

The Diversity of Industrial Experience: Cabinet and Furniture Manufacture in Late Nineteenth-Century Ontario

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The diversity of paths to industrialization is illustrated by the example of the cabinet- and furniture-manufacturing industry in Ontario, Canada. Complex and unpredictable demand combined with smaller markets and lower incomes than those in the United States and the relative abundance of wood to limit mechanization and the size of enterprise in the Canadian industry. Small and unpowered workshops remained competitive throughout the nineteenth and into the twentieth century, creating a distinctive industrial experience that reflects the unique interaction of local demand and supply.

Throughout the later nineteenth century, Francis Jones produced small quantities of furniture and cabinetware in a village north of London, Ontario, with the assistance of one man and a large number of hand tools.¹ Like hundreds of other small woodworking shops,

Enterprise & Society 4 (June 2003): 326–371. © 2003 by the Business History Conference. All rights reserved.

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We gratefully acknowledge support from the Social Sciences and Humanities Research Council of Canada, advice from the editor and anonymous referees of this journal, and helpful comments from Martin Chick, Terry Crowley, Doug McCalla, Marvin McInnis, Normand Seguin, Philip Scranton, and participants at meetings of the Canadian Historical Association, the Canadian Economics Association, and the Sixth Canadian Business History Conference.

1. Jones's tools were enumerated in the 1871 census in Middlesex North, Bidulph F-2. See National Archives of Canada [hereafter, NAC], Record Group 31,

Jones's shop competed with apparent success against mechanized furniture factories (some of them located nearby) that employed hundreds of workers. The survival of small and unpowered enterprises and the continued coexistence of diverse technologies and scales of production were not, of course, unique to furniture manufacture or to Canada. Diverse markets and technologies sustained a wide range of experience in many regions and industries. Small firms were as much a part of the industrial revolution as were Andrew Carnegie's steel mills and other familiar symbols of industrialization.² The example of the cabinet and furniture industry reminds us of an important but seldom-asked question: if large-scale enterprise brought such large and increasing advantages, how did so many small producers manage to survive? The resolution of this paradox will undoubtedly vary with the industry and the region. In the case of Canadian furniture makers, the answer appears to lie in the nature of the demand for furniture and in the particularities of local society.

Wood in Ontario's Industrial Revolution

Ontario during the late nineteenth century was in the midst of profound economic transformation. The use of steam power for rail and water transport was spreading rapidly.³ Roughly half of all track that has ever been laid in Ontario was put in place between 1870 and 1890.⁴ During that period improvements in efficiency halved the cost

series 1, Manuscript Census, 1871, schedule 6 (Industrial Establishments), microfilm [hereafter, RG 31 (1871), schedule 6]. L. A. Koltun describes his tools in *The Cabinetmaker's Art in Ontario, c. 1850–1900* (Ottawa, 1979), 3. Jennifer Trant, in "The Victorian Furniture Industry in Grey and Bruce Counties, Ontario" (MA Thesis, Queen's University, 1987), provides a bibliography and gives examples of other furniture artisans. See also Michael Bird, "Perpetuation and Adaptation: The Furniture and Craftsmanship of John Gemeinhardt (1826–1912)," *Canadian Antiques and Art Review* 3 (March 1981): 20–34; and "Cabinetmaker and Weaver Friedrich K. Ploethner," *Canadian Collector* 15 (May/June 1980): 28–32.

2. Maxine Berg and Pat Hudson, "Rehabilitating the Industrial Revolution," *Economic History Review* (45 Feb. 1992): 24–50; Pat Hudson, ed., *Regions and Industries: A Perspective on the Industrial Revolution in Britain* (Cambridge, U.K., 1989); Charles F. Sabel and Jonathan Zeitlin, "Historical Alternatives to Mass Production," *Past and Present* 108 (Aug. 1985): 133–76, and *World of Possibilities: Flexibility and Mass Production in Western Industrialization* (New York, 1997); Philip Scranton, "Diversity in Diversity: Flexible Production and American Industrialization, 1880–1930," *Business History Review* 35 (Spring 1991): 27–90, and *Endless Novelty: Specialty Production and American Industrialization, 1865–1925* (Princeton, N.J., 1997).

3. Doug McCalla, *Planting the Province: The Economic History of Upper Canada, 1784–1870* (Toronto, 1993), part 3.

4. Marion L. Bladen, "The Construction of Railways in Canada to the Year 1885," *Contributions to Canadian Economics* 5 (1932): 43–60, and "The Construc-

of transportation on many rail and water routes to and within the province.⁵ Urbanization, the growth of incomes, and the momentum of technological change gradually transformed the province's production structure and the way ordinary people earned their livings. Workers faced entirely new challenges as the workplace changed slowly but fundamentally in the face of new technology and market circumstances.⁶ The manufacturing sector grew steadily more complex.⁷ Prolonged interest in primary iron and steel manufacture, for example, led to successful investments during the 1890s.⁸ The increasing price of wood focused attention on alternate sources of fuel and materials.⁹ Coal imports into Ontario increased more than tenfold during the 1870s and 1880s, petroleum production doubled, and several dozen electric plants were erected.¹⁰

Although these transformations shared many features with those of other regions, evidence suggests that the Canadian manufacturing

tion of Railways in Canada Part II: From 1885 to 1931," *ibid.* 7 (1934): 61–107; Ian Drummond, *Progress without Planning: The Industrialization of Ontario from Confederation to the Second World War* (Toronto, 1987), Table 10.1.

5. Ken Cruikshank, "The Transportation Revolution and Its Consequences," *Canadian Historical Association, Historical Papers* (1987), 112–38; Ben Forster, "Finding the Right Size: Markets and Competition in Mid- and Late-Nineteenth-Century Ontario," in *Patterns of the Past: Interpreting Ontario's History*, ed. Roger Hall, William Westfall, and Laurel Sefton MacDowell (Toronto, 1988), 150–73; C. Knick Harley, "Ocean Freight Rates and Productivity, 1740–1913: The Primacy of Mechanical Invention Reaffirmed," *Journal of Economic History* 48 (Dec. 1988): 851–76, and "Coal Exports and British Shipping, 1850–1913," *Explorations in Economic History* 26 (July 1989): 311–38; Kris Inwood, "Transportation, Tariffs and the Canadian Iron Industry, 1867–1897," University of Guelph, Department of Economics Discussion Paper no. 1989–3.

6. Craig Heron, "Factory Workers," in *Labouring Lives: Work and Workers in Nineteenth-Century Ontario*, ed. Paul Craven (Toronto, 1995), 479–594; Greg Kealey, *Toronto Workers Respond to Industrial Capitalism 1867–1892* (Toronto, 1980); Jacob Spelt, *The Urban Development in South-Central Ontario* (Assen, The Netherlands, 1955).

7. The number of industrial categories used to report the industrial census enumeration increased from 140 in 1871 to 312 in 1891; see Canada, *Census, 1870–71*, 5 vols. (Ottawa, 1873–1878), vol. 3 (1875), and *Census, 1890–91*, 4 vols. (Ottawa, 1893–1897), vol. 3 (1894).

8. Craig Heron, *Working in Steel* (Toronto, 1988); Kris Inwood, "The Ontario Iron and Steel Industry," in Drummond, ed., *Progress without Planning*, 185–207.

9. The Canadian price of wood relative to the price of iron approximately doubled between 1870 and 1890; see M. C. Urquhart and Kenneth A. H. Buckley, *Historical Statistics of Canada* (Toronto, 1965), series K38 and J39. Relative price change is understated to the extent that ferric metal prices do not take into account quality improvement. Marvin McInnis, "Canada in the World Market for Forest Products, 1850–1895," paper presented to the Second Canadian Business History Conference, Victoria, Feb. 1988, provides the best evidence of Canadian wood prices.

10. Drummond, *Progress without Planning*, Tables 6.1, 7.6, and 8.1; *Canadian Manufacturer* (21 March 1890), 186, "First Uses of Electricity in Canada."

sector expanded and the structure of the economy changed at a slower pace than those in nearby regions of the United States.¹¹ The scale of business enterprise and levels of income and productivity in most sectors lagged as well.¹² Canada remained a relatively rural society by the standards of the northern states. Another peculiarity was the continued importance to the Canadian economy of wood, both as a preindustrial raw material for energy and construction and as an industrial raw material.

Looking elsewhere on the continent, historians write of a “wooden age,” by which they mean the eighteenth and early nineteenth centuries.¹³ Canada’s wooden age lasted much longer and has attracted considerable attention. Historians of an earlier generation made much of the export markets for wood and the exploitative character of forest-based enterprises.¹⁴ More recently, scholars have re-directed their attention to the internal market for wood and to the implications of forest exploitation for domestic society and growth.¹⁵

11. Morris Altman, “A Revision of Canadian Economic Growth: 1870–1910 (A Challenge to the Gradualist Interpretation),” *Canadian Journal of Economics* 20 (Feb. 1987): 86–113; Gordon W. Bertram, “Economic Growth in Canadian Industry, 1870–1915: The Staple Model and the Take-Off Hypothesis,” *Canadian Journal of Economics and Political Science* 29 (May 1963): 159–84; A. G. Green and M. C. Urquhart, “Estimates of Output Growth in Canada: Measurement and Interpretation,” in *Perspectives on Canadian Economic History*, 2d ed., ed. Doug McCalla and Michael Huberman (Toronto, 1993), 158–76; M. C. Urquhart, “New Estimates of Gross National Product, Canada, 1870–1926: Some Implications for Canadian Development,” in *Long-Term Factors in American Economic Growth*, ed. Stanley Engerman and Robert Gallman (Chicago, 1986), 9–28.

12. Kris Inwood and Jim Irwin, “Emigration and the Canadian Economy, 1870–1900: A Regional Perspective,” paper presented to the Canadian Network for Economic History, Stratford, Ont., Oct. 2000; Kris Inwood and Tim Sullivan, “Nineteenth-Century Ontario in Its Regional Context,” *Canadian Papers in Business History* 2 (1993): 71–102; Marvin McNis, “Marketable Surpluses in Ontario Farming, 1860,” *Social Science History* 8 (Fall 1985): 395–424; M. C. Urquhart, “Canadian Economic Growth, 1870–1980,” Queen’s University, Institute of Economic Research Discussion Paper no. 734 (1988).

13. Brooke Hindle, *America’s Wooden Age: Aspects of Its Early Technology* (Tarrytown, N.Y., 1975).

14. Arthur Reginald Marsden Lower, *The North American Assault on the Canadian Forest: A History of the Lumber Trade between Canada and the United States* (Toronto, 1938), and *Great Britain’s Woodyard: British America and the Timber Trade, 1763–1867* (Montreal, 1973).

15. Chad Gaffield, *History of the Outaouais* (Quebec, 1997); James Gilmour, *Spatial Evolution of Manufacturing: Southern Ontario, 1851–1891* (Toronto, 1972); René Hardy and Normand Séguin, *Fôret et société en Mauricie* (Montreal, 1984); McCalla, *Planting the Province*; McNis, “Canada in the World Market”; Joy Parr, *The Gender of Breadwinners: Women, Men and Change in Two Industrial Towns, 1880–1950* (Toronto, 1990); Ian Radforth, “Confronting Distance: Managing Jacques and Hay’s New Lowell Operations, 1853–1873,” *Canadian Papers in Business History* 1 (1989): 75–100, and “The Shantymen,” in Craven, ed., *Labouring Lives: Work and Workers in Nineteenth-Century Ontario*, 204–70; Rich-

Table 1 Distribution of Manufacturing Workers by Region and Primary Material, 1871 and 1891 (%)

	Ontario		Quebec		Maritimes	
	1871	1891	1871	1891	1871	1891
Wood	36	34	35	26	51	35
Cloth	18	24	12	17	10	18
Metal	16	15	15	15	13	12
Food	9	10	9	18	9	24
Leather	12	6	20	14	11	5
Mineral	5	5	4	4	4	4
Chemical	2	1	3	3	1	1
Printing	3	4	2	2	2	2
Miscellaneous	1	1	1	2	1	1

Source: National Archives of Canada, Record Group 31, series 1, Manuscript Census 1871, schedule 6 (Industrial Establishments), microfilm [hereafter, NAC, RG 31 (1871), schedule 6], and Canada, *Census, 1890–91*, 4 vols. (Ottawa, 1893–97), vol. 3 (1894), Table 1. A similar pattern is obtained by using output rather than the number of workers in each category. Percentages may total greater than 100 because of rounding.

