical difficulties associated with much of the machinery, inability to mechanize many parts of the production process, and increasing productivity through hand technology.[18] The varied character of industry manifested itself in a wide range of labour process forms. Different products call for different ways of organizing how they were to be made. The result was that industries were characterized by different methods with varying degrees of mechanization and skill. Even within the same firm a number of distinct labour processes could be juxtaposed. In a study of Philadelphia between 1850 and 1880, for example, five different work environments have been described ranging from the small artisan workshop to the large factory.[19] While an industry may be dominated by large firms, many small, specialized ones can operate on its fringes.[20] Another feature of the organizational diversity was that the labour force took on a variety of forms. New industries created the need for both skilled and semi-skilled workers. In the older industries, workers either adapted their labour to the changing situation, moved into newer occupations, or became occupationally redundant.

What this all suggests is that the locational choices that 19th-century industries had available to them were much more diverse than what is accommodated by the transportation and transactional models. Each new burst of economic growth creates new economic space. When this growth occurs alongside radical changes in technologies, the development of new industries, and the reshaping of the organizational basis of industry there will be strong pressures for the development of new industrial spaces and the modification of existing ones. There is no a priori reason for believing that these new spaces have to be centrally located. Indeed, the changes associated with an expanding economy and the restructuring of the social organization of production would have a number of significant effects on the locational possibilities of industries. These include the reformulation of transport costs, the creation of new labour demands, the transformation of linkage networks, and the change of a firm's space requirements. These changes working in conjunction with the organizational diversity of industry would create powerful forces upon a city's industrial geography. The cumulative effect of the dissolution, development and modification of industries establishes the possibility for changes to the locational logic of urban industry.

A significant degree of the expanding capital investment and many of the new forms of the social organization of production were concentrated in new industries which were large in scale and incorporated new technologies. The economies of scale that these large-scale, capital-intensive firms could generate made them less reliant on centrally-located agglomeration economies and created the possibility for them to locate in peripheral areas. The outward thrust of these firms would be enhanced by the low land values and large amounts of space available on the city edge as well as the accompanying flow of fixed capital into transportation networks and working-class housing.[21]

Furthermore, the establishment of large-scale firms on the periphery would act as a powerful magnet to firms of all sizes. While the economies of scale that large integrated firms could achieve made them less reliant on inter-firm linkages, they frequently contracted out work to smaller firms, and were dependent upon intimate relations with merchants, financiers, and transport facilities. While large firms tend to have a smaller number of linkages between them and other firms, very few firms are integrated to the degree that they have no need for products from other firms. Indeed, other factors such as industrial type, degree of standardization, the extent of spinoffs and the location of ownership play an important role in the volume of linkages between firms.[22] While large firms may not be heavily dependent upon local linkages, this is not necessarily the case for small ones. The movement of large firms to the periphery could attract a host of smaller ones. This is especially true in the 19th century when the degree of vertical integration was relatively incomplete and linkages between firms were short distance.[23]

In conclusion, discrepancies in empirical work and weaknesses in theory has led us to question the prevailing description and interpretation of industrial location patterns in the 19th century. In particular, the impact of cyclical change, the introduction of new technologies and new industries, the creation of large bodies of fixed capital, the establishment and extension of inter-industry linkages, and a diverse organizational structure can be translated into a varied assortment of locational possibilities. Just how this was achieved in Montreal will be shown through a case-study of Saint-Ann's ward, with particular attention to the Lachine canal area, between 1851 and 1871. First, however, an overview of Montreal's development in this period needs to be presented.

Industrialization in Montreal, 1851–71

From the late 1840s to the early 1870s Montreal became an important industrial

centre. Before 1850 Montreal was primarily a commercial city whose major function was to export primary goods and import manufactured goods. There was a small degree of manufacturing taking place in the 1820s and 1830s, but it was not until the late 1840s that industry became an important feature of the city's economy. A critical factor behind this was the repeal of the corn laws and the navigation act in the 1840s, which forced merchants to seek other profit-making avenues.[24] From the late 1840s to the early 1870s the world economy expanded rapidly.[25] With the dismantling of the colonial system, Canada became increasingly integrated into the wider international economy. From 1850 to 1870 Canada's population rose at an annual rate of 2.1 per cent and exports increased from $17 to $67 million.[26]

Concomitant with the expanding national economy was the growth in demand for Montreal's products. At the local scale, the expanding urban population and the declining self-sufficiency of the rural population of the Montreal plain were critical features underlying the growth of the market for both the city's importers and industrial producers. Montreal's industry supplied a significant share of the rapidly growing national demand for shoes, flour, clothing, sugar and metal goods. For example, it has been estimated that 75 per cent of the shoes worn in Canada in 1872 were manufactured in Montreal.[27] While international markets in the 1840s were not as important as local and national markets, they became increasingly important over the period. Markets in the United States especially opened to Quebec products. For example, two of the city's fur hat manufacturers exported more than 75 per cent of their produce while the market for ready-made clothing in the United States greatly expanded with the Civil War.[28]

At the same time as markets were enlarging there was an increased flow of capital into industry, transportation and communications. Foreign investment in many sectors of the Quebec economy accelerated industrial expansion.[29] The tremendous growth of the railway network, centred in Montreal, helped break down local markets and created markets for a wide range of products. The establishment of the Montreal Telegraph Company in 1847 further propelled Montreal's commercial and industrial sectors into a wider market: by 1856 the company's range was over 2,000 miles and connected Montreal to points in Canada and the United States.[30] At the same time, the capital accumulated by Montreal's bourgeoisie in the colonial commerce system was channelled into banking, transportation and industry. The shift of artisans to manufacturers and the arrival of immigrant industrialists further resulted in the accumulation of industrial capital.[31]

By the 1850s the basic structure of a capitalistic labour market had been created in Canada. Two major groups constituted Montreal's first proletariat. The arrival of unskilled famine Irish and skilled British made up the first group. The other consisted of the French Canadians who, dislocated from agriculture, streamed into Montreal from the surrounding parishes.[32] Both groups formed the basis of Canada's first urban-industrial labour market. At the same time, women and children became increasingly integrated into the industrial workforce. In 1871, 33 per cent of the city's labour force were women while 25 per cent of all boys between the age of 11 and 14 worked.[33]

Central to the rise of Montreal as the primary industrial complex of Canada was its position in the international economy, its capture of expanding markets, the massive flow of capital into a number of sectors, and the rise of an industrial labour force. Fundamental changes were also occurring in the organizational structure of the city's industry.

