CANADA

REPORT

of the

ROYAL COMMISSION

on

FARM MACHINERY

1971

Dr. Clarence L. Barber
Commissioner

Available by mail from Information Canada, Ottawa
and at the following Information Canada bookshops:

HALIFAX
1735 Barrington Street

MONTREAL
Æterna-Vie Building, 1182 St. Catherine Street West

OTTAWA
171 Slater Street

TORONTO
221 Yonge Street

WINNIPEG
Mall Center Building, 499 Portage Avenue

VANCOUVER
657 Granville Street

or through your bookseller

Price $7.50 Catalogue No. Zl-1966/4

Price subject to change without notice

Information Canada
Ottawa, 1971

ORDER IN COUNCIL

P.C. 1966-978

Certified to be a true copy of a Minute of a Meeting of the Committee of the Privy Council, approved by His Excellency the Governor General on the 26th May, 1966.

The Committee of the Privy Council, on the recommendation of the Right Honourable Lester Bowles Pearson the Prime Minister, advise that Clarence Lyle Barber of the City of Winnipeg, Province of Manitoba, be appointed a Commissioner under Part I of the Inquiries Act to inquire into the costs of farm machinery and repair parts and, in particular, without limiting the generality of the foregoing, to consider and report upon

(1) the factors affecting the price to the user of agricultural machinery and equipment and parts in Canada including full reference to the impact of financing, distribution and servicing costs on the total price of the user;

(2) the costs to the user of agricultural machinery in Canada as compared with the costs of similar equipment to users in other countries, both in absolute terms and in relation to total costs;

(3) the present and prospective competitive position of the Canadian agricultural machinery industry in Canadian and in export markets as compared with agricultural machinery industries in other countries, including an examination of research and development activity and its relationship to the establishment of new facilities in Canada;

(4) the historical and present relationship between the price and the productivity of agricultural machinery;

(5) measures that would contribute to the expansion of efficient production of agricultural machinery, the attainment of technological advances, the improvement of distribution, financing and servicing facilities and the enhancement of the industry's competitive position so that Canadian farmers would be ensured most favourable prices for, and availability of, machinery and parts.

The Committee further advise

(a) that the Commissioner be authorized to exercise all the powers set out in section 11 of the Inquiries Act;

(b) that the Commissioner be authorized to engage the services of counsel, technical advisers, experts and staff as may be required, at rates of remuneration, including transportation and living expenses as may be approved by the Treasury Board;

(c) that the Commissioner adopt such procedure and methods as he may from time to time deem expedient for the proper conduct of the inquiry and sit at such times and at such places in Canada as he may decide from time to time;

(d) that the Commissioner be assisted to the fullest extent by government departments and agencies; and

(e) that the Commissioner report to the Governor in Council and file with the Dominion Archivist the papers and records of the inquiry as soon as reasonably may be after conclusion of the inquiry.

R. G. Robertson
Clerk of the Privy Council

CONTENTS

Chapter | Page

ACKNOWLEDGEMENTS

During the four years that this Commission has been in existence many people have been instrumental in helping it to achieve its goals. To all of them, whether their names are listed here or not, I express my very deep thanks. Without them it would just not have been possible to explore the industry in the depth and detail which I feel has been accomplished.

Among the first whose assistance should be acknowledged are the farm machinery companies themselves. Not unnaturally, they viewed with some misgivings the appointment of a Royal Commission to investigate their activities. More than any other industry, the farm machinery manufacturers have been subject to government investigations in the past. These inquiries are an expensive business for them, and their mixed feelings are understandable. Nevertheless, they co-operated fully in the investigation as it progressed. Without that co-operation the Commission could not have undertaken its extensive program of research.

Of equal importance to the Commission's work were the contributions of farm organizations, provincial governments and individuals, outlining the problems in the area of farm machinery as they saw them. Their presentations and the briefs that supported them are listed in Appendix C to this Report.

The Commission is also indebted to the personnel of various manufacturing organizations and government research and testing stations which were visited in 1967. In particular, the valuable insight into problems connected with research and testing gained from visits to the National Institute of Agricultural Engineering in Silsoe, England, the Swedish Test Institute at Uppsala, and the Völkenrode Institute at Brunswick, Germany, should be mentioned. The many contacts made on the Commission's trip to Europe in 1967 would not have been possible without the generous help of the Canadian Missions in the countries concerned. To the staffs overseas and to the officials in the Departments of External Affairs and Industry, Trade and Commerce in Ottawa who helped arrange our trip, the Commission's thanks are extended.

In Appendix D of this Report are noted the names of those who contributed to the Commission's work as staff members or as research consultants and study authors. The contribution made by each of these is gratefully acknowledged. Of the many people who made valuable contributions, several deserve special mention. Of particular importance were the contributions of Dr. David Schwartzman of the New School for Social Research in New York City. His special background in industrial organization and the advice he provided in this field greatly strengthened the Report's analysis in this area. The important contributions made by Dr. G. F. Donaldson of Wye College, the University of London, must also be emphasized. Not only did he provide three significant studies for the Commission but he was also responsible along with Dr. J. P. McInerney of the University of Manchester for

providing an initial draft of Chapters 21 to 26 of this report. Mr. D. Martinusen who was responsible for carrying through the financial analysis required for the Commission's Report also deserves particular mention.

In all its work the Commission benefited from the energy, persistence and initiative of its Director of Research, Mr. Neil MacDonald. Directing the research required for this Commission's Report was not an easy task, requiring as it did some knowledge of many different areas. The significant contributions to our knowledge of the industry made by this Report, the Special Report and the numerous studies published by the Commission are due in no small measure to Mr. MacDonald.

Finally, the Commission was fortunate in its small but efficient administrative staff who kept its work running smoothly. In particular, I would like to single out for mention Miss Lois Culpan, the Commission's Administrative Secretary, Mrs. Eva Dawe and Mrs. Alberta Lamb, who were editorial assistants for the reports and studies of the Commission, and Mrs. Olive Calder and Miss Marni Linton who carried out many specialized tasks in the preparation of manuscripts. The Commission is grateful to Mrs. Ina Deruchie for graphic work and to Mrs. Theresa Hodgins who did much of the editing. The Commission's appreciation is also extended to Mr. Don Hanright who served as editorial adviser, and to Mr. R. H. McKercher, the Commission's counsel.

PART I

INTRODUCTION AND PERSPECTIVE

Chapter 1

INTRODUCTION

When I was first appointed as a Commissioner I was often asked, "Why was this Commission appointed?" At the time I was not in a position to give any clear answer. Some time later, after receiving the views of the farmers, the dealers and the machinery companies in their submissions to the Commission and during the public hearings, the reason why the Commission was established became much clearer. It became evident to me that changes in farm machinery technology were exerting far-reaching effects on the whole rural scene. More than any other single cause, it has been improvements in farm machinery that have led to the large outflow of labour and population from agriculture since 1945. Again, it has been improvements in farm machinery technology that have resulted in the trend to larger farming units. Along with better transportation, these machinery improvements have also helped cause a decline in the number of farm machinery dealers and a concentration of machinery sales and service in larger trading centres. With farming much more highly mechanized, the farmer has also found himself more vulnerable to the effects of machine breakdown during his busy seasons – in particular during seeding operations in the spring, during the haying season, and at harvest time. All of these changes have created a sense of uneasiness among many farm people and a feeling that farm machinery was in some way one of the sources of their difficulties. Thus, there was a genuine need for a thorough examination of developments that were exerting such revolutionary effects on farming operations. It was undoubtedly a recognition of this that led to the Commission's appointment.

