Royal Commission
on Canada's Economic Prospects

The Canadian Electrical Manufacturing Industry

by Clarence L. Barber

THE CANADIAN ELECTRICAL MANUFACTURING INDUSTRY

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While authorizing the publication of this study, which has been prepared at their request, the Commissioners do not necessarily accept responsibility for all the statements or opinions that may be found in it.

FOREWORD

This study analyses the growth and development of the Canadian electrical manufacturing industry over the past 25 or more years and assesses the role the industry can be expected to play in Canada's future development. Particular attention has been paid to the factors that have contributed to the industry's growth in the past, to its dependence on foreign capital for investment funds and research technology, to its present competitive power to withstand foreign competition and to its dependence on tariff protection.

In preparing this study I have drawn freely on the statistical materials contained in an earlier report of which I was a co-author, namely, *The Canadian Electrical Manufacturing Industry: An Economic Analysis* by F. A. Knox, D. W. Slater and C. L. Barber. However, the interpretations given here are entirely my own and do not necessarily reflect in any way the opinions of my associates in the above study. The above report will be referred to subsequently as "The Knox Report".

My preparation of this study has been greatly aided by the co-operation I received from many people in the industry. They not only went to considerable trouble to supply me with the statistical data I required but devoted a good deal of their valuable time to answering my questions about the industry and to showing me through their manufacturing operations. Particular thanks are due to Mr. Simpson, the General Manager of the Canadian Electrical Manufacturers' Association, for arranging many of my visits to individual companies and for supplying me with answers on a number of important queries. Thanks are also due to staff members of the Dominion Bureau of Statistics for supplying me with estimates of concentration in the industry and numerous other data.

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Electronics, including radio, television and the industrial use of electronic equipment, is discussed in detail in a separate Royal Commission study and will be referred to only occasionally here. Statistical data for the industry as a whole include electronics.

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GROWTH AND DEVELOPMENT OF THE INDUSTRY

Origin and Early History

Electrical manufacturing is an extremely complex industry producing as it does products ranging in size from small "grain of wheat" electric bulbs for surgical instruments to large power transformers of over 200 tons in weight. Originally centred around the introduction of arc and incandescent lighting and the power generation and distribution facilities needed to provide this light, the industry soon developed the electric motor and encouraged its application as a motive force in industry and to street railway transportation. The telephone and the telegraph, too, and the equipment needed to operate them were early developments. Somewhat later the radio industry and the production of electrical appliances for use in the home added to the range and diversity of the industry's products. In the postwar period, this trend towards a greater range of products has continued with the growth of television, electronic controls and air conditioning and with a great increase in the variety of electrical appliances available to the homeowner.

Though a primary influence in the growth of the Canadian industry has been the establishment of branch plants by American firms, independent Canadian firms have been important since the industry's beginning and a few important firms have had their origin in the United Kingdom. The Canadian General Electric Company was organized by Canadian interests in 1892 at the same time as General Electric was formed in the United States, and it purchased the Toronto Construction and Electrical Supply Company which had commenced business in 1891 and the Edison Electric Light Company which had built its plant in Peterborough in 1886. Though associated with General Electric from the beginning through the acquisition of rights to manufacture their products in Canada, the firm remained under Canadian control until 1923. The other major American producer, Westinghouse Electric, commenced the production of electrical equipment in Canada

in 1903. A major Canadian firm, the Northern Electric Company, was formed in 1914 through the amalgamation of a wire and cable company that started production in 1895 and a manufacturing subsidiary of the Bell Telephone Company that, in 1882, had commenced the production of telephone sets in a one room shop in Montreal. Other instances of early developments include the W. H. Banfield Company, 1878, later to become part of Amalgamated Electric, the Marconi Wireless and Telegraph Company of Canada, 1903, later to become Canadian Marconi, and the Canada Wire and Cable Company which commenced production in 1911. A number of Canada's present manufacturing firms are branches of United States firms that first set up sales offices in Canada but later decided to begin manufacturing here when they discovered they could more economically supply the Canadian market on this basis. Kelvinator and Maytag are firms that followed this pattern. A substantial influx of new firms was induced in the early thirties by higher Canadian tariffs combined with an increase in the margin of preference in Empire markets. Canadian Line Materials, Leland Electric, Frigidaire, Electrolux and Dominion Electrohome Industries are examples of companies that commenced operations in this period.

Rate of Growth

By any standards the growth of Canada's electrical manufacturing industry has been extremely rapid. During the past 25 years it has grown more rapidly than the total Canadian labour force, more rapidly than all manufacturing and more rapidly than the same industry in the United States. Thus, between 1929 and 1954 total employment in the industry increased by 260% compared with the 37% increase in the total labour force, the 90% increase in employment in manufacturing and the 140% increase in employment in the electrical machinery industry in the United States. Despite this rapid growth, electrical manufacturing is still less important in Canada than it is in the United States. In the latter country, in 1954, employment in the electrical machinery industry amounted to 1.94% of the total labour force as compared with the Canadian percentage of 1.38. The Canadian industry's growth has been particularly rapid since the end of the war. Between 1946 and 1953 the output of electrical apparatus in Canada doubled and employment in the industry rose by 75%. In this period the industry's growth far exceeded the growth of the Canadian economy as a whole for the volume of gross national product only increased at about one-third and total employment by about 13% between 1946 and 1953.

This rapid growth in electrical manufacturing in Canada has paralleled and been stimulated by an equally rapid growth in the production and use of electrical energy. The production of electrical power in Canada has increased almost fourfold in the last 25 years and today, with a total output per capita of some 4,500 kilowatt hours of electrical energy, Canada stands second in the world in the per capita use of electrical energy. An

TABLE 1

CANADA – GROWTH OF ELECTRICAL MANUFACTURING AND ALL INDUSTRY COMPARED, 1929 TO 1954

YEAR	CANADIAN LABOUR FORCE	EMPLOYMENT		OUTPUT IN CONSTANT $1949	
		ELECTRICAL MANUFACTURING	ALL MANUFACTURING	ELECTRICAL MANUFACTURING	GROSS NATIONAL PRODUCT
	Thousands	Thousands		$ Millions	
1929	3,967	20.9	667	N.A.	8,950
1946	4,784	44.0	1,058	313.4	15,168
1952	5,315	69.2	1,288	655.0	19,585
1953	5,383	76.9	1,326	N.A.	20,353
1954	5,426	75.1	1,268	N.A.	19,665
		PERCENT INCREASE			
1929-54	36.8	259.3	90.0	–	119.8
1929-46	20.6	110.8	58.7	–	69.4
1946-54	13.4	70.6	19.8	109.0*	29.6

*1946 – 1952

Source: Dominion Bureau of Statistics, Canadian Statistical Review, Supplement; National Accounts: Income and Expenditure, 1926 to 1950 and 1951 to 1954; Electrical Apparatus and Supplies Annual Reports.

important part this rapid growth has derived from a combination of rich natural resources and abundant supplies of water power in accessible locations. In Canada, about 70% of the electrical energy produced is used for industrial power, and of this sum two-thirds is used in the manufacture of pulp and paper and in the refining of non-ferrous metals. For one of these industries, the refining of aluminum, electric power alone has been the basis of its location in Canada.

Since a number of Canada's largest and most rapidly growing consumers of electric power sell largely in the export market important sectors of Canada's electrical manufacturing industry are in the position of being dependent on some degree of tariff protection themselves yet vitally interested in the economic welfare and rapid growth of export industries such as pulp and paper and the refining of non-ferrous metals from which a significant part of the demand for electric power originates. This is particularly true of the producers of large generators, transformers and heavy switchgear.

Another important cause of rapid expansion in the demand for electrical equipment in Canada has been the rapid growth in population and the steady rise in income levels, a rise that was made possible in no small degree by the increased use of electric power. Higher incomes have led to the more widespread use of electric power, as has been evident in the rapid growth of rural electrification throughout Canada since the end of the war, and to a greatly increased purchase of electrical appliances of all types. Though households use only about 12% of the electrical energy consumed in Canada they purchase at least 40% of the electrical equipment sold here. In fact, household appliances together with domestic radio and television equipment

constitute the largest single market for electrical goods in Canada. Since for many products, the Canadian use of this equipment is still well below that of the United States, the potential growth in this market must be large even on the basis of the products which are now available. And the development of new products and the improvement of existing ones will add greatly to this market in the future.

Both during World War II and in recent years the production of military equipment has provided an important stimulus to the industry's growth. In 1954, the production of radar and other military equipment amounted to about $60 million, or about 7% of the industry's total output.

Though imports of both components and finished products have been significant, the great bulk, some 75% or 80% of the electrical equipment purchased in Canada has been supplied by the Canadian industry. Canadian electrical manufacturers produce almost a complete range of equipment, imports being most important in specialized equipment or components where the volume of sales in Canada is not large enough to justify an economical operation.

Location of the Industry

Electrical manufacturing in Canada is largely concentrated in Ontario and Quebec. Indeed, four cities in this region, Peterborough plus the metropolitan areas of Toronto, Hamilton and Montreal, account for more than 75% and the two provinces together for about 98% of the industry's employment. Ontario, with over 70% of total employment in electrical manufacturing, is the most important province, and Toronto with 32% of the total is the principal city. This location pattern is similar to that of the United States where the bulk of the industry is located in New England and the North Central States.

The industry is strongly market oriented although for some products it is important that there is a nearby source of raw materials and for others that a heavy concentration of parts suppliers is available. Since more than 60% of Canada's population, her two copper rod mills and most of her producers of wire and cable are located in Ontario and Quebec, it is not surprising to find most of the electrical manufacturing industry located there also. The adjacent location of the American industry is an advantage for the import of parts and components. For a few products such as batteries, lighting fixtures, panel boards and switchboards a central location is less important and some production occurs on the prairies and in British Columbia. The pattern of development in the United States also suggests that as the market expands the production of lamps, because of their bulky character, tends to become decentralized.

Since the end of the war two of the major Canadian firms have been establishing many of their new plants in smaller cities in Ontario and Quebec. Both of these firms originally followed a policy of producing a wide range of products in a single plant. However, with the growth of the Canadian market they have found that they can now justify a separate plant for an individual product or a narrower range of products. Canadian General Electric's new transformer plant at Guelph and Canadian Westinghouse's new electric motor plant at Stratford illustrate this development. It is the official policy of one of these companies to limit its total employment in any one area to 15% of the labour force. Though this recent trend may reduce the extent to which the industry is concentrated in the larger metropolitan areas it is unlikely to change the industry's primary concentration in Ontario and Quebec. In 1954, only one of the industry's 457 plants was located in the Maritimes.

The Pattern of Ownership and Control

The industry is dominated by three large firms, Canadian General Electric, Canadian Westinghouse and Northern Electric, and these firms together with Canada Wire and Cable account for two-fifths of the industry's output. Both Canadian General Electric (hereafter referred to as C.G.E.) and Canadian Westinghouse manufacture a relatively complete range of electrical apparatus although neither firm produces telephone equipment and Canadian Westinghouse does not produce wire and cable. Northern Electric, in contrast, confines its manufacturing operations primarily to communications equipment, wire and cable and certain specialized defence products. However, in addition to its own products it sells a wide range of electrical apparatus, primarily products that are complementary to telephone equipment and wire and cable, and a variety of household appliances. Many of these products such as Leonard refrigerators are manufactured for Northern by other Canadian firms. These three firms all have nation-wide sales and service organizations. Outside of the big three most of the firms in the electrical manufacturing industry specialize in the production of one or two products or a relatively narrow range of products.

Despite the continued importance of these large firms the dominance of major firms in the industry has declined significantly over the past 25 years (see Table 2).

Production of electrical apparatus by the four largest firms declined from 59% of the industry total in 1928 to 40% in 1954. A similar decline occurred in their share of the industry's net value of production. In contrast the firms that ranked from fifth to eighth largest in size increased their share of the

Table 2

Concentration of Production in the Canadian Electrical Apparatus and Supplies Industry, 1928 to 1954

		Percentage of Gross value of production	Percentage of Net value of production
1928	Four largest firms	59	60
	Eight largest firms	69	69
1938	Four largest firms	46	53
	Eight largest firms	58	62
1954	Four largest firms	40	43
	Eight largest firms	54	57

The four largest firms were the same in each year, as follows. not arranged in order to size:
Canadian General Electric Co. Ltd.
Northern Electric Co. Ltd.
Canadian Westinghouse Co. Ltd.
Canada Wire and Cable Co. Ltd.

The next four largest were
in 1928:
Phillips Electrical Works Ltd.
Canadian National Carbon Co. Ltd.
Hoover Company Ltd.
Standard Underground Cable Co.
in 1938:
Canadian National Carbon Co. Ltd.
Frigidaire Products of Canada Ltd.
R.C.A. Victor Company Ltd.
Phillips Electrical Works Ltd.
in 1954:
Frigidaire Products of Canada Ltd.
R.C.A. Victor Company Ltd.
Canadian Marconi Co. Ltd.
Canadian Admiral Corp. Ltd.

Source: Dominion Bureau of Statistics.

industry's total output from 10% in 1928 to 12% in 1938 and to 14% in 1954. The rest of the industry also gained, increasing their share from 31% of the total in 1928 to 46% in 1954. Though the four largest firms, namely the big three mentioned above and Canada Wire and Cable, remained the same throughout this period, a completely new set of firms moved into the second rank of the fifth to eighth largest. The newcomers are all in the radio and television or appliance field.

Of the four major firms in the industry, two, Canada Wire and Cable and Northern Electric, are under Canadian control and two, Canadian General Electric and Canadian Westinghouse, are controlled by American parents. Both of the two former companies are controlled by other Canadian companies, Canada Wire and Cable being controlled by Noranda Mines Limited and Northern Electric by the Bell Telephone Company of Canada Limited. The Bell owns 56% of the stock in the Northern Electric Company and appoints eight out of the 11 members of the Board of Directors. All of these eight directors are Canadians. The balance of Northern's stock is owned by the Western Electric Company, a wholly owned subsidiary of

the American Telephone and Telegraph Company, and Western appoints the remaining three directors on Northern's board. While the American Telegraph and Telephone Company owns 5½% of the stock in the Bell Telephone Company of Canada, an important minority holding, they do not appear to exert any control over the company and they have only one director on Bell's board. Control of the Bell Telephone Company of Canada is in the hands of the Canadian management; all but one of the directors are Canadians and 90% of the company's stock is held in Canada.

Though both the Canadian General Electric Company and the Canadian Westinghouse Company are under the control of their American parents it seems clear that on balance this control has not been exercised in a manner detrimental to Canadian interests. In both instances the United States company apparently follows the practice of appointing a chief executive officer and giving him a good deal of freedom to run the Canadian manufacturing operation as a unit rather than treating it as they would another branch plant in the United States. If results are not judged satisfactorily or if there is some disagreement on policy, the chief executive in the Canadian company may be replaced and changes have occurred recently in both companies.[1] With the exception of the chief executive officer of each company almost all of the senior executive officers in these two firms are Canadians. Moreover it has been claimed that there is no general policy of appointing an American chief executive officer. According to one firm, they are anxious to develop more Canadian managerial talent and a Canadian would be appointed as chief executive officer if a competent person were available.

Although the chief executive officer may have considerable freedom in managing the Canadian operation he will have to obtain approval from his board of directors for such major decisions as the construction of new plants, major changes in general competitive price policy, dividend policy and major financing plans. For both companies the board of directors includes one or more prominent Canadians but the board as a whole is dominated by the chief executive officers of the American corporation.

The present board of directors of the Canadian General Electric Company includes five representatives from the General Electric Company, four prominent Canadian businessmen and two executives from C.G.E. For Canadian Westinghouse the present board includes one director from Westinghouse Airbrake, four from Westinghouse Electric, one prominent Canadian shareholder and the current and past executive officers of the company. There is currently one vacancy on the board and it is the company's intention to appoint another Canadian to this position.

[1]For the Canadian General Electric Company the change has been attributed to the need for further division of executive responsibility as a result of the great growth in the company's business. As a result Mr. Turner, the former chief executive was made Chairman of the Board, a newly created position, and Mr. Goss, an American, was appointed President and Chief Executive Officer.

According to the information supplied by these two firms the basic decisions on major plant expansions are made by Canadian management. While the United States management gives advice they have not exerted any restrictive influence on the plant expansion program and in some instances have urged expansions beyond those planned by the Canadian subsidiary.

Some economists argue that because both the major American companies have attempted to introduce their full product line in Canada, the result has been an excessive number of manufacturers in each product line. However, it seems likely that these firms would market their own product in any case. Whether it is produced in Canada or in the United States depends primarily on the question of the tariff level and their comparative cost position. In some fields the influence of American management has undoubtedly led to an excessive volume of investment in production facilities in Canada. Thus, there is reasonable doubt whether the large number of television manufacturers now operating in Canada can be economically justified. Further, once production has been established here a firm may be reluctant to discontinue because of the loss of prestige it would suffer in admitting it had made a mistake.

Both companies have followed a conservative dividend policy and this policy has increased the amount of funds available to finance the construction of new plants. Before the recent reduction in dividend rates in Canadian Westinghouse, the United States parents had urged a reduction in the dividend rate and for a number of years had taken their dividends in the form of stock. For C.G.E. dividends amounted to 41% of total earnings after tax from 1946 to 1950 but declined to 25% in the period 1951 to 1955. Since in both companies dividends on the Canadian operations are only about 2% or less of the total income after tax of the United States parent companies it seems likely that dividend policy is primarily determined by the financing needs of the Canadian company. For Canadian Westinghouse the 24% stock ownership of the Canadian public must also have been a consideration in determining dividend policy but with the recent decline in this holding of 15% of the total and with the acquisition of the stock holdings of Westinghouse Airbrake by Westinghouse Electric it is likely that this will be less true in the future.[1] Executives of C.G.E. have stated that the method of financing their postwar plant expansion was planned in Canada, and with minor exceptions the funds to finance it were obtained from Canadian sources.

[1]It has been stated that the recent decline in the share of Canadian Westinghouse stock held by the Canadian public was not the result of any deliberate policy or desire on the part of American management but was simply a result of the shift in American ownership and the announced intention that the dividend rate would be reduced. When Westinghouse Electric acquired the stock in Canadian Westinghouse held by Westinghouse Airbrake the Canadian public was given the opportunity of selling their holdings at the same price as a matter of fairness. A substantial number of stockholders took advantage of the opportunity.

Though most new products and designs originate in the United States the subsidiary is urged to develop its own engineering and to be as self-sufficient as possible even though it has complete access to all engineering developments, designs and knowhow of the parents. In some areas the Canadian subsidiary has made important contributions to design or has developed products later adopted by its American parent. Again while no attempt is made to carry on fundamental or pure research in the Canadian subsidiaries the larger companies do have laboratories which engage in product design and development, testing of materials and improvement of production methods. There can be little doubt that the Canadian subsidiaries derive important advantages from their relationship with the parent company. Not only do they obtain the results of research but they also have access to productive knowhow and to all the specialized services that are only economical in a very large firm such as advice on the design and layout of new plants, and special management training courses.[1]

In some areas the United States parent apparently exercises little or no influence. Thus the American management takes no interest in and makes no attempt to influence wage negotiations in their Canadian subsidiary. While the Canadian firms can obtain advice from the American labour relations department the difference in legal and other conditions between the two countries makes this of little importance. Again it has been claimed that there is no agreement between parent and subsidiary on markets or prices and that materials are purchased independently. Components are frequently purchased from the parent company and evidence came to light of one instance where a parent company with surplus productive capacity insisted that its Canadian subsidiary purchase a component from the parent company even though another Canadian firm offered to provide the component more cheaply.

Both companies sell in the export market through their parent company's international sales organization. In one instance the international organization handles sales of the Canadian subsidiary on an agency basis. In the other case the Canadian firm has a substantial ownership in the international organization and shares in its profits; the international company can place orders with either the parent firm or the Canadian subsidiary. One firm reports that when the international organization is selling the parent company's product in a particular country the Canadian firm is free to sell its own product in competition with that of the parent company through some other agency and is free to bid on contracts in competition with its parent. But for exports to the United States it is doubtful whether the Canadian subsidiary will be as free to develop markets for its products as an independent

[1]The advantages derived from this flow of technical information and the terms on which it is available are discussed in more detail in the sections on Technology and Research.

Canadian company would. For example, even though the Canadian price on waterwheel generators is now some 31% below the price in the United States it is clear that the Canadian subsidiary would not be encouraged to bid in this market and thus undermine the prices received by the parent company. Again, in at least one instance, an American parent refused its Canadian subsidiary permission to market a product in the United States even though the product was not being produced by the parent. Refusal was apparently based on a fear of antagonizing labour at a time when there was some unemployment in the American market.

If the American parent were to allocate a substantial share of its export business to its Canadian subsidiary it would greatly benefit Canada, particularly in product lines where additional volume is needed to reduce production costs. And since the reduction in costs with increased volume would likely be larger in Canada than it would in the United States the cost of the additional output needed to supply the export market might be as low or lower in Canada than it would in the United States. This may be the basis of Canadian exports of watthour meters. However, if, to make this operation profitable, the Canadian subsidiary had to sell at a lower price in the export market than it does in Canada it would be carrying on a form of dumping, a somewhat vulnerable basis on which to build an export market. Recently the subsidiaries of both major companies have gained some additional export business as both American companies have abandoned the production of wringer type washers and have allocated the parent's export business to their Canadian subsidiary.

While in general the Canadian subsidiaries appear to benefit from their relation with the United States parent companies there may be some instances where policies deemed appropriate to the United States are applied in Canada without adequate consideration of the difference in market conditions in the two areas. Thus within recent years both General Electric and Westinghouse Electric have undertaken a reorganization of their managerial setup designed to secure prompt and more effective decision making in what were becoming very large and somewhat unwieldy organizations. In some instances the same reorganization was extended to the Canadian company even though the much smaller scale of the Canadian operation must have left some room for doubt as to whether the reorganization was needed here. For example, under General Electric's new management setup all marketing is assigned to the individual operating department rather than controlled from the centre. A similar change has been made in Canada despite the fact that centralized control in Canada may have been much more economical and less unwieldy than it was in the United States.

Over-all, the experience of these two major concerns suggests that American control has not been used in a way prejudicial to Canadian interests. In general, basic operating decisions are made in Canada although approval

must be obtained from the board of directors for major decisions such as plant expansion. To a small extent American control may discourage the development of exports to the United States; but since instances in which Canadian electrical products can be sold at a competitive price over the United States tariff are rather exceptional this is probably of minor importance. Any disadvantage arising here is much more than offset by the very great advantage which Canadian subsidiaries derive through their access to the parent company's patent rights, technical knowledge and many specialized services.