An outstanding feature of Montreal's growth that was associated with the expansion after the late 1840s was the growing scale of firms across a wide range of industries. Although the 1871 census gives a mean of 19 workers and capital investment of $10,100 per firm, averages hide the large scale of some firms. Industries such as sugar refining, flour milling, brewing, engine building, and cotton were characterized by a large number of workers and huge capital investment. The locomotive works of the Grand Trunk Railway employed 790 workers in 1871.[34] Canada Rubber, established in 1853 in the east end, employed 158 workers in five buildings worth more than $55,000 in 1856. By 1871 the number of employees had risen to 370 and it was producing alrnost 650,000 pairs of rubber boots and shoes annually.[35] Even in some sectors that were small in size, certain firms were large. The fur and hat factory of Green and Son, established in 1832, employed 177 workers in 1856 (mainly women) and had capital of $60,000 invested in its four storey building in the heart of Montreal.[36]

In the wave of economic growth that swept Montreal in the 1850s the primary sectors of growth were the food processing, metal, shoe and transportation equipment sectors. These sectors were transformed through the introduction of new technologies or the restructuring of the social organization of production. Moreover, the ability of Montreal's industrialists and merchants to tap the

growth of both local and non-local markets added to the general cumulative process.

In terms of value the sugar industry was one of the leading sectors by 1871. Montreal had two plants. The larger was Redpath Sugar, which was established in 1855, and took the lead as the largest factory in the city. In 1867 the two sugar companies together had capital of over $1 million, while in 1871 they employed 339 workers and accounted for 12 per cent of the city's total value of production.[37] The flour industry, likewise stimulated by the rising demands in national and international markets in the late 1840s, was extremely capital-intensive and five firms accounted for over 6 per cent of the city's total value in 1871.[38] The shoe industry which had been undergoing an increasing division of labour for a number of decades, quickly mechanized in the 1850s. By 1871 a small number of firms controlled a large proportion of the industry's production.[39] The metal working industry had a long history in Montreal. Established in conjunction with ship building in the second decade of the 19th century, it experienced dramatic growth after 1851. By 1871, the metal sector was highly diverse, ranging from small specialized machine shops through nail factories, lead pipe firms to large rolling mills. Much of the growth was based on the expansion of the transportation equipment sector which appeared in the early 1850s. The Grand Trunk Railway shops at Point Saint-Charles were Canada's first large-scale, vertically integrated production site.[40]

While the period saw a dramatic growth of large and mechanized firms, it cannot be said that the large-scale factory dominated Montreal's industrial landscape. There was a juxtaposition of artisan shop and factory. There was wide variation between industries in terms of capital, number of employees, technology, labour process, and the labour force. Some industries such as clothing, baking and coopering remained relatively unmechanized and small in scale while others such as flour, sugar, rolling stock, and brewing underwent mechanization and standardization and were large in scale.[41] Even within industrial sectors there were enormous differences between firms. In 1871 the largest seventeen firms in the shoe industry (14 per cent of all establishments) accounted for 70 per cent of employees and 82 per cent of the shoes produced.[42] One of the factors behind the divergence among industries was the uneven application of technology. In the flour industry the introduction of the Hungarian and roller processes was instrumental in determining its scale and concentration. The introduction of packing technology from Chicago in the 1850s was a strong incentive in the growth of Canada's meat packing industry. In the rubber industry large-scale manufacturing was made possible by the introduction of vulcanization and other processes.[43]

Within an industry and even within a firm, production was carried out by a variety of production systems. In the city's type foundry, for example, a cast type machine formed the basic shape, but boys broke off the 'jets' and girls smoothed the surfaces.[44] The shoe industry displayed an increasing division of labour. The making of shoes was relatively simple: it was the the breaking-up of production into an increasing number of steps that underlay the transformation.[45] In the foundry and machine shops, moulders and machinists, because of their indispensible skills and the difficulty of introducing machinery in many aspects of production, "tended to work on their own."[46]

The industrial labour force was segmented by gender and ethnicity. In industries such as clothing, shoes, tobacco, textiles, and rubber, women accounted for at least half of the work force. Various studies have shown that Montreal's economy was differentiated along the lines of ethnicity. French-Canadians and the Irish constituted the bulk of workers in the unskilled and semi-skilled sectors of industry while the British and Americans dominated the skilled sectors.[47]

By the 1870s Montreal had become the preeminent industrial centre of Canada. A central feature of this growth was the ability of Montreal's commercial and industrial elite to link the city's economic structures to the expansion of the world economy. At the same time, the organization of industry underwent massive changes. This revision took the form of increasing firm scale, the introduction of new industries or the fundamental restructuring of old ones, and the introduction of a wide range of technologies, skill opportunities and production systems. The industrial changes were associated with the reshaping of the city's industrial geography. The new economic configuration established new locational possibilities. An outstanding example of this was Saint-Ann ward, especially the Lachine canal area, which very swiftly became the focus for much of this new growth.

Saint-Ann Ward and the Lachine Canal, 1851–71

The 20 years following the depression of the 1840s were extremely important ones in the industrial history of Montreal. A central element of the city's rapid in-

dustrial growth was the development of manufacturing alongside the Lachine canal in Saint-Ann's ward (See. Figure 1). Very quickly the ward's industrial and spatial character was transformed. A technologically-advanced, hydraulically-based, energy-intensive form of production was superimposed upon small-scale artisanal production. Concomitant with this industrial transformation was a reorganization of its geography, as the Lachine canal on the fringe of the built-up area became the locus of the new form of production.[48]

The development of the Lachine canal, in conjunction with the boom starting in the late 1840s, transformed the nature of Saint-Ann's industry. Prior to this, the ward was characterized by a "small and individualized craft system of production," with an embryonic industrial base centred on machinery and steam power.[49] As early as 1831, a writer in the Montreal Gazette stated that Griffintown, the original core of the ward, "has more machinery in operation within its limits than any other portion of Montreal."[50] The Eagle Foundry, for example, had an assortment of turning lathes, grind

Figure 1: Montreal in 1861

stones, and trip hammers, all powered by an eight horsepower engine. Other firms employing both machinery and steam power included another foundry, a nail factory, an oil manufactory, a comb manufactory, a soap and candle works, a tannery, four flour mills, and a smut mill. Nonetheless, the small artisan shop, employing a journeyman or two was the principal form of production.