This Report is divided into five major parts. Part I provides a brief summary of the Report's principal findings along with an index of its recommendations and summarizes in a straightforward fashion and without comment the various views expressed in the submissions received by the Commission or made orally during the Commission's public hearings. Part II considers the market structure and competitive behaviour of the industry that supplies farm machinery to Canadian farmers. It examines the wholesale and retail distribution and finance of farm machinery as well as its manufacture. Part III examines a number of questions affecting the competitive position of the industry in the world market. Part IV reviews the changes and adjustments that changing farm machinery technology has imposed on

Canadian agriculture and, in the light of prospective further changes, considers how the Canadian farmer can be helped to adjust to these changes. Finally, Part V considers a number of special problems that do not fit readily under other headings. These include the problems of repair parts, parts standardization, warranty, postwar changes in prices and costs, and special problems involving farm machinery dealers. The Report concludes with four appendices, two of which relate to the body of this Report. One provides a selection of statistics related to farm machinery and the other presents some information on economies of scale in different types of Canadian farming.

For the purposes of this Report, farm machinery has been definted to include all those machines and implements included in the agricultural implements industry as defined for statistical purposes in the Standard Industrial Classification (S.I.C. 311). As such it includes farm tractors but excludes garden tractors, truck tractors for highway purposes, and tractors used primarily for industrial or construction purposes. Hand tools are also excluded. Some statistical series related to farm machinery, such as the price index of machinery to the farmer, include farm trucks. However, it was decided to exclude trucks from the scope of this Report because their problems are more like those of the automobile industry which has already been subject to one Royal Commission inquiry.[1]

The postwar period has witnessed very significant changes in the structure and organization of the industry that supplies machinery to the farmer. At the end of the 1930s, the industry was dominated by a small number of firms that controlled both the production and distribution of farm machinery. Although the growing sophistication and complexity of machinery was gradually to make the existing distribution system untenable, the industry at the time assumed the major responsibility for supplying repair parts and service. At that time trade-ins were not an important problem, and implements were for the most part of a type that farmers could service themselves if the necessary repair parts were available. Further, before the advent of the combine the timing of harvest operations was less critical, and farmers generally were less aware of the importance of timely seeding, tillage and haying operations. Thus service and the supply of repair parts could be handled through the company's regional branch houses. At the manufacturing level the Canadian industry was mainly oriented to production for the Canadian market or for export to overseas markets. Although the U.S. tariff had been taken off all farm machinery in 1913, the Canadian tariff was not removed until 1944.

In the 25 years that have elapsed since the end of the Second World War, the industry has been transformed into one with a continent-wide, and to some degree worldwide, focus. Although many of the major firms are the same, they have increased very greatly in size. Massey-Harris Company Limited had annual sales of $21 million in 1939. By 1969 its successor company, Massey-Ferguson Limited,

[1] *Report of the Royal Commission on the Automobile Industry* (Ottawa: Queen's Printer, April 1961).

had worldwide sales of Canadian $1,043 million, of which only a little over 8 per cent were in Canada. Almost all the Canadian manufacturing plants now specialize in the production of a few farm machines which are sold throughout North America. As a result, about two-thirds of the farm machinery manufactured in Canada is exported. And 70 per cent of the machinery sold to Canadian farmers is imported. While most of Canada's imports come from the United States, in recent years there has been an increasing flow of imports from Western Europe, especially of tractors, and to a lesser extent, combines.

Another development has been a greatly increased emphasis on research and development expenditures in the industry. Although farmers still contribute many original ideas, increasingly it is industry expenditures that turn these ideas into effective working machines. Massey-Harris was spending about $500,000 on research and development (R&D) in the late thirties. In 1967 Deere & Company reported an R&D expenditure of $46 million. As a result of this level of expenditure and developments in related industries, farm machinery has increased very greatly in sophistication and complexity. The addition of hydraulics, hydrostatic transmissions, diesel engines, and complex sensing mechanisms has not only made farm machinery much more powerful and productive, but has also added to the skill levels required for its operation and for its effective care and maintenance.

Along with this growing sophistication has come an increase in the size of many farm machines. The average size of farm tractor sold has increased from 19.3 HP in 1945 to 62.6 HP for all Canada by 1968, and to 83.2 HP on the Prairies. Many of the tractors sold in the latter area today are over 100 HP in size. And there have been parallel increases in the size of the seeding and cultivating equipment used with them. Combines also have increased very significantly in size.

Accompanying this growth in size of the tractor and other farm machinery has been a consolidation and amalgamation of many farms into larger operating units. Thus, while the total market for farm machinery has continued to increase in terms of dollar volume, the number of units of each machine sold has declined. The number of farm tractors manufactured in North America in 1969 was less than half the number produced in 1951. Unlike the automotive and many other industries whose unit volume increases year by year, the farm machinery industry has faced a declining unit volume. It has been losing rather than gaining economies of scale.

Faced with rising labour costs and declining volume, the industry has recently begun to move towards a more international organization of its manufacturing operations. For example, in the early sixties Ford Motor Company rationalized its tractor manufacturing operations on a worldwide basis, producing each major component in one location only – mainly Basildon, England, and Antwerp, Belgium – and assembling in three different locations, Basildon, Antwerp, and Detroit. In this way it was able to obtain a larger volume and at the same time take advantage of the lower manufacturing costs that prevail in Europe.

These various forces have also produced changes in the other major producing firms. White Motor Company now operates the formerly separate firms of Cockshutt, Oliver, and Minneapolis-Moline, having acquired them at distress prices. It has closed some plants and consolidated output for all three firms in others. Some new firms have appeared. New Holland, now an important producer of haying and harvesting equipment, was just starting to produce farm machinery in 1939. Canadian Co-operative Implements Limited (C.C.I.L.) formed during the war years, has gradually expanded its manufacturing and distribution operations and now occupies a significant place in the Prairie market. Versatile Manufacturing Ltd. in Winnipeg has grown from a small company producing grain augers, sprayers, and drawbars, to a firm with annual sales of $33.8 million in 1969 and with an important production of swathers, combines, and large four-wheel-drive tractors. Generally, however, the industry is still dominated by firms that are among North America's industrial giants.

Until about 1945 the Canadian industry sold its products through local agents who had very little in the way of a stock of repair parts or service facilities. With the growing complexity of farm machinery and the farmer's increasing stress on the need for prompt service, this system was proving unsatisfactory. For this reason, around the end of the Second World War, the industry changed to a system of franchised dealers. These dealers are independent businessmen who purchase machines and repair parts from the companies, maintain service facilities, and provide sales and service to the farmer. In the period of buoyant sales immediately after 1945, these dealers were able to finance their operations with little or no help from the companies. However, when the backlog of demand that had developed during the war and the depression was pretty well satisfied, sales slumped and the companies found it difficult to get their dealers to keep what they regarded as an adequate stock of machines. For this reason, they introduced a plan which called for the interest-free "floor-planning" of new machines. Under this plan the dealer would contract to buy new machines but would obtain them on an interest-free basis for up to 12 months for tractors and up to 23 months for most other machinery.

For the major companies this plan had the advantage of keeping an adequate stock of machines on view at the dealer's place of business. It also made it easier to persuade dealers to contract for machines that did not have to be sold immediately and for which the ultimate payment date was comfortably in the future. The plan had some disadvantages, too. Sales that in the short run are completely financed by the company contain a substantial element of risk. In periods of depressed sales, dealers may go bankrupt, leaving a company to repossess a dealer's unsold inventory. The scheme has also given the farm machinery industry an unusual asset structure. In recent years Deere & Company has had total assets equal in amount to 133 per cent of its annual sales. Accounts receivable alone have amounted to 75 per cent of annual sales. In contrast, their net fixed assets have been only some 22 per cent of annual sales and less than 17 per cent of their total assets. In the end, of course, the heavy carrying costs associated with the large inventory carried by dealers must be paid by the farmer.