Estimates of the share of forest-based activity in all economic activity in the late nineteenth century confirm its importance. Forestry contributed about one-tenth of all income in each of the eastern Canadian provinces.¹⁶ The importance of forest products to local manufacturing in this period can be illustrated through a classification of industries according to their primary materials (see Table 1).¹⁷ The wood-using industries employed one-third of manufacturing workers in Ontario and a larger (although diminishing) share in other provinces. Primary milling employed more than one-third of all workers in wood-based industries and used a slightly smaller proportion of establishments (see Table 2). The secondary manufacture of wood included several substantial trades, of which carriage making was the largest. These and other indicators suggest that, while

ard Reid, *The Upper Ottawa Valley to 1855* (Ottawa, 1990); Peter Russell, "Forests into Farmland: Upper Canada Clearing Rates, 1822–39," *Agricultural History* 57 (July 1983): 326–39; Graeme Wynn, *Timber Colony: A Historical Geography of Early Nineteenth Century New Brunswick* (Toronto, 1981).

16. Inwood and Irwin, "Emigration and the Canadian Economy."

17. We use the principal material used by establishments to organize industries into broad sectors. This classification is convenient, although many industries used more than one material. The industrial categories are those used by the Census Bureau to report on the 1891 industrial census. The basic sources are NAC, RG 31 (1871), schedule 6, and Canada, *Census, 1891*, vol. 3. The wood sector would be even larger if we were to include asheries; match factories; establishments involved with tanning and charcoal burning; those producing or using bark extract, wood pulp, wood pulp paper, and wood chemicals; and industries that burned wood fuel (such as salt manufacturers).

Table 2 Structure of Ontario Wood Manufacturing, 1871 and 1891 (%)

	Establishments		Workers	
	1871	1891	1871	1891
Sawmilling	26	26	37	43
Carriages	25	21	15	9
Cabinet/furniture	9	10	8	8
Agricultural implements	3	2	6	7
Carpentry/joinery	9	9	8	3
Cooperage	11	7	6	3
Shingles	6	4	5	3
Sashes/doors/blinds	2	4	3	4
Boats/ships	1	2	2	1
Musical instruments	—	1	1	4
Planing/molding	1	3	1	4
Pumps/windmills	3	4	1	1
Total	96	93	93	90

Source: NAC, RG 31 (1871), schedule 6, and Canada, *Census, 1890–91*, vol. 3, Table 1. Industries represented here made up at least 2 percent of the wood sector in at least one category in either year.

industrialization in other environments signaled a shift away from the use of wood, in Ontario the growth of manufacturing and the experience of the industrial revolution depended as much on wood as on the new metals and chemicals.

The 1871 industrial census manuscripts make possible, for the first time, a detailed description of Canadian wood-using shops and mills.¹⁸ The first panel of Table 3 confirms the small size of many establishments. More than three-fifths of the sawmills, farm implement makers, and sash and door factories employed five or fewer workers. More than three-fifths of carpenters, carriage makers, cabinet and furniture makers, and coopers worked alone or with only one other person.¹⁹ The data are not shown here, but working with wood was overwhelmingly a male activity. Women accounted for no more than 1 percent of workers in each of these industries, with the exception of the cabinet and furniture industry, where larger firms employed many women in their upholstery rooms.²⁰ We have identi-

18. NAC, RG 31 (1871), schedule 6.

19. The most comprehensive evidence of a pervasive smallness comes from the census, but other sources are consistent. See, for example, the insurance record of one smaller producer cited in the *Monetary Times* (9 April 1875), 1148: “Reed’s cabinet factory, with contents, was burned. Loss said to be \$5000. Insured in the Victoria Mutual for \$1800; \$800 of which is on the building, \$800 on the tools, and the remaining \$200 on the furniture.”

20. The maleness of woodworking is a point of departure for Parr’s *The Gender of Breadwinners*.

Table 3 Characteristics of Select Ontario Wood Industries by Size of Establishment, 1871

	Number of Workers in the Establishment					
	1	2	3-5	6-10	11+	All
1. Share of all establishments (%)						
Agricultural implements	21	19	19	15	26	
Carpentry/joinery	39	20	21	10	9	
Carriages	37	26	23	9	5	
Cabinet/furniture	42	22	22	7	7	
Cooperage	54	20	15	7	4	
Sash/door/blinds	23	18	21	17	21	
Sawmilling	19	22	29	17	13	
2. Average pop. density (per square mile)						
Agricultural implements	184	170	370	1,170	1,511	709
Carpentry/joinery	743	1,053	2,021	4,772	5,786	1,945
Carriages	225	416	528	1,456	3,363	602
Cabinet/furniture	614	615	1,612	2,626	3,004	1,144
Cooperage	188	655	892	2,092	3,138	626
Sash/door/blinds	794	449	1,716	1,373	4,786	1,871
Sawmilling	48	47	76	161	570	142
3. Months of operation						
Agricultural implements	9.7	9.1	11.3	11.2	11.9	10.7
Carpentry/joinery	8.4	10.1	10.4	11.6	11.9	9.8
Carriages	11.0	11.7	11.8	11.9	12.0	11.5
Cabinet/furniture	10.1	11.1	11.8	12.0	11.9	11.0
Cooperage	8.6	10.5	10.7	11.5	11.6	9.6
Sash/door/blinds	8.0	8.8	11.2	11.5	11.8	10.2
Sawmilling	5.5	6.1	6.9	7.7	8.6	6.8
4. Share with water or steam power (%)						
Agricultural implements	5	27	58	80	100	55
Carpentry/joinery	2	6	16	25	53	13
Carriages	1	2	5	6	17	3
Cabinet/furniture	9	10	34	55	92	24
Cooperage	0	2	10	19	48	5
Sash/door/blinds	15	23	88	90	88	60
Sawmilling	99	99	100	100	100	100
5. Steam share of powered (%)						
Agricultural implements		44	68	60	74	68
Carpentry/joinery		71	58	93	100	81
Carriages	67	75	71	88	92	78
Cabinet/furniture	25	54	59	86	76	62
Cooperage			60	78	72	67
Sash/door/blinds		40	59	68	83	70
Sawmilling	5	12	44	61	65	35

Source: NAC, RG 31 (1871), schedule 6. This table describes establishments for which output is calculable: 174 of the 179 implement makers, 550 of the 571 carpenters, 1,543 of the 1,588 carriage makers, 558 of the 574 cabinet and furniture makers, 665 of the 688 coopers, 122 of the 125 sash, door, and blind makers, and 1,752 of the 1,805 sawmills. Empty cells in panel 5 indicate instances in which there were fewer than five establishments with the characteristic.

fied the population density of the census subdistrict, typically an urban ward or rural township, in which each establishment was located. This evidence, summarized in the second panel of Table 3, reveals that sawmills were the most rural of the wood-based establishments. By contrast, sash and door makers, cabinet and furniture shops, and carpenters operated in more urban locations. The larger shops also tended to be situated in more urban locations and to operate during a larger portion of the year (Table 3, panel 3). Sawmills operated little more than half the year, whereas in most other industries a typical workshop was active for ten or eleven months.

The census manuscripts record considerable variations in the sources of industrial power. The information in Table 3, panel 4, indicates that most or all of the sawmills, but little more than half of the farm implement makers and sash and door shops, and only one-quarter of the cabinet and furniture shops used water or steam power. Almost no carpenters and few coopers and carriage makers, even large ones, used mechanical power.²¹ In general, establishments could be large without using mechanical power (“manufactories”) even though the larger establishments were more likely to use mechanical power. They also tended to choose steam over waterpower (Table 3, panel 5).²² The complex correlation between size and power no doubt reflects the ability of a large establishment to absorb the fixed costs of a steam plant and perhaps also steam plants’ greater profitability and ability to grow. The importance of year-round activity to the successful use of steam also contributed to the correlation, because urban plants tended to be larger.

21. A slight propensity among carpenters to use steam reflects the inclusion in this category of a few miscellaneous groups such as large building crews and shops that fashioned wood machinery not elsewhere classifiable. The sizes of the few cooperages and carriage-making establishments that used mechanical (water or steam) power follow: Cooperages with 5 or fewer workers numbered 20; carriage makers in the same category, 4. Cooperages with 5–10 workers numbered 8; carriage makers, 9. Cooperages with 10–20 workers numbered 8; carriage makers, 5. Cooperages with more than 20 workers numbered 5; carriage makers, 4. The two largest cooperages were both in London. William Hawkins in Ward 5 had 40 men and steam power equivalent to 16 hp, while Charles Smith in Ward 3 employed 41 men without using any water or steam power. John Shedden in Toronto, John Campbell in London, and William Gray in Chatham were the largest employers among the carriage makers; they employed 66, 34, and 33 men, respectively, and only the last used steam (16 hp).

22. The water-powered establishments were a special case because they were already located at a mill site or canal. They could abandon water in favor of steam, or they could retreat to hand power alone, but their location clearly encouraged a continued use of water. The Gibbard Furniture Company of Napanee, for example, continued to switch its group-driven machines from electricity to a turbine whenever the head of water was sufficient. See “Furniture Family for Three Generations,” *Canadian Woodworker and Furniture Manufacturer* 23 (Oct.

Table 4 Change in Output, Employment, and Number of Establishments in Ontario, 1871 to 1891 (%)

	No. of Establishments	Total Output	No. of Workers
All manufacturing	44	109	73
All wood-based industries	11	100	63
Agricultural implements	-27	194	113
Carpentry/joinery	26	-4	-13
Carriages	-6	51	0
Cabinet/furniture	22	114	65
Cooperage	-26	-16	-19
Sash/door/blind	86	92	44
Sawmilling	12	96	87

Source: NAC, RG 31 (1871), schedule 6, and Canada, *Census, 1890-91*, vol. 3, Table 1.

The 1871 data taken together with the 1891 census suggest that the size of the wood-using sector increased considerably during the 1870s and 1880s (see Table 4). The expansion reflects growth in the number of workers (and a smaller although still substantial increase in the average output per worker) and in the number of establishments (and in the average size of establishments). Admittedly, the experience of individual industries varied a great deal. Carriage and farm implement makers increased in both size (measured as average output) and labor productivity (average output per worker). The productivity of sash, door, and blind factories increased without any change in size. Sawmills became larger even though productivity did not change. The size and productivity of carpenter shops stagnated, although we exaggerate the effect by including in 1871 building crews whose construction activities we cannot separate from their workshops.²³ The coopering industry stagnated in all respects, pre-

1923): 49-51. The company minimized charges from Ontario Hydro with its own steam-generating plant.

23. A carpenter who ran a building crew testified before the 1887 Royal Commission; see Greg Kealey, *Canada Investigates Industrialism* (Toronto, 1973), 77-81. It is difficult to prepare the census data unambiguously because many carpenters and joiners gave the enumerator no product detail, while others reported both manufacturing and construction work. Of the carpenters who provided useful product detail, 60 percent fabricated articles or equipment (carts, ploughs, sleighs, wheels, blocks, furniture, hubs, cradles, dressed lumber, machinery, tools, doors, ladders, and so on), while slightly less than 40 percent participated in construction activity (building houses, barns, fencing, and bridges; engaging in masonry; and so on). The 1871 carpentry classification also includes a few wheelwrights, millwrights, and shops producing wood machinery that could not be included elsewhere. Using the same calculation as in Table 5 but ignoring powered shops and establishments with more than ten workers reduces the 1871 figure considerably and produces more plausible growth estimates: 104 percent for output and 63 percent for workers.

sumably because of the spread of specialized wood packing cases and tinware. Only farm implement manufacture exceeded the growth of cabinet and furniture manufacture, which was achieved through an expansion in the number of workers, in the workers' productivity, and in the number and size of establishments. Cabinet and furniture manufacture is interesting, in part, because large and steam-powered factories appeared very early, yet numerous small and hand-powered establishments continued late into the nineteenth century.²⁴

Patterns of Location, Specialization, and Organization in Furniture Manufacture

Because cabinetry and furniture products were more costly to transport than wood and other industry inputs, workshops in the industry had a transportation-cost incentive to locate close to their market.²⁵ Ontario's relatively rural and dispersed population (and resulting patterns of consumption) suited a decentralized pattern of production (see map). All but two southern Ontario census districts in 1871 had a cabinet and furniture maker of some sort.²⁶ At the same time, the largest cities, Toronto, Hamilton, and London, were home to only nineteen of the province's six hundred establishments in 1871. The expanded and improving railway network allowed even the urban manufacturers to draw their wood from across Ontario and adjacent states.²⁷ Pine was ubiquitous, but the important hardwoods origi-

24. Jacques and Hay reported annual production of some 75,000 chairs and 7,500 beds by 1861. By 1871 the firm had 430 employees and a fixed capital of \$400,000; see the *Toronto Globe* (15 Feb. 1862), and NAC, RG 31 (1871), schedule 6. In Montreal the Hilton cabinetmakers employed 82 hands as early as the mid-1850s, while the chair factory established by William Allen in 1852 allegedly turned out five hundred chairs daily; see *Montreal in 1856* (Montreal, 1856), reproduced in *Revue de l'histoire de l'amerique francaise* 6 (1952–53): 130, 134.