Though no detailed investigation was made of the many smaller firms that are controlled by American or foreign capital, for the few firms in this category that were visited the relationship of the Canadian subsidiary to the parent company did not appear to differ basically from the above pattern. In small firms that are confined to a single or very few product lines the control exercised by the U.S. parent company may sometimes be more complete. But even here the many differences faced by the Canadian plant, differences in market area, in labour legislation and in tariff treatment make it necessary to leave a good deal of initiative in the hands of the Canadian management.

At the present time only 28% of the total capital invested in the electrical manufacturing industry in Canada is owned by Canadian controlled firms. Some 62% of the industry's total capital is owned by firms controlled in the United States and the remaining 10% is owned by firms controlled from other countries, mainly from Great Britain (see Table 3). Compared with 1932 there has been some decline in the extent of American controlled investment in the industry. At that time it can be estimated that some 71% of the industry's capital was owned by American controlled companies.[1] On the other hand, though no data on this point are available, it seems likely that British controlled holdings in the industry have increased. During the past few years British companies have acquired control over such important companies as Phillips Electrical Company Limited, the John Inglis Company Limited which in turn controls the English Electric Company of Canada Limited, and the Amalgamated Electric Corporation Limited. Although the importance of American controlled investment has declined slightly since the mid-thirties, during the past few years American ownership or control in a number of important companies has been extended. Thus, in 1954 the Tappan Stove Company acquired a substantial interest in Gurney Products Limited and Moffats Limited was taken over by Avco of Canada Limited, a wholly owned subsidiary of the Avco Manufacturing Corporation. Both Moffats and Gurney were long established Canadian companies. Then too, the Admiral Corporation increased its ownership in the stock of the Admiral

[1]Estimate based on data given in H. Marshall, F. A. Southard and K. W. Taylor, *Canadian American Industry* (New Haven, 1936) p. 24.

Corporation of Canada from 73% to 97% and was only prevented from making its ownership complete by an adverse court decision.

Table 3

Ownership and Control in the Canadian Electrical Manufacturing Industry, Canada, 1953

	Million dollars	Percent
Estimated Total Investment	386	100
Owned in Canada	137	35
Owned in the United States	226	59
Owned elsewhere	23	6
Estimated Total Investment	386	100
in companies controlled in Canada	108	28
in companies controlled in the United States	240	62
in companies controlled elsewhere	38	10

Source: *Canada's International Investment Position, 1926-1954*, Dominion Bureau of Statistics, Ottawa.

Recent Developments in Prices, Profits and Production

Throughout most of the post-war period the Canadian electrical manufacturing industry experienced an extremely rapid growth in output and very favourable price and profit levels. Total production of electrical equipment expanded twofold between 1946 and 1953, much more than the increase of about one-third that occurred in Canada's gross national product. In all but one year during this period the industry earned a profit after tax ranging from 12% to 18% of the book value of its capital and surplus. Except for two years this return was higher than that earned by the total of all Canadian manufacturing corporations. More recently, competition from foreign manufacturers has become much more severe and prices and profit levels have declined in important sectors of the industry. However, despite this increased competition, the rate of return on investment for the industry as a whole during 1955 was about the same as the level for all manufacturing.

In substantial part this recent increase in foreign competition represents a reacquisition by foreign producers of a more normal share of the market after a long period during which a series of temporary factors reduced imports below usual levels. Thus during the war and again during the period of defence buildup after the outbreak of the Korean war in 1950 imports were restricted by priorities and the unavailability of supplies. Again during much of the postwar period foreign suppliers were too busy producing for their domestic market to pay much attention to the Canadian market. For a short period from 1948 to 1950 the availability of imported electrical equipment was further restricted by the dollar saving import restrictions that the government imposed near the end of 1947. These special limitations have gradually disappeared during the past few years and as a result there has been a rapid increase in the import share of the market. By 1953 imported electrical goods of all types supplied 23.7% of the Canadian market

compared with 15.1% in 1949, and import competition had become more severe than at any time since 1929

But the recent increase in import competition is not merely the result of the disappearance of a series of temporary restrictions, it reflects longer run changes as well. In the field of heavy custom built apparatus where competition from European producers is most severe the increased competition derives in large part from the currency devaluations which were carried out in 1949, the impact of which were delayed in many areas until 1953 by the keen demand in soft currency areas and the backlog of orders that European manufacturers were carrying at the time devaluation occurred. Since the currency devaluations reflect long run structural changes in the world's economy their effects can be expected to continue for a long time to come. As a result of a deterioration in their terms of trade, the loss of foreign investment assets and the accumulation of new foreign debts, Britain and a number of other European countries will have to export on a much larger scale than formerly to obtain their import requirements. Accordingly it can be expected that they will have to continue to offer their exports on the more favourable terms reflected in the currency devaluations of 1949.

To a large extent these structural changes are of a once for all type rather than continuing changes. Even though complete adjustment to them may take many years, once this has taken place no further adjustments in trade will be required. But there may also be changes that will result in a more or less continuous need for adjustments in our economy. Thus, some economists argue as follows. Productivity in North America has been rising at a faster rate than it has in Europe. Moreover, productivity gains on this continent have been concentrated in capital intensive products or in products susceptible to mass production. By their nature labour-intensive products and processes are less easy to mechanize and as a result Canada's competitive position in them has deteriorated steadily as her wage levels have risen. The devaluations of 1949, they argue, were in part a reflection of these longer run developments. For the electrical manufacturing industry this will mean that producers of heavy custom-built types of apparatus will face a steadily increasing competition from European countries in the years to come. However, this will only be true if gains in productivity are slower here than they are elsewhere in the Canadian economy. It is not entirely clear that this has been or will be the case. Very important cost reductions have occurred in this field in the past and under the more severe competition of recent years the gains being achieved here may well be fairly rapid at the present time.[1] Because of the complex nature of these products there is considerable room for designing new, more efficient products, for redesigning

[1]See A. M. Doyle, "The Electrical Manufacturing Industry's Contribution to Technical Progress", *Proceedings of the Canadian Electrical Association,* Sixty-fifth Annual Convention, 1955, pp. 202-208.

products to reduce their material content, for developing more economical materials and for improvements in manufacturing methods. The importance of technical knowledge and new product development in this field also make it unlikely that newly industrializing countries will offer much competition in the production of heavy apparatus.

While during the first period of increased European competition that followed the devaluations of 1949, Canadian producers lost a number of orders for heavy equipment to foreign suppliers, since that time the prices quoted by Canadian producers have been reduced very substantially and it is reported currently that foreign firms are securing fewer orders. Thus, up to the present, the effect of the increased severity of European competition has been to cause a sharp fall in prices and profit levels in the heavy apparatus sector of the industry rather than to greatly increase the share of the market being supplied by foreign producers.

Tariff reductions have also played some part in the recent growth of import competition. This is particularly true with respect to imports from the United States. Under the General Agreement on Tariffs and Trade, Canada's intermediate tariff rates on a wide range of electrical equipment were reduced from 25% to 22½% or from 25% to 20%. In addition, some of the recent rise in imports may represent a delayed adjustment to the tariff reductions that occurred just prior to World War II. Until 1936 all imports from the United States were subject to the much higher rates of Canada's general tariff. Under agreements signed in 1936 and 1938 tariff rates on imports from the United States were substantially reduced either by the grant of special treaty rates or by allowing imports from the United States to come in under the intermediate tariff. The combined effect of these measures was to reduce the average ad valorem rate of duty on dutiable imports of U.S. electrical apparatus from 27.7% in 1929 to 21.2% in 1952.

On the other hand tariff reductions on electrical apparatus imported from the United Kingdom, our principal European supplier, have been of negligible importance as a cause of increased import competition. Tariff rates are now higher than they were in 1929 on some items and lower on others, but overall the average ad valorem rate of duty is only slightly lower than it was in 1929. In addition, a substantial volume of steam turbo-generators, formerly dutiable at 15%, now enter duty free. However, this class of equipment is not produced in Canada and is not directly competitive with Canadian production. Moderate tariff reductions have also occurred on imports from other European countries.

In the appliance field competition has become more intense during recent years as the postwar shortages have been overcome and as the market in

some areas has become saturated. As a result prices have been declining and on some products are now lower than they were in 1949 (see Table 4). The ban on the enforcement of resale price maintenance has also resulted in more price cutting. Large retailers purchasing appliances in large quantities and selling them at a small markup over cost may well have forced down the manufacturer's margin. Increased competition at the manufacturing level has forced some firms out of business both in Canada and the United States. A continuation of this trend should lead to a smaller number of more efficient production units in Canada.

TABLE 4
RETAIL PRICES OF ELECTRICAL APPLIANCES
CANADA, 1949 TO 1956
(INDEXES 1949= 100)

	ELECTRIC IRON	ELECTRIC STOVE	ELECTRIC REFRIGERATOR	VACUUM CLEANER	WASHING MACHINE
	INDEX	INDEX	INDEX	INDEX	INDEX
1949	100.0	100.0	100.0	100.0	100.0
1950	101.9	102.3	100.0	103.4	101.5
1951	120.1	116.2	113.2	118.6	115.7
1952	116.9	119.9	107.8	119.7	118.1
1953	114.0	120.0	96.9	117.3	116.8
1954	106.6	117.5	84.3	112.4	116.0
1955	98.5	113.0	79.4	108.4	112.4
1956*	93.3	105.4	76.7	106.5	105.8

*April 1956

Note: A special excise tax of 15% was placed on vacuum cleaners, electric irons and other small appliances in September 1950; this tax was increased to 25% in April 1951, was reduced to 15% again in April 1952 and was removed completely in April 1954. An excise tax of 15% was placed on electric stoves, refrigerators and washing machines in April 1951; this tax was removed in April 1952. The manufacturer's sales tax which applies to all of the above commodities was increased from 8% to 10% in April 1951.

In some degree also the increased volume of import competition that has faced Canada's electrical manufacturers in recent years is a result of the capital boom the economy is going through. Heavy capital imports, induced by the opportunities for investment in Canada, have helped to raise the value of the Canadian dollar or maintain its level despite wage costs that were rising more rapidly than those in the United States. And while the increased volume of investment expenditures led to an expanded Canadian market, most of these additional funds were spent in the form of on-site construction expenditures or were used to buy specialized machinery and equipment that was imported from the United States; only part of the additional capital spending provided an increased market for the products of Canadian manufacturers. As a result the Canadian manufacturer found himself squeezed from two sides. The expanded construction industry tended to bid up the price of Canadian labour, thereby increasing his costs. At the same time the increased value of the Canadian dollar made imported manufactures more competitive. Though this competitive pressure has recently abated with the decline in the value of the Canadian dollar, it will likely

continue to some extent as long as the heavy capital spending and capital inflow continues.

Though profit levels in the electrical manufacturing industry fell more sharply during 1954 than was true in manufacturing as a whole the principal effect of this has been to wipe out the advantage the industry had enjoyed until 1953. In 1954 the profit earned on the book value of capital and surplus was identical for electrical and for all manufacturing and in 1955 electrical manufacturing again showed a slight advantage. However, this overall average conceals some sharp differences in the profit experience of different sectors of the industry. Though no detailed profit data by industry sectors are available the recent drop in prices despite rising costs suggests that profit levels on the types of heavy apparatus where European competition is keen are very low or non-existent. For the heavy apparatus group as a whole the rate of return on capital fell to 5.9% in 1954 (see Table 5). However, this group includes a considerable range of equipment where European competition is not effective and this may conceal even lower rates of return on the heaviest class of equipment. Profit levels have also dropped sharply in the appliance field largely as a result of more intense competition and lower profit levels in this sector of the industry in the United States. But even within the appliance group the picture is not uniform and one major producer of washing machines, the Easy Washing Machine Company, showed a continued increase in profit levels in both 1954 and 1955. And profits of Kelvinator of Canada Limited, a major producer of refrigerators, though down about two-thirds between 1953 and 1954, were still over 8% of capital and surplus in 1954. The rapid growth of demand for television equipment and the importance of military orders has helped sustain or even increase profit levels for some firms. In other areas, neither the tariff reductions nor the currency devaluations have had any appreciable effects on Canadian prices and profit levels. Together with other industries electrical manufacturing suffered some reduction in profits and sales as a result of the inventory recession that developed in Canada in 1954.

In 1954, profits in electrical manufacturing in Canada were well below those earned by the same industry in the United States. The rate of return earned on the book value of capital and surplus by both of the major firms, Canadian General Electric and Canadian Westinghouse, was less than half of that earned by their parent organizations, and the rate of return earned by a sample of the major firms in the industry was substantially lower in Canada than it was in the United States (see Table 6). Throughout the post-war period the rate of return earned by the industry in Canada has been lower in most years than that earned in the United States. The difference was especially marked between 1948 and 1950 and again in 1954. In part, this difference reflects the fact that the increased European competition in heavy custom built equipment, which has caused a sharp reduction in prices

TABLE 5

NET INCOME AFTER TAX AS A PERCENT OF CAPITAL STOCK AND SURPLUS, ELECTRICAL AND ALL MANUFACTURING 1946–1955

YEAR	ELECTRICAL MANUFACTURING	ALL MANUFACTURING
1946	8.2	9.7
1947	16.2	14.0
1948	16.5	15.2
1949	12.6	13.0
1950	18.3	15.2
1951	15.2	13.8
1952	12.2	10.2
1953	12.7	9.9
1954	8.4	8.3
1955	10.7	10.2

	1953	1954
Heavy electrical machinery and equipment	9.5	5.9
Household electrical appliances	15.4	6.7
Miscellaneous electrical products	11.7	8.0
Electrical Manufacturing Total	12.7	7.3

[e]Estimate based on the 1953 ratio of sales to capital and surplus and the quarterly survey of corporate profits and sales. In 1953 the ratio of sales to capital and surplus was 3.08 for electrical equipment and 2.34 for all manufacturing. If the 1955 estimate for electrical manufacturing had been based on C.E.M.A.'s survey it would have shown a return of 8.9%.
Source: *Taxation Statistics,* Department of National Revenue; *Survey of Corporate Profits,* Dominion Bureau of Statistics.

TABLE 6

NET INCOME AFTER TAX AS A PERCENT OF THE BOOK VALUE OF CAPITAL AND SURPLUS, ELECTRICAL MANUFACTURING, CANADA AND THE UNITED STATES, 1949 TO 1955

CANADA	1949	1952	1953	1954	1955
24 ELECTRICAL MACHINERY CO'S	14.7	13.5	16.1	8.3	7.0
CANADIAN GENERAL ELECTRIC	9.9	11.5	15.6	9.4	7.0
CANADIAN WESTINGHOUSE	16.0	8.4	10.2	3.5	3.7
CANADIAN WIRE AND CABLE	17.4	17.0	15.8	10.9	12.8
SANGAMO COMPANY LIMITED	14.1	6.5	7.9	3.5	8.1
AMALGAMATED ELECTRIC	4.9	10.8	11.0	N.A.	N.A.
CANADIAN ADMIRAL CORP. LTD.	17.4	50.3	34.8	27.8	17.3
GURNEY PRODUCTS LTD.	24.8	7.6	5.8	4.4	3.9
EASY WASHING MACHINE CO.	21.3	13.8	15.6	18.1	21.2
KELVINATOR OF CANADA LTD.	37.3	11.2	23.6	8.2	9.2
ALL MANUFACTURING	13.0	10.2	9.9	8.3	10.2
UNITED STATES					
78 ELECTRICAL EQUIPMENT, RADIO AND TELEVISION COMPANIES	17.2	14.8	14.9	13.9	12.8
HOUSEHOLD APPLIANCE CO'S	13.9	12.2	10.7	10.3	11.6
GENERAL ELECTRIC	17.0	17.4	17.8	20.8	18.8
WESTINGHOUSE ELECTRIC	15.2	10.2	10.3	10.6	5.4
ALL MANUFACTURING	13.8	12.3	12.7	12.3	13.0

Source: For Canada: data for 24 electrical machinery companies are from the Bank of Canada sample; data for all manufacturing are as given in Tables; data for individual companies are from individual company reports or the Financial Post Corporation Service.
For the United States: data are from the National City Bank sample of corporations and from individual company reports.
[x]Data for 1949 are for Gurney Industries Limited.
*Profits reduced by prolonged strike.

in this class of equipment in Canada, has not had a similar effect in the United States. According to one producer Canadian prices on this equipment now range from 17% to 55% below those in the United States. Prices in the United States have continued to increase at a time when they were falling sharply in Canada (see Tables 7 and 8). The failure of European competition to have more effect on prices in the United States may reflect such barriers as the Buy America Act, the United States customs administration and the lack of familiarity on the part of United States utilities with European equipment after a long period of prohibitive tariff barriers. It can scarcely be attributed to the level of the United States tariff which ranges from 12½% to 17½% on this type of equipment, about the level of our preferential tariff (see Table 9). Lower profit levels in Canada also appear to be part of a general pattern under which Canadian manufacturers earn a lower rate of return than their counterparts in the United States.

2

LABOUR FORCE, EQUIPMENT AND TECHNOLOGY

Labour Force

At the factory worker and clerical levels, the bulk of the employees in the electrical manufacturing industry are semi-skilled, but there is an important core of very highly skilled machine tool operators. For the most part the industry attempts to employ workers with at least two years of high school education. It recruits quite a few graduates from technical schools. A number of firms in the industry have apprentice or other training courses to provide their workers with any special skills their manufacturing operations require. Skilled workers are relatively more important in the heavy apparatus sector of the industry because workers often have to follow blueprint specifications and because large drafting divisions are needed to prepare these plans. In some areas, such as in the production of lamps and radio tubes a high degree of digital dexterity is the main skill required and these operations usually employ a substantial proportion of female workers. For the industry as a whole, women constitute about 30% of all employees, the proportion being highest in the production of lamps, radio and television equipment and in some types of telephone equipment. Fewer women are employed in plants engaged in the production of heavier equipment such as heavy transformers and generators, major appliances and wire and cable. Seasonal fluctuations in employment in the industry are very moderate. In some instances, as with Christmas tree bulbs, production is carried on the year round even though sales are highly seasonal.

With the trend towards more automatic production, the industry anticipates a considerable increase in its requirements for skilled maintenance workers and perhaps also some increase in the demand for workers with no special skills but possessed of a high degree of digital dexterity. The proportion of semi-skilled personnel required may decline.

Table 7

Prices of Electrical Apparatus, Canada, 1949 to 1955
(Index 1949 = 100)

	1949	1950	1951	1952	1953	1954	1955
Waterwheel generators	100	100	110	110	110	99	98
Fractional HP Motors							
Up to 1/3 h.p.	100	104	122	125	115	105	99
½ to ¾ h.p.	100	112	129	130	128	127	126
Integral HP Single phase	100	112	130	131	130	127	127
Integral HP Polyphase	100	106	118	117	115	108	104
Distribution transformers	100	111	132	136	135	119	112
Power transformers	100	100	120	125	125	111	99
Switchgear	100	100	112	123	123	118	111
Power circuit breakers	100	100	107	112	112	94	94
Industrial control	100	111	142	140	136	132	128
Watthour meters	100	107	116	120	121	121	121

Source: Data provided by individual companies. Prices are before Sales Tax.

Table 8

Wholesale Prices, Electrical Apparatus and Appliances, United States, 1949 to 1956
(Index 1949 = 100)

	1949	1950	1951	1952	1953	1954	Jan. 1956
Electrical Machinery	100	103	118	117	120	122	128
Motors and generators	100	105	121	120	122	123	126
Transformers and regulators	100	101	114	114	121	125	128
Switchgear and fuses	100	108	126	122	124	129	141
Integrating instruments	100	104	118	116	120	126	128
Household Appliances	100	101	107	106	107	108	105
Stoves	100	101	110	108	110	114	120
Laundry equipment	100	99	108	111	113	118	124
Vacuum Cleaners	100	99	104	108	110	110	107
Refrigerators	100	101	105	105	106	106	96
Small appliances	100	101	104	102	104	106	100

Source: U.S. Bureau of Labor Statistics.

Table 9

The United States Tariff on Electrical Products as of Sept., 1953

Par. No.	Products	Rate of Duty
212	Electrical porcelain ware	35 %
216	Brushes for electric motors, generators, etc.	12½%
	Carbons and electrodes for producing electric arc light	
	—under ½ inch in diameter	20 %
	—over ½ inch	15 %
	Electrodes, wholly or in part of carbon or graphite for electric furnaces or electrolytic purposes	15 %
229	Incandescent electric light bulbs and lamps:	
	Without filaments or with metal filaments	20 %
	With carbon or other non-metallic filaments	30 %

316(a)	Telegraph, telephone and other wires and cables composed of iron, steel or other metal covered with or composed in part of compound, cotton, enamel, jute lacquer, paper, rubber, silk, or other materials	17½%
320	Electric storage batteries and parts thereof	20 %
339	Electric flatirons (wholly or in chief part of base metal other than brass, copper, pewter or tinplate)	40 %
	Table household, kitchen and household utensils whether or not containing electrical heating elements as constituent parts:	
	plated with silver	25 %
	wholly or chiefly aluminum 4¼¢ per lb. and	20 %
	composed of iron and steel and enameled or glazed with vitreous glasses 2½¢ per lb. and	7½%
353	Articles having as an essential feature an electrical device or element, such as electric fans, furnaces, heaters, locomotives, motors, ovens, portable tools, ranges, refrigerators, signs and washing machines, finished or unfinished, wholly or in chief value of metal, nspf;	
	Batteries	17½%
	Blowers and fans	17½%
	Calculating machines for multiplying and dividing, etc.	12½%
	Cooking stoves and ranges	10 %
	Flashlights	35 %
	Furnaces, heaters and ovens	12½%
	Motors	12½%
	Television apparatus	12½%
	Washing machines	17½%
	Other	13¾%
	Articles suitable for controlling, distributing, modifying producing, or rectifying electrical energy, finished or unfinished, wholly or in chief value of metal, and nspf.:	
	Switches and switch gear which are not wiring apparatus, instruments or devices	17½%
	Transformers	12½%
	Other	15 %
	Electrical apparatus, instruments (other than laboratory), and devices, finished or unfinished, wholly or in chief value of metal, and nspf.:	
	Ignition, radio, signalling and welding	12½%
	Telegraph, telephone and therapeutic	17½%
	Wiring	17½%
	X-ray—tubes	10 %
	—other	8¾%
	Parts, finished or unfinished, wholly or in chief value of metal, nspf., of articles provided for in this paragraph:	
	X-ray tubes and parts thereof	10 %
	Other	The rate for the article of which these are parts.
1542	Dictaphones, gramophones, graphophones, phonographs, and similar articles and parts thereof, nspf.	15 %

Note: Some specialized classifications under Par. No. 353 have been omitted.