From these early beginnings, Saint-Ann was to experience tremendous changes in the scale of industry. As Table 1 shows, in 20 years the number of firms in the ward almost tripled from 64 to 176.[51] More important than the number of firms was the increasing scale. The median annual rent rose from $60 in 1851 to $144 in 1871, while the aggregate increased more than sevenfold. A more detailed description is shown in Table 2. In 1851, 86 per cent of all firms had rents lower than $300 while 20 years later this had declined to 62 per cent.[52] In Figure 2, the 15 largest firms in 1851 and 1871 are shown.[53] Over the 20 years the importance of Griffintown declined as the Lachine canal became the focus of many of the largest firms. It was enterprises such as Bartley and Dunbar's St. Lawrence Engine Works located at the Canal basin that were responsible for this dramatic growth. Their 160 men and apprentices manufactured boilers, engines, iron and brass castings, and millwork in a large factory composed of a smith's shop, a boiler shop, a foundry, a pattern shop, and a finishing shop. The centre piece of Redpath's sugar refinery, another large canal plant, was the "main" building, a seven storey stone and brick edifice that could produce 6,000 barrels of refined sugar monthly.[54]

One historian estimates that between 1847 and 1854, a sum of $2 million was invested in the ward's industry, 2000 jobs were created; and about 30 factories estab-

TABLE 1
Saint-Ann's Industry by Rent, 1851–71

Year	No	Median rent ($)	Mean rent ($)	Total rent ($)
1851	64	60	186	11 912
1856	102	120	347	35 352
1861	126	130	406	51 140
1866	143	144	471	67 354
1871	176	144	487	85 700

Source: Ville de Montréal, rôle d'evaluation.

TABLE 2:
Firm Size in Saint-Ann, 1851–71

	1851		1856		1861		1866		1871	
	No	%	No	%	No	%	No	%	No	%
0–99	40	62.5	43	42.2	51	40.4	55	38.5	68	38.6
100–299	15	23.4	25	24.5	29	23.0	34	23.8	42	23.9
300–799	4	6.2	21	20.6	28	22.2	34	23.8	42	23.9
800–1599	4	6.2	9	8.8	11	8.7	12	8.4	14	8.0
1600+	1	1.6	4	3.9	7	5.6	8	5.6	10	5.7
Total	64	99.9	102	100.0	126	99.9	143	100.1	176	100.1

Source: As for Table 1.

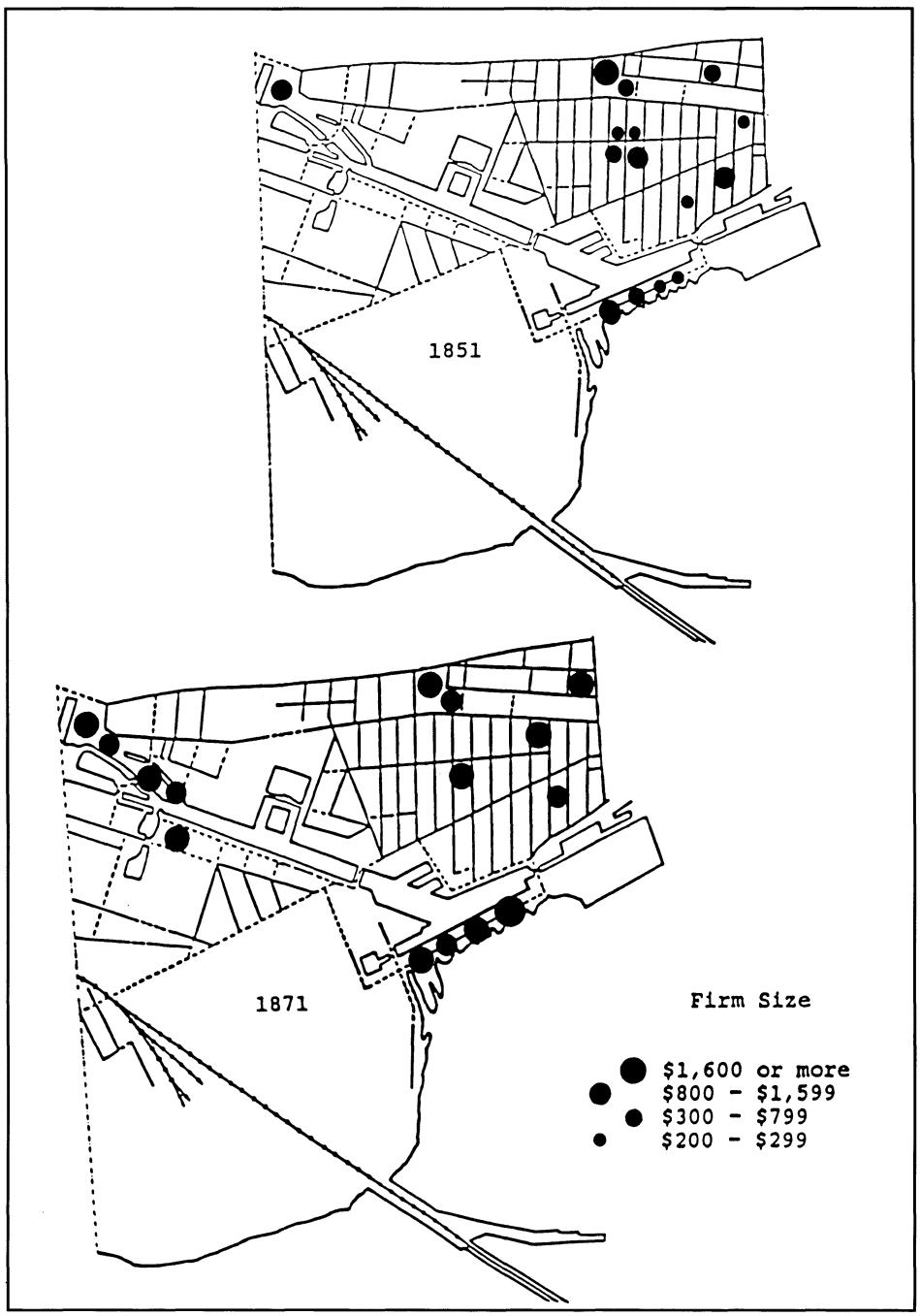

Figure 2: Largest 15 Firms in Saint-Ann, 1851 and 1871

lished.[55] Impetus for this was the large capital investment made by outside entrepreneurs and loans extended by Canadian banks. Skilled labour from Britain and the United States, and unskilled labour from Ireland and the countryside surrounding Montreal also stimulated development. Take the case of the cotton cloth factory of F.W. Harris located at St. Gabriel locks. In the manufacture of "seamless bags and denims", he employed 70 workers, "nearly all women and children". On the other hand, the moulders employed in Saint-Ann's foundries whose work "require(d) great skill" were essential to the manufacture of castings.[56] The state was also important as it not only offered industrialists what Tulchinsky has termed "beneficient encouragement", but it also heavily subsidized the reconstruction of the Lachine canal whose hydraulic power provided a growth pole for large-scale industry.[57] The ability of Saint-Ann's manufacturers to capture a growing share of national and international markets played a large role too. For example, William Allen's chair factory produced "chiefly for home consumption" and his chairs were "fast superseding those of American manufacture." The threshing machine manufacturer, B.P. Paige, stated that "there is increased demand both for home consumption and export, and the business is steadily increasing."[58]

Despite the increasing size of firms, Saint-Ann's industrial structure was characterized by a diversity of scale, industry, and technological organization. Even when large capital investments were flowing into Redpath's sugar refinery or Gould's flour mill, a large number of small and medium-size firms dotted the ward's landscape. The variety of scale is shown in Table 2. In 1871, for example, almost 40 per cent of the ward's firms had rents less than $100, almost 48 per

cent between $100 and $799, and 14 per cent over $800. The development of large-scale firms in leading sectors did not discourage the growth of smaller firms. The coexistence of small and large were in fact inseparable aspects of the development of Saint-Ann.