25. Terence S. Green, "A Locational Study of the Furniture Industry in Southern Ontario" (BA Thesis, University of Toronto, 1967); John Leonard Oliver, *The Development and Structure of the Furniture Industry* (Oxford, U.K., 1966), 144–45; Trant, "Victorian Furniture Industry," 37.

26. The exceptions are unexpected: Niagara and Russell in 1871 and Frontenac in 1891.

27. Rail was the chief method of long-distance transport for furniture and its materials; see Green, "A Locational Study," 35–36. The importance of the railroad is reflected in the 1889 resolution of the Canadian Furniture Manufacturers Association asking railway companies for lower freight rates on the cheaper lines of furniture and in the many references recorded in the Minutes of the Furniture Section of the Canadian Manufacturers Association; see *Canadian Manufacturer* (1 March 1889), 149, and NAC, MG 28 I 230 (Canadian Manufacturers' Association), vol. 50. Jacques and Hay shipped by water as well; they had their own wharf in Toronto harbor in the 1850s; *Toronto Globe* (16 March 1854).



Map of Ontario.

nated on the northern edge of the Carolingian forest in the counties bordering both sides of lakes Huron and Erie.²⁸

Descriptions of contemporary furniture make clear that many furniture shops used locally available woods, although there was a growing demand for exotic and imported woods for veneering and other purposes. Most of the firms for which the 1871 census includes details about materials indicated that they used more than one kind of wood. About three-fifths confirmed the use of pine. Walnut was the most common hardwood, although basswood, cherry, maple, and butternut were also used widely, and oak had growing popularity. By the 1880s firms imported a considerable quantity of walnut, once widely available in southwestern Ontario. The growth of wood imports further enhanced the advantages of plants situated on railway lines.²⁹

28. *Industrial Canada* (March 1903), 370–72. Rail charges ranged from 7 to 11 percent of the value of the furniture.

29. *Canadian Manufacturer* (23 Feb. 1883), 154; (6 Aug. 1886), 466. The trade journal *Industrial Canada* (March 1903), 370–72, indicates that domestic woods dominated until late in the century, when imported woods came to be more commonly used. See also *Canada Lumberman and Millers, Manufacturers and Miners' Gazette* (July 1900).



Krug Furniture Factory, Chesley, Ont., c. 1923–24. The factory “is surrounded at all seasons of the year with immense piles of wood. . . . the quantity gathered together, presents the appearance rather of a mill where lumber is manufactured, than of a place where it is used. Much of this lumber stands for three years before it is considered sufficiently dry to be worked up into articles of furniture.” This description of the Jacques and Hay factory in Toronto (from the *Toronto Globe*, 15 Feb. 1862) remained accurate for the Krug Furniture Factory more than sixty years later. Photograph by W. J. Bolton, reproduced courtesy of the National Archives of Canada, PA-031421.

A number of manufacturers drew from their own woodlots. As early as the 1850s, the Jacques and Hay Company had woodlots and a sizing and dimensioning plant in Simcoe County to supply the finishing plant in Toronto.³⁰ Similarly, the Krug brothers’ firm in Chesley, just south of the Bruce Peninsula, obtained raw materials from company-owned woodlots scattered through Bruce and Grey counties.³¹ Companies without woodlots purchased stock from sawmills that, in turn, assembled the wood on a contract or purchase basis from farmers and owners of independent woodlots. The firm begun by Daniel Knechtel in Hanover simply owned its own sawmill and advertised for wood supplies, especially soliciting wood obtained from the clearing of farmland, because there was a consid-

30. Radforth, in “Confronting Distance,” 80, 97, discusses the management and communications challenges of this arrangement.

31. Personal communication from Bruce Krug. We have no direct evidence of costs with and without woodlots.

erable expansion of farm acreage in these counties during the period.³²

The need to acquire labor and management expertise implied a locational influence of a different sort. Regional and urban concentrations of furniture manufacturers created local supplies of skilled labor, which would have afforded external economies to firms in the relevant industrial community.³³ Certainly new factories begun by employees could most easily dip into an existing pool of workers and managers in locations close to or within an existing manufacturing community. Proximity also facilitated the transfer of new technology and new styling. Styling, neither patented nor embodied in equipment, was particularly easy to borrow. One manufacturer explained that “when we want a design, we buy something, and take a design of it; we do not keep a designer.”³⁴ The rapid diffusion of technology, style, and other improvements both reflected and enhanced competition and generally increased the rate of industrial development.³⁵

Possibly the most important aspect of proximity, though difficult to trace, is the web of relationships among woodworking firms for contracting and purchasing of parts.³⁶ The formalization of systems of ownership could occur through the buying of parts or via subcontracting, either directly or through interlocking partnerships and share-owning arrangements. Enumerators for the 1871 industrial census sometimes refer to establishments operated in conjunction with each other.³⁷ The proportion of establishments that can be identified from the 1871 census as being linked to another is small, but it rises among the larger firms (Table 5), suggesting that diverse or multipur-

32. Parr, *Gender of Breadwinners*, 128; Inwood and Sullivan, “Nineteenth-Century Ontario.”

33. Oliver, *Development and Structure*, 152, argues that the development of laborsaving machinery would have reduced the dependence on labor as a locational factor.

34. Canada, *Report of the Royal Commission on the Relations of Capital and Labor in Canada* (Ottawa, 1889), 442.

35. Michael Porter, *The Competitive Advantage of Nations* (New York, 1990). Although it is difficult to obtain detailed evidence about the interactions between manufacturers, we are able to glimpse enough to suggest a pattern of interconnectedness reminiscent of the “systems” of small manufacturing firms in Italy and elsewhere. See Aurelio Alaimo, “Small Manufacturing Firms and Local Productive Systems in Modern Italy,” in *Small Firms, Large Concerns: The Development of Small Business in Comparative Perspective*, ed. Konosuke Odaka and Minoru Sawai (New York, 1999), 168–96.

36. Parr, *Gender of Breadwinners*, 129.

37. The linkage is more often inferred; see Kris Inwood, “The Representation of Industry in the Canadian Census, 1871–91,” *Histoire sociale/Social History* 28 (Nov. 1995): 347–74.

Table 5 Evident Product Diversity and Apparent Linkages between Establishments among Ontario Cabinet and Furniture Makers, 1871

	No. of Workshops	Workshops with Product Diversity (%)	Workshops Linked to Other Firm (%)
1 Worker	245	20	2
2 Workers	125	15	4
3–5 Workers	123	18	4
6–10 Workers	41	22	2
11+ Workers	40	30	8
All	574	19	3

Source: NAC, RG 31 (1871), schedule 6.

pose firms tended to divide into specialized but linked establishments.

The history of individual firms provides examples. We know that the Chesley Chair Factory opened next door to the Krug case goods plant in Chesley, with considerable finance from the Krug family. The chair factory produced chairs and other goods directly for retailers and complemented Krug's production of case goods. The Jacques and Hay stock-dimensioning plant in Simcoe County produced parts for the mother firm, as well as products of its own. Robert Hay revealed that his firm supplied smaller producers with parts and purchased other furniture parts from outside manufacturers, such as the Guggisberg molding factory in Preston.³⁸ The Knechtel investment in firms at Walkerton and Southampton was probably an extension of contracting and subcontracting arrangements already in place. Managers who left Knechtel established their own companies in proximity to their former employer.³⁹

38. Robert Hay, of Jacques and Hay, when asked, "Are you in the habit of supplying the cabinet-makers in the country?" answered: "Yes, we have been supplying them." Canada, House of Commons, *Journals* (1876), Appendix No. 3, "Report of the Select Committee on the Causes of the Present Depression" [hereafter, House of Commons, *Journals*, "Report"], 47. See also A. E. Byerly, "Preston in 1866," *Waterloo Historical Society: Annual Report* 21 (1933): 53–56, and Canada, *Report*, 442, 609.

39. On Knechtel, see James Acton, *The Canadian Book of Furniture* (Toronto, 1923), 65–66, and D. McConnell, "Daniel Knechtel, 1843–1936," Historic Sites and Monuments Board of Canada, *Agenda Papers* (Ottawa, 1980). In 1901, years before establishing his own furniture manufacturing business, Henry Peppler spoke to his fellow employees at Knechtel's (quoted in Trant, "Victorian Furniture Industry," 70):

I feel proud to say that there is not another concern in Canada that has sent out men so well qualified to take charge of factories and run them successfully as we have. Take Hollinger & Ball and their staff. Take Hill, of Wiarton. He left the farm and came here and got his experience, then went to Wiarton, started up in business and is running it successfully. There are

The practice of one firm's supplying parts to another is as common in the United States as it is in Ontario and is not surprising.⁴⁰ At its simplest, we might see this aspect of factory organization as an extension of the purchasing and subcontracting processes. Individuals working on a piecework basis for a larger firm could have their own employees. In effect, they would be running a partly independent, specialized woodworking shop within the factory. These patterns of labor subdivision, subcontracting, and specialization are not easily visible in the census data, although we learn a little from the characterization of the "type of establishment."

Almost all of the establishments were described in relatively simple terms as "furniture shop" or "cabinet factory." A few records specify some related stage of production, such as "upholsterer/cabinet shop," "planing mill," and "turning shop," or an allied industry such as "furniture/sashes" and "cabinet shop/coffins." Some hint of specialization arises with sixteen establishments identified as "chair factory," one as a "cradle making shop," one as a maker of "rustic sofas," and one as a "chair/bedstead factory." In addition, there were a few piano manufacturers and sewing machine makers and several dozen coffin and casket makers. Nevertheless, it is remarkable how many of the nearly six hundred workshops and small factories were designated as general-purpose cabinet and/or furniture shops.

Undoubtedly, many of these shops produced different designs and degrees of fineness, but the nature of their specialization must have been individual rather than systematic, because no subindustry had a distinct social identity, with the possible exception of chair making.⁴¹ The description of products summarized in the census manuscripts gives a similar impression.⁴² Over half of the relevant records simply indicate "furniture," while a third specify "cabinets" or "cupboards." The most commonly identified kinds of furniture were the chair (16 percent), the table (10 percent), the bureau or side-

four or five of our men in Walkerton, others in Berlin, Preston, Hespeler, and I dare say our friend Mr. Nesbitt is filling an important position in one of the biggest concerns in Grand Rapids. And these men got their experience here.

40. Michael Ettema, "Technological Innovation and Design Economics in Furniture Manufacture," *Winterthur Portfolio* 16 (Summer/Autumn 1981): 197–224, esp. p. 207.

41. Ivan G. Sparkes, *Woodland Craftsmen* (Aylesbury, U.K., 1977), 9–16, and *The English Country Chair: An Illustrated History of Chairs and Chairmaking* (Bourne End, U.K., 1973).

42. The product (and material) detail is for those firms reporting useful information; material and product descriptions are either missing or uninformative for the other shops. The most likely reason for not recording product detail is that it added little to the identification of the establishment itself.

board (10 percent), and the bed or bedstead (7 percent). Another 7 percent of the firms mentioned coffins or undertaking.⁴³

Most shops reported several kinds of products. Ontario industry in 1871 had developed to the point of hosting several hundred cabinet and furniture shops, but by and large these shops did not specialize in individual products such as tables or beds. The system of industrial classification provides another measure of specialization. Principal products can serve as a basis for classifying establishments, although many reported secondary products would place them in a different industry. Many records also betray evidence of nonmanufacturing activity, such as construction and importing. We designate as diverse any establishment for which there is evidence of nonmanufacturing production or of manufacture of products that would be classified in another industry. The summary in Table 5 indicates that about one-fifth the cabinet and furniture establishments were diverse in this sense and that the incidence of diversity was greater among the larger firms.