At the professional and highly technical level the electrical manufacturing industry employs a very large number of engineers and other university graduates. At the present time more than 3,000 university graduates are employed by the three largest firms in the industry. Indeed, in these three companies roughly one out of every 13 workers is a university graduate,

usually an engineer. Two major companies reported that the ratio of engineers to total employment had doubled within the past ten years. Though many of the engineers are employed in sales, administrative or supervisory jobs the industry also has a large number of engineers engaged in product development, in cost reduction and in testing of materials. Because of the diversity of its products, and the complex nature of its operations, the industry requires highly skilled management personnel. Many of these have an engineering background. Engineering requirements are particularly high in the heavy apparatus sector of the industry because of the large amount of design and drafting that goes into the custom built type of products such as large transformers and generators. The major companies give their new engineering recruits an intensive training course lasting from 18 months to two years in order to thoroughly familiarize them with electrical manufacturing operations. Since many of the graduates of these courses later take positions with smaller independent companies or with utilities, these training courses make an important contribution to the development of skilled engineering personnel in Canada.

A continued rapid growth in the demand for engineering and trained technical personnel is expected in the future and the industry has expressed concern about the shortage of engineers now being graduated. The trend towards automation, the rapid growth now occurring in electronics and in some defence areas and the increasing proportion of research and product development expected to take place in Canada as the industry expands will all increase the demand for engineering and technical personnel.

One estimate placed Canadian industry's annual requirement for engineers at between 2,500 and 3,000. This compares with an expected graduating class of 1,874 in 1956 and about 2,500 by 1958.[1] The present shortage of engineers is concentrated in the aircraft, electrical and oil industries. Though some firms are now recruiting engineers in Europe the supply that can be obtained in this way is limited and some fear was expressed that Canada may soon lose a substantial number of engineers to the United States if the draft laws in the latter country are modified. While most industrialists stress the need for increasing the supply of trained engineers some argue that the anticipated shortages will be eased if industry learns to use its engineering talent more economically by providing them with more technical assistants and by relieving them of jobs which do not call for engineering skills.[2]

To solve the shortage of trained personnel the industry has urged the need for the establishment of new technical institutes, greater support to universities and greater encouragement for the more talented students to

[1] *The Canadian Electrical Manufacturing Industry in Transition,* brief of the Canadian Electrical Manufacturers Association, pp. 81-82.

[2] Presentation to the Commission by J. H. Goss, President of the Canadian General Electric Company, pp. 13-14.

attend university. Though many companies in the industry have extensive training courses for their own personnel they have done very little to support university or technical school education in general. None of the firms offer scholarships at Canadian universities or technical schools.

Equipment

Since the end of the war the electrical manufacturing industry has spent about $30 million per year in terms of 1954 prices for new plant and equipment. On the average it has invested for both replacement and expansion purposes about $7,500 for each new employee added to the payroll. While it is not possible to estimate precisely the proportion of the industry's plant which has been added since the end of World War II two major companies have estimated that as much as half of their plant and equipment fall into this category. For one of these companies some 44% of their total manufacturing floor space has been constructed since 1945 and since there is a trend towards the use of more complicated and expensive equipment on each square foot of floor area, the total new investment has probably been in excess of 50%. The amount of plant and equipment required per employee varies widely in different manufacturing operations. It is generally low, perhaps around $3,000 to $3,500, on light assembly type operations such as radios, small appliances and meters. It may run as high as $15,000 per employee on a two shift basis for some of the heaviest types of apparatus where expensive testing and lifting equipment is required. It is also high, perhaps $8,000 to $10,000 per employee on a two shift basis, in the highly automatic type of manufacturing operation such as lamps. Where equipment costs are high, firms frequently operate on a two or even three shift basis to keep capital costs per unit of output down.

Though no precise data are available as to the source of the industry's machinery and equipment it is believed that some 70% to 80% of the total is imported, mainly from the United States. In general, the simpler types of machines are purchased in Canada while more complicated equipment is imported.

With the trend towards higher speed equipment and because of the rapid rate of product change that characterizes the industry the rate of obsolescence in equipment is increasing. Obsolescence is most important in highly specialized types of equipment. It is not a major factor in many standard types of equipment such as the cranes and machine tools used in the heavy apparatus industry or the wire drawing machines used by wire and cable firms.

In financing these capital expansions the industry has depended mainly on internal sources such as depreciation allowances and undistributed profits. In the period 1948 to 1954 these two sources provided about 92% of the funds used by 24 large electrical manufacturing companies for financing expenditures on plant, equipment and inventories. The remaining 8% was

financed by means of new bond issues (6%) and new issues of preferred and common stock (2%). Though there were several major bond issues during this period these were partially offset by the debt retirements of other firms. Dividend policy in the industry has been conservative. In 1953, for example, only about 21% of earnings after tax were paid out as dividends whereas in manufacturing as a whole the percentage was 49%. Within recent years several of the major companies, subsidiaries of American firms, have reduced their dividend rate to leave more funds available for investment in the face of lower earnings.

Technology and Research

Though there has been and will continue to be steady improvements in the efficiency of the industry no dramatic developments in the direction of automation are anticipated. An important sector of the industry's output has a custom built character and does not lend itself to automation. The electrical manufacturing industry will be more important as the supplier of much of the control devices needed in automated production rather than as an example of the application of the automation principle. In all sectors of the industry there is a trend towards the use of higher speed equipment and to the use of more machinery and equipment per worker.

For its supply of technical information the industry is primarily dependent on its relations with large firms in the United States or the United Kingdom. Subsidiaries of American firms such as Canadian General Electric, Canadian Westinghouse, Kelvinator of Canada and many others are usually granted a prior right to manufacture for the Canadian market under their parent company's patents and trade marks. In addition they have access to a large amount of technical information on production methods, new plant design and marketing, and they use or adapt to Canadian requirements the new models developed by the parent company. In many instances the Canadian subsidiary is charged for this flow of technical information and patent rights through a small percentage charge (one percent or less) on the subsidiary's total sales, the subsidiary being encouraged to take all of the information and patent rights it can make use of. In other instances charges are based on the sales of the specific products where a patent right or other information is used. According to the chief executive of one important company the amount paid by their company to its American parent is substantially less than the charge that would be levied against individual branch plants in the United States. As a result the Canadian firm is able to spend proportionately more on building up its Canadian research and development staff. Many independent Canadian firms have licensing arrangements with American firms which entitle them to manufacture the latter's products in Canada. In a very few instances, independent Canadian firms are large enough to exchange patent and other technical information on an equal basis with firms in other countries.

Access to technical information and new model designs is so important in electrical manufacturing that most independent Canadian firms find it necessary to obtain agreements with firms in the United States or the United Kingdom which give them the right to manufacture the latter firms' product in the Canadian market. Thus Enamel and Heating Products Limited recently signed an agreement with the Florence Stove Company of Gardner, Mass., to manufacture their line of electric stoves, gas ranges and gas heaters in Canada. Independent Canadian firms can also license their own models and new developments in other countries but they are under a considerable handicap here because the small size of the Canadian market limits the amount of money they can spend on new product development. Despite this handicap a few firms have been successful in doing just this. The Moffat stove is licensed for manufacture in a number of foreign countries and the Beatty Washer is manufactured and distributed in Australia. It would be possible for independent Canadian firms to license their products for manufacture in the large American market but the rapid rate of change in that market and the large amount of money which American firms can spend on pioneering new products make it unlikely that this type of business will be important in the immediate future.

In Canada research is confined mainly to testing materials, to devising new productive methods and to adapting designs developed elsewhere to the Canadian market. In large companies a very substantial amount of product design and development takes place but the Canadian market is too small to support any relatively pure research. In a number of fields Canadian developments have been of major importance and a number of them have been adopted by other countries. For example, in the heavy apparatus field Canadian engineers have made important contributions to the design of waterwheel generators, transformers and circuit breakers. In the appliance field, Canadians accept the widely advertised American models and this makes new developments more difficult, but in a few instances new products or designs such as an electric floor polisher, the electric kettle and an open handed electric iron were pioneered in Canada and later taken up in the United States. Some Canadian developments reflect advantages which derive from our environment. Thus, the contributions to waterwheel generator design reflects the heavy dependence of Canada on hydro-electric power, the design of engine block heaters has been encouraged by our cold climate and the electric kettle has been attributed to the Canadian tea drinking habit. But other developments are not due to any special advantages. They are simply the result of the ingenuity, initiative and foresight of Canadian engineers and business management. It is anticipated that Canadian product development and research will gradually increase in importance as Canadian output continues to grow.

3

THE CANADIAN MARKET FOR ELECTRICAL APPARATUS

Introduction

Competitive conditions within Canada, the degree of import competition and the ability of the Canadian industry to withstand this competition all vary widely in different sectors of the Canadian electrical manufacturing industry. For some products competition among Canadian producers is extremely keen even in the absence of import competition. For other products there are only two or three producers in Canada and when imports are absent these firms will enjoy a virtual monopoly of the Canadian market. Again, on some products Canadian producers can meet the competition of foreign firms with ease and could even withstand such competition on a tariff free basis. On other products Canadian firms find import competition extremely severe despite the tariff protection they now enjoy. This great diversity of conditions makes it difficult to generalize about the electrical manufacturing industry and makes it desirable to discuss individual sectors of the industry in some detail.

For convenience of analysis the industry's products have been grouped into five major divisions: heavy electrical apparatus; miscellaneous electrical apparatus; major appliances; other appliances; and radio and other electronic equipment. The principal components of each of these groups are shown in Table 10.

In a general way the heavy apparatus group comprises equipment used in the generation, distribution, control and measurement of electric power, equipment used in the industrial use of that power and the specialized category of telephone and telegraph apparatus. The two appliances groups cover equipment that is used mainly in the home and the miscellaneous group includes a rather mixed group of equipment many items of which are used both by industry and the individual consumer.

As the data in Table 11 indicates, over the past 25 years, there has been a significant decline in the relative importance of the first two groups of apparatus, heavy and miscellaneous, and a marked increase in the last three groups. The growing relative importance of the electronics and radio group under impact of television has been very rapid in recent years.

Table 10

Gross Value of Production of Electrical Apparatus, Canada, 1954, by Main Product Groups

		Thousand dollars
I	*Heavy Apparatus*	
	Meters and instruments	10,277
	Industrial control equipment	13,488
	Motors and parts (includes converter equipment)	42,225
	Generators and parts	14,366
	Welding apparatus	5,531
	Transformers and parts	49,615
	Switchgear and protective equipment	41,877
	Telephone materials	53,292
II	*Miscellaneous Apparatus*	
	Wire and cable	122,929
	Wiring devices	12,241
	Lighting fixtures	25,577
	Lamps	19,704
	Batteries	29,193
	Conduits and fittings	8,897
	Pole line hardware	8,654
	Cutouts and fuses	3,077
	Electro-therapeutic equipment	367
	Signal systems	2,394
III	*Major Appliances*	
	Refrigeration equipment	67,622
	Ranges, rangettes, cookingplates and parts	27,818
	Washing machines	24,236
IV	*Other Appliances*	
	Vacuum cleaners	7,363
	Floor polishers	4,595
	Flat irons	4,089
	Toasters	2,757
	Heating pads	408
	Food mixers	2,402
	Water heaters	3,709
	Clothes dryers	3,018
V	*Radio, T.V. and other Electronic Equipment*	236,585

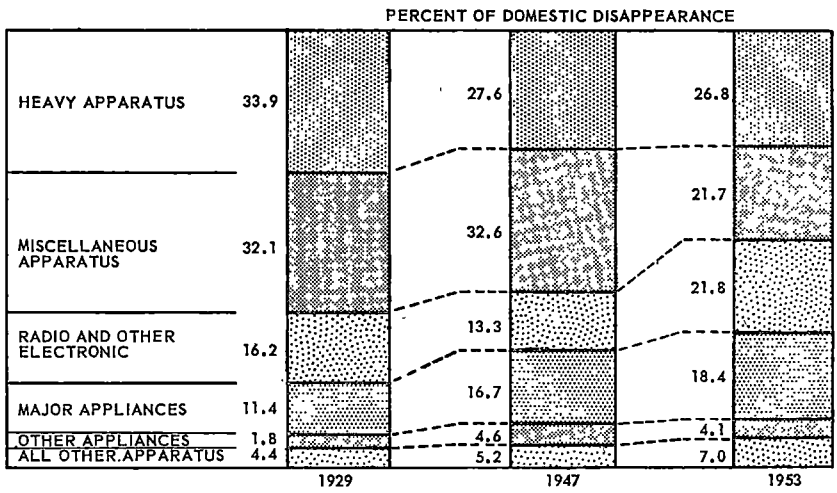
Note: All data except Group V are for production by all industries.
Source: *Electrical Apparatus and Supplies Industry*, 1954, Dominion Bureau of Statistics.

Competitive Structure of the Domestic Market

Competitive conditions in the Canadian market vary widely. At one extreme are products that are produced by but two or three Canadian firms as is true of the largest types of generators, motors, transformers and switchgear, lamps and telephone and telegraph apparatus. In these instances, if

TABLE 11

RELATIVE IMPORTANCE OF MAJOR PRODUCT GROUPS IN THE CANADIAN MARKET FOR ELECTRICAL APPARATUS, 1929, 1947 AND 1953



SOURCE: ADAPTED FROM DATA IN THE KNOX REPORT.

import competition is ineffective because of the tariff level or other barriers to the entry of foreign goods, prices are likely to approach a monopoly level either through tacit or outright agreement among these few firms. But when, as has been true recently of heavy apparatus, there is a substantial volume of imports at low or moderate prices the market may become extremely competitive. At the other extreme are products where the number of Canadian producers is large and competition is keen even in the absence of import competition. This would appear to be true in Canada for many types of lighting fixtures, cord sets, some small appliances and a number of types of small heating and cooking equipment. In between these extremes there is a broad group of equipment where the number of Canadian firms is comparatively small, say from five to fifteen. For these products competition will vary in severity according to the ease with which imports enter the market and according to the degree of concentration of production in Canada.

Some data on the degree of concentration in the electrical manufacturing industry in Canada and the United States are given in Tables 12 and 13. In Canada concentration is very high, four firms accounting for 90% or more of the total value of output, for watt-hour meters, generators, large power transformers, telephone equipment, lamps, dry cell batteries, electrical conduit and fittings, automatic washing machines, electric floor polishers, and electric food mixers. In addition, there are only five producers of converter equipment and six producers of capacitors. Concentration is moderately high, with the four largest firms accounting for over 72% of total output and the eight largest for 90% or more, for industrial control equipment, electrical wire and cable, storage batteries, pole line hardware, signal systems, house-

Table 12

Concentration of Production, by Value, Electrical Manufacturing, Canada, 1954

	Percentage of Total Output by 4 largest producers	by 8 largest producers
Heavy Apparatus		
Watthour meters	100	
Industrial control equipment	84	98
Motors and parts, total	66	84
Motors, 5 h.p. and under	65	90
Converter equipment	(5 producers only)	
Generators and parts	100	
Transformers and parts, total	58	77
Distribution transformers, 200 k.v.a. and under	53	84
Power transformers, 201 k.v.a. to 7,500 k.v.a.	58	88
over 7,500 k.v.a.	100	
Switchgear and protective equipment	55	70
Power circuit breakers	72	79
Telephone materials	99	100
Miscellaneous Apparatus		
Electrical wire and cable	75	91
Wiring devices	51	85
Lighting fixtures	34	53
Lamps	100	
Batteries, electric storage	74	97
Batteries, dry cell	100	
Cutouts and fuses	61	92
Conduit and fittings, electrical	100	
Pole line hardware	72	94
Signal systems, all types	80	98
Capacitors	(6 producers only)	
Major Appliances		
Electric refrigerators, household	77	99
All other electric refrigeration equipment	70	81
Electric washing machines, conventional	52	81
Electric washing machines, automatic	91	100
Electric ranges, over 35 amps.	60	80
Electric clothes dryers, automatic	66	98
Other Appliances		
Vacuum cleaners and parts, electric	79	100
	(7 producers only)	
Electric flatirons	88	96
Electric toasters	72	93
Electric food mixers	(3 producers only)	
Electric floor polishers	90	100

Source: Dominion Bureau of Statistics.

hold refrigerators, vacuum cleaners, electric flatirons and toasters. In the product groups covered, concentration in Canada is lowest for lighting fixtures, switchgear and protective equipment, wiring devices, conventional washing machines, distribution and small power transformers, and electric ranges. In almost all products production in Canada is more highly concentrated than it is in the United States.

Table 13

Concentration of Production, by Value, Electrical Manufacturing, United States, 1947

	Percentage of Total Output by 4 largest producers	by 8 largest producers
Heavy Apparatus		
Electrical measuring instruments	61	74
Electrical control apparatus	49	62
Motors and generators	59	66
Electrical welding apparatus	46	58
Transformers	73	84
Telephone and telegraph equipment	96	98
Watthour meters	100	—
Miscellaneous Apparatus		
Wiring devices	22	36
Lighting fixtures	18	26
Lamps	92	96
Storage batteries	62	78
Primary batteries, dry and wet	76	95
Appliances		
Refrigeration equipment[x]	41	59
Domestic laundry equipment	40	64
Vacuum cleaners	61	87
Electrical appliances[y]	36	47

[x]Concentration of Employment, 1950.

[y]Includes electric ranges and small appliances.

Source: Federal Trade Commission, *Report on Changes in Concentration in Manufacturing,* 1935 to 1947 and 1950. (Washington, 1954).

Though the reasons for this particular pattern of concentration are not entirely clear it appears to reflect in a rough way the size of plant needed for efficient operation. Thus, in the production of large generators and power transformers the very size of the final product requires a manufacturing plant of considerable size and in the limited Canadian market there is room for only a small number of producers. At the other extreme, lighting fixtures, wiring devices and conventional washing machines can apparently be produced efficiently in plants of relatively modest size and as a result concentration for these products is relatively low.

In the appliance field concentration is slightly higher for small appliances than it is for large appliances. For example, the percentage of total output of electric refrigerators, ranges and clothes dryers produced by the four largest producers is lower than it is for electric flatirons, vacuum cleaners, floor polishers and food mixers. Since it has been reported that the size of plant required for an efficient operation in the output of refrigerators is extremely large, the moderate concentration here calls for some explanation. It may be due to the fact that an assembly operation can be carried on efficiently with a relatively moderate volume of output and all Canadian producers import at least some of their components, the proportion being much higher for some producers than it is for others.

Factors other than the size of plant are also important in explaining variations in the degree of concentration. For lamps, output would undoubtedly be highly concentrated in any case because of the virtual patent monopoly formerly held by the General Electric Company. Patents, the need for a close tie-up with a firm possessing important research facilities, and the ownership relation between Bell and Northern undoubtedly explain the high concentration in telephone materials. Where patents and technical knowledge are important high concentration in the United States and the United Kingdom will frequently lead to high concentration in Canada also.

Canada's higher concentration as compared with the United States is due primarily to the small size of her market which leaves room for fewer production units of an efficient or optimum size. As a result not all of the major firms that operate in the United States establish branch plants in Canada. But this principle is modified in several ways. First, in the United States some of the major firms have more than one plant in some product lines and some of their plants may be much larger than is needed for a low cost operation. Second, Canadian plants frequently do not specialize to the extent that would be justified on grounds of efficiency. For example, in the output of wire and cable a number of Canadian plants produce a complete range of products even though their volume on many of these is too small to secure minimum costs. Again, as was pointed out above, Canadian plants may restrict themselves to an assembly operation on some products and import components from the United States. Since a large output is not required for an efficient assembly operation this reduces the degree of concentration in Canada. For all these reasons the difference between concentration of output in Canada and the United States is less than might have been expected on the basis of the size of plant needed for optimum efficiency.

Where the number of firms in Canada is sufficiently small and where import competition is restricted by the tariff a price leader may develop who sets a price believed to be in the interest of the industry as a whole. In other instances, as was formerly true of wire and cable, secret price agreements may be negotiated. In either case prices and profit levels are likely to be higher than would be true in a more competitive situation. Higher than normal profits will tend to attract new firms into the industry unless entry is limited in some way. Patents, the high cost of advertising expenditures, the large amount of capital needed to begin production or the large size needed for efficient production may all act as barriers to the entry of new firms. Where barriers to the entry of new firms are ineffective a policy of pricing up to the laid down price of the foreign product may result in an excessive number of firms and an insufficient degree of specialization in the Canadian market. In Canada, some of the above barriers to entry are likely to be absent because of the nearby existence of large American or British firms with the necessary financial resources and access to patent rights. In addition, the impact of advertising through American media tends to build

up a market without added cost on brands that are not already produced in Canada, thus encouraging the establishment of branch plants in Canada. Hence, only if the size needed for efficient output is large is there likely to be an effective barrier to the entry of new firms. However, if the American or other foreign firms who may be considering entry into the Canadian market are accustomed to oligopoly profit levels in their own market they will be unlikely to enter the Canadian market unless the funds they have available for investment can earn as much in Canada as they could if invested in the United States.

How widely applicable is this set of conditions in the electrical manufacturing industry? It seems likely that it applies to a limited range of products. Where the tariff is low enough to allow the import of a significant volume of goods the Canadian price will be determined by the laid down foreign price irrespective of the number of firms producing in Canada. Only where the tariff is high enough to keep out the foreign product almost entirely is there room for some measure of tacit or formal price agreement among Canadian producers. Tariffs are high enough to make this possible for wire and cable, watthour meters, lamps, and batteries and in all of these fields the volume of imports has been very small. However, for lamps, patent agreements until recently enabled the General Electric Company to control competition throughout the North American continent. Thus, wire and cable batteries and watthour meters appear to be the primary examples of this pattern of market behaviour. Current prices of watthour meters suggests that prices are based on the laid down U.S. price. According to the Goldenberg report this was also formerly true of a substantial range of wire and cable. However, current prices of all but a few lines of wire and cable are well below the laid down U.S. price. On most of the larger volume items, lamp prices in Canada are only slightly higher than those in the United States. There may be other products or product lines where import competition is ineffective and where oligopoly pricing in the Canadian market results but the available statistics on imports are not detailed enough to reveal them.