Another feature of Saint-Ann's industry was the diversity of industries. Table 3 shows that in 1851, 54 (84 per cent) of the ward's firms belonged to the food, metal, chemical, and wood industries. Only 119 (68 per cent) did 20 years later.[59] Although these industries' share of the aggregate rent only marginally decreased over the period (from 87 per cent to 84 percent), there was increasing diversity. Many new firms in other industries sprung up. Textile, boot and shoe, broom, clothing, and tobacco factories became increasingly common. They were, however, generally smaller in size than those in the dominant industries. At the same time, the four major industries were characterized by great variety. In the food industry in 1871, seven flour mills, breweries and a sugar refinery had an average rent of over $4,000, while the 13 bakeries and confectionery makers averaged only $107.

TABLE 3:
The Number and Rent of Saint-Ann's by Sector, 1851–71 (%)

	1851		1861		1871	
Industry	No	Rent	No	Rent	No	Rent
Food	15.6	34.0	18.3	35.4	13.1	36.6
Metal	35.9	28.5	33.3	29.6	27.3	21.1
Chemical	9.4	16.3	8.7	9.8	5.7	15.9
Wood	23.4	8.3	20.6	12.7	21.6	10.4
Other	15.7	12.9	19.1	12.5	32.3	16.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: As for Table 1.

In this period the water and steam powered mills replaced "the various artisan boutiques and manually-powered shops as the more technically advanced form of enterprise."[60] Despite this, the form of industrial production taking place was characterized by the coexistence of different inputs of machinery. The metal industry in 1861 is a good example of this. The 42 firms that made up the industry had a median rent of $160. At one end of the spectrum, foundries, nail factories, rolling mills, lead pipe makers, and threshing machine manufacturers were large in scale and employed newer technology and different forms of labour. In 1871 the five nail factories along the canal were producing over 90 per cent of Canada's output. Technological advances and vertical integration are greatly responsible for this. Two of the nail manufacturers in the late 1850s, in order to manufacture nail plate, built rolling mills and introduced puddling furnaces in the early 1860s. The skilled employees in Robert Scott's edge tool works in 1856 worked with a vast assortment of machines: trip hammers, polishing frames, auger lathes, grind stones jammers, a friction wheel, an oval lathe, a circular saw, a wood polishing machine, and a lip strapping machine.[61]

At the other extreme, 19 blacksmiths as well as an assortment of spike makers, machinists, platers, lock makers, scale makers, and file cutters were small in scale and either specialized in particular market niches or operated on the fringes of larger firms. Unlike the foundries and nail factories, these establishments did not employ much, if any, motive power or machinery. Hand work still was the predominant form of production.

The well-developed character of technology in other industries is also evident among the firms established in Saint-Ann. In the wood-processing industry, it has been alleged that Canada was more technologically advanced than that of the United States.[62] James Shearer's sash and door factory located close to Redpath's refinery produced doors, sashes, blinds, mouldings, and architraves with "ingenious machinery" which "do very much of the work." The manufacture of putty and paints in the chemical factory of Lyman, Clare and Company was "performed by powerful machinery." The Commissioners of Public Works report of 1856 indicates that the firms along the Lachine, without exception, employed a wide variety of modern machinery.[63]

By 1871 Saint-Ann can be described as a complex of linked, diverse, and horizontally disintegrated firms. Linkages extended within industries and between

industries and firms of different sizes. John McDougall's foundry manufactured railway car wheels that must have found their way to the Grand Trunk Railway shops in Point Saint-Charles. Coopers provided barrels and kegs for all trades, and blacksmiths applied their skills in carriagemaking. In 1876, George Drummond told a government committee that the Redpath sugar refinery indirectly employed at least 75 workers in such trades as coopering and carting besides the 300 employees in the refinery proper. Shearer's sash and door factory built its mouldings and much of its other woodwork for steamship builders. George Brush's Eagle Foundry manufactured nearly all the steam engines used in the vicinty's steamers.[64]

Saint-Ann's firms were not only connected by direct linkages: the existence of a diverse labour force also played a major role. In the 20 years following 1851, the ward's population more than doubled. The 7,455 people living there in 1850 had climbed to nearly 19,000 in 1871.[65] The vast number were employed in the surrounding factories and workshops.[66] In 1861 more than 90 per cent of all household heads were manual workers. The ward had concentrations of workers in skilled occupations such as machinists, moulders and coopers. A large number of these skilled workers were from Britain and the United States. There was also a large number of unskilled workers: labourers accounted for more than one-third of the ward's household heads. To the north of Saint-Ann, in the southern part of Saint-Antoine, there were also substantial numbers of workers. A large number were French Canadians.[67] With this large and varied labour pool to draw on, an essential component of production was met.

The radical changes taking place in the industrial character of Saint-Ann went hand in hand with the reorganization of the location of industry. Although Griffintown had been the traditional manufacturing core, in the mid-1840s a new set of firms—larger and more capital-intensive—would locate on the rural fringe of both the ward and the city. At the time of the redevelopment of the canal in the mid-1840s the land of the Saint-Sulphician seminary bordering the Lachine canal was still being used for "the leasing of pasture, the sale of farm produce, and the use of farm workers and horses to haul firewood".[68] According to the Royal Commission of 1887 looking into the leasing of water power at the Lachine canal, "at the date (1851) of the lease of the power at . . . (Saint-Gabriel) lock, it was at the outskirts of the city".[69]