Most of these firms were single proprietorships. This would not be clear from traditional sources such as the business directory. Only a handful of furniture makers, all of them large and most describing themselves as “companies,” chose to advertise in the 1870 *Guide to the Manufactures of Ontario and Quebec*.⁴⁴ The limited number of firms selling widely enough to appear in a provincial business directory reminds us that such directories cannot provide a balanced or comprehensive overview of a largely rural society. For that purpose, we must look to the census enumeration, which in 1871 returned the name of the proprietor for each establishment. Undoubtedly there is some imprecision in the records, because census enumerators did not receive close instruction about how to determine the proprietor of an establishment. Nevertheless, the patterns reported in Table 6 are sufficiently clear to be instructive. The proprietors listed for 99 percent of the one-person shops and 92 percent of the two-person shops were individuals; the numbers fall to 78 percent for workplaces employing six to ten workers and to 60 percent for factories

43. Gibbard Furniture Company Limited of Napanee began its operations in 1835 as a single-proprietorship maker of fanning mills, furniture, and coffins (which were dropped as furniture proved more popular). *Canadian Woodworker and Furniture Manufacturer* 19 (Nov. 1919): 103; Acton, *The Canadian Book of Furniture*, 66.

44. W. T. Urquhart and H. L. Forbes, *Guide to the Manufactures of Ontario and Quebec* (Montreal, 1870). Only one firm, the Bowmanville Furniture Company, identified itself as a limited-liability enterprise. Ironically, it encountered difficulties shortly thereafter; see *Monetary Times* (11 Aug. 1871), 108; (4 Feb. 1876), 880; and (25 Feb. 1876), 978.

Table 6 Organizational Basis for Cabinet and Furniture Manufacture in Ontario, 1871

	No. of Workshops	Single Proprietor (%)	Partnership (%)	Company (%)
1 Worker	245	99	1	0
2 Workers	125	92	6	2
3–5 Workers	123	89	11	1
6–10 Workers	41	78	20	2
11+ Workers	40	60	25	15
All	574	11	7	2

Source: NAC, RG 31 (1871), schedule 6.

with eleven or more workers. Conversely, the incidence of partnership increases with size: only 6 percent of the two-person establishments are known to have been partnerships, as opposed to 20 percent of those with six to ten workers and 25 percent of those in the largest size category.

The word “company” appears only rarely in the 1871 census manuscripts, although 15 percent of the proprietors employing eleven or more workers described their establishments by using the word “company.” Overall, only 2 percent of the shops show any evidence of corporate or joint-stock organization, while 7 percent seem to have been partnerships. Admittedly, the incidence of joint-stock and other corporations may be underestimated among large firms, because the enumerators could not easily ascertain the legal status of each enterprise. Nevertheless, it is clear that the dominant organizational form was the single proprietorship, with partnerships and some kind of corporate status being somewhat more common among the larger firms.⁴⁵

Changes in Patterns of Mechanization and Productivity during the 1870s and 1880s

The pattern of small plants and decentralized manufacture changed somewhat in subsequent decades. The faster growth of urban populations meant that Toronto, London, and Hamilton became home to 104 establishments, about one-fifth of the provincial industry, by

45. Naomi Lamoreaux, in “Constructing Firms: Partnerships and Alternative Contractual Arrangements in Early Nineteenth Century American Business,” *Business and Economic History* 24 (Winter 1995): 43–72, explores the theoretical considerations informing the choice of organizational form by nineteenth-century businesses.

1891.⁴⁶ Another concentration emerged in the rural counties facing Lake Huron. Manufacturers in Grey, Bruce, Huron, and Simcoe counties contributed 10 percent of provincial furniture output and jobs in 1871, a portion that had risen two decades later to 15 percent of output and 20 percent of jobs. By the early twentieth century the region was home to a dense network of factories and plants, including the majority of plants operated by the only two companies known to have coordinated production at multiple sites in order to achieve greater plant-level specialization.⁴⁷ The expansion of a network of plants in this region undoubtedly relied on the fall in freight rates and an expanding rail network that by the end of the 1880s reached all major towns and cities and even many smaller towns.⁴⁸ The Knechtel operation in Hanover, for example, was able to expand rapidly following the arrival in the region of the Stratford and Lake Huron Railway in 1881.⁴⁹ Manufacturers as far west as London began to ship on a regular basis to Halifax, Montreal, Ottawa, Toronto, and Kingston.⁵⁰ The development of railway lines throughout western Canada also allowed expansion into that market.⁵¹

46. Demand from the urban areas was important for reasons not simply proportional to the areas' share of population. One Toronto hotel spent \$25,000 on furniture in a single year; see *Monetary Times* (21 Nov. 1867), 106. Many of the firms incorporating during the late 1880s and the 1890s, some with substantial nominal capitalization, were located in urban areas.

47. The Canada Furniture Company in 1923 claimed to have plants in six locations, while the Knechtel Furniture Company had five factories with distinct product lines. See Acton, *The Canadian Book of Furniture*, 65–68, 97–104.

48. The Elora and Saugeen Railway connected Goderich and the mouth of the Saugeen River. The Wellington Grey and Bruce ran through to Southampton. The Toronto Grey and Bruce Railway reached Owen Sound by 1873. The Grand Trunk Railway built a line through to Wiarton; see Trant, "Victorian Furniture Industry," 33–34. More generally, see Ken Cruikshank, *Close Ties: Railways, Government and the Board of Railway Commissioners, 1851–1933* (Montreal, 1991), Forster, "Finding the Right Size," and George Rogers Taylor and Irene D. Neu, *The American Railway Network, 1861–1890* (Cambridge, Mass., 1956).

49. Parr, *Gender of Breadwinners*, 123–27; *Canadian Woodworker and Furniture Manufacturer* 19 (Nov. 1919): 104. Transportation concerns also drove highly specific locational decisions, such as the Krugs' abandonment of their riverside location in Chesley, with its abundant waterpower, because a railway spur could not be built into the plant. See Trant, "Victorian Furniture Industry," 87–88.

50. Canada, *Report*, 610.

51. *Canadian Manufacturer* (20 June 1890), 414; *ibid.* (23 Feb. 1883), 145. The furniture tariff, roughly 30 percent from 1879 to 1896, provided Canadian producers with some protection in the western market and may have encouraged the location in Ontario of American branch plants such as the American Rattan Company of Toronto and the Global Furniture Company of Michigan, Boston, and Walkersville. The *Monetary Times* (19 March 1880), 1105, notes, "The rate at which several cars of furniture have been sent from Parkhill to Manitoba is \$280 per car."

Table 7 Ontario Cabinet and Furniture Makers, 1871 to 1891

	1871 Manuscript	1871 Published	1891 Published	Changes, 1871 to 1891 (%)	
				Manuscript- Published	Published- Published
No. of establishments	574	536	701	22	31
No. of workers	2,824	2,769	4,720	65	70
Total output	\$1,295,955	\$1,214,242	\$2,773,165	114	128
Output/establishment	\$2,258	\$2,265	\$3,956	75	75
Fixed capital/establishment	\$2,248		\$2,365	5	
Workers/establishment	4.9	5.2	6.7	37	30
Output/worker	\$458	\$439	\$588	28	34
Wage/worker	\$296	\$301	\$350	18	16
Total steam power	1,119 hp		3,361 hp	300	
Share working full time	84%		94%		
Share with steam power	15%				
Establishments with 5+ workers	17%		18%		
Workers in establishments of 5+ workers	68%		77%		

Sources: Calculations based on the 1871 manuscript figures follow the procedures outlined in Kris Inwood, "The Representation of Industry in the Canadian Census, 1871–91," *Historire sociale/Social History* 28 (Nov. 1995): 347–74. Published figures are from tabulations made by the Census Bureau and published in Canada, *Census, 1870–71*, 5 vols. (Ottawa, 1873–1878), vol. 3 (1875), and 1891, vol. 3 (1894). The 1891 seasonality and steam power evidence is from Canada, *Census Bulletin* 8 (April 1892) and 13 (Aug. 1892). Shops with fewer than five employees (for Canada, not just Ontario) are reported in Canada, *Census, 1901*, 4 vols. (Ottawa, 1902–1906), vol. 2 (1904), Table 22; for comparative purposes, the 1871 figure is also for Canada. Definition of full time in 1871 is eleven months or more of operation; no definition is available for 1891. Average wage is calculated by weighting children at 0.5 and women at 0.67, because only one wage figure is reported for all workers. For "Total steam power," hp = horsepower.

Across the province the number of workers increased by two-thirds, and their production more than doubled between 1871 and 1891. The indicators summarized in Table 7 confirm significant growth in the average size of plant work forces and in the importance of large plants. The share of the industry in full-time operation increased to 94 percent, average output per establishment more than doubled, and labor productivity increased about 30 percent.⁵² Output and productivity must have increased even more dramatically in real terms, because input prices were rising and output prices were stable or falling during the period. The summary census data tell us little about the precise nature of industrial transformation, but they do suggest that the changes were significant and accompanied by growth in productivity.

52. There is no direct evidence of work intensity. Evidence for the lengths of working years is not directly comparable for 1871 and 1891.

Workers appear to have shared in the gains, as wages per worker (admittedly a crude average across all industries and types of labor) increased 15 to 20 percent. Consumers also gained from the growth in productivity through a reduction in the price of furniture, all the more remarkable given the increase in the cost of lumber. Charles Rogers, who took over R. Hay and Company (successor to Jacques and Hay) in Toronto, told the 1887 Royal Commission that the price of medium grades of furniture had fallen considerably, although high-end furniture had seen more limited change: "The price has been reduced 20 per cent in the last ten years. Competition and machinery have done that. . . . Take a suite worth \$100 to-day, a bedroom suite of three pieces; such a suite could not have been made twenty-five or thirty years ago, certainly thirty years ago, for \$200."⁵³

The trend toward growth in output and productivity and decline in price undoubtedly reflects a number of factors. One important influence, of course, was the growth of demand arising from population growth and increased personal incomes. Urbanization and the decline in transportation costs permitted some spatial concentration of production and contributed to the realization of scale economies, reinforcing the stimulus to the growth of production. Reductions in the price of capital facilitated the adoption of productivity-enhancing technologies, some of which were new and others of which had been available but previously unutilized.

Evidence of unrealized scale economies is available from an examination of productivity by size of establishment in 1871. For this purpose, it is helpful to consider all four existing Canadian provinces (Nova Scotia, New Brunswick, Quebec, and Ontario) in order to expand the number of cases for consideration. In total, we are able to examine 640 workshops that operated without mechanical power, 75 that used waterpower, and 89 that operated with steam power.⁵⁴ In Table 8 we report labor productivity and capital productivity (output per worker per month and per dollar of fixed capital) for furniture manufacturers of different sizes. It is apparent that small and hand-powered establishments used capital more efficiently than did the larger and steam- or water-powered establishments. The inferior capital productivity of large firms reflects, in part, their tendency to locate in more urban areas, where land and buildings were more

53. Canada, *Report*, 354, 610–11, 613.

54. Details for about 10 percent of the cases in each category are lost because of missing information on raw materials, product value, worker months, or fixed capital. We also ignore a handful of establishments that operated for only one month or reported productivity so large that the data must have been recorded improperly.

Table 8 Labor and Capital Productivity among Canadian Cabinet and Furniture Makers, 1871

Establishment	No.	Output per Worker-Month (%)	Output per Fixed Capital (\$)
Hand powered	722	38.40	3.42
Water powered	99	39.40	2.43
Steam powered	102	48.70	2.25
1 Worker	411	37.90	3.22
2 Workers	181	40.50	3.24
3–5 Workers	203	38.90	3.22
6–10 Workers	61	45.30	3.30
11+ Workers	67	45.30	2.70
All	923	39.70	3.19

Note: Output is value of products less value of raw materials, measured in dollars. The labor input is the reported number of months of operation multiplied by the reported number of employees. Fixed capital is the value in dollars reported by each firm.