At the distribution level significant structural changes have been taking place. The major manufacturers all maintain their own wholesale branch-house distribution network to support their sales and service. But the number of branches has been greatly reduced in recent years. The major companies have recently been closing many of their smaller dealerships, and concentrating on sales by the larger dealers who operate out of major trading centres. For four major companies, the number of dealer franchises in Canada declined 45 per cent between 1962 and 1969. Some of the dealers whose franchises were cancelled have stayed in business by handling the products of smaller and more specialized manufacturers. Nevertheless, it is clear that a major structural change has been occurring. Since the cost of supervising and supporting dealers has become a substantial component in the companies' branch-house distribution costs, this change undoubtedly reflects pressure on the companies to reduce their costs. The change is also likely to improve the quality of service to the farmers. One of the Commission's surveys has shown that the small dealer accounts for a disproportionate share of farmers' complaints about slow or poor-quality service.

During the postwar period almost all the major companies began to finance farm machinery sales at the retail level, and they set up finance subsidiaries to help support this activity. Not only has finance been used as a competitive device in general, but by offering interest-free financing on "out of season" sales it has also been used as a method of encouraging the farmer to buy ahead of the normal season of use. More recently, interest-free "in season" deals have been offered which have been little more than disguised price cuts.

At the retail of dealer level there has been keen competition for the farmer's business, and dealer operating margins have declined over the postwar period. There is also some evidence that dealer efficiency increases over a moderate range as dealer size increases.

Because the production and sale of farm machinery in Canada is just one part of a continent-wide, and to some degree worldwide, activity, it has been necessary to examine many of the industry's problems from an equally broad point of view. Thus, as was made clear in the *Special Report on Prices of Tractors and Combines in Canada and Other Countries* released January 1970, the prices of tractors and other farm machines in Canada depend to a major degree on the way in which the leading companies "source" the machinery sold in Canada and on how it is priced for transfer between divisions of the same company. Many of these decisions are made outside Canada.

Similarly, the profits reported as being earned in Canada require very careful interpretation, because they depend heavily on the prices at which machines are being transferred from one division to another of the same international company. With such transfer prices involved in a very large part of Canadian imports and exports of farm machinery, it is clear that profits reported within Canada have a somewhat artificial character. For example, in 1966, four major companies

reported a profit before tax in Canada of about $35 million. However, if all of the companies had used the least favourable of the transfer prices on imports and exports used by any one of these firms, reported profits would have been only $25 million. If they had all used the most favourable (to Canada) of the transfer prices used by any firm, the profits would have been $47 million.

Evidence gathered by the Commission indicates that a very substantial share of the profits earned by the international farm machinery companies on their sales of equipment to Canadian farmers are earned outside Canada. For example, in 1966 it was estimated that a number of major firms in the industry earned a total profit of $54 million on sales of $310 million in Canada. Of this total, $25 million was reported as earned in Canada and $29 million as earned in the United States or other countries. Because of the difficulties of gathering data outside Canada, profits on this basis were developed by the Commission for only the one year.

In general, the profits earned by the major international farm machinery companies during the postwar period have been moderate compared with those earned by many other industries. They have been at a substantially lower rate than those earned by the industry in the twenties or thirties. During the past decade, the profits reported in Canada increased rapidly during the period of rising sales up to 1966, but have since fallen sharply. In 1969 the companies reporting to the Commission recorded a net profit (after taxes) of only $.6 million on sales of $491 million. Three years earlier in 1966 the same companies had reported an after-tax profit in Canada of $30 million on sales of $569 million. These profits include those earned on export as well as domestic sales, and are strongly affected by transfer prices as described above.

Although profits on the average have been moderate, the industry is characterized by a high degree of concentration in the sense that a small number of companies account for a large proportion of all sales. It is also an industry that has formidable barriers to the entry of new firms. Entry barriers exist on both the demand and cost side. On the demand side, the highly seasonal and erratic year-to-year fluctuations in sales and the comparatively slow longer-term growth in demand have favoured the large well-established firm. On the cost side, the importance of economies of scale has had a similar effect. The need for a well-organized distribution and repair parts service is also a major entry barrier.

Despite these barriers, new firms have entered the industry and over the past decade the share of the market enjoyed by the three largest firms has declined appreciably for almost all major product lines. For all farm machinery the market share of the three largest firms fell from 50 per cent in 1957 to 42 per cent in 1967. This evidence of declining market shares for major companies in spite of significant barriers to entry and moderate profits is consistent with the picture of an industry that has followed a policy of pricing its products high in relation to manufacturing costs. The high prices have allowed smaller firms with lower volume and higher unit

costs to survive, and in some cases even increase their market shares. Some of the smaller firms have been reorganized after suffering serious losses with a major writing-down in asset values. The high prices have also attracted new entrants to the industry. For tractors, the new entrants have included British firms such as British Leyland Motors and David Brown, as well as a Canadian firm, Versatile. For combines, they have included European models such as New Holland's Clayson machine and Ford's Claas-made combine as well as Versatile's own model. For other products, too, such as swathers, diskers, and other tillage equipment, the major companies' policy of pricing high in relation to manufacturing cost appears to have been a factor in attracting new entrants. To the extent that the new entrants have smaller volume and higher costs than the major firms, their entry does not bring the price down, but simply divides the market among a larger number of firms.

That a policy of pricing high in relation to manufacturing costs has not resulted in higher rates of profit is due in very considerable measure to the large distribution assets the industry has accumulated – a direct result of its practice of interest-free floor-planning of dealer inventory. Because the Canadian industry is just one small part of a continental, and to some degree worldwide, one, it is not easy to devise policies for adoption by the Canadian government that will have substantial effects on the industry's structure. The Commission's major proposal designed to affect industry structure is for an eventual ban on the practice of interest-free floor-planning. The first step suggested is for a limit on the period for which interest-free credit could be granted – six months on tractors, and 12 months for all other machines. In time, this restriction should lead to less accumulation of inventory in the hands of dealers and a significant over-all reduction in distribution costs. The recommendation is described in more detail in Chapter 11.

The industry has been accused here of pricing high in relation to cost. This is, of course, a relative matter. Nevertheless, it is a difference that can have a substantial effect on both unit costs and prices in the industry. This is especially so where unit costs increase significantly as the volume of output declines, as is true for tractors and combines and may well be true for other farm machines. In these circumstances, if the leading firms in the industry price high in relation to unit costs, the attractive gross margin created in this way will induce other firms to enter the industry or allow existing small firms to survive. The end result is one where the major firms end up with a smaller sales volume and higher unit costs that appear to justify the companies' pricing policy. In contrast, where the leading firms price low in relation to cost, smaller firms will disappear or will not be attracted into the industry, and the major firms will end up with larger volume and lower unit costs. For tractors, the North American pattern appears to be one of pricing high in relation to unit costs. In Britain the reverse appears to be true. Just why this difference in approach exists is not clear. It may be related to the characteristics of the dominant firms in each market and to historical developments. As individuals, both Henry Ford and Harry Ferguson believed in pricing low in relation to costs,

with the goal of achieving the lower unit costs that accompany large-volume production. And the two dominant firms in the British market today are the successors to firms started by those two individuals.

Because of the increasing sophistication and complexity of the machinery they produce, the major manufacturers have recognized the need to give much more support to their dealers. They provide special training courses for their service personnel, they supply service manuals and produce special dealer magazines, and they advise dealers on the management of their business and on facilities planning. However, the companies have been slower to recognize the farmer's need for more information and advice in selecting machinery to suit his needs. They are not alone in this regard. A recent book, *Principles and Practices of Commercial Farming,* prepared by the Faculty of Agriculture and Home Economics at the University of Manitoba, has in its 600 pages only one page dealing with combines, and says almost nothing at all about how a farmer decides on what is an appropriate size of machine for his operation. Yet as machines become larger and more expensive, a farmer's machinery-investment decisions become increasingly critical. It is for this reason that this Report includes a recommendation for an evaluation and testing unit that could supply farmers with much more reliable and comprehensive information to help them make their decisions on machinery investment and replacement.