For a wide range of products electrical goods are imported in some volume and the laid down price of these imports will determine prices in Canada. In these instances the degree of competition will be determined by the total number of Canadian and foreign suppliers and in most instances the number will be comparatively large. In the appliance field there is competition in the form of product differentiation and advertising as well as in price. In recent years technological progress and style changes have been fairly rapid, particularly for refrigerators, automatic washing machines and electric ranges. In the industrial field many of the products have been in existence for a long time and technical improvements are less important. Here, recent changes have primarily taken the form of the use of new and better materials or of new designs that economize on materials and space.

The market for electrical goods is influenced in some fields by the presence of large buyers. Thus in the appliance field large department stores such as Eatons and Simpsons-Sears contract to have appliances made under their own brand names by some of the major Canadian or American producers. For example, Kelvinator produces refrigerators for Simpsons-Sears and Frigidaire does the same for Eatons. And the large discount appliance stores such as George's and Eddy Black's in Toronto often buy in carload lots. These large buyers probably help to keep prices down both through their ability to bargain for a favourable price on a large quantity order and because of the increased volume of output they give to the producing firms concerned. Large buyers are also important in the telephone and telegraph field, in electrical equipment for automobiles such as batteries and sealed beam headlights and in electrical equipment for the railroads.

In some areas of the industrial field a variety of electrical equipment is sold as parts for a large industrial control operation. Here, the supplier provides both the equipment and the engineering services needed to design and install the equipment. On contracts of this kind the large full line producer such as Canadian General Electric or Canadian Westinghouse have a special advantage.

In the telephone materials field the major Canadian producer, Northern Electric, is controlled by the Bell Telephone Company and the British Columbia Telephone Company also buys much of its equipment from a related manufacturing company. In addition to supplying most of Bell's requirements, Northern Electric also sells its equipment extensively on the prairies and in the Maritimes. Northern's contract with Bell provides that "prices shall be as low as to the electric company's most favoured customers for like materials and services under comparable conditions." While more intense import competition may reduce the price at which Northern sells to Bell, it is unlikely to capture any significant share of that market.

Import Competition in the Canadian Market for Electrical Equipment: Its Extent and Importance

Canadian electrical producers are subject to two main types of foreign competition. On the one hand because of their smaller market and shorter production runs they find it difficult to meet the competition of the mass produced electrical goods imported from the United States. Competition from the United States is particularly strong in major appliances where style and new technical improvements are important and where the optimum production unit is large. On the other hand, as has been true recently, they sometimes find the competition of the low wage European producer very severe in heavy custom built apparatus such as large generators, motors and transformers, power cables, switchgear, and some types of telephone and telegraph apparatus.

Table 14

Production, Imports, Exports, and Domestic Disappearance of Electrical Apparatus and Supplies Canada, Selected years, 1929-1954

Year	(1) Gross Value of Production	(2) Imports	(3) Exports	(4)=(1)+(2)—(3) Domestic Disappearance	(5) Imports as % of Domestic Disappearance	(6) Imports as % of GVP	(7) Exports as % of GVP
			Million dollars				
1929	124.9	41.3	4.4	161.9	25.5	33.7	3.5
1937	110.5	18.2	6.1	122.6	14.8	16.4	5.5
1946	255.8	62.0	21.8	295.7	21.0	24.2	8.5
1947	400.8	100.8	25.9	475.8	21.2	25.2	6.4
1948	478.1	82.8	23.7	537.3	15.4	17.3	4.9
1949	540.4	92.7	17.6	615.3	15.1	17.2	3.3
1950	641.9	116.2	17.0	741.1	15.7	18.1	2.6
1951	739.4	171.4	24.8	886.0	19.3	23.2	3.4
1952	782.0	202.5	49.0	938.5	21.6	25.9	6.3
1953	919.3	278.2	42.7	1164.7	24.9	30.3	4.6
1954	927.4	282.7	27.7	1183.4	23.9	30.5	3.0

Note: In this Table, the definition of the industry for both production and trade is broader than the DBS classification.

Source: F. A. Knox, C. L. Barber and D. W. Slater, *The Canadian Electrical Manufacturing Industry: an Economic Analysis* (Toronto, 1954). Hereafter this publication will be cited as *The Knox Report.*

Table 15

Major Groups of Electrical Products: Imports as a percent of Domestic Disappearance

Year	Heavy Electrical Apparatus	Miscellaneous Electrical Apparatus	Major Appliances	Other Appliances	Radio and Electronic Equipment	Total Industry
1929	31.7	14.1	27.2	31.0	40.8	25.5
1937	23.4	9.0	17.8	8.5	17.2	14.8
1947	28.6	10.6	33.2	29.2	22.2	21.2
1949	23.6	6.7	15.3	12.0	23.3	15.1
1950	23.1	6.8	17.2	11.6	23.6	15.7
1952	28.0	9.2	33.0	20.9	25.1	21.6
1953	28.1	12.2	36.3	25.8	29.2	24.9
1954	28.1	13.1	33.6	28.3	27.4	23.9

Note: Domestic Disappearance is defined as the Gross Value of Canadian Production plus imports minus exports.

Source: The Knox Report and Dominion Bureau of Statistics, Census of Industry and Trade of Canada.

Overall imports provide just under 25% of the total value of electrical goods used in Canada. During the past few years some 87% or 88% of these imports has come from the United States, some 8% to 10% has come from the United Kingdom and the remaining 3% or 4% has come from all other countries. In respect to finished products, these data overstate the relative importance of competition from the United States for a significant part of our purchases across the border consist of parts and components or of finished goods that are complementary to rather than competitive with Canadian production. In contrast, the major portion of our imports from the United Kingdom are final products rather than parts but a significant part of the total, some 27% in 1953, consists of thermal generating equipment which is not directly competitive with anything produced in Canada. Data on the relative importance of imports in the Canadian market as a whole and in each major sector of the industry are given in Tables 14 and 15.

The extent of import competition in different electrical products is dependent to a significant extent on the amount of *effective tariff protection* received by these products. *Effective protection* is a measure of the extent to which a tariff makes it possible for a firm's conversion costs or the value it adds through manufacture to exceed those of its competitor in another country.[1] As such it may differ significantly from the level of the actual tariff rate. For example, if in the manufacture of a certain kind of electrical cable the cost of raw materials makes up 60% of the total selling value of the product, then the manufacturer's conversion costs or the value he adds through manufacture will be 40% of the total. If the tariff rate on this cable is 20% and if the Canadian manufacturer can buy his raw materials as cheaply

[1]See C. L. Barber, "Canadian Tariff Policy", *Canadian Journal of Economics and Political Science*, November 1955, pp. 513-531.

as his foreign competitor, then the effective level of protection to the Canadian manufacturer will be 50%; on cable valued at $100 the duty of $20 is equivalent to 50% of the $40 worth of conversion costs embodied in the cable. Thus the effective level of tariff protection on a particular product may vary widely from the formal tariff rate depending on the product's raw material content and the price at which these materials can be purchased.

In the heavy apparatus field the import share of the market is particularly high for instruments and meters, generators, industrial control equipment and welding apparatus. Only for transformers is the import share comparatively low, 10% or less. For the remaining products in this field, electric motors, switchgear and telephone and telegraph apparatus, imports supply from 20% to 25% of the Canadian market. The higher proportion of instrument and meter imports is largely accounted for by specialized equipment of a type not produced in Canada. Imports of meters that are competitive with Canadian production supply well below 20% of the market in Canada. For watthour meters, the largest volume product of domestic firms, imports are of minor importance. For generators also, a significant portion of total imports consists of equipment that is not produced in Canada, mainly steam-turbogenerators. However, even when imports of this product are excluded the import share of the Canadian market for generators still amounted to 44% in 1954 (see Table 16). In the main these imports consist of diesel powered generating sets or parts and accessories from the United States. Imports of the important waterwheel generators which make up the bulk of Canadian production have never been of any importance in the past though the industry has lost a number of orders on this equipment to European suppliers within the last year or two.

If more detailed information were available it would undoubtedly reveal that the degree of import competition varies widely in each product group. For example, data on imports of electric motors from the United States indicate that about two-thirds of the total consists of railway and other vehicle motors and of motor vehicle parts. Imports of small electric motors (¾ h.p. and under) from the United States, our principal foreign supplier, were only about 10% of Canadian output in 1954 (see Table 17). Though imports of the larger sizes of motors were relatively more important they were still below 20% of Canadian requirements.

For the heavy apparatus group as a whole, imports have supplied about the same share of the Canadian market as they did in 1929. For two products, instruments and meters, and generators, the import share has increased substantially since 1929. For meters and instruments this entire increase can be attributed to a rise in the volume of specialized instruments that are not produced in Canada. For generators, almost all of the increase is accounted for by the increased import of thermal equipment and by a rise in imports from the United States. In contrast, the import share of the market for four

other groups of products, industrial control equipment, switchgear, electric motors and telephone and telegraph equipment, has declined moderately since 1929. The comparatively large decline for electric motors is partly due to a recent change in the statistical and tariff treatment of motors that are imported attached to other equipment.

The lower import share of the market in the transformer field has been attributed to the advanced state of Canadian transformer design and to the lack of good quality transformer steel in Europe. In addition, the lower tariff rate that has been applicable on silicon steel has increased the effective rate of protection on this product. Silicon steel has been subject to an intermediate tariff rate of 12½% though this has been reduced to zero under a temporary order in council for the past year or two.

In general, for most classes of equipment in the heavy apparatus field Canadian producers have been able to maintain or increase their share of the domestic market since 1929. But on the heaviest type of equipment, such as large power transformers, waterwheel generators and power circuit breakers imports have been kept from increasing only by sharp price reductions on the part of Canadian producers. The decline in import shares in a number of areas probably reflects the increasing ability of the Canadian industry to meet foreign competition as a result of the growth in the size of the Canadian market and the more economical level of production this has made possible. This gain in the competitive power of the Canadian industry must have been substantial for tariff reductions during this period reduced rates on imports of heavy apparatus from the United States from 27½% to 22½%. Tariffs on imports of heavy apparatus from the United Kingdom are about the same today as they were in 1929 except for a reduction from 15% to 10% on telephone and telegraph equipment and a reduction from 15% to free for large steam turbo-generators. Under the intermediate rates applicable to most other countries tariff rates were reduced from 25% to 22½% for most types of heavy apparatus (see Table 18).

In the miscellaneous apparatus group imports are a much smaller percentage of total domestic disappearance than is true of the electrical manufacturing industry as a whole and this is true for all but one of the principal components of this group (see Table 19). The exception is cutouts and fuses and here the import share is about the same as the industry average. For two products, cutouts and fuses and lighting fixtures, there has been a very sharp decline in the import share of the Canadian market since 1929. Except for lamps the import share for most other products in this group has shown little change. The higher import share for lamps may reflect some increase in competitive conditions in this field as a result of the breaking up of the international patent cartel that formerly operated, rather than any loss in Canada's competitive power. The very low level of imports for wire and cable and for batteries undoubtedly reflects the high levels of effective pro-

Table 16

Import Share of the Canadian Market for Heavy Electrical Apparatus, by product groups, 1929, 1937, 1950 and 1952 to 1954

Type of Equipment	Import Share of the Market					
	1929	1937	1950	1952	1953	1954
			(percent)			
Instruments and Meters	20.1	15.3	29.3	40.2	40.4	46.9
Industrial Controls	50.5	34.1	44.3	48.0	42.2	38.4
Motors and Parts	40.7	23.7	22.4	31.6	24.5	22.9
Generators and Parts	27.5	54.1	35.7	50.8	47.8	50.8
Welding Apparatus	n.a.	32.7	50.8	47.8	44.6	43.0
Transformers and Parts	7.8	4.4	5.2	7.0	7.9	10.6
Switchgear	27.8	21.1	16.5	19.1	21.1	21.1
Telephone and Telegraph	27.5	15.4	22.0	22.5	24.2	21.1
Total Heavy Apparatus	28.1	21.8	21.8	26.3	28.1	28.1

Import Share excluding Certain Equipment of a Class not made in Canada

	1937	1950	1952	1953	1954
Instruments and Meters*	12.6	9.7	13.4	13.1	16.6
Generators and Parts	37.4	23.2	36.6	34.5	43.8

*Percent of imports and gross value of production. Data for exports of meters are not available prior to 1945. Imports of meters and parts of a kind made in Canada as a percent of domestic disappearance would be from 2 to 3 percentage points higher than the data shown for the years 1950 to 1954.

Source: Adapted from *The Knox Report*, Trade of Canada and Annual Reports on Electrical Apparatus and Supplies Industry, Dominion Bureau of Statistics.

tection enjoyed by these products. On wire and cable the 20% and 22½% intermediate tariff provides an average level of protection in the neighbourhood of 40% to 45%, although this varies a good deal for different classes of wire and cable. On some of the simpler types of wire it may be as high as 100%. On storage batteries the 22½% intermediate tariff gives an effective protection of from 45% to 50% and on dry cell batteries the same tariff provides an effective protection of about 30%. A higher than average amount of effective protection is also a factor in limiting the import of lamps. For lighting fixtures the optimum size of plant is apparently comparatively small, especially for residential fixtures, and this would explain the moderate importance of imports. The same would appear to be true for wiring devices. A number of medium size and small plants produce this class of product and these plants can probably sell cheaply enough to keep out imports in most lines. Thus, higher than average levels of effective protection in some fields and the ability of Canadian firms to achieve efficient production levels in others explain the low volume of imports in the miscellaneous apparatus group.

Table 17

Heavy Apparatus, Canadian Production and Imports from the United States, 1954, by Products

	Million dollars	
	Canadian Production	Imports from United States
Meters and Instruments, total	10,277	8,104
Meters, watt-hour and other integrating	7,368	201
Indicating instruments, non-recording		1,062
Recording instruments electrical, n.e.c.		514
Testing instruments electrical, n.e.c.		5,567
Measuring and indicating instruments, parts		760
Industrial Control Equipment, total	13,488	3,807
Motor controls and parts, materials hdlg. eq.		709
Motor controls and parts, special purpose		464
Motor controls, industrial		2,634
Motors and Parts	39,861	13,001
Motors, electric ⅛ h.p. and under	12,150	1,105
Motors, electric, over ⅛ and under 1 h.p.	2,325	551
Motors, electric, 1 h.p. up to and including 200 h.p.	11,622	2,206
Motors, electric, over 200 h.p.	2,882	456
Electric propulsion motors and parts, land vehicle	3,640	5,892
Electric motor parts, n.e.c.		2,791
Generators and Parts	14,366	5,778
Generators, D.C.		1,151
Generators, A.C.		656
Generator parts and accessories, n.e.c.		466
Generator sets, steam turbine		664
Diesel powered generator sets		2,238
Generator sets, self-contained ex. diesel		586
Wind driven generator sets		17
Welding Apparatus	5,531	
Welders, arc, A.C. and D.C.	1,213	1,172
Resistance welding sets	1,530	586
Welding rod	3,635	
Transformers and Parts	49,615	3,826
Power Transformers	18,856	377
Instrument Transformers		311
Fluorescent ballasts	3,455	746
Regulators electric	992	518
Specialty transformers		748
Transformer and regulator parts		1,126
Switchgear and Protective Equipment	41,877	7,729
Switchboards and panel boards	20,711	1,053
Circuit breakers and switches, oil		325
Switches, power, circuit breakers and parts, n.e.c.		6,351

Source: *U.S. Export Statistics* and *The Electrical Apparatus and Supplies Industry, 1954*, Dominion Bureau of Statistics.

Table 18

Heavy Electrical Equipment—Tariff Rates 1929-1953 (percent)

Tariff	Classification	Year	British Preference	MFN or intermediate	Gen.	U.S.
445f	Electric dynamos or generators and transformers and complete parts thereof N.O.P.	1929	15	25	27½	27½
		1930	15	25	27½	27½
		1931	25/10	33⅓	37½	37½
		1936	25/10	33⅓	37½	30
		1937	15	33⅓	37½	30
		1938	15	33⅓	37½	25
		1947	15	22½	37½	22½
445g	Electric motors and complete parts thereof N.O.P.	1929	15	25	27½	27½
		1930	15	25	27½	27½
		1931	25/10	33⅓	37½	37½
		1936	25/10	33⅓	37½	30
		1937	15	33⅓	37½	30
		1938	15	33⅓	37½	25
		1947	15	22½	37½	22½
445h	Electric insulators of all kinds and complete parts thereof N.O.P.	1929	15	25	27½	27½
		1930	15	25	27½	30
		1931	15	25	27½	30
		1936	15	25	27½	25
		1947	15	22½	27½	22½
445k	Electric apparatus and complete parts thereof, including instruments and meters, industrial control equipment, and switchgear and protection equipment.	1929	15	25	27½	27½
		1930	15	25	30	30
		1931	15	25	30	30
		1936	15	25	30	25
		1947	15	22½	30	22½
446g	Welding apparatus.	1929	—	—	—	—
		1937	10	—	—	25
		1938	10	—	—	20
		1939	5	20	30	20
445c	Electric telegraph or telephone apparatus and complete parts thereof.	1929	15	25	27½	27½
		1931b*	15	25	30	30
		1932b	Free	25	30	30
		1933tg	Free	25	30	—
		th	10	25	30	30
		1936tg	Free	25	30	25
		th	10	25	30	25
		1947th	10	22½	30	22½
446	Electric steam-turbo generator sets, 700 h.p. and greater of a class or kind not made in Canada, and complete parts thereof.	1922	15	25	27½	27½
		1931	Free	15	20	20
		1932	Free	20	25	25
		1947	Free	20	25	20

Source: The Customs Tariff and Amendments.

*Abbreviations: b both, tg telegraph, th telephone.

Table 19

Miscellaneous Electrical Apparatus: Imports as Percent of Domestic Disappearance in Canada, Selected Years

	1929	1937	1947	1950	1952	1953	1954
Wire and Cable	5.4	2.4	4.5	2.1	3.1	3.0	3.7
Wiring Devices	11.0	1.1	5.6	4.3	9.0	10.5	12.1
Lighting Fixtures	44.8	29.4	26.1	16.3	17.8	19.1	17.9
Lamps	4.8	12.2	19.0	6.0	11.2	19.0	15.3
Batteries	5.2	3.3	5.0	3.8	6.5	7.4	8.4
Cutouts and fuses	36.3	15.5	16.0	12.5	16.0	21.3	23.7
Total Miscellaneous	14.1	9.0	10.6	6.8	9.2	12.2	13.1

Source: The Knox Report and Dominion Bureau of Statistics, Census of Industry Reports and Trade of Canada.

Table 20

Miscellaneous Electrical Equipment Rates of Custom Duty (percent)

Tariff	Classification	Year	British Preference	MFN or intermediate	Gen.	U.S.
350	Wire of all metals and kinds, n.o.p.	1906	15	17½	20	20
		1930	15	17½	20	20
		1932	10	30	35	35
		1936	10	30	35	30
		1948	10	20	35	20
351	Wire, single or several, covered with any material, including cable so covered, n.o.p.	1906	20	27½	30	30
		1930	20	27½	30	30
		1931	20/10	27½	30	30
		1936	20/10	27½	30	27½
		1947	20/10	20	30	20
351a	Wire, twisted, braided or stranded, including wire rope and wire cable, coated or not, n.o.p.	1930	17½	22½	25	25
		1936	17½/10	22½	25	22½
			(unchanged by GATT)			
445k	Electrical apparatus n.o.p.	1929	15	25	27½	27½
		1930	15	25	30	30
		1936	15	25	30	25
		1947	15	22½	30	22½
445a	Electric head, side and tail lights, n.o.p., electric torches or flashlights.	1930	15	27½	30	30
		1931	20/10	27½	30	30
		1938	20/10	27½	20	27½
		1947	20/10	22½	30	22½
445b	Electric arc lamps and incandescent electric light lamps, n.o.p.	May 1930	15	27½	30	30
		Sept. 1930	20/10	30	30	30
		1947	29/10	25	30	25
445c	Electric and galvanic batteries.	1929	15	25	27½	27½
		1936	15	25	27½	25
		1947	15	22½	27½	22½
445	Electric light fixtures and appliances n.o.p. and complete parts thereof.	May 1930	15	27½	30	30
		Sept. 1930	20/10	30	30	30
		1938	20/10	30	30	27½
		1947	20/10	22½	30	22½

Source: Customs Tariff.

Table 21

Major Appliances: Import Share of the Canadian Market (percent)

Year	Refrigerators	Cook[1] Stoves	Washing Machines	All major Appliances	Total Electrical industry
1929	64.6	15.7	15.9	27.4	25.5
1937	18.6	20.0	15.0	17.7	14.8
1946	33.9	30.8	12.8	29.0	21.0
1947	36.5	31.2	27.7	33.2	21.2
1948	21.9	18.3	6.4	16.6	15.4
1949	17.6	19.1	5.8	15.3	15.1
1950	18.0	20.6	9.1	17.2	15.7
1951	30.4	23.8	11.8	26.3	19.3
1952	42.0	22.5[1]	10.7	33.0	21.6
1953	44.0	28.3[1]	16.6	36.2	24.9
1954	39.0	30.3[1]	18.6	33.6	23.9
1955					

Source: The Knox Report, p. 24 and Dominion Bureau of Statistics, Census of Industry Reports and Trade of Canada.

1. The data in this group include miscellaneous cooking and heating equipment and parts. The import share of the Canadian market for finished electric stoves is much smaller; in recent years the import share by value and by volume is as follows:

	1952	1953	1954	1955
Electric Stoves				
Value of Imports as % of Consumption.	4.31	7.50	9.18	10.51
Volume of Imports as % of Consumption	4.25	7.72	8.86	10.48

For most products in this group import shares have remained stable or declined since 1929 despite substantial tariff reductions on imports from the United States. The tariff applicable on imports from the United States declined from 30% to 22½% for lighting fixtures, from 27½% to 22½% on wiring devices, batteries and cutouts and fuses, from 30% to 25% on lamps and by amounts ranging from 0 to 5 percentage points on different types of wire and cable. The preferential tariff on the various types of power cable on which producers in the United Kingdom are competitive has declined only slightly since 1929, from 20% to 18% for one class of cable and from 17½% to 15% for another class (see Table 20).

Canadian Tariffs in the Heavy Electrical Appliances Field

In the major appliance group the import share of the Canadian market is particularly high, 40% or more in recent years, for refrigerators, it is moderately high, about 30%, for all cooking and heating apparatus, and it is well below the industry average for electric ranges and washing machines (see table 21).