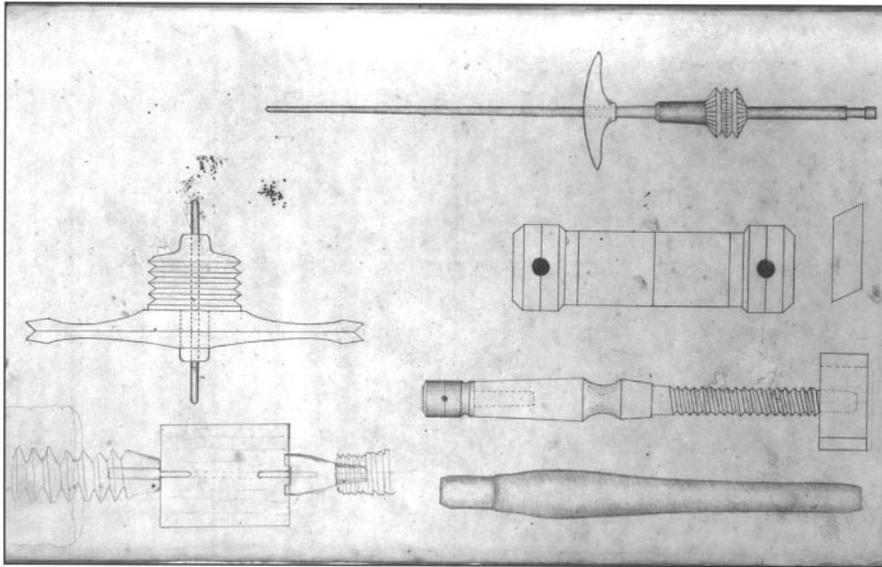
Source: NAC, RG 31 (1871), schedule 6.

costly.⁵⁵ Larger plants also needed extensive inventories and kiln-drying facilities in order to avoid costly shutdowns.⁵⁶ Fortunately, larger establishments had the advantage of higher labor productivity to offset these difficulties. Indeed, they were more efficient overall, in the sense that higher labor productivity outweighed the burden of less productive capital. This evidence comes from a statistical estimation, reported elsewhere, of the relationship between inputs and outputs that permits the testing of scale economies. Larger plants are shown to have been more efficient when efficiency is measured in a way that reflects the productivity of both capital and labor.⁵⁷

55. An ordinary least squares regression confirms that greater population density and the choice of steam power were strongly associated with larger establishments; see Kris Inwood, "Industry in a Rural Society: Canada during the Late Nineteenth Century," paper presented to the Canadian Network for Economic History, Kananaskis, Alberta, April 1999.

56. *Canadian Manufacturer* (1 Nov. 1889), 339 (Knechtel); (3 July 1891), 19 (Oxford Furniture Company); (15 March 1907), 27 (Canada Manufacturing Company and the Anthes Furniture Manufacturing Company, both of Berlin). The Moorhead firm in London had its own drying kilns as early as the 1870s.

57. Inwood, "Industry in a Rural Society," Tables 9–11. An analysis of American industrial data yields qualitatively similar results; see Jeremy Atack, "Firm Size and Industrial Structure in the United States during the Nineteenth Century," *Journal of Economic History* 46 (June 1986): 463–76, and "Economies of Scale and Efficiency Gains in the Rise of the Factory in America, 1820–1900," in *Quantity and Quiddity: Essays in U.S. Economic History*, ed. Peter Kilby (Middletown, Conn., 1987), 286–335; Ken Sokoloff, "Was the Transition from the Artisanal Shop to the Non-mechanized Factory Associated with Gains in Efficiency? Evidence from the U.S. Manufacturing Censuses of 1820 and 1850," *Explorations in Economic History* 21 (Oct. 1984): 351–82; Viken Tchakerian, "Productivity,



The high skill levels useful for a cabinet maker are apparent in Francis Jones's many sketches. Drawing, Francis Jones's sketchbook, reproduced courtesy of the Canadian Museum of Civilization, © Canadian Museum of Civilization, negative no. 77-156.

Clearly, in 1871 there was considerable scope to increase the size of establishments and the level of mechanization. The typical woodworking shop relied entirely on many hand tools of the sort held by Francis Jones.⁵⁸ Slightly larger shops might have had one or two foot-powered tools. Only 15 percent of workshops and factories made use of steam power. Even some of the largest shops did not yet use steam power in 1871. In subsequent decades steam became more widely used, especially among firms aiming to expand their production. Some of those already using steam would adopt improved machinery or expand production simply by installing larger boilers.⁵⁹ Over-

Extent of Markets, and Manufacturing in the Late Antebellum South and Midwest," *Journal of Economic History* 54 (Sept. 1994): 497–525.

58. Jones's shop was neither big nor small by contemporary standards. The 1871 census data indicate that 42 percent of the cabinet and furniture makers reported fewer employees and 34 percent had more. See also Kenneth R. Davis, *Furniture Marketing: Product, Price and Promotional Policies of Manufacturers* (Chapel Hill, N.C., 1957), 50–51, and Koltun, *The Cabinetmaker's Art*, 3.

59. Market or transportation node orientation could require the early adoption of steam power. Jacques and Hay sold a 20-hp engine in 1854–55 because they wanted to upgrade; that it took them six months to sell the engine gives some sense of the industrial demand for steam at that time. See the *Toronto Globe* (25 Sept. 1854) and (26 March 1855). Messrs. Cliff and Forrester of Lucknow in 1890 used a municipal bonus to purchase a larger steam engine, boilers, and other machinery. Knechtel and Company in 1894 purchased a 150-hp steam engine

all, from 1871 to 1891 the amount of steam power available to Ontario's furniture industry increased threefold and horsepower per worker almost doubled (see Table 7). The advent of water turbines during the mid-1860s also encouraged the use of machinery.⁶⁰ The particular advantage of steam, however, was that it liberated plants from the constraints of size, seasonality, and location associated with waterpower. Indeed, one of the striking characteristics of the industry in the 1880s and 1890s was the apparent ease with which individual Ontario plants changed their locations.⁶¹ The growing attractiveness of steam power reflects not only the tendency for demand to concentrate in urban areas and the desire of some manufacturers to expand production, but also the diminishing cost of steam power. There is no reason to doubt the owner of a London foundry who in 1876 claimed that a significant fall in the price of steam engines was permitting smaller firms to acquire steam power.⁶²

In retrospect, the limitations of the steam engine are easy to see. The use of flow-line production techniques, for example, did not deliver substantial efficiencies of material handling so long as the steam engine dictated plant layout.⁶³ Electrically driven machinery facilitated a radical redesign of plant layout in the 1920s, but the full adoption of flow-line production techniques waited for the second

from Goldie and McCulloch Company of Guelph to replace a 100-hp steam engine. In 1894 Bennett Furniture Company of London replaced a 100-hp boiler with one of 150 hp, and the Hanover Furniture Company installed a 225-hp steam engine. See *Canadian Manufacturer* (7 Nov. 1890), 301; (2 Feb. 1894), 110; (6 April 1894), 278; (20 April 1894), 327.

60. Barbara Robertson, *Sawpower: Making Lumber in the Sawmills of Nova Scotia* (Halifax, 1986), 42–44; Trant, "Victorian Furniture Industry," 87. Until 1901 a horizontal water turbine powered in whole or in part the Krug brothers' plant in Chesley (established in 1886). On the origin of the Krug works, see Acton, *The Canadian Book of Furniture*, 97.

61. Some furniture manufacturers seemed to relocate to take advantage of municipal bonusing; see *Canadian Manufacturer* (7 Feb. 1890), 88; (18 April 1890), 268; (5 Sept. 1890), 268. The rattan manufacturers Messrs. J. G. and A. Hay of Woodstock were reported to be ready to move to Owen Sound, which had offered a tax holiday and free water; see *Canadian Manufacturer* (6 Nov. 1891), 289.

62. The proprietor explained that machinery and engine prices declined because of the fall in iron prices and, to a lesser extent, in labor costs. See House of Commons, *Journals*, "Report," 250–53.

63. Heavy metal shafting and leather belting required machines to be set side by side, with machines that required higher levels of power positioned closer to the engine and boiler and lighter machines that used less power located at a distance, often on a second floor. *Canadian Manufacturer* (29 June 1883), 474, describes a factory in which heavy machines driven by steam (planer, tenoning machine, saws) were on the ground floor; the second floor had lighter machinery and some tools for handwork; the third floor was used for upholstering and painting. Jacques and Hay had a similar layout; see Kealey, *Toronto Workers*, 19.

half of the twentieth century.⁶⁴ From the vantage point of the 1870s, however, steam was of considerable interest, because it made possible the use of a widening array of machinery. By the 1870s an international technological transition that saw substantial improvements to many machines and the emergence of entirely new ones had advanced wood manufacture.⁶⁵ John Richards's technical treatise describes in some detail the growing array of circular saws, band saws, planing machines, mortising and tenoning machines, lathes, dovetailing machines, and other machinery available to furniture makers. The new machines, according to Michael Ettema, became useful in a practical way at different dates.⁶⁶ Circular and reciprocal saws,

64. Carroll Pursell, "Variations on Mass Production: The Case of Furniture Manufacture in the United States to 1940," *History of Technology* 17 (1995): 127–41; Sparkes, *The English Country Chair*, 76, 86; "Foundation of Economic Production," *Canadian Woodworker and Furniture Manufacturer* 22 (Feb. 1922): 91–94, 162. See "Furniture Family for Three Generations" *ibid.* 23 (Oct. 1923): 49–51, for a suggestive indication of how electricity could allow changes in plant layout.

65. Edward T. Joy, *English Furniture, 1800–1851* (London, 1977), 226–30, and Koltun, *The Cabinetmaker's Art*, 127, note the first use of machinery in England and in Canada during the 1870s. Oliver, *Development and Structure*, 81, and Sparkes, *The English Country Chair*, 74 and following, are more cautious but note a significant transition after 1870 in Britain. Oliver, *Development and Structure*; John Richards, *A Treatise on the Construction and Operation of Wood-working Machines: Including a History of the Origins and Progress of the Manufacture of Wood-working Machinery* (London, 1872); Alfred D. Chandler, Jr., *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, Mass., 1977), 248; and Steven S. Plice, *Manpower and Merger: The Impact of Merger upon Personnel Policies in the Carpet & Furniture Industries* (Philadelphia, Pa., 1976), 7–8, see an earlier arrival in the United States of complex mechanization. Sharon Darling's view of the American market is more complex. She sees a balance that slowly tipped in favor of large factories, growing mechanization, and increased specialization even though small workshops persisted as well; see her *Chicago Furniture: Art, Craft & Industry, 1833–1983* (New York, 1984), 38.

66. Richards, *Treatise*; Ettema, "Technological Innovation." Clive Edwards, "The Mechanization of Carving: The Development of the Carving Machine, Especially in Relation to the Manufacture of Furniture and the Working of Wood," *History of Technology* 20 (1998): 73–102, locates the first practical use of carving machines in Britain in the making of decorations for the Houses of Parliament in the 1840s; in that context and that of the development of spindle carvers in the 1870s in the United States, he stresses that the machines were used to rough out carvings—repositioning rather than replacing skill. Of course, there is always some lag between "best" and actual practice. The International Labour Organization's "Technological Changes in the Woodworking Industries and Their Social Consequences," Tripartite Technical Meeting for the Woodworking Industries (Geneva, 1967), 15, suggests a five- to ten-year lag in the wide adoption of wood-working machinery after World War II; surely the lag was longer in the previous century. Technical education may have helped to reduce the lag. Richards's *Treatise*, 19–20, stresses with some pride the emergence of engineering in the development of woodworking machines in the two or three years immediately preceding the publication of the book. Robertson, in *Sawpower*, echoes the importance of

planers, mortisers and tenoners, and boring machines were available by the 1850s; dowelling cutters and shapers and routers in the 1860s; gauge lathes as well as band and scroll saws in the 1870s; and sanders, embossers, and carving machines in the 1880s.