In some ways the farmers and the machine companies remind one of an old married couple who have their ups and downs. The interests of both are inextricably intertwined. Farmers are highly dependent on the machinery companies for their new machines and for a prompt and reliable repair parts service. In some respects they admire the achievements of the company, especially the many improved labour-saving machines they have developed. At the same time they are often very suspicious of the major companies. They suspect them of making large profits at the farmer's expense. Some of them believe the companies bring out new machines without adequate testing.

In very considerable measure the suspicions that develop in this relationship are due to the fact that the machinery companies have had almost a monopoly over the technical knowledge and expertise in this industry. There has been almost no research into farm machinery technology at either the governmental or university level in Canada. Except for a brief period when the Agricultural Machinery Administration operated in Saskatchewan, there has been no machinery testing or evaluation beyond what was carried on by the companies themselves. As a result, the number of engineers with a thorough knowledge of the industry's problems who are not employed by the industry itself has been very limited. Even these few may be reluctant to be openly critical of the companies because they are dependent on them in various ways – for a loan of equipment for research purposes, for possible research grants, and for informal discussion of farm machinery questions. The farm journals, too, are sometimes suspected of being less than independent

because they are so heavily supported by the advertising expenditures of the farm machinery companies.

Such extreme dependency, I am convinced, is undesirable. Implementation of the various measures recommended in this Report should do much to end it. In particular, a larger research program at both the governmental and university levels, dealing with the basic problems of how farm machines operate and how farm machine systems can be designed to carry out farming operations more economically and effectively, will increase the number of engineering and other machinery specialists who are employed outside the companies. The establishment of an evaluation unit will also help reduce the farmer's present overwhelming dependence on the machinery companies' published data for information about machinery capacity and suitability.

The basic proposal being made is for a comparatively small (compared to such a body as the National Research Council) but highly expert research and evaluation unit controlled by a semi-independent governing board. The unit would have its own program of research designed to improve farm machinery. In addition it would be responsible for a greatly expanded program of research grants to Canadian universities. This would ensure a continuing flow of farm machinery technology suited to the needs of Canadian farms. It could do much to help keep them competitive on world markets. The unit or centre would also be responsible for the testing and evaluation of farm machinery and for providing farmers with reliable information to guide their investment and replacement decisions. As a general centre of expertise, the unit could also be responsible for a program of research designed to improve safety and reduce the health hazards connected with farm machinery, for developing an improved program of education on health and safety hazards, and for initiating an improved set of statistical data in this area. It should also develop a small program of research into the feasibility of more standardization, and should take a lead in attempting to initiate increased standardization. Finally, it should use its good offices to promote a smooth-functioning co-operative relationship between the manufacturers, distributors, and users of farm machinery.

The Commission was also asked to examine "the present and prospective competitive position of the Canadian agricultural machinery industry in Canadian and export markets" and to recommend "measures that could contribute to the expansion of efficient production of agricultural machinery". At the present time the Canadian share of farm machinery manufacturing in North America, about 7 to 8 per cent, is well below Canada's proportion of the region's farm machinery sales, around 12 per cent. The reasons for this disparity are not entirely clear. It is at least partly due to the fact that a number of full-line companies have no manufacturing facilities in Canada and that other major firms manufacture much less in Canada than the locational advantages of the country would appear to justify. It is clearly no accident that the only major company that manufactures more in Canada than it does in the United States is Massey-Ferguson. The lack of any major tractor plant in Canada and the failure of any of the larger companies, other than Massey-Ferguson,

to supply tractor components from Canada also contributes to a smaller Canadian share of manufacturing output.

Because the growth in farm machinery sales on this continent is slow and because the number of units of most machines produced declines as farms get larger, there is unlikely to be any major shift in the location of manufacturing plants for the industry's present products. However, farm machinery has been subject to a rapid rate of technological change and this is likely to continue. Experience in Britain and other countries indicates that small independent firms often take the lead in developing and marketing newer specialized equipment. Thus the expanded program of research into farm machinery technology recommended above should give a valuable stimulus to the growth of farm machinery production in Canada. Small independent firms will benefit from the flow of new ideas generated by this research and from the availability of a larger number of qualified agricultural engineers in government research stations and at universities. The larger firms would be encouraged to locate more of their own research in Canada because of the much more favourable milieu that had been created for farm machinery research. And this should lead, in time, to an expansion in their manufacturing output in Canada.

In this brief introductory survey it has not been possible to do more than review some of the highlights of this Report. Many questions that have been examined at length, such as the repair parts problem, have not been mentioned here at all. To understand the industry in all its complexity the Report must be read in its entirety. Numerous recommendations have been made. These appear in various chapters throughout the Report, usually in the context of a discussion of the problem to which they relate. An index of these recommendations is appended to this chapter for ease of reference.

INDEX OF RECOMMENDATIONS

Chapter 2

FARM MACHINERY PROBLEMS AS VIEWED BY THE FARMER, THE MACHINERY COMPANY AND THE DEALER

The Commission has received the views of many organizations and individuals about problems related to farm machinery. Before examining these problems in detail it will be useful to make a brief survey of the testimony. Particular attention will be given to the views of the farm community as expressed through their organizations, and to the views of the major farm machinery suppliers. Opinions expressed by others, including provincial governments, dealer organizations, and individuals, will also be considered. No attempt will be made at this stage to draw conclusions on the questions or problems raised. Rather, in this chapter, a broad picture of the industry and its problems will be painted. The picture will necessarily be a multi-faceted one, reflecting the many different and often conflicting points of view.

Prices of Farm Machinery and the Cost-Price Squeeze

It was repeatedly stressed before the Commission that the investment in farm machinery required for a modern and efficient farming enterprise was rising and, as a consequence, farm machinery costs were becoming an increasing proportion of total farm costs. This, in turn, made more crucial the price at which the farmer was able to buy his machinery and equipment. Many witnesses were not prepared to argue that the price of farm machinery was higher than it should be in absolute terms. But there was almost unanimous agreement among farm groups that its price had become too high in relation to the price at which the farmer had to sell his product. In effect, farm machinery costs were an important element in a more general cost-price squeeze. The Saskatchewan Wheat Pool, for example, pointed out that the prices received by farmers had risen only 3 per cent in Western Canada since 1949 whereas the price of machinery had risen 85 per cent.

While farmers did not feel fully competent to judge the reasonableness of farm machinery prices, they were clearly suspicious of present price levels. The industry's prices, it was argued, were administered. Competition might exist for sales but there was little competition in quality or price. Instances were given of

comparatively large price increases within a short period of time and of major increases for machines that had changed very little in design. The Alberta Wheat Pool wondered why tractor prices had an almost constant price per horsepower. Why shouldn't the price per horsepower on very large tractors be much lower? A number of witnesses cited evidence that prices of tractors and other machinery in Britain were lower than in Canada and asked the Commission to investigate the reason for these differences.

The difference between the manufacturer's list price and the price at which machines are actually sold by the dealer was a source of concern to some witnesses. In recent years, it was contended, the effective price was some 10 to 15 per cent below the list price, the difference being concealed by the practice of giving an excessive trade-in allowance. Some groups favoured a lower list price, arguing that the present practice made it difficult to know what the retail price really was. Others argued that there were some advantages to the farmer in the present practice, in that it made it easier for him to meet the down-payment requirements under Farm Improvement Loans Act (F.I.L.A.), and it also gave certain advantages under the Income Tax Act. The Canadian Federation of Farm Equipment Dealers pointed out that the practice of selling well below list meant that the farmer was paying less for his product than might appear from quoted list prices.