The high level of import competition for electrical refrigerators undoubtedly reflects the large size of production unit needed to obtain an efficient operation; according to evidence presented to the Commission one efficient plant along United States lines could produce all of Canada's present requirements for refrigerators and still not be operating at capacity. For electric ranges the requirement of the Canadian Standards Association that all stoves must have individual fusing on their elements, rather than the block fusing which is customary in the United States, undoubtedly increases costs for the foreign producer who wishes to sell in the Canadian market and hence limits the volume of imports. The recent increase in the proportion of electric ranges imported may reflect some slackening in the strictness with which this provision has been enforced in some provinces. Imports of standard wringer type washing machines are a minor factor in the Canadian market; imports in 1954 amounted to only about 3% of Canadian production.

In contrast, for semi-automatic and automatic washing machines imports supplied about one-third of the Canadian market in 1954. On the conventional washer which still predominates in Canadian sales, an efficient manu-

Table 22

Major and Small Appliances, Customs Tariff Rates, 1929-1953
(percent)

Tariff	Classification	Year	British Preference	MFN or intermediate	Gen.	U.S.
415a	Refrigerators, domestic or store, completely equipped or not	1930	12½	20	25	25
		1930	12½	20	25	25
	(i) Electric.	1932	20/10	35	40	30
		1936	20/10	35	40	30
		1938	20/10	35	40	25
		1947	20/10	22½	40	22½
		1951	20/10	20	40	20
415a	(iii) Refrigerator parts	1953	7½	20	35	20
443	Apparatus designed for cooking or for heating buildings.	1930	15	22½	25	25
		1931	20/10	25	30	30
	(3) for electricity.	1938	20/10	25	30	27½
		1947	20/10	22½	30	22½
415b	Washing machines, domestic.	1929	15	25	27½	27½
		1930	15	25	35	35
		1936	15	25	35	25
		1947	15	22½	35	22½
415	Vacuum Cleaners.	1931	12½	20	25	25
		1936	12½	—	—	20
		1937	5	20	25	20
445j	Electric dry shaving machines.	1933	Free	Free	10	10
		1937	Free	Free	10	Free
445i	Electric flat irons and complete parts thereof.	1930	15	25	27½	
		1936	15	25	27½	
		1947	12½	22½	27½	

Source: Customs Tariff.

facturing operation can apparently be achieved with only a moderate sized plant and prices are only slightly higher than those in the United States.

Because of the marked change that has taken place in major appliances over the past 25 years any comparison of changing import shares over this period is of doubtful meaning. For washing machines and ranges the export market that had been developed in the late thirties undoubtedly contributed very substantially to the efficiency of Canadian operations at that time. However, at the present time currency and other restrictions make exports a minor factor only. On imports from the United States tariff duties have been reduced since 1929 from 25% to 20% on refrigerators, from 27½% to 22½% on washing machines and 25% to 22½% on electric ranges (see Table 22).

Though statistical data on most of the smaller appliances are relatively incomplete it is known that a substantial volume of items such as toasters, irons and food mixers are brought back into the country by tourists under their duty free allotment. Imported vacuum cleaners supplied about one-third of Canadian requirements in 1953 and 1954. Lower priced cleaners from the United Kingdom provided about 45% of Canada's imports in terms of number and about one-third in terms of value. Imports of electric irons from the United States in 1954 supplied about 6% of the total sold in Canada. Tariff reductions on appliances have been similar in amount to those that have been put into effect on other electrical products (see Table 22).

The Competitive Power of the Canadian Electrical Manufacturing Industry

For the purpose of analyzing the ability of the Canadian industry to withstand foreign competition it is convenient to group the wide range of productive operations in the industry into three general categories[1]. After discussing the main characteristics of each of these categories this section will then deal with the relative cost position of Canadian producers in respect to labour costs, productivity, material costs and equipment and other overhead costs.

At one extreme is the heavy custom built apparatus such as large water-wheel generators, large power transformers, power cable and heavy switchgear. The production of this apparatus requires very heavy and expensive machinery, but machinery which in the main is of a general purpose type, consisting of standard machine tools. Because of its custom built character, this apparatus has a large labour content,—about 40% of the selling price consists of direct and indirect labour costs—and a significant portion of this consists of the engineering and drafting staff needed to prepare plans and specifications. On some jobs these plans run to 150 to 200 pages. The labour needed to follow these plans, though not necessarily highly

[1]See evidence presented to Commission by J. H. Goss, President, Canadian General Electric Co. Ltd.

skilled is above average in skill. While labour costs are always very important the heavy fixed charges imposed by the large investment required also become burdensome if plants are not operating at a comparatively high level.

On most of this equipment the most efficient size of plant is not exceptionally large and Canadian plants can produce as cheaply as plants in the United States, Canada's lower labour costs at least balancing her higher materials and machinery and equipment costs. This is particularly true of waterwheel generators which must be designed to meet the requirements of a particular waterfall site. On thermal equipment more standardization is possible and both the United States and the United Kingdom now mass produce this equipment to some extent in standard sizes. Canadian firms do not produce this type of equipment at present and if, as was suggested in C.E.M.A.'s brief to the Commission, they plan to enter this expanding market in the future they may find considerable difficulty in meeting foreign competition[1]. Canada's handicap here will be accentuated by the fact that Canadian requirements will call for a variety of different sizes ranging from 30 to 200 megacycles.

Competition on custom built equipment is most severe from producers in the United Kingdom and other European countries such as Switzerland and Sweden. The lower wage rates in these countries give their producers an advantage which Canadian firms are currently finding it difficult to meet. For the United Kingdom and Sweden this has been particularly true since the currency devaluations of 1949. In their attempts to meet this competition Canadian producers have placed heavy stress on improved designs which are more efficient or reduce material costs and on improving productivity through better factory layout or improved production methods. They are also currently buying some materials in Europe such as German forgings to further reduce their costs.

Canadian firms derive some advantages over European firms through their closeness to the market and through their nationwide organizations which give them the ability to service their equipment and supply repair parts quickly. None of the British firms have established service organizations here in the past though there are reports that one or two of the major companies may do so in the near future. The different engineering specifications of European equipment are also a deterrent to Canadian purchasers. Plans and specifications have to be recalculated in terms of Canadian units of measurements and sometimes may even have to be translated into the English language. Further, Canadian and American standards are specified in more detail than is true in the United Kingdom and they also publish more data on the characteristics of their equipment. Purchasers of European equipment sometimes find they have difficulty getting additional information about their equipment once it has been installed.

[1]See *The Canadian Electrical Manufacturing Industry in Transition,* page 33.

Canadian utilities have on their staffs many former employees of the major Canadian producers of this equipment and this may be a factor in maintaining close relations between buyers and sellers of heavy electrical equipment. In addition, both General Electric and Westinghouse Electric maintain a central electric station engineering staff which is available without charge for consultation by central electric stations in both Canada and the United States. Through their highly qualified engineers and expensive equipment such as a.c. network analyzers and digital computers these companies are in a position to provide a very valuable service to the utilities. Neither the British or other European firms offer an equivalent service.

The quality of European equipment is generally recognized to be high although purchasers admit there is some truth in the contention of Canadian manufacturers that European equipment does not make provision for substantial overloads in excess of rated capacity as is true of Canadian equipment. It is apparently also true that producers on this continent, conscious of high wage levels, design their equipment with more regard to repair and maintenance costs than is true in Europe. The attitude of the Canadian buyer of this equipment is undoubtedly affected by his recollection that British producers sold their equipment extensively in the Canadian market for a short period following the devaluation of sterling in 1931 but within a few years lost interest and virtually abandoned the Canadian market.

Except for Canadian General Electric's new transformer plant at Guelph much of the plant and equipment used by the two major firms for the production of heavy apparatus, is old and in need of reconstruction. Moreover, a considerable expansion in production facilities will be required in the future if Canadian producers are to retain a reasonable share of the very large growth in volume of business than can be expected in this field during the next 25 years. While the construction of new plants or the renovation of existing facilities would undoubtedly contribute to a further reduction in production costs Canadian producers may be understandably reluctant to launch major investment programmes in this field in view of the uncertainty that potential European competition creates as to their profitability. This uncertainty undoubtedly underlies much of the emphasis which the industry places on the need for tariff stability and for consideration of the interests of Canada's secondary manufacturing industries.

At the opposite extreme in the industry's range of manufacturing operations is the highly mechanized production of standard goods such as lamp bulbs. In this type of operation highly automatic or semi-automatic machinery is used and the labour content per unit of output is quite low but the equipment cost per operator is high. In the production of many standard lamps Canadian costs are close to those in the United States, the Canadian market being large enough to permit more than one plant of optimum size. The Canadian General Electric Company reported that their net selling price

exceeded that of their parent company by about 2% in the case of a 60 watt incandescent bulb and a Christmas tree bulb and by a slightly larger amount, 13.5%, for a sealed beam headlamp where material costs are more important. On some products the Canadian market is not yet large enough for the output of a completely automatic machine. Thus a ribbon machine that turns out glass shells for lamp bulbs could produce all of Canada's annual requirements in about three months. With the trend towards increased automation in industry it can be expected that more and more of the industry's output will approach this type of operation, though no dramatic shifts in this direction are anticipated.

It has been suggested that an intermediate class of production is typified by electric ranges and refrigerators. Here, according to Mr. Goss, President of Canadian General Electric,

> "an intitial mass production facility would produce between 250,000 and 350,000 units per year on a two shift 80 hour basis. This would represent the smallest mass production facility that could be put in place—a minimum of at least one of a kind of each equipment or equipment group. As production requirements rise beyond this level, additional investment of the order of 20 to 30 percent is necessary to round it out. This will complete the facility and round it out to near optimum size gaining further reduction in unit costs and increasing the capacity to roughly double or in excess of 500,000 units. Beyond this fully developed facility, relatively little cost advantage will be gained by a further increase in size."[1]

If an optimum production unit can produce upwards of 500,000 units it is evident that a single plant for each product could produce all of Canada's requirements for electric ranges and refrigerators and not be employed full time.

Thus, Canadian firms have difficulty in meeting the competition of American imports on major appliances and other products where the most efficient size of plant is very large. Canadian General Electric reported that their production costs exceeded those of General Electric (U.S.) by about 15% on ranges and by 20% on refrigerators. Canadian Westinghouse reported that their factory costs on one popular type of electric range were about 22% higher in Canada than in the United States, and that the cost of a 21-inch television set was 23% higher in Canada.[2]

The costs of a Canadian firm would fall if its sales volume increased. Two different estimates of the rate at which Canadian costs would fall with in-

[1]Evidence presented by J. H. Goss, President, Canadian General Electric.

[2]Canadian Westinghouse's higher comparative cost on ranges may reflect a smaller volume as compared with C.G.E. and the higher wage level of Hamilton as compared with Montreal.

creased volume are given in Table 23. These cost comparisons assume that wage rates in Canada and the United States will remain at their present level and that the parent firm's costs do not change.[1] Both estimates suggest that the most rapid fall in costs occurs in the production range up to 100,000 units. According to the estimates given by Company A, at an annual output of 100,000 and with present wage levels Canadian costs would only exceed costs in the United States by 8% for refrigerators and by 3% for electric ranges. In contrast, Company B estimated that even if its output reached the 100,000 level its costs would still exceed those of its United States parent by 25.5% for refrigerators and by 22.5% for electric ranges. No reason has been given for this large difference in costs. It may reflect a difference in costs in the American parent firms and a difference in the size of the present plant (and per unit overhead costs) of the Canadian subsidiaries. If the parent company's costs have been overestimated, all the estimated costs appearing in Table 23 will have been increased by a constant percentage.

This decline in costs with increasing volume is due to a number of factors. Where production volume is smaller it is necessary to use the same equipment for different products or different sizes and models of the same product. Both machine and labour time are lost in changing over and costs are increased accordingly. For example, in the output of wire and cable Canadian production runs are much shorter and it is necessary to change over the wire drawing machines frequently. Further, larger volume often justifies more completely automatic equipment and more automation. Be-

[1]This decline in costs with increasing volume would not be the same as the decline that would occur in an American plant, for at small volume a Canadian plant can usually import components that are not profitable to produce in Canada, an alternative which may not be available to the American plant.

TABLE 23

ESTIMATED PRODUCTION COSTS IN CANADA AT DIFFERENT LEVELS OF OUTPUT, REFRIGERATORS AND RANGES, 1955

If Annual Output of Canadian Subsidiary reached		Canadian Production Cost as a Percent of Cost for U.S. Parent	
		REFRIGERATORS	RANGES
COMPANY A	50,000	117	112
	100,000	108	103
	150,000	105	100
	200,000	102	97
COMPANY B	50,000	138.1	126.5
	100,000	125.5	122.5
	150,000	122.8	121.2
	200,000	121.4	120.5

Data supplied by Cost Accounting Departments of the Canadian Subsidiaries.

cause automatic equipment runs continuously its annual output may be very large. Again, as is true in the output of small appliances when the volume is sufficiently large it is profitable to install automatic feeds and purchase steel in coils.

All of these principles may apply both to the output of the final product and to the production of particular components. Larger volume also reduces tooling and engineering costs on a per unit basis. Similarly the cost of designing and developing lower cost production methods is much lower per unit where volume is sufficiently large. While Canadian firms will usually have access to the new productive methods developed by their parent or a related company in the United States these methods may not be directly applicable to the smaller volume Canadian operation.

In adapting their operations to meet American competition Canadian producers do several things. Some firms restrict themselves to an assembly operation, importing parts and components from the United States or buying components from other Canadian producers. The fact that this type of operation is carried on by a number of smaller producers suggests that for a purely assembly operation an efficient level of output can be obtained with a comparatively small volume. One firm reported that it was profitable for it to import and assemble the components for an automatic washing machine even though its annual sales volume was quite small (less than 10,000).

Other producers combine the production of a number of major appliances such as ranges, refrigerators and washing machines in the same plant. This enables them to use certain equipment such as die stamping machines and enameling units on each of these products. While this permits fuller use of each equipment group, costs are increased as compared with the American production operation by the time lost in changing over from one type of product to another and by the high tooling and engineering costs on a smaller volume of output. One firm estimated that its tooling costs per unit on ranges and refrigerators amounted to $5.75 and $5.00 respectively compared with costs in the United States of $.60 and $.50 per unit on these same products. This comparison applied only to tooling costs on equivalent operations. Overall tooling costs in the United States are much higher than this because the American firm tools up and produces many parts which the Canadian firm imports. Larger volume in the United States also permits more automatic and multi-stage tooling.

Estimates of tooling and engineering costs for major appliances vary considerably. One firm reported that its total cost of tooling up an automatic washing machine had been about $200,000. This basic expenditure, which was on a machine that had been entirely designed and engineered in Canada, would be recovered over a period of three to five years, depending on the rate of obsolescence for this product. Each year a new model is brought out

but the changes involved are mainly in exterior design and trim. Their annual cost was estimated at about $5,000.

An important Canadian producer of electric ranges estimated that their tooling costs for a new electric range would vary between $400,000 and $600,000 depending upon its design and construction. An additional $100,000 or more would be required to cover the cost of designing and engineering the range. A further cost is incurred in altering the layout of the plant for production of a new model. The cost of annual modifications in style needed to keep the ranges appearance up to date was estimated at between $100,000 and $150,000. Both of these estimates were for products designed and engineered in Canada. Where, as is frequently the case, Canadian firms obtain licences to manufacture designs developed in the United States their design and engineering costs will be lower. Tooling costs are also reduced in Canada by importing components whose tooling costs are particularly high.

Because of their complex nature, because compressors must be tooled to very close tolerances and due to their large number of plastic parts, tooling costs for refrigerators are very high. One executive in the industry estimated that tooling costs on refrigerators are about three times as high as they are for electric ranges or automatic washers and that double the production volume was needed for efficient operation. Another Canadian firm estimated that its total budget for tooling refrigerators for 1957 was $750,000. This same firm estimated that the cost of tooling up to produce parts for the compressor unit would run between 1.5 and 2 million dollars. These parts are currently imported because Canadian volume would not justify an expenditure of this size. If the trend towards a more rapid rate of obsolescence now being fostered by some firms in the United States becomes more marked the handicap imposed on Canadian firms by tooling costs will be increased.

A major difficulty often faced by Canadian producers in the major appliance field results from the fact that they do not have control over their own product. Because the Canadian manufacturer imports a significant portion of his parts from the United States, minor changes in model design adopted by the parent company may make it necessary for him to incur new tooling costs on related parts of the appliance before his earlier tooling costs have been recovered. In contrast producers of small appliances appear to have their product much more under their own control. Here, the Canadian manufacturer produces almost all of his own components and since style is less important on these products he can spread his tooling costs over a longer period. Even where the parent company makes frequent changes in its own product, such as an electric iron, the Canadian plant will only change its basic model when significant improvements occur. Changes in surface trim may be made annually so that the Canadian product looks similar to the American product but fundamental changes will be made less frequently

and the Canadian firm is free to determine when it is economical to make a change. On a few major appliances such as home freezers style changes and basic improvements are less frequent and the more infrequent model changes helps to offset the very small volume available to Canadian producers.

Tooling costs on small appliances are more moderate. One estimate placed the tooling cost of an automatic toaster at $180,000 and the tooling costs for an electric floor polisher at about $100,000.

Canadian producers also adjust to their lower volume by concentrating on the larger volume models of a product and rounding out their lines by importing small volume lines from their parent organization. Where parts can be imported at a lower rate of duty than applies to the final product firms can increase their effective tariff protection by increasing the proportion of the product they import. However, this condition does not appear to be widely applicable in the appliance industry for many components carry the same rate of duty as the final product.

It seems clear that on major appliances Canadian firms do not have a large enough volume to compete effectively on even terms with producers in the United States. Standard wringer type washing machines appear to be an exception to this statement and current prices on this product are not significantly higher than those in the United States. Production of standard washers is a simpler manufacturing operation than the production of ranges or refrigerators and an efficient operation can be achieved with a much smaller volume. Since prices here are now very close to those in the United States it would appear that an efficient operation can be obtained with an output in the range of 10,000 to 25,000 per year.

As the Canadian market grows Canadian manufacturers should be able to meet United States competition on more and more electrical products since there are limits to the reduction in units costs that accompanies an increase in the size of plant; but on ranges and refrigerators either a very substantial growth or a much smaller number of producers will be needed before Canadian costs are reduced to American levels. Moreover, the trend towards more frequent model changes and an increased variety of models and colours may increase the size of plant needed for an efficient operation. Canadian firms often find themselves at a special disadvantage when a new product is being introduced and sales in Canada are very small. One firm reported that its automatic washing machines are being produced at a loss in Canada at the present time.

Because of the great variety of products in the electrical manufacturing industry it is difficult to generalize about the extent to which the industry's output falls into each of the three types of productive operation outlined above, namely, the heavy custom built type of product, the product where production is highly automated and the intermediate type product such as

appliances. If one-fourth of the wire and cable and one-half of the telephone apparatus is considered to be of the custom built type of product, where European competition is particularly effective, it can be estimated that about 15% of the industry's total output falls into this first group. It seems likely that the great bulk of the remainder falls in the intermediate group where mass production techniques are of varying importance.

For most products the size of production unit needed to obtain unit costs comparable to those in other countries is probably smaller than is true for electric ranges and refrigerators. But the pattern of output is frequently similar. In the small appliance field for example Canadian firms typically produce a variety of products in the same plant whereas in the United States, the larger firms, at least, have separate plants for each product. Thus General Electric (U.S.) has separate plants for each of the following products: irons; mixers; fans; vacuum cleaners; heating pads and blankets; and for toasters; grills and percolators.

In contrast the Canadian General Electric Company has one plant at Barrie which produces some seven different small appliances (irons, mixers, floor polishers, vacuum cleaners, toasters, coffee makers and frypans). A similar difference in the degree of specialization within plants is true for many electrical products produced in Canada and the United States.

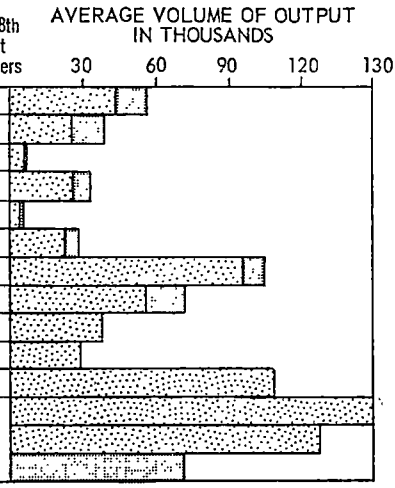
Some indication of the volume of output that obtains in Canadian firms is given by the data in Table 24. While no precise conclusions are possible on the basis of the data now available it seems likely that on a number of items where the average output attained by the larger Canadian firms is comparatively large, cost of production in Canada should be as low as or almost as low as that in the United States. This may well be true for irons, toasters, watthour meters, storage batteries, dry cell batteries and for some sizes of electric motors.

However, it must be emphasized that the total production of many electrical products in the United States is extremely large relative to output volume in Canada. Thus as the data in Table 25 show the total Canadian output of many appliances is less than 10% of the annual American output. For the industry as a whole, net value added in the production of electrical apparatus in the United States exceeded net value added by manufacture in the Canadian industry by 21 times. In the appliance field Canada's disadvantage is least, as judged by relative total volume, for floor polishers, hot plates, electric ranges, and conventional washing machines. This can be explained by a number of special factors; floor polishers have won greater acceptance and use in Canada; electric ranges are relatively less important in the United States because of the greater availability of gas; in the washing machine field the majority of Americans now buy automatic or semi-automatic equipment.