In the first years of the recovery from the depression of the 1840s the industrial face of Saint-Ann was transformed. The establishment of large-scale mills, first at the canal basin and later at Saint-Gabriel locks, created an industrial district that mirrored the break with the pre-industrial past. It was during the early years of the 1850s when the shape of the new geography was created.[70] The ward's 64 firms of 1851 were concentrated in Griffintown. As Table 4 indicates, Griffintown's 47 firms (73 per cent) accounted for more more than half of the ward's total rent. They were generally small in scale, although some larger establishments such as the gas company ($1,000) and George Brush's Eagle Foundry ($800) existed. Along Notre Dame street, the major commercial artery, were a dozen small manufacturing firms catering largely to a retail trade: two bakeries, two saddlers, and four cabinet makers. The western part of the ward along the canal was yet little developed. In the west end lay Cantin's ship yard, while a flour mill, a foundry, and two nail factories were located on Mill street. What is of interest, as it points to future developments, is that these firms were larger and more technologically advanced than other firms in the city.[71]

The Lachine area over the next five years underwent a massive infusion of capital investment. From five firms with an aggregate rent of $3,000 in 1851, the area had 29 firms with an aggregate rent of $21,960. Its share of the ward's total rent rose from 25 per cent to 62 per cent. Firms such as Montreal Rubber ($800), Ostell's saw mill ($1,040), Redmond's foundry ($600), and Redpath's sugar refinery ($4,000) appeared, and existing firms expanded: rent on Gilbert and Bartley's foundry rose from $280 to $1,000, on Ira Goulds' flour mill from $1,200 to $3,000, and on Peck's nail factory from $320 to $960. As a result, the median rent for establishments along the canal rose to $500, more than four times the city median. The Lachine area, however, was not homogeneous: large flour mills, foundries and nail factories dominated the landscape along Mill street, while at the Saint-Gabriel locks firms were smaller and more diversified.[72] Nonetheless, the establishments along the Lachine canal can be distinguished from those of Griffintown and Notre Dame by their scale and organization.[73]

This dramatic burst of industrialization was not to be repeated. In the 15 years following 1856 there was a steady growth in the number of firms and volume of rent, but it was never to equal the development in the previous five years (See. Table 1). The Lachine area, however, remained the locational core of the city's large-scale and technologically-

TABLE 4:
Saint-Ann's Firms by Area, 1851–71

		Districts			
		Lachine	Griffintown	Notre Dame	Total
1851	No	5	47	12	64
	%	25.2	52.4	22.4	100.0
	Med	320	48	64	60
1856	No	29	57	16	102
	%	62.1	29.7	8.1	99.9
	Med	500	80	32	120
1861	No	41	65	20	126
	%	60.9	29.9	9.1	99.9
	Med	500	120	44	130
1866	No	40	81	22	143
	%	52.7	36.7	10.6	100.0
	Med	500	120	50	144
1871	No	47	92	37	176
	%	51.2	37.4	11.4	100.0
	Med	500	126	60	144

% = per cent of the total rent in each district.
Med = the median rent of the firms in each district

Source: As for Table 1.

advanced firms.[74] Although its share of the ward's total rent declined to half by 1871, the number of firms located there increased, and their scale of operations remained large relative to Saint-Ann and the rest of the city.[75] There was remarkable continuity in the Lachine area during the period. Nearly all the 1856 firms were still there in 1871. While some remained as they had in 1856, others changed hands. The initial development had centered on a few industries, mainly flour milling, metal and woodworking, but by 1871 had diversified: large-scale chemical, textile, leather, and clothing mills clustered along the banks of the canal.

Underpinning the large-scale industrial growth in the Lachine area was the construction of a built environment amenable to the new economic order. Central to this was the leasing of hydraulic sites along the canal by the government and the Saint-Sulphician seminary. In 1844 the government commissioned a plan to lay out hydraulic lots at the Canal Basin close to where the canal emptied into the Saint-Lawrence River. By 1856, 20 sites had been leased, mainly to metal and milling concerns. In 1851 the five lots at Saint-Gabriel locks, further down the canal, were leased as a whole to John Young, a grain and wholesale merchant, and Ira Gould, a miller. They were shortly joined as partners by John Ostell and Jacob DeWitt. Gould, Ostell and DeWitt were all active in manufacturing along the canal. They subdivided the original five lots into 20 and subleased them to other manufacturers. By 1856 most of the new, large-scale firms of the previous ten years were built at Canal Bank and Saint-Gabriel locks.[76]

At the same time as the government was leasing lots along the canal, the seminary, forced by the Ordinance of 1840, was selling off its Saint-Gabriel domain. The seminary's first strategy was to sell subdivisions to manufacturers. Although this was generally unsuccessful, and they eventually turned to housing subdivisions, the sale of seminary land to the Young clique in the early 1850s resulted in the expansion of the hydraulic locks at Saint-Gabriel locks.[77] The industrial development that occurred along the Lachine Canal did not trigger immediate full-scale residential development. The opening-up of the Saint-Gabriel Domain by the Seminary of Montreal for residential construction after 1854 added some housing south of the canal. Between 1854 and 1874, 439 individuals bought lots. Most of them were Irish who worked in the surrounding industrial establishments.[78] Griffintown and the neighbouring western section north of the canal remained, however, the core of residence for most of the ward's population. In 1861 only 13 per cent (341 households) lived south of the canal. Although this had increased to 1443 households by 1881, most of the population increase occurred during the housing boom of the 1870s.[79]

Conclusion

This paper provides evidence that urban peripheral industrial districts were in existence from as early as the mid-

nineteenth century. This fact suggests that the explanation for the growth of industry on the periphery needs to extend past the arguments advocated by the transportation and transactional perspectives. The answer lies, it has been argued, in the manner in which a number of features interlocked. These include cyclical change, new technology and new industries, flows of fixed capital, linkages, and organizational structure. The broad range of possibilities and constraints under which industries operated created a diverse array of locational choices. The concentration of production in the city core is but one case. It has been argued here that a configuration of forces in the mid-19th century also created the possibility for the development of another: the industrial suburb.

One such industrial suburb was Saint-Ann. The growth of industry along the Lachine canal during the boom years following the depression of the 1840s was a major break with the past. Firms were large in scale, energy-intensive, incorporating new organizational structures and labour processes, and utilizing modern machinery. They also located in a new part of town. The development along the canal represented a major change from the concentration of industry in the core area. A decisive element in the formation of a new industrial district was the availability of the Lachine canal's hydraulic power after the mid 1840s. The role of the state and the activity of land developers and manufacturers were instrumental in making the industrialization of the canal possible. At the same time, rising land prices and the scale of operations of the new firms must have played a role in the manufacturers' decisions. We must not, however, view these decisions outside of the processes at work at the international and national levels. The growing internationalization of the world economy, changes wrought in technologies, the scale of capital investments, and the strategies of Montreal's merchants to overcome the crisis associated with the dismantling of the colonial economy were important factors in the creation of industry along the Lachine canal. Throughout the rest of the century Saint-Ann would remain an important industrial area of Montreal. It would, however, decline in relative importance and other peripheral areas such as Saint-Henri and Maisonneuve would become important suburban industrial districts.[80]

Notes

I would like to thank Sherry Olson and three anonymous referees for their comments on an earlier draft of this paper.