A good deal of concern was also expressed about the price of repair parts. Instances were given of large price increases on parts during the past few years. A number of people pointed out that it was possible to buy bearings from the original bearing manufacturer at prices much lower than those of identical bearings from a farm machinery company. One witness suggested that list prices be stamped on packages containing small parts. This would prevent dealers from taking an excessive mark-up. Evidence of widely different prices being charged by different dealers for the same parts suggests that such practices do occur. There were complaints, too, about the need to buy a completely assembled unit when only a minor component had failed.

The farm machinery companies admitted that prices of farm machinery had risen more than the prices of farm products, but they argued that there was little relation between these two sets of prices. Prices of farm machinery had risen, they contended, because wage rates and raw material prices had increased by more than could be offset by improvements in efficiency, despite the best efforts of manufacturers to keep costs down. This was partly due to the fact that as farm machines became larger and more sophisticated, the volume on any one type of machine had declined. Thus the industry was not able to offset cost increases by efficiencies obtained through large-scale production as was true for automobiles, trucks and other products. Because farm machines had become larger, heavier and more intricate in design they had also become more difficult and expensive to manufacture, requiring more sophisticated production machinery and more skilled labour. The increasing number of models and options required to meet the farmer's needs had also added to costs.

The failure of farm product prices to rise more was a separate problem, they argued, and some companies said that if it had not been for the greatly improved productivity of agriculture, much of which reflected the improved farm equipment available, the farmer's position would be much worse. One company questioned whether the cost-price squeeze was a problem affecting all farmers or just the smaller farms which had not kept up with modern technology or didn't have enough land and capital for an efficient operation. Was the problem of low income in agriculture a structural problem, they asked, rather than one of the level of farm prices?

All companies said that the rise in farm machinery prices had not been caused by excessive profits in the industry or by a widening of profit margins. Indeed, just the opposite was contended: the profits of the farm machinery industry had been lower than those earned in other industries. This, they claimed, was the result of intense competition in the industry. Moreover, prices to the Canadian farmer were largely set by competition throughout the North American market rather than in Canada alone, because many of the machines purchased by Canadian farmers were imported from the United States and a major share of Canadian production was sold in the U.S. market. Two major companies cited cases of tractors being sold at lower prices in Canada than in the United States, a difference they attributed to the larger amount of competition from European producers in the Canadian market.

Parts prices, they argued, were determined in relation to costs and to the competition of alternative sources such as discount stores and will-fit manufacturers (those who produce parts designed to fit the machines of many different firms). For many of the slower-moving parts, it is often difficult to recover all costs, including the costs of scrapping obsolete parts and storing, insuring and keeping in salable condition a vast array of parts. One company stated that 85 per cent of its dollar parts sales were provided by only 15 per cent of its parts numbers. The companies recognized that individual dealers might charge different prices for the same parts, but they felt this was difficult to prevent. The dealer was an independent businessman and, in the long run, competition from other dealers should prevent excessive parts pricing. One company said that its present policy provides parts to the Canadian farmer at more favourable prices than to the U.S. farmer, the Canadian price being set at the U.S. price plus a surcharge of only 5 per cent rather than the full exchange differential.[1]

Availability of Repair Parts and Service

Next to price, and for some even more important, the question uppermost in the farmer's mind was the availability of repair parts in critical periods such as seeding, haying and harvest time. A few days' delay in such critical periods could cause serious loss to the farmer. Hence it was of utmost importance that, when a

[1]This statement was made of course at a time when the Canadian dollar was pegged at .925 (U.S.) so that the full differential would be about 8 per cent.

tractor or combine or other farm machine broke down at such a time, the farmer should be able to get it repaired promptly. And farmers are far from satisfied with the service they are getting. Many examples were cited of long delays at crucial times. Many dealers, it was contended, now carry only a minimum stock of parts and depend on telephone orders to the nearest city to fill orders for all but the fastest-moving parts. Often parts had to come from outside the provinces, with delays of a week or more being not at all uncommon. Some farmers even felt that the companies deliberately created a scarcity of parts on older machines so that farmers would be forced to trade in their machines more frequently in order to reduce the risk of a critical breakdown. Instances were also cited of a shortage of parts on relatively new machines. However, some farmers felt that the service they received was good and the supply of parts adequate. Often, these turned out to be farmers who were close to large, well-equipped and efficient dealers.

Many suggestions for improving the situation were made. Many farmers felt that the machinery companies should stock a major parts supply in every province or in various parts of the province. Some felt that multi-company parts centres might be the answer. These would be parts depots located at a central point in each province and open on a 24-hour basis during busy seasons, including weekends and holidays. It was felt that repairs should be available within 24 hours in an emergency and within 48 hours in less pressing situations. Many were critical of parts availability on Saturday and Sunday and holiday weekends during busy seasons. Instances were cited where central repair parts depots would not accept orders for delivery on the same day unless they were placed by mid-afternoon. A number felt that the staff of the companies' regional or central warehouses showed little concern for the problems faced by a farmer with a machine "down" in the field. Others suggested that parts manuals should be provided to farmers so they could order parts by telephone. It was argued, too, that companies should provide cross-references in their parts list so that a farmer in an emergency could obtain an equivalent part from another supplier.

Responding to such criticism, the companies argued that it was simply not true that their parts service had deteriorated, and said a number of major steps had been taken in recent years to improve their parts operation. Almost all companies were making use of computers to keep a record of their stock of parts and to help them determine where and in what amounts different repair parts should be kept. Several major companies had introduced special programs to help their dealers manage their parts stock more effectively. The results of these programs, they contended, had been reflected in an increasing percentage of parts orders being filled directly over the counter. All companies have been engaged in upgrading their dealers, eliminating the smaller, less efficient dealers who were unable to give an adequate parts service. Although this has often meant that the farmer has to travel further in order to obtain repair parts he has a better chance of getting them when he arrives.

The repair parts problem has been complicated by an increasing number of parts. One major company reported that the number of different farm machinery parts stocked had increased from 68,000 in 1958 to over 100,000 in 1967. Some 30,000 of these had no North American sales at all in the preceding 12 months. The large number of parts in stock reflects the fact that the company undertakes to stock parts for tractors and combines for a minimum of 15 years after they stop manufacturing a given model. In practice they hold parts longer than this, and as long as there is a reasonable need for them. Other companies reported comparable experience and practices.

Nearly all companies reported that they had an emergency service which the dealer could use to obtain a part quickly when a farmer had a machine "down" in a busy season. By the use of telex communication it now is possible, they stated, to find the required part wherever it is located in North America within an hour or two. In all but 5 per cent of their emergency orders from dealers, one company stated, it is possible to obtain the part from the dealer's regional branch warehouse. A further 3 per cent can be filled from an adjacent branch. For this company, only two emergency requests out of 100 had to be filled through the company's central parts warehouse. All the major companies reported that their branch warehouse personnel could be contacted on weekends during busy seasons.

Nevertheless, it was admitted that breakdowns in the system still occurred and farmers sometimes had to wait a long time for an urgently required part in a critical period. Often these breakdowns reflected human error. The farmer might fail to communicate to the dealer the urgency of the requirement or the dealer might fail to order the part on an emergency basis. Occasionally, the company will find itself out of stock when the demand for a seldom used part suddenly increases, and a delay occurs until a new supply can be manufactured.