Proprietors in the Canadian woodworking industry appreciated the significance of the new machinery. George Moorhead, proprietor of a large furniture factory in London, Ontario, boasted in 1870 of “workshops fully supplied with the latest and most approved machinery, all driven by steam power. . . . Every new improvement immediately adopted, to keep up with the progress of the times.”⁶⁷ By 1874 Moorhead kiln-dried his own lumber by using a fan-forced-air arrangement, and he had subdivided his labor force to include specialized varnishers and a separate upholstery shop. By 1875 he had two hundred hands.⁶⁸ The very large Jacques and Hay plant in Toronto used not only circular saws and power planers, but also lathes, mortising machines, dovetailing machines, a jigsaw, a molding machine, and a multiple-drilling machine in the early and mid-1860s.⁶⁹ A description of the Knechtel plant in 1900 indicates that the factory contained some 150 machines, all steam driven, as well as blowers, dust conveyers, and an elevator.⁷⁰

The growth of machinery production for use in the furniture industry provides further, if indirect, evidence of local mechanization. We know that Michigan plants producing woodworking machinery were in operation by the mid-1860s.⁷¹ By the 1880s similar machinery was available from a number of Canadian firms. The Waterous plant in Brantford was a major supplier of specialized boilers. Guelph’s Goldie & McCulloch and the Cowan plant in Galt provided an array of machinery reflecting the mechanization of wood production.⁷² They supplied planers, double-sided rotary planers, molding machines (including four-sided molders), band saws, and heaters for

advanced education in mechanical engineering (see pp. 131, 152–54). Rodney Millard, *The Master Spirit of the Age: Canadian Engineers and the Politics of Professionalism* (Toronto, 1988), discusses the formation of the Canadian Society of Civil Engineers.

67. *Free Press* (London), 30 June 1870.

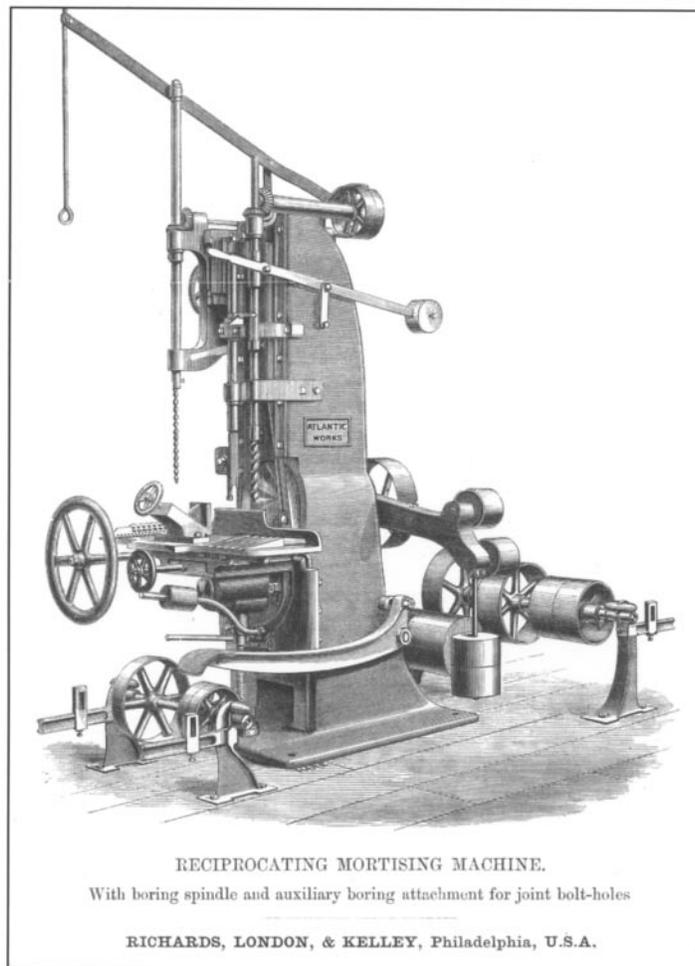
68. *Ibid.*, 5 Nov. 1874, 21 July 1875.

69. Ruth Cathcart, *Jacques and Hay: 19th Century Toronto Furniture Makers* (Erin, Ont., 1986), 15; *Toronto Globe* (16 Feb. 1862), and House of Commons, *Journals*, “Report,” 46–48.

70. McConnell, “Daniel Knechtel.”

71. Oliver, *Development and Structure*, 90.

72. Cowan and Company is known to have equipped plants in Deseronto, British Columbia, and Nova Scotia with a full array of machinery; see *Canadian Manufacture* (20 June 1887), 316, and (1 Dec. 1893), 464; Robertson, *Sawpower*, 131. William Clendenning and Sons established a plant for the production of wood-processing machinery; *Canadian Manufacturer* (21 April 1893), 264.



The mechanical engineer John Richards provided numerous illustrations in his *Treatise on the Construction and Operation of Wood-working Machines* (London, 1872). Mortising machines such as this were utilized by large Canadian furniture manufacturers such as Jacques & Hay by the early 1860s. Reproduced from Richards, *Treatise*, Plate LXX.

wood kilns, as well as the usual array of boilers and steam engines. Their sales were extensive, as a somewhat boastful *Canadian Manufacturer* listing indicated in 1895. One busy manufacturer in London, Ontario, told the 1887 Royal Commission that about half his machinery was made in the United States, “the other half in Canada, at Galt.” He claimed that the machinery from Galt had been fully as

good as the American-made machinery “for the last two or three years.”⁷³

Although some of the new machines, such as dust conveyors, fans, and mortising and tenoning machines, were dedicated to specific purposes, most of the machinery was more flexible and used to shape wood in a wide variety of ways. Band saws, carving machines, jigsaws, and some lathes were general-purpose machines requiring constant adjustment by a skilled hand. Planers, drills and multiple-drilling machines, circular saws, automatic or gauge lathes, and molding machines also could be put to a variety of uses, providing that adjustments could be made for different woods and different sizes and shapes of products. The use of such machinery was therefore dependent on human skill and permitted a highly varied output. As Richards wrote in 1872, “The operator in a planing mill must . . . understand the whole theory of carpentry [*sic*] and joinery; he should carry in his head by memory thousands of standard dimensions . . . he must understand machine fittings so as to direct and make repairs.” Woodworking machines were not to “supplant skill, but rather to assist it; to add the element of physical force to the power of the mind.” When Charles Rogers, a major furniture manufacturer, was asked, “Can first-class furniture be manufactured by machinery?” his reply was, “Yes, assisted by machinery.”⁷⁴

The cost of machinery was falling, in part because of the dramatic decline in iron and steel prices during the period. Drills, rotary planers, carving machines, and like machinery required a metal that combined hardness and tensile strength. The metal of choice, crucible steel, was costly to produce in Sheffield, England, and even more expensive after being shipped to Canada.⁷⁵ The decline in the costs of steel production and shipping from their 1873 peak increased access to quality steel and hence better machinery. Improved metal,

73. *Canadian Manufacturer* (18 Jan. 1895), 84–85; *Canada, Report*, 612.

74. *Canada, Report*, 354; Richards, *Treatise*, 282–83.

75. The saw manufacturer Roswald H. Smith of St. Catherine’s, with a fixed capital of \$100,000 and annual sales of \$49,000 to \$66,000, imported his steel from Jessops of Sheffield; see House of Commons, *Journals*, “Report,” 189–93. The production of crucible steel required considerable fuel, skilled labor, and preferably Swedish iron. Only the best crucible steel was suitable for “turning tools or other tools where a sharp cutting edge had to be maintained”; see Kenneth C. Barraclough, “Swedish Iron and Sheffield Steel,” *History of Technology* 12 (1990): 23, and throughout. Experiments with tungsten steel, later the tool steel of choice, began during the 1860s; see P. S. Bardell, “The Origins of Alloy Steels,” *History of Technology* 9 (1984): 1–30. There were no Canadian steel producers at that time; see James Rose, president, Montreal Saw Works, Montreal, to R. J. Cartwright, 25 Jan. 1876, NAC RG 19 (Department of Finance Records), vol. 3373.

for example, permitted cutting machinery to maintain sharp edges and hence minimized the binding and throwing of wood.⁷⁶ Many of the woodworking inventions of Sir Samuel Bentham (philosopher Jeremy's brother) during 1796–1805 entered into wider use simply because of the improved quality and falling cost of metals.⁷⁷

Although the costs of capital goods were falling, a great deal of machinery remained expensive by the standards of small artisans like Francis Jones. In the mid-1870s, for example, a single standard 60-inch circular saw cost \$114, a sum equivalent to more than three months' wages for a semiskilled artisan.⁷⁸ Most saws were custom-made and expensive, and other equipment could be even more costly.⁷⁹ It is worth asking how the small artisan looking to expand his business would have financed the acquisition of such equipment. Part of the answer, undoubtedly, was to live frugally, save, and invest the retained earnings from manufacturing or other business. Daniel Knechtel, for example, scrimped endlessly, lived with relatives, and took on whatever jobs were available during his early years in Hanover.⁸⁰ Other manufacturers made extensive use of short-term credit (basically, inventory finance) from merchants. Indeed, many manufacturers were merchants with the capacity to divert some of their liquidity into fixed capital.⁸¹ However, the investment required to open a woodworking establishment at the end of the century might easily exceed personal savings, retained earnings, and commercial credit. The challenge of larger-scale investment encouraged the entrepreneur to seek out new sources of finance.

Incorporation was one obvious mechanism for generating more

76. Ettema, "Technological Innovation," 212; Canada, *Report*, 404.

77. Joy, *English Furniture*, 225–30; Richards, *Treatise*, 3–6.

78. Kris Inwood and Jim Irwin, "Land, Income and Regional Inequality: New Estimates of Provincial Incomes and Growth in Canada, 1871–1891," *Acadiensis* 31 (Spring 2002): 157–84, appendix B.

79. House of Commons, *Journals*, "Report," 189–93. Machinery at the Chesley Chair Company was valued at \$15,600, greater than the value of the company's real estate and buildings. Two years later the company paid at least \$2,200 for a second-hand mortiser, a gauge lathe with its knives, and a graining machine. See the Heirloom Furniture Manufacturing Company papers, private collection, in the possession of the Calhoun Family, Chesley, Ont., Annual Audits, 1916 and 1918, and Board of Directors Minutes. The high cost of new equipment prompted Knechtel to use a Waterous device for stretching saws even though the device had been bent or warped; see Knechtel Furniture Company Records, A.ARCH 5001 (acc. 84–63), box 7, Queen's University Archives, Kingston, Ont.

80. Parr, *Gender of Breadwinners*, 126–27.

81. Glenn Porter and Harold Livesay, *Merchants and Manufacturers: Studies in the Changing Structure of Nineteenth-Century Marketing* (Baltimore, Md., 1971), chaps. 4, 7; Kris Inwood, *The Canadian Charcoal Iron Industry, 1870–1914* (New York, 1986), chaps. 5–7.



Woodworking shops such as this could produce elaborate furniture. The shop pictured is partly modelled after Francis Jones's shop in Middlesex County, in which London, Ontario, is situated. Cabinetmaker's shop, reproduced courtesy of the Canadian Museum of Civilization, © Canadian Museum of Civilization, negative no. 77-5829.

capital.⁸² Although we have not undertaken a systematic search, the available evidence indicates that incorporation became more common for cabinet and furniture makers after 1870. The number of corporations and the extent of capitalization suggest that this route was a way of easing the capital constraint.⁸³ The constraint was most

82. R. C. B. Risk, "The Nineteenth-Century Foundations of the Business Corporation in Ontario," *University of Toronto Law Journal* 23 (1973): 270–306.