1. K.T. Jackson, Crabgrass Frontier: the Suburbanization of the United States (New York: Oxford University Press, 1985); P.O. Muller, Contemporary Suburban America (Englewood Cliffs: Prentice-Hall, 1981); S.B. Warner, The Private City (Philadelphia: University of Pennsylvania Press, 1968).

2. E.K. Muller and P.A. Groves, "The emergence of industrial districts in mid-nineteenth century Baltimore", Geographical Review, 69, (1979), 159–178; M. Bellavance and J-D. Gronoff, "Les structures de l'espace montréalais à l'epoque de la confédération", Cahiers de Géographie de Québec, 24, (1980), 362–383. See P.A. Wood, "Urban manufacturing: a view from the fringe" in J.H. Johnson (ed.), Suburban Growth: Geographical Processes at the Edge of the Western City (London: Wiley, 1974), 129–154 for an interpretation of industrial decentralization as an on-going process.

3. By suburban I do not mean an area that is necessarily outside of the city. Conceptually, suburban areas provide certain advantages and disadvantages in comparison to the city core regardless of whether they are within the municipal limits or not. By suburban I am referring to the dynamic process of development and change occurring on the edge of the existing built-up area.

4. Jackson, Crabgrass Frontier, 113–115.

5. R.L. Fales and L.N. Moses, "Land-use theory and the spatial structure of the nineteenth-century city", Papers of the Regional Science Association, 28 (1972), 49–80.

6. Ibid.; Jackson, Crabgrass Frontier; Muller, Contemporary Suburban America; A.R. Pred, "The intrametropolitan location of American manufacturing", Annals of the American Association of Geographers, 54, (1964), 165–180; D. Ward, Cities and Immigrants (New York: Oxford University Press, 1971); Warner, The Private City.

7. Jackson, Crabgrass Frontier, 183–184; Muller, Contemporary Suburban America, 30–88; Pred, "The intrametropolitan location", 169–170.

8. Over the last decade Allen Scott has published a great number of papers that deal with the internal structure of the city. His recent book, Metropolis: From the Division of Labor to Urban Form (Berkeley: University of California Press, 1988) summarizes this work.

9. Definitions and discussion of vertical integration and disintegration, and horizontal integration and disintegration can be found in Scott, Metropolis, 35–37, 41–43, 209.

10. Muller and Groves, "The emergence of industrial districts", 178; Bellavance and Gronoff "Les structures de l'espace montréalais". For similar findings for Philadelphia see S. Greenberg, "Industrial location and ethnic residential patterns in an industrializing city: Philadelphia, 1880" in T. Hershberg (ed.), Philadelphia: Work, Space, Family and Group Experience in the Nineteenth Century (New York: Oxford University Press, 1981), 204–232 and P. Scranton, Proprietary Capitalism: The Textile Manufacture at Philadelphia, 1800–1885 (New York: Cambridge University Press, 1983).

11. For an exception to this see Allan Pred's work on the U.S. urban system in The Spatial Dynamics of U.S. Urban-Industrial Growth, 1880–1914: Interpretive and Theoretical Essays (Cambridge: M.I.T. Press, 1966).

12. C. Freeman, (ed.) Design, Innovation and Long Cycles in Economic Development (New York: St Martin's Press, 1986); D.M. Gordon, R. Edwards and M. Reich, Segmented Work, Divided Workers (New York: Cambridge University Press, 1982); E. Mandel, Late Capitalism (London: New Left Books, 1975) and Long Waves in Capitalist Development (Cambridge: Cambridge University Press, 1980).

13. Gordon, Edwards and Reich, Segmented Work; D.M. Kotz, "Long waves and social structures of accumulation: a critique and reinterpretation", Review of Radical Political Economies, 19, (1987), 16–38.

14. K.R. Cox and A. Mair, "Locality and community in the politics of local economic development", Annals of the Association of American Geographers, 78 (1988), 307–325; D. Harvey, The Limits to Capital (Oxford: Basil Blackwell, 1982), chap. 13; J.R. Logan and H.L. Molotch, Urban Fortunes: the Political Economy of Place (Berkeley: University of California Press, 1987).

15. M. Storper, "Technology and spatial production relations: disequilibrium, interindustry relationships, and industrial development" in M. Castells (ed.), High Technology, Space and Society (Beverley Hills: Sage, 1985), 265–283 and "Big structures, small events and large processes in economic geography", Environment and Planning A, 20, (1988), 165–185.

16. B. Laurie and M. Schmitz, "Manufacture and productivity: the making of an industrial base, Philadelphia, 1850–1880" in Hershberg (ed.), Philadelphia, 43–93; I. McKay, "Capital and labour in the Halifax baking and confectionery industry during the last half of the nineteenth century" in T.Traves (ed.), Essays in Canadian Business History (Toronto: McClelland and Stewart, 1984), 47–87; R. Samuel, "Workshop of the world: steam power and hand technology in mid-Victorian Britain", History Workshop, 3, (1977), 6–72.

17. M. Storper and R. Walker, "The theory of labor and the theory of location", International Journal of Urban and Regional Research, 7, (1983), 25. See R. Walker, "Technological determination and determinism: industrial growth and location" in Castells (ed.), High Technology, 226–264 and the "The geographical organization of production-systems", Environment and Planning D, 6 (1988), 377–408 for a discussion of the relationship between location and the differences in the way that production is structured.

18. Samuel, "Workshop of the world", 49–57.

19. Laurie and Schmitz, "Manufacture and productivity", 53–65. See also the study of Halifax's baking industry in McKay, "Capital and labour".

20. J.H. Soltow, "Origins of small business and the relationships between large and small firms: metal fabricating and machinery making in New England, 1890–1957" in S.W. Bruchey (ed.), Small Business in American Life (New York: Columbia University Press, 1980), 192–211.

21. Scott, Metropolis. I have pointed to the existence of peripheral working-class districts next to factory districts in nineteenth-century Montreal in "The segregated city: class residential patterns and the development of industrial districts in Montreal, 1861 and 1901", Journal of Urban History, 16, (1991), 2.

22. M.J. Hagey and E.J. Malecki, "Linkages in high technology industries: a Florida case study", Environment and Planning A, 18, (1986), 1477–1498; A. Glasmeier, "Factors governing the development of high tech industry agglomerations: a tale of three cities", Regional Studies, 22, (1988), 287–301.