Farmers in more outlying areas such as Prince Edward Island or the Peace River area of British Columbia were particularly conscious of delays caused in transporting parts. However, delays apparently often occur within provinces as well, and the Commission was told of substantial time lost, just in moving parts from Hamilton to the Ottawa Valley. It was alleged that transport systems have deteriorated significantly in recent years. Many trains have been discontinued or the service cut back. Both express and parcel post are less reliable than they used to be. And buses are unwilling to take bulky parts and will not drop parts at unattended points. Delays also occur with truck shipments, particularly where a transfer has to take place at a terminal warehouse. Instances were cited of material being carried through a town and then back-hauled to it a day or two later, because of truck licensing requirements. Service on weekends is especially difficult. Offsetting these difficulties in some degree has been the increased speed of jet aircraft. Parts can now be flown from Europe virtually overnight. One company stated that all but 2 per cent of its dealers would normally receive delivery of parts within two days of shipment from its regional depots, and the remaining number would receive shipment within three days. However, another farm machinery company felt that

they were being blamed for delays that were the fault of the transportation system. Even air shipments of parts might be delayed in favour of higher-priority cargo.

When parts are shipped from the United States, further delays occur because of the need to clear customs. Although all repair parts clearly usable only on farm machinery enter Canada duty-free, they still must clear customs. Canada Customs does not provide a 24-hour service at border points for commercial shipments, and delays of several days in obtaining customs clearance can occur even on air shipments. Further, it is necessary to ship even emergency parts from U.S. sources to branch houses in Canada rather than direct to the dealer, or almost interminable delays will occur. Some delay on these shipments also occurs because special invoices have to be prepared to accompany the shipment.

Service facilities, too, were criticized. Many servicemen, it was argued, were not adequately trained, their wages were low and their work inferior. Some felt that repair centres should be able to act as dealers for more than one company in order to get an adequate volume of business and improve their service. Smaller dealers, in particular, are likely to have inadequate facilities. A number of witnesses stressed the need for dealers to have large enough trading areas to support a viable service operation. Even larger dealers apparently have difficulty retaining skilled servicemen in competition with the higher wages often offered by automotive dealers. There were complaints as well that machines were not properly adjusted before delivery, so that a farmer might have to spend a day or two adjusting a machine before it would work satisfactorily. One witness suggested that there was a lack of co-operation betweeen dealers and companies as to who was responsible for adequate servicing of new units. Some dealers were reported to be reluctant to report problems to their companies.

The Province of Manitoba suggested that certification and licensing of repair personnel might be considered after a formal training course, with service personnel required to take upgrading courses from time to time. Another witness suggested that central repair depots should have more trouble-shooters who could go out into the country and fix or adjust machines. While the trend to large dealers is apparently improving service, farmers are often farther from these centres and this creates awkward problems for machines that are too large to transport easily. Many farmers like to service their own machines and it was suggested that shop facilities should be available that a farmer could rent. At least one farm organization pointed out that not all farmers wanted better service if it was going to involve higher costs.

All the companies reported that they had active training programs designed to upgrade the skills of dealer service personnel. Generally the company pays all the expenses of providing the course except for transportation to the training location and living accommodation during the course. Some companies reported that they provided their dealers with an incentive to send personnel on such courses by offering higher rates for warranty work where company-trained mechanics were employed.

The Commission was also told of a number of courses that had recently been established in technical high schools dealing with diesel motors, farm tractors and farm machinery in general. However, in at least one province, the course being offered is in danger of being discontinued because of the very small number of applicants.

The Saskatchewan Wheat Pool suggested the desirability of diagnostic clinics for trucks and tractors in major cities and towns. A wrong diagnosis could cost the farmer many dollars. They also suggested that the servicing of hydraulic equipment had not kept pace with the increased use of this equipment. Most dealers, they reported, had reasonable facilities, but there was an urgent need for skilled mechanics, especially in medium-sized and smaller centres in the province. A number of organizations suggested that multi-line dealers would lead to improved service, since it would allow each dealer enough business to warrant well-trained mechanics.

Research, Testing and Machine Performance

Although farmers feel that models are changed too frequently and there are an excessive number of options on some machines, on the whole they think that the major farm machinery companies have done a good job in improving old machines and designing new ones. In the Saskatchewan Wheat Pool Survey, some 95 per cent of those responding felt that machines perform well the work for which they were designed. Still, a significant number of farmers felt that some design aspects of various machines were lacking either in strength, durability, or convenience of repair. At the same time many witnesses appearing before the Commission felt that research on machinery and equipment had been neglected by governments and universities. The United Farmers of Alberta Co-operative Ltd. suggested the need for a national agricultural research council, one of whose duties would be to supervise research in agricultural engineering. The Saskatchewan Government suggested there was need for more fundamental research in both the engineering and economics of farm mechanization, directed towards finding new, better and lower cost methods, machines and systems for doing farm work. Existing biological and chemical research, they argued, was insufficiently oriented to engineering requirements. For example, there was need for data on the optimum depth, temperature, moisture content, pressure, fineness, uniformity, etc., for the best growth and health of plants. Basic data of this type would enable engineers to produce better farm machines. The Government of New Brunswick pointed out that in the United States and Europe agricultural engineering research receives from 5 to 10 per cent of the agricultural research budget, compared with only about 2 per cent in Canada.

A number of witnesses linked research and testing and suggested that a single agency should carry out both functions. An independent testing authority was recommended by almost every farm organization appearing before the Commission. Farmers, it was argued, need unbiased data on the capacity, efficiency and

performance of machinery under different conditions, rather than the high-pressure sales campaigns of the machinery companies. The need for tests as to the suitability of machinery for conditions in different regions was repeatedly stressed. Many organizations commented favourably on the experience of the Agricultural Machinery Administration (AMA) in Saskatchewan and felt something similar to it should be revived on a regional or national basis. The Saskatchewan Wheat Pool reported that 141 out of 178 respondents favoured independent comparative testing such as the AMA had provided. The Manitoba Farm Bureau reported that 80 per cent of those canvassed favoured testing by an independent body. However, the Government of New Brunswick was not in favour of a national testing body if it would inhibit the development of an expanded program of engineering research.

It was also suggested that a national testing body could test on a fee basis for individual designers and small manufacturers. In addition, new equipment developed in other countries could be tested for its suitability to Canadian conditions. If combined with a research agency, the testing agency could act as a co-ordinating body for new developments in research in agricultural engineering, helping to draw these to the attention of farmers. Farmers often feel that the power and performance claims of the farm machinery manufacturers bear little relation to reality, and it was suggested that a testing agency could act as a sort of a policeman in this area, drawing attention to false or misleading advertising.

To be fully effective, one witness contended, machines should be tested both before and after new models are introduced. Moreover, testing should cover both durability and suitability, and durability testing should include both testing in the field and bench-testing of components.

The machinery companies almost uniformly took a negative attitude towards a public testing agency. They argued that such a body would merely duplicate the very extensive tests that are now being carried out by the companies. One company described its testing program on new machines in some detail. This program includes intensive laboratory testing of machine components, and a laboratory test of the first prototype machine designed to test its structural strength and the wear on moving parts. This latter test gives the machine the equivalent of several seasons of intensive use. A number of machines are then tested by farmers in carefully selected locations under various soil and crop conditions. By testing in different parts of North America it is possible to get the equivalent of two or more seasons of use on a seasonal-type machine within a single year. Each machine is accompanied by a technician in the field and at the end of the season it is returned to the engineering department where the test group takes the machine apart and checks each component to see how it has stood up under actual operating conditions. If the results are satisfactory, the machine may be tested again a second year before approval is given for a pre-production run. Some of these will go to farmers who test machines for the company and some will again be followed by the company's own test group. Only when the new machine has been thoroughly evaluated, this company reported, will it be released for full production tooling.