83. One incorporated firm, the Bowmanville Furniture Company, with sales of \$142,000 in 1871, valued its assets at \$161,000 in 1876 (although they sold for only \$70,000). See *Monetary Times* (11 Aug. 1871), 108; (4 Feb. 1876), 880; and (25 Feb. 1876), 978. Further examples reported in the business press include the Canada Lumber Company of Ottawa, with a capitalization of \$500,000, listed in the *Canadian Manufacturer* (17 June 1887), 390; the Dominion of Canada Manufacturing Company, maker of office furniture, with a capitalization of \$100,000, listed in *ibid.* (19 April 1889), 258; the Brantford Furniture Company, with a capitalization of \$25,000, listed in *ibid.* (21 March 1890), 196; the Knechtel Furniture Company of Hanover, with a capitalization of \$100,000, listed in *ibid.* (5 Aug. 1892), 82; the Aylmer Furniture Company, with a capitalization of \$20,000, listed

binding and incorporation was particularly likely in moments of crisis. Moorhead's first public stock offering, for example, was a response to excessive debt acquired during the company's rapid expansion in the 1860s and 1870s.⁸⁴ A few years later Worsfield & O'Brien, of Guelph, attempted to incorporate after becoming excessively indebted through the purchase of a new mill.⁸⁵ The Gibbard Furniture Company of Napanee began as a single proprietorship in 1835 but became a partnership in 1862 and then a joint-stock company in the early 1890s, just as the company approached the costs of electrification.⁸⁶ Some firms were able to enhance the attractiveness of their capital stock through the generosity of municipal bonuses, tax holidays, holidays on charges for municipal services, and other techniques that municipalities used to attract manufacturers.⁸⁷

Work skills and routines also evolved, with increasingly narrow skill definition, as well as age and sex segregation, to improve productivity. By the late 1880s some manufacturers said that they no longer trained "complete" woodworkers and had put aside the apprenticeship system. One manufacturer explained, "We only pretend to teach any one man a branch. An upholsterer would not be a finisher, a finisher would not be a turner, under any circumstances."⁸⁸ Boys obtained training and functioned as lower-level workers, permitting the skilled laborers to focus more narrowly.⁸⁹ The new ma-

in *ibid.* (7 Oct. 1892), 207; the Union Furniture Company of Wingham, with a capitalization of \$95,000, listed in *ibid.* (19 May 1893), 343; the Simpson Company of Berlin, with a capitalization of \$90,000, listed in *ibid.* (6 Oct. 1893), 291; the Carnovsky Wood Manufacturing Company of Kingston, with a capitalization of \$410,000, listed in *ibid.* (15 Dec. 1893), 510; the Southampton Manufacturing Company, listed in *Canadian Woodworker and Furniture Manufacturer* 19 (Nov. 1919): 101; and the Hill Chair Company of Wiarton, with a capitalization of \$25,000, listed in *Industrial Canada* (May 1896), 89. Of course, nominal capitalization was typically higher than actual capital. For example, the majority stockholder family had fully paid-up shares in the Drum Furniture Company, whereas other stockholders paid only 50 cents on the dollar (a source of some dispute when the company disbanded in 1878); see *Monetary Times* (21 June 1878), 1489.

84. *Free Press* (London) 30 June 1870, 5 Nov. 1874, and 21 July 1875.

85. *Monetary Times* (20 May 1881), 1846.

86. *Canadian Woodworker and Furniture Manufacturer* 23 (Oct. 1923): 91.

87. Messrs. Button and Company received a bonus to expand their works in 1888; in the following year, the Uxbridge Cabinet and Organ Company asked for a \$6,000 bonus to expand and to hire more hands. See *Canadian Manufacturer* (2 Nov. 1888) and (6 Sept. 1889). The Almonte Furniture Company used a municipal bonus of \$10,000 as a kind of guarantee that permitted the company to issue \$3,000 worth of new stock. Unfortunately for the company, ratepayers successfully went to the law to prevent the payment of the bonus, and the company failed; see *Monetary Times* (16 Nov. 1877), 584.

88. Canada, *Report*, 608; Parr, *Gender of Breadwinners*, 127.

89. Kealey, in *Toronto Workers*, 19, lists specialized workers at Jacques and Hay in 1865: cabinetmakers, chair makers, carvers, turners, carpenters, finishers,

chinery both modified and reduced the use of labor. The Oxford Furniture Company, for example, dispensed with most hand planing after the introduction of molding and planing machines in the 1880s.⁹⁰ Stahlschmidt Furniture Manufacturing in Preston developed a combination drill that reduced six handlings of the wood to one.⁹¹ A new carving machine was introduced to do the rough carving.⁹² Knechtel began experimenting with another variety of carving machine soon after the first use of the machine in Michigan. These and other examples illustrate the new blend of skill and machine that diminished overall labor requirements and modified, but did not eliminate, the skills needed from workers.⁹³

Ambiguous Industrialization and the Demand for Furniture

We have seen considerable evidence that larger plants, mechanization, increased capitalization, and new patterns of work skills contributed to a growth of output and labor productivity in Ontario's cabinet and furniture industry during the later nineteenth century. Yet the arrival of mass production and highly specific machinery did not transform the industry: quite the opposite. At the end of the century, most workshops remained small, unspecialized, and unpowered. A majority of furniture makers used only hand tools. Most machine tools continued to be unspecialized and useable for diverse purposes. Even the larger steam-powered plants show only some evi-

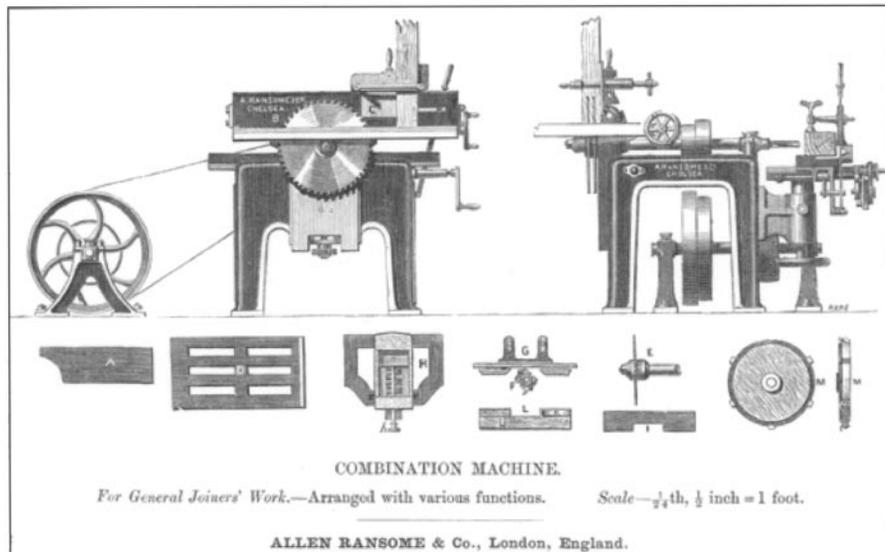
sawyers, and upholsterers. On the hiring of boys, see Canada, *Report*, 355–56, 404, 443, 607, 609, 611. Of course, there were variations in practice. Some plants did not apprentice, some trained informally, and others avoided the use of boys altogether.

90. *Canadian Manufacturer* (29 June 1883), 474; (3 July 1891), 19.

91. The drill allowed three holes to be bored and countersunk concurrently at any angle and at any distance from one another within eight inches; see *Canadian Manufacturer* (7 June 1889), 365. Sparkes, *The English Country Chair*, 43, 75, emphasizes the significance of boring machinery for the English industry.

92. “[The machine] cut away the rough parts of a bit of carving. A peculiar tool driven by steam power eats out the wood wherever it goes, and thus a skillful man blocks out in a rough way as much work in a day as twenty men could have done formerly.” *Monetary Times* (June 1882), 28.

93. Knechtel Furniture Company Records, Board of Directors Minute Book, A.ARCH 5001 (acc.84–63), box 7. Edwards, “Mechanization of Carving,” 99, quotes Sir Lawrence Weaver, “Tradition and Modernity in Craftsmanship IV,” *Architectural Review* (Jan. 1929): “The skill of a man who can set forty knives in a power lathe to turn a table leg which is part a spiral, part square, part round and part octagonal and hexagonal—a thing that can be made in less than a minute—may be far from the skill of a cabinet maker, but it is a prodigious skill nevertheless, and must command our respect.”



This combination machine exemplifies the enormous variety of adjustments skilled workers might undertake in shaping wood. Note that the scale markings on this reproduced illustration are inaccurate. Reproduced from Richards, *Treatise*, Plate CII.

dence of assembly line techniques. A few high-volume goods (chairs, beds, church pews, and school desks) sustained some deskilling of the sort associated with mass production and specialized routine tasks, but this trend cannot have been widespread among Ontario furniture makers.⁹⁴ The very prominence of working with wood, a preindustrial raw material, reinforces the impression that Canadian manufacturing somehow failed to participate fully in the process of industrialization sweeping through the North Atlantic world during the nineteenth century.

Clearly, local conditions shaped the nature of industrialization in Ontario. The relatively low cost of wood allowed more woodworking shops, including the furniture makers, to survive than might otherwise have been possible. Incomes were lower than those in the United States, although the distribution may have been significantly less unequal.⁹⁵ The availability of workers at wages that were low by American standards also contributed to the survival of the smaller and less capital-intensive workshops.

94. Canada, *Report*, 608; Heron, "Factory Workers," 507–8; *Toronto Globe* (15 Feb. 1862), 1.

95. Gordon Darroch and Lee Soltow, *Property and Inequality in Victorian Ontario* (Toronto, 1994).

Resistance to change also arose from the strongly gendered artisanal culture of furniture manufacture. The acquisition of skills in this industry was part of a process, as Joy Parr argues, of boys learning to be men.⁹⁶ Men would resist technological change that dispensed with these skills for all the reasons they might cling to their own experience of masculine identity. Indeed, the very structure of the industry permitted manly independence. The cost of entry into the industry with a hand-powered, unmechanized workshop was relatively low. Artisans who brought their own tool kits to the factory, or who essentially acted as subcontractors within factory walls and were paid on a piece-rate basis, could envisage themselves as virtually independent. Such modes of factory organization also facilitated batch production methods and allowed some measure of resistance to the systematic management that was beginning to emerge. The attitudinal base for such actions was deeply embedded in a culture in which self-employment was seen as key to independence and social mobility.⁹⁷

A more prosaic but arguably important influence on all of the woodworking industries was the nature of their basic raw material. The structural properties of wood can vary even within the length of a medium-sized piece. Wood demanded a level of sensitivity to its properties that was difficult to obtain from an entirely mechanized process. Some nineteenth-century observers saw the qualities of wood as an impediment to greater mechanization and the introduction of mass production.⁹⁸ Alfred Chandler seems to favor this view, although he offers little comment on the woodworking industries apart from observing their continued use of “relatively labor-intensive and simple mechanical technologies.”⁹⁹ The uneven character of wood undoubtedly slowed the introduction of high-speed assembly lines attended by low-skill labor, but evidence from Europe and the United States of mass-produced sewing machine cabinets, chairs, and specialized machinery suggests that this influence is overstated.¹⁰⁰ The obstacle to mass production with wood, according to

96. *Monetary Times* (June 1882), 28; Parr, *Gender of Breadwinners*, 163, 240.

97. David G. Burley, in *A Particular Condition in Life: Self-Employment and Social Mobility in Mid-Victorian Brantford, Ontario* (Kingston, Ont., 1994), examines self-employment in a Canadian context. Daniel Nelson, “Scientific Management, Systematic Management, and Labor, 1880–1915,” *Business History Review* 48 (Winter 1974): 479–500, introduces notions of scientific management.

98. Richards, *Treatise*, 37–39.

99. Chandler, *The Visible Hand*, 247–49.

100. David Hounshell, *From the American System to Mass Production, 1800–1932: Development of Manufacturing Technology in the United States* (Baltimore, Md., 1984), 126–51. Sparkes argues that in England chair making was the earliest furniture trade to use a form of mass production; see his *The English Country*

David Hounshell, was not the nature of wood but rather the nature of the market: the necessary demand was absent, even in the large American market, for any single piece of furniture apart from sewing machine cabinets.¹⁰¹

If the United States lacked the level of demand needed to support mass production for most lines of furniture, then the size of the market was even more of a constraint in Canada, with an economy less than one-tenth that of the United States. The market available to Ontario furniture makers was small and widely dispersed by virtue of a relatively low level of local income, a small population, and long distances between urban centers and, equally important, to other parts of the country. The American market was nearby, of course, but largely inaccessible because of protective tariffs. A firm in any one location might reduce unit costs through an expansion in the scale of production, but the added costs of shipping to consumers further afield offset such economies.¹⁰² The result, not surprisingly, was a decentralized production structure with numerous small and general-purpose manufacturers, many of whom could have lowered production costs by expanding their scale of operation. The long production runs needed to sustain specialized machinery were largely absent from furniture manufacture during this period, even in the United States, but especially in the small Canadian market.

The market for Ontario furniture was growing, however. The growth of population and per capita income and the reduction in transport costs contributed to an expansion of all sorts of consumer goods, including furniture.¹⁰³ The density of furniture retailers increased sharply, as the store-to-person ratio in Ontario more than doubled during the 1870s and 1880s.¹⁰⁴ Market expansion contributed to a modest growth of productivity insofar as it permitted an increase in workshop size (especially in the urban areas), which in turn made it easier to adopt mechanical power and more complex machinery. Market expansion also permitted greater plant-level specialization, although change did not come quickly. An industry in-

Chair, 36. Ekaterini Kyriazidou and Martin Pesendorfer, "Viennese Chairs: A Case Study for Modern Industrialization," *Journal of Economic History* 59 (March 1999): 143–66, provide further evidence.