TABLE 24

VOLUME OF PRODUCTION IN 1954, LEADING CANADIAN PRODUCERS, SELECTED TYPES OF ELECTRICAL APPARATUS

SELECTED TYPES OF ELECTRICAL APPARATUS	4 Largest Producers	5th to 8th Largest Producers
HOUSEHOLD REFRIGERATORS	44.3	12.6
WASHING MACHINES, CONVENTIONAL	25.0	13.9
WASHING MACHINES, AUTOMATIC	6.3	.6
ELECTRIC RANGES, OVER 35 AMPS.	25.2	8.4
ELECTRIC CLOTHES DRYERS	3.4	1.7
VACUUM CLEANERS	22.0	5.8
FLATIRONS, ALL TYPES	96.2	8.7
TOASTERS, ALL TYPES	55.7	16.2
FOOD MIXERS	38.5	–
FLOOR POLISHERS	29.3	–
WATT-HOUR METERS	108.5	–
STORAGE BATTERIES (INTERNAL COMBUSTION ENGINE)	277.6	71.6



Labour Costs: Wage Rates and Productivity

As measured by the average hourly earnings of production workers current wage levels in the Canadian electrical manufacturing industry are about 23% below those paid in the United States and from two to three times or more higher than those paid in Western Europe (see Table 26). In December 1955 average hourly earnings in electrical manufacturing in the United States were $1.95 per hour (for a weighted average of electrical machinery, domestic laundry equipment, refrigeration equipment and lighting fixtures) compared with $1.51 in Canada. However, for some of the products where United States competition in Canada is most severe, U.S. wage levels are above the average for the industry as a whole. Thus, in December 1955 average hourly earnings in the United States were $2.22 for domestic laundry equipment, $2.17 for refrigeration and air conditioning and $1.96 for electric ranges and other appliances. In contrast, average hourly earnings in the appliance sector of the Canadian industry for December 1955 were about 3% below the industry average (see Table 27). The advantage which the Canadian producer obtains over his United States competitor through the lower wage level he faces also extends to salaried personnel. In 1953, average annual earnings of all salaried-employees in electrical manufacturing were about 28% lower in Canada than they were in the United States.

The disadvantage that the Canadian manufacturer of electrical equipment suffers because his wage levels are from two to three times as high as those paid by his competitors in Western Europe is particularly severe in respect to custom built lines of heavy apparatus where labour content is very high. While salaries and wages amount to only 30% of the selling value of all elec-

trical equipment, this represents about 55% of the value added in the industry and on heavy apparatus the proportion is much higher. One firm has estimated that on this type of equipment direct and indirect wage costs amount to about 40% of the selling price, and that a further 12% of the total is taken up by the engineering costs of designing and developing equipment. Some 70% of total labour costs would be for highly skilled labour.

As was pointed out in the Knox report wage levels in the electrical manufacturing industry increased more rapidly in Canada than they did in the United States both over the period from 1939 to 1949 and again during the more recent period from 1949 to May 1954. (see Table 28). However, since that time wage levels have remained almost unchanged in the Canadian industry whereas they have advanced a further 6% in the United States. This has eased somewhat the competitive pressure the Canadian industry faced in 1954. As a result, the 37% increase in average hourly earnings that occurred in the Canadian electrical manufacturing industry, between 1949 and December 1955 is now only slightly larger than the 34% increase that occurred during this same period in the United States. While the disadvantage to the Canadian producer that developed between 1939 and 1949 still remains, it is possible that at least part of this reflects the fact that unionization of this industry in the United States had already proceeded some distance by 1939 whereas unionization in Canada did not occur on any substantial scale until after 1941.[1] As a result wages in the Canadian industry may have

[1]See H. A. Logan, *Trade Unions in Canada* (Toronto: 1948), pp. 276-278.

TABLE 25

HOUSEHOLD APPLIANCES, ANNUAL PRODUCTION, CANADA AND UNITED STATES, COMPARED, 1954

APPLIANCES	ANNUAL OUTPUT IN THOUSANDS		CANADIAN ANNUAL PRODUCTION AS A PERCENT OF U.S.A. PRODUCTION
	CANADA	U.S.A.	% 0 10 20 30 40
VACUUM CLEANERS	116	2,782	4.2
CLOTHES DRYERS	21	656	3.2
FLOOR POLISHERS	130	325	40.0
FREEZERS, HOME	8	975	.8
HEATING PADS	113	1,675	6.8
HOT PLATES	174	710	24.6
IRONERS	6	91	6.6
IRONS	497	6,320	7.9
MIXERS, FOOD	115	1,950	5.9
RADIOS	488	6,415	7.6
RANGES, ELECTRIC	168	1,165	14.4
TELEVISION SETS	611	7,300	8.4
REFRIGERATORS	230	3,425	6.7
TOASTERS	270	3,100	8.7
* WASHING MACHINES	28	2,420	1.2
•WASHING MACHINES	192	1,230	15.6

* Autom and semiautom.
•Wringer, spin.

Source: U.S., Statistical Abstract of the United States, 1955.
Canada. The Electrical Apparatus and Supplies Industry, 1954.

been abnormally low relative to the United States industry in 1939. And, as will be pointed out below, a larger rise in productivity in Canadian manufacturing may offset some two-thirds of the remaining disadvantage.

For most European countries the effects of changes in wage rates upon the competitive position of Canadian manufacturers can be most conveniently discussed in connection with an analysis of the effects of the currency devaluations that were carried out in 1949 (see below, page 68). Switzerland is an exception here, for the value of the Swiss franc has remained almost unchanged in relation to the United States dollar since before the war. But while Switzerland has not gained any competitive advantage through exchange depreciation she has improved her position relative to Canada a great deal because of the greater stability in her wage levels. Most of this advantage has developed since 1948. Thus, between 1949 and 1955 average hourly earnings paid by Swiss manufacturers advanced only 8% compared with the 37% increase that Canadian manufacturers have had to pay. As a result Swiss manufacturers have recently been quoting prices on steam turbo-generators and other types of heavy apparatus that at times are significantly below prices quoted by British manufacturers.

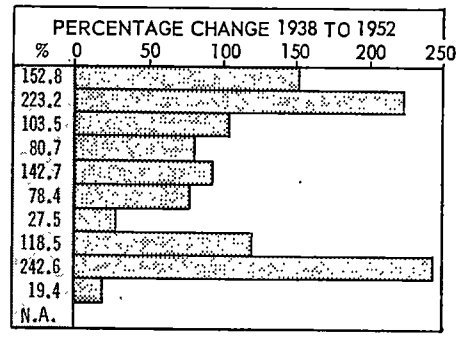
Although there are no reliable data on the relative level of worker productivity in the electrical manufacturing industries of Canada and her principal competitors the Knox report provided an estimate of the change in output per man-hour that has occurred in Canada and the United States (see Table 29). These data indicated that productivity gains in this industry during the postwar period were slightly larger in the United States than they were in Canada. In the Canadian industry output per man-hour increased an estimated 34.5% between 1946 and 1952 whereas in the United States the increase between 1947 and 1953 was estimated at 41.6%. However, over the longer period since before the war the Canadian industry showed the larger gain. Thus between 1937 and 1952 productivity in the Canadian industry increased 94%, about 29% more than the estimated 73% gain in the United States electrical manufacturing industry between 1939 and 1953. While these estimates may be subject to a substantial margin of error they suggest that the relative improvement in productivity attained by the Canadian electrical manufacturing industry during this period has been sufficient to offset about two-thirds of the relative rise in Canadian wage levels that has occurred since the late nineteen thirties.

For the electrical manufacturing industry in the United Kingdom no separate data on productivity changes are available but for the combined industry group of "engineering, shipbuilding, and electrical goods" output per employee increased about 33% between 1948 and 1955 (see Table 30). This is almost exactly the same as the increase in output per employee that occurred in the Canadian electrical manufacturing industry between 1946 and 1952. Thus these data would suggest that during the postwar period

TABLE 26

AVERAGE HOURLY EARNINGS INCLUDING WAGE SUPPLEMENTS IN THE ELECTRICAL MANUFACTURING INDUSTRY, CANADA AND SELECTED FOREIGN COUNTRIES. (IN CANADIAN DOLLARS)

COUNTRY	YEARS			PERCENTAGE CHANGE 1938 TO 1952
	1938	1948	1952	%
UNITED STATES	.741	1.495	1.873	152.8
CANADA*	.446	1.060	1.506	223.2
UNITED KINGDOM	.259	.661	.527	103.5
FRANCE	.321	.397	.580	80.7
BELGIUM	.255	.584	.619	142.7
SWITZERLAND	.250	.456	.446	78.4
NETHERLANDS	.305	.475	.389	27.5
ITALY	.168	.343	.367	118.5
JAPAN	.054	N.A.	.185	242.6
GERMANY	.345	N.A.	.412	19.4
SWEDEN	.329	.703	N.A.	N.A.



* Data for Canada for 1938 are those reported to the census of Manufacturers for one week of high employment.

Source: Adopted from data given in the United States and its Foreign Trade Position, a special study prepared by the National Industrial Conference Board.

productivity gains in the electrical manufacturing industries of the two countries have not been widely different.

Since the increased severity of import competition that developed during 1954, Canadian manufacturers of electrical equipment have been intensifying their efforts to improve their productivity and reduce their costs. According to one executive "most (electrical) manufacturing companies just started to learn how to reduce costs in 1953".[1] Efforts to reduce costs have frequently taken the form of organizing productivity teams in each department which are given annual goals in the form of cost reduction dollars. Workers at all levels have been indoctrinated with the need for cost reduction. Improvements in productivity have resulted from better purchasing techniques, changes in design, new manufacturing methods or factory layout, revised incentive payments, simplified office procedures, improved materials handling, better inventory control and many other sources.

One large company examined 3,000 ideas for cost reduction during 1954 and took action on 2,100 of them. It has been estimated that on the average about 60% of any cost reduction goal is initiated by or is due to changes initiated by design engineering personnel, 30% by manufacturing people, 7% by the purchasing department and 3% from employee's suggestion plans. This drive for lower costs reflects the industry's recognition that if they are to meet and survive the competition now offered by European manufacturers in the heavy apparatus field they will need to reduce their costs very substantially.

[1] J. W. Kerr, "The Electrical Manufacturing Industry's Drive for Lower Costs", *Proceedings of the Canadian Electrical Association*, Sixty-fifth Annual Convention, 1955, p. 200. Mr. Kerr is General Manager of the Apparatus Products Division of Canadian Westinghouse.

Raw Materials and Other Costs

On the average raw materials account for about 45% of the selling value of electrical apparatus and about 40% of these materials consist of primary iron and steel and non-ferrous metals (see Tables 31 and 32). On some products such as electric motors these latter materials make up 75% or more of all materials cost. Prices of copper, lead and zinc are about the same in Canada as they are in the United States but Canada has an advantage of about 10% in price over the United States on aluminum. For iron and steel and a wide range of other materials Canadian prices are 10% or more higher than those in the United States. To the extent that the wire and cable industry take advantage of their tariff protection, prices on wire and cable to the Canadian electrical manufacturing industry may be as much as 20% or 22½% higher than it is in the United States. However, current prices (in Jan. 1956) on a considerable range of wire and cable are slightly lower than prices in the United States and on a substantial number of other types are less than 5% higher. Mr. Titus of the Canada Wire and Cable Company has reported that prices on magnet wire are deliberately being kept down "in order to assist Canadian motor and appliance manufacturers to meet competition from low wage rate areas" and thereby maintain the demand for Canadian wire and cable.[1]

[1]Memorandum Re: *Electrical Wires and Cables,* presentation to the Commission, p. 3.

Table 27

Average hourly earnings in the Electrical Manufacturing Industry, Canada and the United States, December, 1955

	Hourly Earnings
Canada	(Canadian dollars)
Heavy Electrical Machinery and equipment	1.68
Radios and radio parts	1.33
Batteries	1.52
Refrigerators, vacuum cleaners and appliances	1.45
Miscellaneous electrical products	1.51
Total Electrical Manufacturing	1.50
United States	(United States dollars)
Domestic laundry equipment	2.22
Refrigerators and air conditioning equipment	2.17
Electrical machinery	1.92
Electrical industrial apparatus	2.03
Electrical appliances	1.96
Insulated wire and cable	1.91
Electric lamps	1.79
Radio and television	1.76
Telephone and telegraph	2.17
Storage batteries	2.09
Lighting Fixtures	1.91
Electrical Manufacturing (weighted average)	1.95

Source: Canada, Employment and Payrolls Division, Dominion Bureau of Statistics; United States.

In recent years, prices of the principal non-ferrous metals, copper, lead, zinc and aluminum have been about the same (or slightly lower) in Canada as they have in the United Kingdom. Iron and steel is also somewhat cheaper in the United Kingdom and in Western Germany and Canadian manufacturers have recently been buying some materials such as steel forgings in Western Europe.

Where components are imported their cost to the Canadian producer will normally be 20% or 22½% higher than in the United States, for most complete parts carry the same rate of duty as the final product. On both materials and components the more specialized American firm will gain some advantage through its ability to buy in larger quantities. The large firm not only can take advantage of quantity discounts and lower handling and transport costs but it may be able to bargain for particularly favourable prices.

Machinery and equipment is also somewhat higher in price in Canada than it is in the United States. The Knox report estimated that Canadian manufacturers of electrical equipment pay about 10% more for their machinery than the United States industry does. On the other hand, since construction costs may be somewhat lower in Canada, the total plant and equipment cost of the Canadian manufacturer may not be significantly different from that of his United States competitor. In addition, long term interest rates in Canada are lower than those prevailing in most countries in Western Europe and are only slightly higher than those in the United States. Thus, it is doubtful if the Canadian manufacturer suffers any appreciable disadvantage in respect to the cost of plant and equipment.

Table 28

Average Hourly Earnings, Electrical Manufacturing, Canada and the United States Compared, 1939-1954

	Canada		United States	
	dollars per hour	percent change	dollars per hour	percent change
1939	.468		.702	
1945	.705	50.6	1.053	50.0
1946	.715	1.4	1.131	7.4
1947	.847	18.5	1.279	13.1
1948	.991	17.0	1.379	7.8
1949	1.091	10.1	1.432	3.8
1950	1.147	5.1	1.465	2.3
1951	1.275	11.2	1.580	7.8
1952	1.397	9.6	1.67	5.7
1953	1.432	2.5	1.76	5.4
1954 — May	1.513	5.7	1.81	2.8
1955 — Dec.	1.505		1.92	
1939-1945		50.6		50.0
1945-1949		54.7		36.0
1949-1954 (May)		38.7		26.4
1949-1955 (Dec.)		37.4		34.3

Source: Canada, Canadian Statistical Review: United States, Survey of Current Business and Employment and Earnings.

Table 29

Productivity in the Electrical Manufacturing Industry, Canada and United States, 1937 to 1953 (Indexes)

	Output per Man hour, All Employees		Canada		
	United States	Canada	Output per Manhour Production Workers	Output per Employee	Output per Production Worker
1937	—	69.3	71.5	76.7	79.1
1939	81.9	—	—	—	—
1946	—	100.0	100.0	100.0	100.0
1947	100.0	111.8	109.2	110.2	107.6
1948	105.6	119.1	117.7	115.9	114.6
1949	118.2	123.4	124.6	122.2	123.4
1950	132.8	138.2	141.0	137.5	140.3
1951	121.2	131.5	136.8	129.9	135.2
1952	136.6	134.5	144.3	132.9	142.6
1953	141.6				

Source: The Knox Report.

Table 30

Output, Employment, and Output per Employee, Engineering, Shipbuilding and Electrical Manufacturing, United Kingdom, 1948 to 1955

	Index of Production	Number of Employees, June 30	Output per Employee
		(Indexes 1948 = 100)	
1948	100.0	100.0	100.0
1949	106.2	99.2	107.0
1950	116.4	100.4	115.9
1951	127.1	103.4	122.9
1952	126.9	107.3	118.3
1953	129.2	106.9	120.9
1954	140.1	110.1	127.2
1955	154.0	116.0	132.8

Source: United Kingdom, *Annual Abstract of Statistics*, Central Statistical Office, London.

Table 31

Materials, Wages and Other Costs in the Canadian Electrical Manufacturing Industry, by Main Product Divisions, 1952 (Percent of Gross Value of Production)

	Total Industry	Motors	Transformers
Materials	43.8	36.9	37.8
Wages	20.3	26.2	18.9
Salaries	10.1	8.7	9.2
Fuel and Electricity	.9	.7	.5
All other costs	24.9	27.5	33.6
Total, All Costs	100.0	100.0	100.0

Source: Census of Industry, Dominion Bureau of Statistics.

Table 32

Materials Used in the Canadian Electrical Manufacturing Industry, 1952

	($000)	Percent
Primary		
Copper, all forms	52,438	16.7
Iron and Steel	42,985	13.7
Lead	12,339	3.9
Aluminum	6,765	2.2
Brass and Bronze	6,100	1.9
Zinc	2,482	.8
Sub-Total		39.2
Other Materials		
Cotton and linen sheets, etc.	3,177	1.0
Paints, lacquers, varnishes	4,196	1.3
Insulators, porcelain	2,143	.7
Battery boxes and containers	2,598	.8
Lumber	1,944	.6
Wood battery separators	1,031	.3
Rubber	2,022	.7
Mica	1,187	.4
Transformer oil	1,223	.4
Radio and TV tubes and parts	26,470	8.4
Radio and TV cabinets	6,243	2.0
Electric motors purchases	1,835	.6
Packing materials	5,812	1.9
All other materials	130,723	41.7
Total All Materials	313,713	100.0

Source: Census of Industry, Dominion Bureau of Statistics.

The cost position of the Canadian manufacturer as compared with his competitors in other countries is also affected by the difference in electrical standards and in voltage and cycle characteristics of electric power in Canada as compared with these other countries. Where Canadian electrical standards are higher or differ for any reason from those in other countries it will be necessary for the foreign manufacturer who wishes to export to Canada to set up a special production run to meet these requirements. In doing so he will lose some of the advantages which he derives from mass production for his domestic market. Thus the Canadian requirement that each element on an electric range must have separate fusing increases the costs of the American producer and makes it more difficult for him to compete in the Canadian market. A difference in the characteristics of electric current will have a similar effect.

British television equipment has a different cycle and voltage level than is required in Canada and equipment produced for the domestic market in England might have to be modified before it could be sold in Canada. Because voltage levels vary widely throughout Europe and even within the United Kingdom their equipment is typically built to operate on a range of voltages. This increases their production costs. Differences in current characteristics are important only in the case of European competition. Differences in electric standards affect the competitive position of both European and American producers.

Electrical standards in Canada are determined by the Canadian Standards Association. On this body there are representatives of the Provincial Government Inspection Departments, the National Research Council, electrical contractors, industrial electricians, electrical utilities and electrical manufacturers. The C.S.A. maintains its own testing laboratories and makes it relatively easy for foreign manufacturers to have their equipment tested to see if it meets Canadian standards. However, the importer must pay the costs of having equipment tested and these costs are high enough to prevent isolated or small volume purchases. Canadian standards are higher than those in the United States on some types of wire and cable, on some lighting fixtures and on electric ranges, and these higher standards have provided some additional protection to Canadian manufacturers. However, this does not appear to have been an important factor for the electrical manufacturing industry as a whole. Electrical standards in Canada are determined on the basis of what is considered necessary from the standpoint of safety and there is no evidence that electrical manufacturers are dominant in determining these standards.

For costs as a whole the Canadian producer as compared with his United States competitor has the advantage of wage levels that are 20% or more lower but as against this he faces higher material costs and higher per unit engineering and tooling costs. Overhead costs for plant and equipment are

probably not significantly different in the two countries. The advantage that derives from the lower wage levels will be offset to varying extent on different products by the longer production runs and the more highly automated production techniques of the American producer. On heavy apparatus of a custom built character the economies of large scale production are of little significance and Canadian production costs on this type of equipment are as low as or lower than those in the United States, Canada's lower labour costs offsetting any difference on materials. But for a wide range of other products large scale output yields substantial economies and here per unit labour costs in the United States may be as low as or lower than they are in Canada.

For the cost of manufacturing large appliances in Canada and the United States three Canadian producers submitted the data given in Table 33.

Table 33

Comparative Costs, Major Appliances, Canada and the United States, 1955

	Cost in the U.S.A.	Cost in Canada	Cost in Canada as percent of cost in U.S.A.
Producer A:			
Electric Range			
Direct labour	$ 8.90	$ 14.50	163
Parts and materials	68.62	84.77	124
Labour and materials	77.52	99.27	128
Producer B:			
Automatic Washing Machine			
Direct labour	$ 10.35	$ 9.70	99
Parts and materials	96.00	106.00	110
Labour and materials	106.00	115.70	109
Producer C:			
Electric Refrigrator			
Labour costs			66
Material and parts			153
Overhead			87
Total cost			119
Electric Range			
Labour costs			100
Materials and parts			145
Overhead			76
Total cost			117

All estimates are based on present output levels in the two countries which means that in each case Canadian output would be small relative to output in the United States. These data show lower overhead costs in Canada, substantially higher costs for parts and materials and considerable variation in labour costs. In part the higher cost of components in Canada reflects the fact that Canadian companies purchase many parts from other Canadian manufacturers or from their parent company whereas the American company produces most of its own components. The reason for the wide

difference in labour costs in these examples is not clear, though producer A gave the opinion that labour rates in the Canadian range industry were comparable with those in the United States and considerably higher than many places in the southern United States.

As Canadian volume increases the cost differential between Canada and the United States should decline. Where a Canadian producer can attain an annual output of 100,000 units or more costs in Canada may be 10% or less in excess of those in the United States. This is true even on refrigerators where the advantage of large volume production is particularly great. (see Table 23).

As compared with his competitors in the United Kingdom and other European countries the Canadian manufacturer's principal cost disadvantage arises out of the higher wage levels he must meet. On custom built apparatus where the labour content is particularly high and Canada's higher wage levels are difficult to offset by mass production techniques this disadvantage is particularly great. The longstanding differential in wage levels between Canada and Western Europe has recently been accentuated by the exchange depreciations that these countries have been forced to undertake. Since a substantial portion of this added advantage to the European producer is likely to be retained it will be necessary for the Canadian producer to reduce his relative costs by means of better design and improvements in production methods if he is to retain his former share of the market in this field. In the appliance field, where style is important and changes in technical design are rapid, competition from Western Europe has not been a significant factor in the Canadian market.

The Tariff and its Effects

Electrical manufacturers along with many other Canadian manufacturing industries have long received and been dependent on a moderate level of tariff protection. Most electrical products now carry a preferential rate of 15% or 18% and an intermediate or most favoured nation rate of 20% or 22½% (see Tables 18, 20 and 22). These rates are similar in level to those applied on other manufactured goods of a comparable degree of manufacture.

Despite a significant reduction in the degree of tariff protection since 1929—the average ad valorem rate on dutiable imports of electrical apparatus declined from 26.8% in 1929 to 20.8% in 1952—the industry has grown and maintained or slightly increased its share of the Canadian market. Imports averaged about 24.5% of the electrical goods used in Canada in 1953 and 1954 compared with 25.5% in 1929. Moreover, the industry now produces a much wider range of products than it did in 1929 and many of its products have a higher Canadian content than was formerly the case. Products which at one time were merely assembled in Canada with the components being manufactured in the United States are now produced to a

large extent in Canada. Economists frequently complain that the tariffs granted to infant industries are not justified because the infants never grow up. The experience of the electrical manufacturing industry suggests that some infants in fact do grow up but there is a constant stream of new infants arriving to take their place.