While for the most part the machinery companies found the tests carried out by the AMA were satisfactory, they argued that most of the defects discovered by that organization had already been brought to their attention and corrected before the AMA report appeared. On the other hand, they almost all felt that universities and government agencies could perform a useful role in the research area, particularly in developing basic data about the characteristics of various machines and in developing new machines for specialty crops where the small volume would preclude a satisfactory research effort by a private company.

Warranty Arrangements

Farmers vary in their attitude towards present warranty arrangements. The Saskatchewan Wheat Pool reported that about half of those who responded to its survey felt that present arrangements were satisfactory, whereas the other half felt they should be improved. Many farmers apparently feel that a one-year warranty is not adequate on machines such as combines which are often only used for a few weeks of the year. The most frequent suggestion was for a warranty in terms of hours of use with machines being equipped with sealed hour-meters. The Western Manitoba Farm Business Association recommended that warranties be extended to cover 1,000 hours of use on combines and 4,000 hours on tractors. They felt that most of the machines now being sold could live up to such a warranty.

Difficulties sometimes arise where the warranty period expires before the machine is satisfactorily repaired. It was suggested that the warranty period should be extended until the machine is working properly and that the warranty should cover parts replacing those originally found to be defective. Another witness recommended that warranties be written so that the intent is clear and that they be simple to carry out. Dealers should be required to explain warranties to the purchaser at the time the machines are sold. It was argued, too, that the practice of voiding warranties where the customer did not use special company-marketed materials was not in the public interest. Several witnesses suggested that warranties of limited duration on reconditioned second-hand machines would serve a useful purpose.

In Prince Edward Island, the Federation of Agriculture complained of long delays in the implementation of warranties and said the farmer had difficulty in determining whether the dealer or the company was responsible. The Federation suggested the need for an appeal board to review warranty complaints.

The dealers, too, voiced dissatisfaction with present warranty arrangements. The usual company warranty policy does not cover the full financial costs incurred by the dealer in handling warranty work. The Canadian Federation of Farm Equipment Dealers pointed out that dealers have to absorb freight and telephone costs, the expense of picking up and returning the farmer's equipment, and up to 50 per cent of the shop service costs.

For their part, most of the companies felt that a year's use was adequate to show up any original defects in material or workmanship, which was all that the warranty was intended to cover. They claimed that the warranty was often misunderstood, with many farmers expecting it to cover ordinary wear and tear as well as original defects. However, one company said they warranted their machines for as long as they were in use, and another company reported that they would be willing to offer a longer warranty period if warranty on farm machines was not so difficult to administer. All the major companies reported that in implementing their warranties they provided parts at dealer cost and covered servicing costs at standard labour rates.

Model Changes, Standardization, Safety and Finance

Many farmers feel that fewer model changes would reduce manufacturing costs, simplify the stocking of repair parts, and reduce the rate of obsolescence on parts and machines. They accuse the farm machinery companies of following the practice of the automobile industry in deliberately fostering obsolescence by frequent model changes. Farmers, they argue, often bear part of the costs of testing and of removing the bugs from the new models. At the same time, they recognize that equipment has improved over time so that new models are justified from time to time.

Farmers also find it difficult to understand why there is not more standardization in the industry. More standardization would, they believe, reduce inventory and bookkeeping costs, allow more bulk buying and enable farmers to obtain needed repair parts with less delay. They cite belts, chains, batteries, oil filters, pulleys, tires, wheels, knife sections, guards, axles, shafts, sprockets, canvases, generators, starters, and bearings as components that should be standardized both among machines and among companies. They also suggest the need to standardize hydraulic pressures and couplers and identify hydraulic oil with an SAE number (specification of the Society of Automotive Engineers). One witness also suggested the need for a code of minimum requirements for belts, chains, wheels, tires, hydraulic hose, and similar items.

In respect to safety, concern was expressed about the alarming increase in the accident rate. The Commission was told about the high noise level that often exists in tractor cabs, and about the high incidence of back ailments among farmers who have driven tractors and travelled on farm machines for many years. One doctor who appeared before the Commission suggested that more care and standardization in the location of the controls on tractors and other machinery might help in achieving a higher level of safety.

A number of witnesses expressed satisfaction with the availability of funds under F.I.L.A. However, some felt the $15,000 ceiling was too low. It was also suggested that it should be possible to combine separate farm improvement loans

and arrange for a longer repayment period. Other witnesses recommended that the legislation be revised to enable farmers who take advantage of interest-free finance plans to utilize the Farm Improvements Loans at the end of the interest-free period.

On these various questions the companies invariably offered a contrasting point of view. Model changes, they argued, were necessary to incorporate new improvements in farm machines and these often resulted in lower costs to the farmer. The farmer had shown a demand for more sophisticated equipment and for more comfort and ease of handling, and the industry was doing its best to provide him with what he wanted. The growing volume of research provided a continued flow of new developments, and competition enforced the incorporation of these developments in new models. One company defended the large number of options and sizes of equipment it offered as necessary to meet the varied demands of the many different sizes and types of farm operations.

In regard to standardization, the companies said substantial progress had already been achieved through various engineering societies. Among major contributions, they cited the standardization of power take-off and drawbar dimensions to permit safe coupling of implements to all makes of tractors, worldwide standardization of the three-point hitch to permit integration of all mounted implements with tractors, standardization of power take-off pulleys and belt speeds for power-driven equipment, hydraulic coupling standardization for remote-controlled implements, standardization of operator controls on farm tractors, establishment of safety lighting standards, development of slow-moving-vehicle signs for safety, and the development of hundreds of miscellaneous standards for fasteners, materials, fuels, lubricants, electrical systems, hydraulics, threads, splines, and V-belts.

Some companies reported very substantial progress in standardization among different models of their own equipment. One company reported that for its new line of tractors the same basic tractor models are sold throughout the world, and on all models 19 major items have complete interchangeability. This includes water pumps, connecting rods, oil pumps, cylinder blocks and heads, transmissions, axles and hydraulics. It was also argued before the Commission that cost considerations made it unwise to carry standardization beyond a certain point. Some machines require heavier and stronger components than others and to provide standard components for all would add to the cost of the lighter machines.

Many of the companies expressed concern about operator health and safety in their submissions to the Commission. They said the design of safe equipment was a constant area of study, and were able to point to substantial improvements. These improvements include non-skid platform surfaces, safety lights, cushioned and spring-loaded seats with back support, low-elevation fuel tanks, and numerous safety shields and warning stickers. Although they are not often purchased, roll bars and safety belts are available on some tractors.

PART II

MARKET STRUCTURE AND COMPETITIVE BEHAVIOUR

Chapter 3

HISTORICAL BACKGROUND

The appearance of farm machinery manufacturing as a significant industry in North America can be traced back to 1831 when Cyrus McCormick developed a successful reaper, and to 1837 when John Deere pioneered the first steel plow. In the early stages of its development the industry was characterized by a large number of firms, each concentrating on a single implement or a related line of implements such as harvesting machinery, tillage implements, or seeding equipment. At first, machinery was sold through local agents who received a commission on their sales. The early history of the industry was also characterized by an emphasis on acquiring patents and on the prosecution of rival firms who were suspected of infringing these patents. With further growth of the industry, patent pools developed and a series of mergers occurred as some of the larger firms attempted to secure a more dominant position in particular markets and thus reduce the level of competition. The most spectacular of these was the formation of the International Harvester Company in 1902 by the five largest producers of harvesting machinery in the United States. This merger brought 90 per cent of binder sales and 80 per cent of the mower trade in the United States into the hands of a single firm. A number of years earlier, in 1891, the two largest Canadian firms, the Massey Company and the Harris Company, had merged to form the Massey-Harris Company. However, their share of the binder trade in Canada at that time, about 60 per cent exclusive of imports, was appreciably lower than International's share of the U.S. market.