23. A.G. Hoare, "Industrial linkage studies" in M. Pacione (ed.), Progress in Human Geography, (London: Croom Helm, 1985), 40–81.

24. J. Hamelin and Y. Roby, Histoire Economique du Québec, 1851–1896 (Montréal: Fides, 1971); G. Tulchinsky, The River Barons (Toronto: University of Toronto Press, 1977); J. Willis, The Process of Hydraulic Industrialization on the Lachine Canal, 1840–1880: Origins, Rise and Fall (Ottawa: Environment Canada, 1987).

25. Mandel, Late Capitalism, chap. 4; R. Walker, "The transformation of urban structure in the nineteenth century and the beginnings of suburbanization" in K. Cox (ed.), Urbanization and Conflict in Market Societies (Chicago: Maaroufa, 1978), 181–203.

26. M. Lamontagne, Business Cycles in Canada (Ottawa: Canadian Institute for Public Policy, 1984), 101–102; Hamelin and Roby, Histoire Economique.

27. Celebration Committee of the Grand Trunk Railway, Montreal in 1856 (Montreal: Lovell, 1856); Hamelin and Roby, Histoire Economique, 263; J. McCallum, Unequal Beginnings: Agriculture and Economic Development in Quebec and Ontario Until 1870 (Toronto: University of Toronto Press, 1980), 83–96; G.L. Teal, "The organization of production and the heterogeneity of the working class: occupation, gender and ethnicity among clothing workers in Quebec" (Ph.D., McGill University, 1986), 162–198.

28. Celebration Committee Montreal in 1856, 46; Hamelin and Roby, Histoire Economique, *76, 268–269; H.C. Pentland, "The role of capital in Canadian economic development before 1875"*, Canadian Journal of Economics and Political Science, 16, (1950), 457–474; Teal "The organization of production", 162–198.

29. Hamelin and Roby, Histoire Economique; Pentland, "The role of capital".

30. P. Craven and T. Traves, "Canadian railways as manufacturers, 1850-1880", Canadian Historical Association, Historical Papers, (1983), 254; Pentland, "The role of capital", 463; Hamelin and Roby, Histoire Economique, 300–301.

31. Hamelin and Roby, Histoire Economique, 369–370; Tulchinsky, The River Barons; Willis, The Process of Hydraulic Industrialization.

32. McCallum, Unequal Beginnings; H.C. Pentland, "The development of a capitalistic labour market in Canada", Canadian Journal of Economics and Political Science, 25, (1959), 450–461; Willis, The Process of Hydraulic Industrialization; B. Young and J.A. Dickinson, A Short History of Quebec: A Socio-Economic Perspective (Toronto: Copp Clarke Pittman, 1988), 104–114.

33. B. Bradbury, "The family economy and work in an industrializing city: Montreal in the 1870s", Canadian Historical Association, Historical Papers, (1979), 71–96; D.S. Cross, "The neglected majority: the changing role of women in nineteenth-century Montreal" in G.A. Stelter and A.F.J. Artibise (eds.), The Canadian City (Toronto: McClelland and Stewart, 1977), 255–281; Young and Dickinson, A Short History of Quebec, 124.

34. Craven and Traves, "Canadian railways as manufacturers", 266.

35. Celebration Committee, Montreal in 1856; Bellavance and Gronoff, "Les structures de l'espace montréalais", 361.

36. Celebration Committee, Montreal in 1856; Montreal Business Sketches with a Description of the City of Montreal, Its Public Buildings and Places of Interest (Montreal: Longmoore and Company, 1864).

37. Celebration Committee, Montreal in 1856, 40; Canada, Census of Canada, 1870–1871 (Ottawa: I.B. Taylor, 1875), vol.3, 444; Hamelin and Roby, Histoire Economique, 263.

38. Canada. 1870–1871, vol. 3, 323.

39. J. Burgess, "L'industrie de la chassure à Montréal: 1840–1870—le passage de l'artisanat à la fabrique", Revue d'histoire de l'Amérique Français, 31, (1977), 187–210.

40. Craven and Traves, "Canadian railways as manufacturers".

41. Bradbury, "The family economy and work"; Craven and Traves, "Canadian railways as manufacturers"; Teal, "The organization of production".

42. Burgess, "L'industrie de la chasssure".

43. Canada Year Book, 1922–1923 (Ottawa: Acland, 1924), 444–446; J. Fountain, "The growth of a local enterprise: from J.M. Schneider Ltd to the Heritage Group" in D.F. Walker (ed.), Manufactur-

ing in Kitchener-Waterloo: A Long Term Perspective (Waterloo: Department of Geography Publication Series No. 26, University of Waterloo), 87; L. Roberts, From Three Men (np: Dominion Rubber Company Ltd., nd), 15.

44. Montreal Business Sketches, 18–19.

45. Burgess, "L'industrie de la chassure".

46. W. Kilbourn, The Elements Combined: A History of the Steel Company of Canada (Toronto: Clarke, Irwin, 1960), 24; C. Heron, "The crisis of the craftsman: Hamilton's metal workers in the early twentieth century", Labour/le Travailleur, 6, (1980), 10–13.

47. Cross, "The neglected majority", 260; Bradbury, "The family economy and work"; Kilbourn, The Elements Combined.

48. A number of writers have pointed to the important changes taking place at the canal in this period. See L. McNally, Water Power on the Lachine Canal, 1846–1900 (Ottawa: Parks Canada, 1982); Tulchnisky, The River Barons; Willis, The Process of Hydraulic Industrialization. None of these writers, however, have drawn out the spatial implications of these changes.

49. Willis, The Process of Hydraulic Industrialization, 168.

50. 16 July, 1831. Griffintown, just west of the city core, was laid out between 1815 and 1830 by Thomas McCord. It was the only fully developed part of Saint-Ann before 1851 except for a small population of Irish immigrants that settled alongside the north bank of the canal adjacent to Griffintown in the 1840s. See Willis, The Process of Hydraulic Industrialization, 96.

51. Neither the census nor the city directories provide the type of data necessary for analysing the development of Montreal's industrial geography in this period. Their most serious problem is that they seriously underestimate the number of manufacturing establishments. The exception to this is the 1871 census. An alternative source is the City of Montreal water tax rolls which have been collected on an annual basis since 1847. They provide, among other things, the address, name, tenure status and rent of each business establishment. Thus, for any year beginning in 1847, it is possible to construct a listing of all of Montreal's manufacturing, commercial and financial enterprises. Despite the obvious biases and discrepancies that creep into any enumeration system, the rents paid by firms provide an excellent picture of the scale of operations. I have tested this assertion for the year 1871, where an analysis of the rents from firms in Saint-Ann can be compared with the census values of capital invested and number of employees. The degree of linear association is 0.95 between rent and capital, and 0.79 between rent and number of employees. Thus, rent is a useful measure of scale.