For within the electrical manufacturing industry dependence on tariff protection varies widely. Some products are undoubtedly produced as cheaply and efficiently in Canada today as they are in the United States or Europe. This would appear to be true of the cheaper lines of standard washing machines and for products such as cord sets, some types of lighting fixtures and small heating appliances. For a number of these items production is carried on in small plants and the business is highly competitive. For some other products such as panelboards, output is usually local in nature in any case. Again, for a number of kinds of wire and cable prices in Canada are currently below those in the United States.

Many other instances probably occur though it is impossible to estimate the relative importance of this group without more detailed information. For another group of items Canadian costs are probably higher than those in the United States or elsewhere but the difference in costs may be substantially less than the tariff rate which now applies. This is true of lamps, some of the larger volume small appliances, some wiring devices and batteries. For still other products a substantial volume of imports come in over the tariff and Canadian producers adjust or limit their range of operations to what the degree of tariff protection will allow. Refrigerators, electric ranges, and vacuum cleaners fall into this category

In general, for many electrical products there are product lines or components which cannot be economically produced in Canada even with the present tariff. As the Canadian market grows and a larger volume of output becomes possible more and more of these products or components will come within the range of items that can be economically produced in Canada. For example, one manager of a lamp plant has estimated that within a few years it will be economical to produce lamp bases for incandescent lamps and glass shells for fluorescent lamps in Canada and plans are being made accordingly. In fact, a growing market should bring Canadian costs on a wide range of products closer to those of their foreign competitors and thus reduce their dependence on tariff protection.

Yet, in an industry as varied and rapidly changing as the electrical manufacturing industry there will always be new or specialized products where the Canadian market will be too small to justify economical production even with the present level of tariff protection or where Canadian production will be restricted to an assembly or partial manufacturing operation. For example, Canadian sales of automatic washing machines are still too small to

make a complete manufacturing operation profitable, and for specialized components such as the thermostat for an electric frypan it is more economical to buy in the United States than to produce in Canada. In the custom built heavy apparatus field there is little reason to suppose that additional volume will significantly reduce production costs. With the exception of these two areas it seems probable that a growing Canadian market plus a constant level of tariff protection would result in a gradually rising share of the Canadian market being supplied by Canadian producers. Alternatively, with a growing market Canadian firms could probably maintain their present share of the market despite a gradual reduction in present tariff rates.

As was pointed out earlier for any particular manufacturing operation the amount of protection accorded by a tariff may diverge substantially from the rate on the product in question. This difference between effective and apparent protection will occur wherever parts, components and materials can be imported duty free or at rates below those applying on the finished product or where the domestic price is lower for any other reason. For a wide range of electrical goods it seems likely that effective protection is only moderately higher than apparent protection. Most tariffs on electrical goods carry identical rates for both parts and the finished product. But, lower rates are in effect on parts or materials where these are mentioned specifically elsewhere in the tariff, such as steel sheets so that the parts rate is not applicable. Further, materials such as non-ferrous metals may be obtained as cheaply in Canada as in other countries.

Electrical products for which effective protection is substantially higher than apparent protection include wire and cable, batteries, lamps, and radio tubes. For the last three of these products this arises in part from special tariff sections which allow the import of some components free of duty or at very low rates. For both wire and cable and batteries the high material content and the favourable Canadian prices on non-ferrous metals serve to make effective protection substantially higher than would be indicated by the formal tariff rate.

Some economists have expressed the view that the tariff has increased the degree of monopoly in Canadian industry. In their view a reduction and even an outright removal of the tariff would not substantially reduce the amount of electrical manufacturing carried on in Canada but would simply serve to eliminate some monopoly profit. What truth is there in this contention?

Although the tariff increases that were put into effect in the early thirties may have contributed to very favourable if not monopoly profit levels in Canada there is less evidence to suggest that such a condition applies very widely today. Indeed, for the two main American controlled firms profit levels in recent years have been substantially higher on their operations in

the United States than they have been in their Canadian subsidiaries (see Table 34). And for an industry sample of larger corporations, profit levels in all but one of the postwar years have been higher in the United States market than they have in Canada. However, comparison with the United States is not an adequate test of the presence or absence of monopoly profit, since there are undoubtedly important areas where high or monopoly profits exist in the production of electrical apparatus in the United States. And the Canadian data may represent a mixture of high or monopoly profits on some products along with very low or zero profit levels on other products. Thus on a number of products where production is highly concentrated in the Canadian market, such as irons, watthour meters and wire and cable there may be a temptation to price up to the cost of the imported product including the tariff. Even on products such as lamps where both prices and costs in Canada and the United States are at similar levels, tariff reductions might eliminate some monopoly profit through increased competition from Western Europe or Japan. These possibilities for some degree of monopoly profit will be limited to products where there is no significant volume of imports and where, in addition, competition between firms in the domestic market is weak. Over-all it seems doubtful that this condition applies to a very large proportion of the Canadian market for electrical apparatus at the present.

Table 34

Profits in Electrical Manufacturing, Canada and the United States, Selected Years, 1928 to 1954

Year	Canada	United States A	United States B	C.G.E.	G.E.	Cdn. We.	West. El.
		Net Profits after tax as a percent of net worth					
1928....	n.a.	15.8	—	15.3	14.6	21.8	11.2
1929....	n.a.	19.0	—	16.6	16.3	21.5	11.8
1930....	n.a.	9.3	—	12.4	13.6	17.1	5.2
1931....	n.a.	4.1	—	7.3	9.4	10.9	—1.7
1938....	6.7	5.7	—	7.3	8.3	8.4	4.9
1939....	6.6	10.5	—	8.0	13.1	5.2	7.3
1946....	6.2	8.9	18.4	6.5	7.6	3.0	1.8
1947....	10.6	19.3	34.3	7.9	15.8	10.7	
1948....	11.7	20.5	27.8	11.7	17.5	17.0	
1949....	14.7	17.2	13.9	9.9	17.0	16.0	15.2
1950....	16.8	23.0	22.3	14.0	25.2	17.8	14.7
1951....	13.0	16.2	13.0	13.8	17.5	10.3	10.3
1952....	13.5	14.8	12.2	11.5	17.4	8.4	10.2
1953....	16.1	14.9	10.7	15.6	17.8	10.2	10.3
1954....	8.3	13.9	10.3	9.4	20.8	3.5	10.6
1955....	—	12.8	11.6	7.0	18.8	3.7	5.4x

Data for Canada are for 24 companies as reported in Bank of Canada Statistical Summary (27 companies prior to 1948). Data for the United States are from the National City Bank sample of larger corporations. Series A consists of companies producing electrical equipment and radio and television apparatus. Series B consists of companies producing household appliances. C.G.E. and G.E. represent the Canadian General Electric Company and the General Electric Company respectively. Cdn. W. and West. El. represent the Canadian Westinghouse Company and Westinghouse Electric.

xProfits reduced by long strike.

It has also been argued by some economists that the tariff has encouraged an excessive number of producers and an insufficient degree of specialization in the Canadian market. These economists contend that a reduction in present tariffs would result in the elimination of some of the smaller producers and an increase in the size and degree of specialization of those firms that survived. Instead of eight or ten firms producing electric ranges, refrigerators, vacuum cleaners and toasters there would be only two or three producers in each line. And instead of each major wire and cable company producing almost a complete range of products, each major producer would specialize on a limited number of types of wire and cable. While it would be possible for a few firms to expand and drive out a number of smaller firms even in the absence of a reduction in the tariff, they have no strong inducement to embark on such a course, it is contended, as long as they can earn satisfactory profits at the higher prices that present tariff levels make possible. Thus, these economists argue that tariff reductions would not significantly increase the volume of imports but instead would enforce increased efficiency upon the Canadian industry

While it is conceivable that tariff reductions might enforce greater specialization on the part of Canadian producers there is no assurance that this would be the result. It is also possible that tariff reductions would lead to the elimination of Canadian producers in certain fields or to the narrowing of the range of Canadian operations. A Canadian producer cannot be expected to embark upon a programme of expanded production in order to reduce his costs unless he has some assurance that he will be able to sell his additional output. For products in the appliance field, like vacuum cleaners and refrigerators, which are widely advertised under brand names and differentiated in the customer's eyes by special features, the acquisition of a larger portion of the Canadian market would probably require larger advertising expenditures and the ability to offer a price significantly below the price of competing brands.

One producer has estimated that a price differential of from 5% to 8% is necessary on these products to divert consumer demand from one brand to another. And yet if the Canadian tariff were reduced by a substantial amount, say to 15% to 10%, the ability of the Canadian producer to offer such a price differential would be correspondingly reduced. For if the Canadian tariff were reduced American firms would find it easier to come into the Canadian market; and since some Canadian market for their produce is created without added cost by advertising in American publications or on American television and radio stations they would be unlikely to abandon the Canadian market without a major fight. An additional consideration is the sales and service organizations these producers have developed. Even if a firm such as Canadian Westinghouse were forced to discontinue the production of electric ranges in Canada it would undoubtedly continue to sell a Westinghouse range through its distributive and dealer organization.

It seems likely that in the absence of tariff protection production of many appliances would never have been started in Canada. But now that production has been established the effects that might ensue with tariff reductions are difficult to establish. On products such as refrigerators that are now imported in substantial volume, tariff reductions might be met in the main by a reduction in the Canadian produced content of the product. Some parts now produced in Canada would be imported and output of some of the smaller volume models would be discontinued. Some producers might abandon output in Canada entirely and supply the Canadian market from their plants in the United States. Even for appliances that are now largely produced in Canada similar reductions in Canadian content might occur. While the opposite policy, higher tariffs, might allow Canadian producers to obtain a larger volume and lower costs as is alleged by some manufacturers, there is no assurance that the benefit of this would be passed on to the consumer. A more likely result would be higher prices to the consumer, an expansion in the range of Canadian manufacturing operations to higher cost components and smaller volume models, and an increase in the number of firms operating in the Canadian market.

In both Canada and the United States, competition in the appliance field has become more severe in recent years and there is already some trend towards the elimination of some of the smaller firms. In the United States some of the firms that went into the appliance field to diversify their production have since discontinued output. For example, International Harvester has ceased production of refrigerators and General Foods has discontinued its Betty Crocker electric iron. If this trend continues there may well be a concentration of appliance production in a smaller number of larger and more efficient plants. Moderate tariff reductions would undoubtedly hasten the elimination of the smaller firms and reduce the prices of appliances in Canada. But they might hinder rather than hasten the efforts of our larger producers to obtain the sales and output volume needed (say 50,000 to 100,000 per year) to reduce appreciably the cost differential between Canada and the United States.

On some products the importance of transport costs in the dispersed Canadian market also make it unlikely that tariff reductions would enforce greater specialization on Canadian producers. The Canadian producer in Toronto who specializes to supply the Canadian market as a whole may find that he has to compete in Halifax, Winnipeg and Vancouver with American producers located in Portland, Minneapolis and Seattle. In these circumstances also, tariff reductions might hamper rather than encourage increased specialization.

Tariff reductions would be most effective in enforcing increased specialization and greater efficiency where transport costs are not of major importance and where products are not significantly different in the customer's

eyes. Both these considerations are true of a range of industrial apparatus. For example, producers of wire and cable would undoubtedly be forced to specialize to a greater extent and thus secure the economies of longer production runs if their present rather high level of effective protection were reduced. For industrial equipment a small price differential will usually be sufficient to shift consumer demand from one product to another. Hence, if the Canadian manufacturer specialized on fewer products or sizes of products, such as watthour meters or electric motors, and expanded his output to secure the lower costs that go with longer production runs, he might be able to capture a major share of the Canadian market for his particular specialty. As long as he still received some tariff protection and provided he could reduce his costs to a level comparable with those in the United States he would be able to limit imports into Canada by offering a price below the laid down price of the United States product. But in the industrial field too the Canadian manufacturer might react to tariff reductions in part by narrowing the range of his manufacturing operations and importing components that could be produced more economically in the United States. Moreover, for a considerable range of products Canadian prices are now well below the laid down price of United States imports (see Table 35). For these products moderate tariff reductions would have little or no effect.

Though the Canadian Electrical Manufacturers Association has frequently pointed with pride to the fact that it has never requested an increase in tariffs from the government, it is opposed to any further tariff reductions. Moreover, in supporting a return to the customs valuation provisions which were in effect in Canada during the nineteen thirties they are in fact seeking more protection. Restoration of the former provision that the value of goods for duty purposes should in no case be less than the cost of production plus a reasonable advance for selling cost and profit would be inconsistent with the terms of G.A.T.T. and could result in an appreciably higher level of protection for the industry, particularly during periods of intense competition in other countries. In supporting the continuance of present tariff levels C.E.M.A. stresses the importance of secondary manufacturing as a creator of additional employment, and the need for tariff stability to give manufacturers the confidence they need to undertake the large capital expenditures required for the industry's future growth. On a number of occasions C.E.M.A. has also complained about the amount of apparatus whose importation is allowed duty free under special purpose tariff items. However, the evidence suggests that the volume of electrical apparatus imported under these items is comparatively small.

Exchange Rate Changes and Their Effects

As was noted above, the devaluation of sterling and many other European currencies that took place during 1949 together with the recent

Table 35

Comparative Prices of Electrical Apparatus Canada and the United States, 1955

	Relation of Canadian domestic price to U.S. domestic price	Date of Comparison
Heavy Apparatus		
Watthour meters	Average 27% above U.S.	Dec. 1955
Industrial control equipment	Average 7.8% above U.S.	Dec. 1955
Fractional h.p. motors	Varies from 10% above to 10% below U.S.	Dec. 1955
Integral h.p. motors	Varies from 4% below to 19% below U.S.	Dec. 1955
Distribution transformers	Average 6% below U.S.	Dec. 1955
Power transformers	Average 43% below U.S.	Dec. 1955
Switchgear	Average 17% below U.S.	Dec. 1955
Power circuit breakers	Average 55% below U.S.	Dec. 1955
Waterwheel generators	Average 31% below U.S.	Dec. 1955
Telephone equipment	Varies from 26% below to 33% above U.S. Averages slightly higher.	Jan. 1956
Miscellaneous Apparatus		
Wire and Cable	Varies from 14% below to 22% above. Two-thirds of prices quoted were in range 5% above and 5% below U.S.	Jan. 1956
Lamps	Varies from the same or slightly higher on standard lamps to 10% to 20% higher on small volume special purpose lamps.	
Appliances		
Refrigerator	Price to distributor on three models, average 17% higher than U.S. price.	Dec. 1955
Range	Price to distributor on three models, average 20% above U.S. domestic price.	Dec. 1955

All prices exclude any taxes that are applicable. Because of recent price cutting in small appliances in both countries it is difficult to make a representative price comparison. One producer reported that their current prices on vacuum cleaners in Canada are above the laid down price of the parent firm's product.

Source: Data supplied by individual firms.

appreciation of the Canadian dollar has greatly increased the severity of import competition in many lines of heavy apparatus. The Knox report estimated that by the middle of 1954 the appreciation of the Canadian dollar and the devaluation of sterling had given the United Kingdom manufacturer an advantage in wage costs of about 44% over his position in 1938. If the increase in productivity in this industry in the United Kingdom has lagged behind the increase in Canada this advantage would be reduced. Although no information is available as to what has happened to productivity in the

United Kingdom over the longer period back to 1938, data presented earlier indicate that productivity gains in this industry during the postwar period have been similar in size in Canada and the United Kingdom.

The decline in Canadian prices of heavy apparatus since 1949 despite rising costs supports the conclusion that the competitive advantage gained by the manufacturer in the United Kingdom has been very large. Canadian prices of heavy apparatus are now either below their 1949 level or only slightly higher despite increases since that date of 44% in average hourly earnings, 33% in the price of steel and 114% in the price of copper (see Table 36). The impact of the higher price of copper has been eased by the lower price policy on magnet wire now being followed by the wire and cable companies. A temporary suspension of the 12½% duty on silicon steel has also helped moderate the effects of this cost price squeeze on the Canadian manufacturer. But despite these alleviating factors the effects on the competitive position of the Canadian manufacturer are still very severe.

Since the publication of the Knox report the position of the Canadian manufacturer of electrical equipment has improved moderately. Wage levels in the United Kingdom have advanced a further 13% since mid-1954, whereas the average hourly earnings paid by electrical manufacturers in Canada have increased only 4%.[1] In addition, the premium of more than 3% on the Canadian dollar that prevailed during 1954 has been reduced.

When the Canadian dollar appreciates in terms of the United States dollar it has an adverse effect on the competitive position of the Canadian manufacturer of electrical equipment as compared with producers in other countries. Though the appreciation that occurred several years ago did not have any major effects on the structure of Canadian manufacturing operations it undoubtedly led to a careful re-examination of production costs on many parts and components and a shift to United States or other foreign sources of supply where Canadian production costs were too high.

[1]Both percentages are for the period ending April, 1956.

TABLE 36

PRICES, MATERIAL COSTS AND AVERAGE HOURLY EARNINGS
HEAVY ELECTRICAL APPARATUS, 1949 TO 1955

INDEXES 1949 = 100

	1949	1952	1953	1954	1955	Jan. 1956
HEAVY SWITCHGEAR	100	123	123	118	111	106
POWER TRANSFORMERS	100	125	125	111	99	95
POWER CIRCUIT BREAKERS	100	112	112	94	94	80
WATERWHEEL GENERATORS	100	110	110	99	98	98
COPPER	100	142	149	145	185	214
IRON AND STEEL*	100	127	130	128	130	133
AVERAGE HOURLY EARNINGS, HEAVY APPARATUS	100	132	136	143	143	144

* Rolling Mill Products

Source: Canadian Westinghouse and Dominion Bureau of Statistics.

4

THE EXPORT MARKET FOR CANADIAN ELECTRICAL APPARATUS

IN 1954 Canadian manufacturers of electrical apparatus sold only 3% of their output in the export market, compared with 3.5% in 1929 and 5% to 6% in the late nineteen-thirties and in some of the earlier postwar years (see Table 37). This relative decline in the importance of export sales does not reflect any relative lag in the efficiency of Canadian manufacturers but is due rather to the import restrictions many countries impose against dollar goods, to the currency devaluations carried out in Western Europe and the sterling area, and to the increased tariffs and other trade barriers that have accompanied the industrialization programmes of many underdeveloped countries. Export sales were slightly higher in the period of shortages that followed the war but have declined significantly in recent years as supplies have become more plentiful and as the recovery of Germany and other countries have made many markets more competitive.

Potentially the sale of electrical apparatus in the export market represents a method by which the Canadian industry could offset the disadvantage arising out of the small size of their domestic market. But past experience would indicate that this market is not very dependable.

For a period in the nineteen-thirties Canadian manufacturers built up a very substantial market in electric ranges and washing machines in British Commonwealth markets, largely as a result of the preferential tariffs Canada was granted under the Ottawa Agreements. As a result of the restrictions these countries now impose against the export of Canadian manufactured goods these markets have largely disappeared. And in view of the altered sterling-dollar rate of exchange and the narrowing of our former margins of preference it is unlikely that Canadian manufacturers could regain their former position in many of these markets even if import restrictions were removed. Some electric ranges and washing machines are still sold on a small scale in a large number of different countries but these sales now account for only 1% or 2% of Canadian output.

In the apparatus field Canadian manufacturers have had a small but significant market in watthour meters, wire and cable, small motors, and

wiring devices, mainly in Latin American countries. Export of meters now includes a larger proportion of parts business but exports still account for 13% or 14% of Canadian output. Wire and cable is one of the few products where there has been a significant upward trend in the importance of export sales over the past 25 years. Canada exports mainly bare copper wire or relatively simple types of insulated wire where the labour content is low. Canada's comparative advantage here reflects the fact that Canada is a surplus copper area. If copper becomes more plentiful in world markets again much of this export business may disappear. In a number of recent years a substantial dollar volume of generators have been exported to Brazil.

Though Canada exports some electrical apparatus to the United States these exports are usually intermittent and marginal in character. Thus, when supplies have been short across the line Canada has exported small amounts of telephone equipment to the United States. Then too, Canadian manufacturers have had a small American market in 25 cycle equipment such as electric motors. But for the most part the barriers to imports created by the United States Customs administration and government legislation such as the Buy America act make it difficult for Canadian manufacturers to invade the United States market even on the few products where their production costs are below those in the United States. If Canadian manufacturers could gain tariff free access to the United States market on products where they have some advantage, they could develop a substantial market across the border. But barring this no significant market is likely to develop.

Table 37

Exports as a Percent of Domestic Production, Electrical Apparatus, Canada, Selected Years

	1929	1937	1947	1952	1953	1954
HEAVY APPARATUS	0.8	3.9	7.9	6.6	3.8	4.1
Instruments and Meters	n.a.	n.a.	17.8	22.4	14.3	13.3
Motors and parts	.4	16.5	12.5	5.0	2.0	2.7
Generators and parts			48.4	19.2	8.1	16.5
Transformers and parts	n.a.	n.a.	2.5	7.5	1.2	2.4
Switchgear and protective eq.	n.a.	n.a.	2.0	.2	.2	.0
Telephone and telegraph	n.a.	3.1	.6	5.9	3.8	4.1
MISCELLANEOUS ELECTRICAL APPARATUS	2.6	3.0	6.6	7.4	3.3	3.5
Wire and Cable*	.5	2.9	7.1	11.8	5.0	4.9
Batteries	10.2	4.7	12.2	2.8	1.5	1.6
Wiring devices	n.a.	n.a.	2.8	.8	.8	1.0
MAJOR APPLIANCES	6.6	21.5	8.4	1.9	1.0	.9
Refrigerators	4.3	8.6	2.8	.6	.6	.4
Washing machines	1.4	23.8	10.5	5.8	2.3	2.2
Electric ranges	21.0	45.5	17.3	1.3	.8	1.0
OTHER APPLIANCES	51.3	5.4	2.5	1.5	1.3	1.3
Vacuum Cleaners	65.5	8.4	1.5	.3	.1	.1
RADIO AND ELECTRIC EQ.	n.a.	1.3	5.4	11.8	11.7	3.5
Total Electrical Apparatus	3.5	5.5	6.5	6.3	4.6	3.0

*Includes copper wire and cable only.

Source: Dominion Bureau of Statistics, Census of Industry Reports and Trade of Canada.