101. Hounshell, *From the American System*. Kyriazidou and Pesendorfer, in "Viennese Chairs," remind us that export opportunities may expand market size if the international market is close at hand and fast growing and if producers are able to respond flexibly.

102. Atack, "Economies of Scale"; Forster, "Finding the Right Size."

103. The provincial production of consumer goods increased by 266 percent from 1870 to 1890; see Drummond, *Progress without Planning*, 107–8.

104. David Monod, *Store Wars: Shopkeepers and the Culture of Mass Marketing, 1890–1939* (Toronto, 1996), 27, 293.

dex published in 1923 classified manufacturers according to their production of sixteen different types of furniture. The classification reveals that about half of the firms in Ontario contributed at least three distinct kinds of furniture, whereas less than one-fifth restricted production to a single line. Most of the specialized firms made novelty or upholstered furniture rather than the beds, tables, chairs, and such that would be most likely to sustain economies of assembly or flow-line production.¹⁰⁵

The process of continuing improvement to metals, machinery, and engines undoubtedly contributed to the growth of productivity in the Canadian industry, but transportation improvements, market expansion, and the emergence of a broader middle-class consumerism were more powerful influences on the demand side. There may be some temptation to argue that change originated in either supply or demand developments, but one does not exclude the other. Indeed, detailed studies dealing with chairs and sewing machine cabinets suggest that forces for change were pushing from both directions simultaneously.¹⁰⁶

It is difficult to assess the impact of demand composition and change with any precision, in part because of the complexity of the market. In fact, the complexity of furniture demand may be its most significant characteristic. Even at midcentury, after only two generations of continuous settlement in Ontario, an individual farmhouse would contain several dozen different types of furniture.¹⁰⁷ As society evolved, the market for furniture became even more complex, in part through the growing influence of middle-class “fashion.”¹⁰⁸

105. Acton, *The Canadian Book of Furniture*, 105–11. At the end of the century, some firms began to specialize in office furniture and rattan furniture, but levels of production were low. Robert Hay began rattan production in the 1880s at Woodstock and later at Owen Sound; the American Rattan Company was established in Toronto.

106. Sparkes, *The English Country Chair*; Hounshell, *From the American System*; Kyriazidou and Pesendorfer, “Viennese Chairs.”

107. Howard Paine, *The Heritage of Upper Canadian Furniture* (Toronto, 1978), 26. The inventory of Myrtle Farm in 1849 reveals at least fifty different kinds of furniture without allowing for differences of size or styling.

108. David Gagan and Rosemary Gagan, in “Working Class Standards of Living in Late Victorian Urban Ontario: A Review of the Miscellaneous Evidence on the Quality of Material Life,” *Canadian Historical Association Journal* 1 (1990): 171–93, review the literature on standards of living. On mass marketing, see Monod, *Store Wars*. More generally, on consumer society see Neil McKendrick, John Brewer and J. H. Plumb, *The Birth of a Consumer Society: The Commercialization of Eighteenth-Century England* (London, 1982), and Lorna Weatherill, *Consumer Behaviour and Material Culture in Britain, 1660–1760* (London, 1988). It is worth pointing out that the rate of new household formation and therefore the demand for new (as opposed to replacement) furniture was significantly less than that in the United States simply because population grew more slowly in Canada. On



This elaborate 1870s bedroom suite with its unusual masculine motifs was the product of both human craft and machine work. Reproduced from Geo. Moorhead Manufacturing Co., *Photographs of Furniture* (n.p., n.d.), courtesy of J. J. Talman Regional Collection, Weldon Library, University of Western Ontario, RC80835.

From the middle of the century onward, expectations about the home as a locus for individual privacy and specialized functions progressively added to the variety of furniture in use. Postmortem inventories, pattern books, and architectural guides reflect the popularity of dining room suites among the middle classes.¹⁰⁹ Bedroom

homes and home furnishings, see John E. Crowley, *The Invention of Comfort: Sensibilities and Design in Early Modern Britain and Early America* (Baltimore, Md., 2001).

109. Clifford E. Clark, "The Vision of the Dining Room: Plan Book Dreams and Middle Class Realities," in *Dining in America, 1850–1900*, ed. Kathryn Grover (Boston, 1987), 142–72; John R. Porter, ed., *Living in Style: Fine Furniture in Victorian Quebec* (Montreal, 1993), 230–36; Peter Ennals and Deryck W. Holdsworth,

suites likewise became more widespread after 1850, with an increasing emphasis on decorative characteristics. The more ornately worked such furniture was, the more status it conferred, although even inexpensive furniture began to have extensive decorative elements.¹¹⁰ Front parlors became repositories of status furniture. The piano, a furniture piece both decorative and nonessential, a Victorian symbol of leisure time constructively spent, of discretionary income devoted to moral uplift, appeared in many homes, middle-class and not.¹¹¹

We find evidence of the complexity of choice in sales catalogues and collections of photographs from the period. One English catalogue from the 1860s offers more than four hundred different chairs.¹¹² Similar sources for the United States suggest that a single company in the 1880s might offer several hundred variants of basic case goods and then change its line the following year.¹¹³ Philip Scranton highlights the scale of the problem with his observation that variation of wood and ornamentation for a simple five-piece bedroom suite implies ninety different options within the context of a single style of furniture for a single room in a single year.¹¹⁴ Canadian manufacturers tried (although they undoubtedly found it difficult) to match the full range of styles and types available in the larger British and American markets.¹¹⁵

The channels of distribution in Canada also reflected the growing complexity of furniture lines. Small producers were most likely to be involved in the production of bespoke goods for local markets; they produced few case goods except on specific demand and maintained little finished inventory. A few large firms had their own commercial travelers carrying collections of photographs and, later, catalogues to dealers across the country. Moorhead followed this practice during the 1870s, as did Knechtel in western Canada somewhat

Homeplace: The Making of the Canadian Dwelling over Three Centuries (Toronto, 1998), 91–120.

110. Ettema, “Technological Innovation.”

111. James Andrew Ross, “‘Ye Olde Firme’: Heintzman & Company, Ltd., 1885–1930: A Case Study in Canadian Piano Manufacturing” (MA Thesis, University of Western Ontario, 1994); Craig H. Roell, *The Piano in America, 1890–1940* (Chapel Hill, N.C., 1989).

112. Sparkes, *The English Country Chair*, 67. See also the great variety of chairs described in chaps. 7–11.

113. Scranton, *Endless Novelty*, 142, 172. One company was said to offer three thousand variants of furniture pieces.

114. *Ibid.*, 142n24.

115. Early Canadian evidence of Canadian furniture lines can be found in Geo. Moorhead Manufacturing Co., *Photographs of Furniture* (n.p., n.d.), held in the J. J. Talman Regional Collection at the Weldon Library of the University of Western Ontario, London, Ont.

later.¹¹⁶ Department stores were not widely influential in Ontario until the early years of the twentieth century, but the furniture mart anticipated the need to display a wide variety of goods in one location.¹¹⁷ These furniture shows, where manufacturers showed their products and dealers clustered, took place in a variety of Ontario locations, most commonly in Berlin (Kitchener), Stratford, and Toronto. Furniture retailers faced a considerable range of choices from each of several manufacturers, all attempting to provide a comprehensive line of products.¹¹⁸ Market pressure to offer multiple lines of furniture with a variety of wood and ornamentation in a world of changing styles must have limited manufacturers to relatively short production runs and, in turn, impeded the introduction of the structures of mass production.

Conclusion: The Diversity of Industrial Experience

Much discussion of late nineteenth-century manufacturing focuses on the spread of continuous assembly lines along with specialized machinery, routinized labor, high throughput, dramatic growth in productivity, new managerial strategies, and the corporate structures needed for truly large industrial enterprise.¹¹⁹ The impact of these developments where they appear creates a temptation to use them as a yardstick to measure all industrial change. By that standard, the evolution of the cabinet and furniture industry in Ontario might be considered disappointing, perhaps a failure. Such a judgment would be mistaken, however, because the yardstick is inappropriate. Philip Scranton and others distinguish mass production industries from industries relying on batch production.¹²⁰ Furniture clearly falls into the latter category.

The essential features of batch production arise from the diversity and unpredictability of demand, which, in turn, make production

116. See Moorhead's photographic catalogue in the J. J. Talman Regional Collection.

117. Monod, *Store Wars*, 293. Grand Rapids, Michigan, hosted the largest furniture expositions. The Canadian furniture marts were temporary, but permanent showrooms appeared during the 1880s in New York and London; see Sparkes, *The English Country Chair*, 81, and Scranton, *Endless Novelty*, 143.

118. Plice, *Manpower and Merger*, 16, 19; *Canadian Woodworker and Furniture Manufacturer* 18 (Jan. 1918): 20; and 23 (Jan. 1923): 53. Monod, *Store Wars*, 160–61, cites one dealer who had forty-four suppliers.

119. Chandler, *The Visible Hand*, and *Scale and Scope: The Dynamics of Industrial Capitalism* (Cambridge, Mass., 1990).

120. Scranton, *Endless Novelty*.

flexibility and specialty formats an advantage.¹²¹ The nature of the raw material for the cabinet and furniture industry was a contributing factor to the industry's reliance on batch production, but the level and structure of demand were undoubtedly more powerful. The variety of product favored the use of general-purpose technologies and distinctive marketing strategies and encouraged rival firms to locate in proximity to one another in order to have access to a shared pool of skilled laborers. There was some tendency to organize personnel management on personal rather than bureaucratic relationships because of the continued reliance on skilled artisans to work the general-purpose machines and to apply them to a succession of distinct purposes. In this kind of industry we should not expect to see dramatic growth in productivity and high-volume assembly lines producing a standardized output with specialized machinery and unskilled labor.

The Ontario furniture industry was a batch producer of goods driven by a complex demand that was significantly contingent on fashion. The demand for furniture products was complex in Canada, as elsewhere, in the sense that people had many kinds of furniture and that styling mattered and changed frequently, leading to a proliferation of types, styles, and sizes. As did their counterparts elsewhere, Ontario furniture producers responded with smaller and more flexible equipment and factories that adapted the new technological possibilities to their own needs. Wherever machines were introduced, they were general-purpose machines to reconstruct the tasks of skilled workers rather than specialized machinery to replace them. This industrial transformation was not a failed effort to achieve bulk or mass production. In the context of the aggregate indicators displayed in Table 7, we should not expect to see dramatic growth in the sizes of establishments, wide use of steam power, specialization of production, and fast-growing labor productivity. Rather, the more modest pace of change monitored by these indicators reflects the successful transformation of an industry facing highly complex demand in a society the size of Canada and working a material with intrinsic variability in an economy unusually dependent on wood.

The inability to realize economies of larger scale and mechanized production could be a disadvantage, more so with some lines of furniture than with others, although never as much as for the flour-

121. *Ibid.*, 11–17. Scranton estimates that industries dominated by batch and custom approaches accounted for nearly 40 percent of American industrial employment and value added in 1909. Another large part of manufacturing relied somewhat but not exclusively on batch approaches. His "Diversity in Diversity," 27–90, and "The Politics of Production: Technology, Markets, and the Two Cultures of American Industry," *Science in Context* 8 (Autumn 1995): 369–95, pro-

milling, brewing, steel, and other mass production industries of the period. In this environment, small and hand-powered furniture makers such as Francis Jones survived for several reasons. Proximity to relatively inexpensive wood improved the terms on which local producers were able to meet the competition from imports. Even small firms were able to adopt and gain some advantage from the new technologies of the industrial revolution. Transport considerations in the industry created a tendency to choose locations based on access to markets, which, for the relatively rural Canadian population, favored a plethora of small factories and workshops. The complexity of demand further encouraged small producers whose diversified output and flexible production methods could respond easily to complex and changing consumer preferences.

These aspects of a unique interaction between supply and demand shaped the way in which the Ontario furniture industry experienced its industrial revolution. Recognition of the particularities, however, does not make furniture making a peculiar exception to an otherwise uniform model of industrialization. Rather, the lesson of this case study is that the industrial revolution had no single template and that diverse markets and technologies produced a wide range of industrial experience.

vide particularly clear statements of the conceptual framework underlying *Endless Novelty*.

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