52. The most dramatic change took place between 1851 and 1856 when rents lower than $100 fell from 62.5 per cent of all rents to 42.2 per cent.

53. Although the workshops of the Grand Trunk Railway were located in Saint-Ann (at Point Saint-Charles, south of the Lachine canal), they were not assessed during this period. They have been excluded from the analysis here. In later years the shops had the largest rent of all industrial establishments in the city and probably did in this period as well.

54. Celebration Committee, Montreal in 1856, 40, 43–44.

55. Tulchinsky, The River Barons, 228.

56. Celebration Committee, Montreal in 1856, 40; Montreal Business Sketches, 36. For a discussion of the moulders in Montreal see P. Bischoff, "La formation des traditions de solidarité ouvrière chez les mouleurs montréalais: la longue marche vers le syndicalisme (1859–1881)", Labour/Le Travail, 21 (1988), 9–43, and "Des forges du Saint-Maurice aux fonderies de Montréal: mobilité géographique, solidarité communautaire et action syndicale des mouleurs, 1829–1881", Revue d'histoire de l'Amérique Française, 43, (1989), 3–29.

57. Tulchinsky, The River Barons, 228–281. See also McNally, Water Power on the Lachine Canal; Willis, The Process of Hydraulic Industrialization.

58. Celebration Committee, Montreal in 1856, 42, 48. Despite the growing extent of the market, many manufacturers were limited by its size. The foundry of Ives and Allen were forced "to keep a large variety of manufactures . . . instead of confining themselves to a few articles." See Montreal Business Sketches, 37.

59. It should be noted that the chemical industry was dominated by one firm. The gas company with a rent of $9,000 in 1871 accounted for 66 per cent of the industry's rent and almost 11 per cent of the ward's aggregate rent. It was the same throughout the period.

60. Willis, The Process of Hydraulic Industrialization, 51.

61. McNally, Water Power on the Lachine Canal, 66–77. For a description of the manufacture of nails in Thomas Peck's factory see Montreal Business Sketches, 9–12. The description of Scott's plant comes from Report of the Commissioners of Public Works for the Year Ending 31st December, 1855 (Toronto: Lovell, 1856).

62. McNally, Water Power on the Lachine Canal, 77.

63. Celebration Committee, Montreal in 1856, 42; Montreal Business Sketches, 15; Report of the Commissioners of Public Works.

64. Canada, House of Parliament, "Report of the select committee on the causes of the recent depression of the manufacturing, mining, commercial, shipping, lumber and fishing interests", Journals, (Ottawa, 1876), Appendix 3, 37; McNally, Water Power on the Lachine Canal, 78; Celebration Committee, Montreal in 1856, 47. The other foundry that produced engines for steamships was St. Mary's in the east end. It went out of business with the advent of the canal's factories.

65. A.H. Conter, "The origins of a working-class district: a portrait of Saint-Ann's ward in the 1850s", (Undergraduate paper, McGill University, 1976), 4; Canada, 1870–1871, vol. 1, 38–39.

66. B. Young, In Its Corporate Capacity: The Seminary of Montreal as a Business Institution, 1816–1876 (Kingston and Montreal: McGill-Queens University Press, 1986), 139; R.F.H. Hoskins, "Original acquisition of land in Montreal by the Grand Trunk Railway of Canada", Shared Spaces No. 7, Department of Geography, McGill University, 7; Conter, "The origins of a working-class district".

67. Bischoff, "Des forges du Saint-Maurice", 19–24; D.B. Hanna and F.W. Remiggi, Montreal Neighbourhoods (Canadian Association of Geographers, May 1980), 5–6; Lewis, "The segregated city".

68. Young, In Its Corporate Capacity, 133.

69. Report of Royal Commission on the Leasing of Water Power, Lachine Canal (Ottawa: Maclean, Roger and Company, 1887), 7.

70. In order to capture this geography, all firms were assigned to one of three areas. Griffintown is the part of the ward east of McCord street. The Lachine area is the zone along the canal and includes Saint-Gabriel Locks as well as Mill, Saint-Patrick, and subsidiary streets running close to the canal. The Notre Dame area accounts for all the businesses along Notre Dame street.

71. McNally, Water Power on the Lachine Canal, 22–23.

72. For a more detailed description of the factories see McNally, Water Power on the Lachine Canal, and Willis, The Process of Hydraulic Industrialization.

73. A few studies have shown that energy-intensive large-scale firms were the dominant ones on the periphery after 1890. These include E.P. Erickson and W.L. Yancey, "Work and residence in industrial Philadelphia", Journal of Urban History, 5, (1979), 147–182; R. Lewis, "The industrial geography of Montreal, 1850–1929" in F. Remiggi and G. Senecal (eds.), Montréal . . . du faubourg au carrefour, du local à l'international (forthcoming); E.E. Pratt, Industrial Causes of Congestion of Population in New York City (New York: Columbia University, 1911); P. Scranton, "Beyond anecdotes and aggregates: the pattern of industrial decline in Philadelphia textiles, 1916–1931", Antipode, 18, (1986), 284–310; G. Taylor, Satellite Cities: A Study of Industrial Suburbs (New York: D. Appleton and Company, 1915); F.W. Viehe, "Black gold suburbs: the influence of the extractive industry on the suburbanization of Los Angeles, 1890–1930", Journal of Urban History, 8, (1981), 3–26.

74. Bellavance and Gronoff, "Les structures de l'espace montréalais", 380–381.

75. The median business rent for the city in 1861 was $100. See D. Hanna, "Partage social et partage de l'espace à Montréal, 1847–1901", Rapport d'Étape, 30 Juin 1986, 6.

76. McNally, Water Power on the Lachine Canal, 17–48.

77. Young, In Its Corporate Capacity, 131–142; McNally, Water Power on the Lachine Canal, 39.

78. Young, In Its Corporate Capacity, 138-141.

79. Hanna and Remiggi, Montreal Neighbourhoods, 3; S. Olson, "Partage social et partage de l'espace à Montréal, 1847–1901", Rapport d'Étape, 31 Janvier 1986, 13, 46.

80. G. Lauzon et L. Ruellard, 1875/Saint-Henri (Montréal: Société historique de Saint-Henri, 1985); P-A. Linteau, The Promoters' City: Building the Industrial Town of Maisonneuve, 1883–1918 (Toronto: Lorimer, 1985).