5

PROSPECTIVE DEVELOPMENTS

IN THE past, the electrical manufacturing industry has been subject to a very rapid rate of growth and it seems likely that this will continue in the future. In part this rapid growth has been due to the continuous flow of new products the industry has developed. On a world wide basis, the industry has always been one of the leaders in the field in its expenditures on industrial research and a significant portion of these funds have gone into research of a fundamental nature. With the growth in the size of the industry these expenditures have increased and it is almost certain that they will generate a large flow of new developments in the years ahead.

In part too, the rapid growth of the industry arises out of the fact that many electrical products have a high income elasticity so that the market for them expands rapidly as income levels rise. The shortage of domestic help has also encouraged a greater use of labour saving appliances in the home and most of these are electrically operated. A similar development has been occurring in industry. Faced with a continuous rise in wage levels manufacturers have sought to mechanize their operations as much as possible and this again has frequently involved the use of equipment that is electrically operated and electronically controlled.

Already there are many new products or materials that are in various stages of experimental development. It has been predicted that in time we shall have a light amplifier that will allow the image from a television tube to be projected on a screen. And light instead of coming from a single source may be spread over the walls and ceiling through electroluminescence. Another important advance, the transistor, will permit a personal pocket radio and portable television. Again some experts predict that within a few years many homes will be heated in winter and cooled in summer with an electrically operated heat pump. Air conditioning has already received widespread application and is due for a further great development in the future.

Electric ranges with high frequency ovens may greatly speed many of today's slower cooking processes.

In the industrial field many minor wonders are taking place, through the use of semi-conductors which have properties midway between those of a conductor and a resistor, and through the use of new magnetic and insulation materials which allow a considerable reduction in the size of motors and transformers, yet give longer life. In the metallurgical field vacuum smelting and refining now provide metals of unequalled purity. And in the paper making, wood-working and plastics industries dielectric heating holds great promise of future development.

In the communications field new electronic switching methods now in development may permit faster and more accurate interconnection of subscriber phones. The long distance dial exchange will call for a great deal of new equipment and should stimulate the use of the long distance telephone. A system of micro-wave stations and relays is already nearing completion and will give Canada its first direct coast to coast television programmes. These stations will have many other uses as well.

Perhaps most important of all will be developments in the use of nuclear energy. A great deal of progress has already been made in this field and it is anticipated that nuclear powered generators will be in widespread use within 10 or 15 years. Further developments may lead to a thermonuclear type of reactor perhaps contained by an electrostatic or electromagnetic field.[1]

As the domestic market expands the Canadian manufacturer of electrical equipment should find himself able to compete on even terms with manufacturers in the United States on a wider and wider range of products. For the economies of large scale production are usually limited and once a plant reaches a certain size no further economies can be obtained. The trend towards automation may offset this for a time, since in some cases completely automatic equipment has a very large annual output. However, since no rapid shifts towards automatic production are expected in electrical manufacturing this offsetting effect may be smaller than it will be in some other industries.

Increases in the rate of product change and the trend towards a greater variety of styles and models that often accompanies a general rise in income levels will also tend to maintain the disadvantage the Canadian manufacturer suffers on account of the size of his market. This disadvantage may be increased if the efforts that are now being made to induce a rapid rate of change in products such as refrigerators and electric ranges are successful

[1]This survey of potential new products and technical developments is largely based on the account given in *The Canadian Electrical Manufacturing Industry in Transition*, a brief presented to this Commission by the Canadian Electrical Manufacturers Association.

and the consumer can be persuaded to trade in these products every few years as he now does an automobile. Canadian firms will continually find themselves at a disadvantage on newer products which are usually introduced into the United States market first because of the higher income levels there and because they are usually developed in the parent firm's research laboratories. As long as sales on these newer products are small, production in the Canadian market will fall below the optimum size level.

In respect to competition with the United Kingdom and other countries in Western Europe, further growth in the size of the Canadian market cannot be expected to yield the Canadian manufacturer any additional advantage. For on the products where European competition is most severe, the custom built type of heavy apparatus, Canadian plants are already large enough to achieve most of the economies of large scale production in this field. The ability of Canadian firms to meet and survive the present severe competition in this field will depend primarily on the cost reductions they can achieve through changes in design that reduce labour and material costs, through improvement in manufacturing methods and through other cost reductions in their business organization.

Some easing of the present competitive pressure may gradually develop in the future as a result of a rapid growth in the world market for electrical apparatus and the comparatively slow rate of growth in the population and labour force of Western Europe. In addition, because the European manufacturer is under less pressure to reduce his costs technical progress and improvements in productivity may be slower in Europe than they are in Canada. Nevertheless, since Western Europe is still suffering from a dollar shortage and since heavy electrical apparatus is the type of product on which they have the greatest comparative advantage in dollar markets the future may well witness a renewed drive on the part of European manufacturers to obtain an added share of the North American market.

In addition, the shift towards thermal sources of power may lead to a substantial increase in European sales of generating equipment in Canada. It has been predicted that by 1980 some 30% of the generation equipment used in Canada will be of the thermal type with a significant portion of this, perhaps a third to one half, powered by nuclear sources of power. If this development takes place it can also be predicted that some 40% of the new generating capacity installed in the decade from 1970 to 1980 will be of the thermal type.

Since Canadian firms have not yet produced any equipment of this type it seems likely that even if they enter this field in the future they will have more difficulty competing here than they have on waterwheel generators where their background of experience is greater. Producers in both the United Kingdom and the United States have had a long experience in pro-

ducing steam turbogenerators and they are currently experimenting with nuclear reactors on a larger scale than is true for Canadian firms. Thus even if Canadian firms are accorded the additional tariff protection that is usually given on equipment of a class or kind made in Canada there may be a very substantial increase in European sales of this type of equipment.

Table 38

Forecast of Future Generating Capacity Required, Canada, 1956 to 1981

	Total Installed Capacity	Thermal Equipment	Average annual value of new generating equipment	
	Million kilowatts			Million dollars
1956	14.8	1.9		
1961	20.8	3.3	1956–61	17.8
1966	29.1	5.5	1961–66	25.1
1971	40.8	9.0	1966–71	35.2
1976	57.3	14.9	1971–76	49.3
1981	80.3	24.1	1976–81	69.2

Note: A 7 percent per annum compound rate of growth in installed capacity was assumed. It was further assumed that the proportion of thermal capacity would increase from about 13 percent in 1956 to 30 percent by 1980. New generating equipment was valued at $15.00 per installed kilowatt.

Table 39

Market Saturation, Home Appliances, Canada and the United States, 1954 or 1955

	Percent of Home with Given Appliance	
	Canada	United States
Vacuum cleaner	52	62
Home freezer	5	15
Radio	96	98
Electric range	42	27
Television set	39	74
Refrigerator	75	92
Washing machine	79	81

Source: *U.S. Statistical Abstract of the United States*, 1955 and *Household Facilities and Equipment*, September, 1955, Dominion Bureau of Statistics. Data for the United States are as of January 1954. Data for Canada are as of September, 1955.

Table 40

Employment and Output in Electrical Manufacturing, Canada and the United States, Selected Years, 1929 to 1954, and Forecast 1980

	Employment	Value added by Manufacture	Gross Value of Production
	(Percent of Labour Force)	(Percent of Gross National Product)	
CANADA	%	%	%
1929	.53	1.04	1.84
1946	.92	1.08	1.95
1954	1.38	1.93	3.59
1980	2.12[1]	4.06[1]	8.12[1]
UNITED STATES			
1947	1.72	1.79	—
1953	2.09	2.59	—

	Employment	Output per employee
	Annual Percentage Rate of Growth	
CANADA	%	%
1929 to 1954	5.25	
1946 to 1954	6.91	1946 to 1952 4.85
UNITED STATES		
1947 to 1953	4.36	

[1]Data for 1980 are forecast and assume a total Canadian labour force of 9.9 million and a total gross national product of $62 billion in 1949 prices. They assume a compound rate of growth of 4 percent for employment and 3 percent for net output per employee in electrical manufacturing.

Table 41

Forecast Employment and Production in the Canadian Electrical Manufacturing Industry for 1980 (assuming various rates of growth)

Annual Growth Rate in Employment	Estimated Employment, 1980	Annual Growth Rate in Output per Employee	Value Added per Employee, 1980
%		%	
4	210,000	2½	$10,650
5	267,000	3	12,090
6	340,000	3½	13,710
		4	15,540

Note: Value added are in 1949 prices. It was assumed that current prices are about 10 percent above 1949 levels.

Little more than rough guesses can be made as to the magnitude of future Canadian markets for electrical equipment. If the use of electrical power continues to expand at a rate of 7% per annum, as has been widely predicted, the annual market for the generating equipment needed to produce this power would exceed $70 million per year by 1980 (see Table 38). A

corresponding growth in the demand for transformers, switchgear and wire and cable could be expected.

Some experts predict an even larger growth than this. Thus, forecasts made by Canadian Westinghouse "indicate that the annual Canadian demand for new generators will increase from the current level of about 1 million k.v.a. per year to 5 million k.v.a. by 1980; demand for power transformers will increase from 5 million k.v.a. to 22 million k.v.a. per year in 25 years, and demand for motors of all types will increase from the present 1,250,000 horsepower per year to 6,250,000 horsepower per year in 1980".[1]

In the consumer field much of the growth will undoubtedly take the form of the sale of new appliances that have not yet been introduced. However, even on existing products market saturation is lower in Canada than it is in the United States (see Table 39). This would indicate considerable room for increased sales of existing products, particularly for those introduced comparatively recently such as television sets, clothes dryers and home freezers.

The lower saturation levels in Canada as compared with those in the United States reflect a number of factors. The absence of electric power, until recently, in many rural parts of Canada prevented the sale of electric appliances in this market in the past. Further, the introduction of television in Canada has been so recent that there has not yet been time to fully develop this market. Again, the lower income levels in Canada and the higher Canadian prices for many appliances limit the market for these products here. As Canadian income levels rise and as the growing Canadian market makes possible lower production costs there should be a rapid expansion in the demand for appliances.

While no precise estimates are possible of future employment and output in the electrical and electronics manufacturing industry, it would not be unreasonable to expect that by 1980 the industry would be employing about 210,000 people and producing annually a gross product worth $5 billion (1949 prices), or a value added of $2½ billion. In arriving at this estimate it was assumed that employment in the industry would continue to grow at an average rate of 4% per annum, and that output per employee would increase at a rate of 3% per annum. For total output this is equivalent to an annual growth rate of about 7% per annum, the same rate of growth as has been predicted for total consumption of electric power. Higher rates of growth than this would, of course, result in a much larger annual output value for the industry. For example, if employment were to grow at an annual rate of 5% (between 1946 and 1954 the rate of increase was 7%), and output per employee were to increase at 3½% per annum, the industry's total output would reach a value of over $6½ billion by 1980. Some alternative estimates and an analysis of past rates of growth are given in Tables 40 and 41.

[1]See *Submission to the Royal Commission on Canada's Economic Prospects,* by J. M. Thompson, Vice-president, Canadian Westinghouse Co. Ltd., p. 4.

6

SUMMARY AND CONCLUSIONS

THE DEMAND for electrical apparatus and equipment in Canada has grown extremely rapidly during the past few decades and there is reason to expect that this rapid growth will continue in the future. Even despite the severe depression of the thirties the use of electric power in Canada increased at an average rate of 6% per annum over the period from 1929 to the present, thereby creating a large demand for the equipment needed to produce, control and distribute this power. In addition, the many new products developed by the industry, in particular the radio, television and a host of appliances for use in the home has greatly expanded the consumer demand for electrical equipment.

The reasons for expecting a continuation of this rapid growth are many. Research has always played a large role in this industry and expenditures on research are undoubtedly larger today than at any time in the past. Continued research can be expected to yield a great variety of new products. Because of their labour saving character or because they provide new sources of consumer satisfaction these new products secure ready acceptance by a community whose income is steadily rising. Then too, our defence programme with its emphasis on the development of automatic devices and guided missiles has a very heavy electrical or electronic content. Again the trend towards automation in industry creates a demand for electrical equipment and controls to guide the new more automatic processes. All of these factors make the prospective market for electrical goods appear extremely attractive.

Faced with this great expansion in the demand for their products the Canadian electrical manufacturing industry has grown rapidly and prospered. Despite tariff reductions which reduced the average rate of duty on electrical apparatus from about 27% in 1929 to around 21% today, the industry has maintained or perhaps even slightly increased its share of the market. Cur-

rently the Canadian manufacturer supplies about 75% of all the electrical equipment used in Canada. And for a major part of the past two and one-half decades the share of the domestic market enjoyed by the Canadian manufacturer was even larger, from 80% to 85%. This larger share was due to the higher tariff levels in effect during the thirties and to a number of temporary protective factors such as the import restrictions imposed in 1947 and the shortage of supplies during the war and early postwar years.

As the Canadian market has grown the power of the domestic manufacturer to compete with foreign producers has gradually increased. Products which were formerly assembled from imported parts are now almost completely manufactured in Canada. And the variety of the industry's products has greatly increased until today it produces almost a complete range of electrical products.

With the continued growth of the Canadian market more and more products and components should reach the stage where they can be produced as cheaply in Canada as they can in other countries. But at the present time, even with a tariff protection of 20% or 22½%, the industry has difficulty meeting the competition of American producers on major appliances such as refrigerators, and electric ranges, and on other products where the economies of large scale production are particularly important. In recent years it has also found the competition of European producers very keen on heavy custom built power apparatus where labour costs are high and the lower European wage rates give their producers a special advantage.

Canadian producers of electrical equipment pay wage rates about 23% lower than those paid by electrical manufacturers in the United States but from two to three times as high as those paid by the European manufacturer. Some raw materials such as copper and aluminum are as cheap in Canada as they are anywhere but on iron and steel and a wide range of manufactured components prices in Canada may be 10% or more above those in the United States or the United Kingdom. Moreover, material costs for the Canadian producer are sometimes increased relative to those of his competitors elsewhere because he buys in smaller quantities. The Canadian producer also pays about 10% more for his machinery and equipment but this may be offset by lower Canadian construction costs.

On electrical goods such as major appliances where large scale production is very economical labour costs per unit of output may be lower in the United States than they are in Canada despite the higher wage levels in the former country. Longer production runs and the ability to use expensive automatic machinery lead to important cost reductions. Where volume is large, tooling and engineering costs per unit are lower also. According to one estimate an annual output of about 300,000 units is necessary to obtain an efficient operation in the production of appliances like refrigerators and

ranges. However, one firm estimated that with present wage levels Canadian production costs for an output of 100,000 units would only exceed those in the United States by 8% on refrigerators and 3% on electric ranges. Currently the average annual output of each of the four largest producers of these appliances is only 44,000 for refrigerators and 25,000 for ranges.

However, in the appliance field there are now an excessive number of producers in most product lines. If the Canadian market were divided among a smaller number of producers, production costs in Canada would be lower and Canadian firms would find it easier to compete with foreign producers. It is anticipated that as markets for particular appliances become more saturated and competition becomes more severe some further concentration will occur and some of the smaller and weaker firms will be squeezed out.

Though the disadvantage Canadian producers now suffer on the mass-produced goods will decline as the Canadian market grows there will always be new products whose volume is too small to justify anything more than an assembly operation in Canada. Moreover, the increased competitive power which comes with a larger market will be offset in part at least by the trend towards a greater variety of models and a more rapid rate of obsolescence. In some instances the development of more fully automatic production processes may have a similar effect.

The growth of the Canadian market will not significantly improve the competitive position of the producer of heavy specially engineered apparatus. For many of these products Canadian plants are already large enough for an economical operation. While keener European competition in this field has developed since the currency devaluations of 1949, thus far, the principal effect of this competition has been to cause a sharp drop in prices and profit levels throughout this sector of the industry rather than to cause any very large increase in imports of European equipment. However, adjustment to the structural changes that made these devaluations necessary are far from complete and the eventual result may be a significant increase in Europe's share of this market.

For thermal equipment where the growth in Canadian demand is expected to be particularly rapid almost all of Canada's requirements are now supplied by Europe. Even if Canadian producers enter this field it seems likely that European firms will continue to supply a large share of the Canadian market. Thus, imports of European equipment are likely to be more important in the future than they have been in the past. Once adjustment has been made to the changed structural position of the European economy the market situation should stabilize again for there is little reason to expect a continuous pressure for adjustment. Although it has a high labour content, the production of heavy apparatus requires a great deal of engineering skill. Hence it is not likely to be subject to the competition of imports of

newly developing countries as may be true for less complex labour-intensive products.

Canada's increased competitive power in electrical manufacturing reflects not only a growth in the size of the domestic market but an increase in her supply of technical knowledge and manufacturing skills. While there is still not any fundamental research carried on in this industry in Canada there is an increasing number of engineers and other trained personnel employed in developing new products, devising better manufacturing methods and in adapting American methods and products to Canadian requirements. Two major firms reported that the proportion of engineers to their total employment had more than doubled in the past ten years. It has been predicted that expenditures in this field will continue to increase and that eventually Canada may reach a stage where she can begin to exchange technical information with other countries on a more or less equal basis. In the meantime, Canada buys research from other countries just as she buys raw materials.

As has been true for many years Canada's electrical manufacturing industry is predominantly foreign owned and controlled. In 1955 some 65% of the industry's total assets were owned by foreign investors and some 70% were under the control of foreign individuals or companies. The United States is the major country concerned with control over 62% of the industry's investment. Of the eight largest Canadian manufacturers of electrical equipment, two are under Canadian control, five are controlled in the United States and one is controlled from the United Kingdom.

There can be little doubt that Canada has derived important advantages from this foreign investment. The large American and British firms that have invested in Canada have brought with them manufacturing skill and access to patent rights and other technical information. It is true that independent Canadian firms can secure some of these advantages through agreements to license products developed in other countries but the relations here may not be nearly as close. The close relations that may exist between a subsidiary and its parent are indicated by the following excerpt from a letter which the president of General Electric sent out to his staff:

> "It is the policy of the General Electric Company that all its departments and affiliated corporations give to C.G.E. their active assistance and co-operation in every way possible. This includes the furnishing and making available to it of full information, data, design, engineering technique, machinery layout, production processes, drawings, specifications and plans and research concerning all products G.E. and its affiliated companies are from time to time planning and manufacturing. . . . Employees of C.G.E. shall be given access to G.E. factories and offices and those of its affiliated companies to the extent necessary to implement this policy".

It is doubtful if any independent Canadian firm can obtain access to the research and other facilities of a large American firm on an equivalent basis.

Though foreign firms have in the past made important investments in Canada there has not been any major investment of foreign funds in the industry in recent years. As a source of capital, foreign firms have contributed mainly through accepting a low dividend rate thus leaving a large percentage of current earnings available for reinvestment.

On balance Canada has not suffered any important disadvantages as a result of the extensive foreign ownership in her electrical manufacturing industry and she has gained a good deal on the technical side. For the most part Canadian subsidiaries are run as an operating unit by the chief executive of the Canadian companies, although as is true in any company important decisions must receive approval from the foreign dominated Board of Directors.

The relative importance of the largest firms in the industry has declined appreciably over the past 25 years. In 1954 the four largest firms accounted for only 40% of the industry's total product as compared with 59% in 1928. But in individual product lines there is a much higher degree of concentration than is true for the industry as a whole. This reflects the fact that many firms produce only a narrow range of products. For the 34 product groups examined the four largest producers accounted for 90% or more of the total output in 12 instances and for 70% or more in 23 cases. In only one product group, lighting fixtures, did the four largest firms account for less than 50% of total output. For most electrical products output is more highly concentrated than it is in the United States.

Competitive conditions in the industry vary widely. Where a product is imported in significant volume as is true of many appliances and a wide range of industrial apparatus the price in Canada will be largely determined by the laid down import price. Here the total number of foreign and domestic suppliers is usually large and competition is keen. Competition is likely to be weakest where the tariff is high enough to keep imports out of the Canadian market. In these circumstances, if the concentration of output is high some degree or form of monopoly pricing frequently develops. This may well be true for wire and cable, watthour meters, lamps and batteries. For some products, such as lighting fixtures, the number of Canadian producers is relatively large and competition is keen even in the absence of imports.

During the past few years competition has been exceptionally keen in the appliance field and for heavy power equipment and in both instances prices are now as low as or lower than they were in 1949. The result has been a sharp drop in profit levels in many sectors of the industry. Profit levels in the Canadian industry are appreciably lower than they are in the electrical manufacturing industry in the United States.

In 1954 the Canadian electrical manufacturing industry exported 3% of its total output just slightly less than the 3.5% of its output it exported in 1929 and appreciably less than the export level reached in the late thirties and the earlier postwar years. In recent years exports have been most important in meters, generators, and wire and cable. Though exports have been important for some products Canadian manufacturers of electrical goods have never found the export market very dependable. Since the war they have been debarred from many markets by the import restrictions imposed in many countries against dollar goods. Exports to the United States have never been of more than minor importance.

Today, the competitive position of the Canadian electrical manufacturing industry is strong in many lines and its current earnings in relation to its invested capital are about the same as is true for all manufacturing. Profits have declined sharply in the appliance sector but this has been true in the United States also and the outcome of this keener competition may eventually be a smaller number of more efficient producers in Canada. In the heavy apparatus or power equipment sector of the industry profits have been sharply reduced by European competition, and though the competitive pressure here appears to be easing it may remain severe for some time to come.

For the industry as a whole it seems fair to say that if tariffs remain at their present level the industry will be able to gain an increasing share of the domestic market. Alternatively, the industry can probably maintain its present share of the market as the Canadian economy grows despite a gradual reduction in tariff levels. In a number of areas substantial tariff reductions could be made today without any appreciable effect on price levels in Canada or on the volume of imports. Though exports will continue to be important in a few lines they are unlikely to be of major importance for a long time to come.

In looking ahead to 1980, one cannot but be influenced by the rapid growth of electrical manufacturing in the past and the strong position that the industry enjoys today. While precise estimates of future output must depend on one's assumptions about the rate of increase of demand for electrical equipment it is not unreasonable to expect output to expand at an annual rate of 7%, approximately the same as is forecast for power consumption. On the basis of a forecast annual increase in output per employee of 3%, employment in the industry would be about 210,000 compared to the present total of slightly under 80,000, and the total gross value of production around $5 billion. In summary, the industry can look forward to a continuing and substantial expansion and seems assured of increasing its relative importance, both in the manufacturing sector and in the economy as a whole.

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[1]This is one of a series of three studies on Canadian international economic relations prepared under the direction of S. S. Reisman.

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