This trend towards consolidation of competing firms in particular fields was followed by a gradual evolution of full-line companies. Shortly after its formation, the Massey-Harris Company, which initially had been primarily a harvesting firm, began to acquire other firms which had specialized in the development of plows, wagons, and seeding and cultivating equipment. After 1910, International Harvester, too, began to branch out into new lines of implements, and by 1919 when it first entered the plow business it was producing some 54 different kinds of machinery compared with only 9 in 1902. Other firms followed suit, and by the end of the 1920s most of the present full-line companies had emerged. Certain distribution economies fostered this development. The full-line firm offered a more

effective marketing mechanism, allowing the firm's agent more continuous employment throughout the year. Similar economies would accrue to the firm's own distribution network. To some degree there may also have been economies on the production side.

Another major development in this period was the tractor revolution. Huge steam tractors had been developed in the latter half of the nineteenth century, but their use for field work was confined to plowing, and even this was limited to the large open tracts of land on the Prairies of Canada and the United States. The use of the internal combustion engine for tractors began about 1900, and by 1910 there were scores of manufacturers turning out tractors for farm use. Some of these early machines were huge monsters weighing 10 or 11 tons and generating 60 HP.

However, with the entry of Ford into the tractor business in 1917 there was a rapid shift towards a light tractor, and Ford soon secured a large share of the market with his Fordson, a 20 HP model. By organizing his production along mass production lines, Ford was able to reduce costs and cut prices sharply, reducing his price from $885 in 1919 to $395 in 1922. Fordson sales exceeded 100,000 units in both 1923 and 1925. However, Ford's success in the tractor business was short-lived. He was handicapped in securing effective dealer representation because he did not have a line of tillage, seeding and harvesting equipment to go with the tractor. Moreover, the Fordson had a tendency to flip over backwards, and Ford did little to improve his design. In addition, his principal competitor, International Harvester, was able to pioneer a number of improvements in tractor design which undermined Ford's competitive position. These included the development of an "all-purpose, row-crop" tractor and the power take-off. The usefulness of the tractor was further increased in the early 1930s when Allis-Chalmers pioneered the use of rubber tractor tires. An Irish inventor, Harry Ferguson, also made a number of notable contributions to the tractor's development in this period. These included the principle of attaching plows and tillage implements so they became an integral part of the tractor, and the use of hydraulics to control the depth of implements.

During this period the leading Canadian firms, Massey-Harris and Cockshutt, faced a difficult problem in adapting to the tractor revolution. For a short period, from 1917 to 1923, Massey-Harris produced a tractor modelled after one being built in the United States, but the removal of the tariff on low-priced tractors in 1918 eventually forced an end to this production. In 1927, Massey-Harris made arrangements to market the Case Wallis tractor in Canada, and later in the same year they acquired in its entirety the company that manufactured this tractor in the United States, the J. I. Case Plow Company. In 1928, Cockshutt acquired the right to market the Allis-Chalmers tractor in Canada, but two years later Allis-Chalmers acquired the Rumely Company and, with it, its own Canadian distribution network. Compelled to shift to another source, Cockshutt arranged to market tractors for the Oliver Farm Equipment Company. At the onset of the Great Depression in 1929, Cockshutt and Massey-Harris were still at the stage of adapting their operations and their line of equipment to tractor farming.

Another major development in the 1930s was the introduction of the combine harvester. Some combines pulled by as many as 40 horses had been used in California as early as the 1890s. In Canada, Massey-Harris began to test and develop combines as early as 1906, and was exporting them by 1910. The first successful use of a combine in Canada was at the Dominion Experimental Farm at Swift Current in 1922 when the Massey-Harris Reaper Harvester No. 5 was tested. Within a decade, all the major U.S. full-line companies were producing combines. However, although a number of combines were sold in Canada and the United States during the twenties and thirties, the combine did not become a major production item until after the Second World War, and Cockshutt did not begin producing a combine until that time.

With the development of the tractor and combine, and other more complex machinery, the major machinery companies gradually shifted from selling through commission agents to the establishment of independent dealers. The dealer, in turn, began to assume responsibility for maintaining a stock of repair parts, and for providing shop facilities and mechanics to service the equipment they sold. The increasing importance of second-hand equipment, especially second-hand tractors and combines, also encouraged this development; an independent dealer was a more effective and less risky method of selling machines where trade-ins were a significant element. This shift from commission agents to dealers had largely been completed in the United States by the 1930s. In Canada it did not take place until after the Second World War. One company attributed this delay to its inability in the earlier period to find dealers with the capital needed to get established on an independent basis.

Thus, by the end of the 1930s, the farm machinery industry in Canada was dominated by a few major firms who were producing what, by modern standards, was a technically unsophisticated product. For the period from 1926-35 it has been estimated that four firms accounted for about 76 per cent of the total sales of farm machinery and parts in Canada (Table 3.1).

TABLE 3.1 – GROSS SALES OF FARM MACHINERY AND PARTS, CANADA, 1926-35

	$ Million	Per Cent
International Harvester	129.0	33.0
Massey-Harris	75.3	19.2
Deere & Company	48.0	12.2
Cockshutt (including Frost & Wood)	45.6	11.6
Four largest firms	297.9	76.0
Industry total (estimated)	392.0	100.0

Source: Canada, House of Commons, Special Committee on Farm Implement Prices, *Minutes of Proceedings and Evidence* and *Report*, Nos. 1-20, Sess. 1937.

The general character of the 1941 market – prior to the wartime restrictions on output – is shown in Table 3.2. By that time tractors accounted for about 40 per cent of the industry's total sales, and its other sales were distributed over a great variety of items. Combines, which were of growing importance, accounted for only about 9 per cent of total sales. A significant characteristic of the industry was the relatively small production volume for individual implements. With this production scattered among a number of firms, even the largest firm was usually producing, at the most, a few thousand of each implement; for many items production would be numbered in the hundreds. The prewar Canadian industry was oriented mainly towards supplying the domestic market. Massey-Harris was an exception here, for their Canadian sales in the late twenties were only about one-third of their worldwide sales, and they had only begun to acquire production facilities in other countries.

TABLE 3.2 – PRODUCTION AND SALES OF FARM MACHINERY, CANADA, BY TYPE, 1941

	Production	Sales	
	Number	Number	$ Thousand
All Farm Machinery			52,106
Planting and Seeding Machinery, Total			2,129
Grain drills	7,944	4,644	1,094
Manure spreaders	4,019	5,624	872
Tillage Machinery, Total			7,415
Field cultivators	5,996	5,948	869
Rod weeders	n.a.	1,189	136
Disk harrows	9,564	9,909	960
Plows	25,800[1]	36,990	4,668
Haying Machinery, Total			1,836
Mowers	11,218	10,549	1,111
Harvesting Machinery, Total			7,587
Grain binders	8,893	5,556	1,576
Combines	n.a.	4,209	4,747
Swathers	n.a.	415	154
Threshers	n.a.	886	790
Tractors and Engines, Total			23,188
Tractors	n.a.	22,103	22,139
Other Farm Equipment, Total			9,950
Cream separators	19,588	32,783	1,894

[1]Excludes single-furrow plows.

Source: Dominion Bureau of Statistics, Merchandising and Services Division, *Farm Implement and Equipment Sales*, 1936-43, various years.
DBS, *The Farm Implements and Machinery Industry*, Cat. No. 42-202, 1941.

While farm machines had been improved substantially over a period of years, technical progress in the industry could scarcely be considered rapid. Research and development in its modern sense was virtually in its infancy. Except for changes made to adapt them for use with a tractor, many implements such as the binder,

the mower, the grain drill, and the moldboard plow had changed very little for several decades. The development of a tractor suitable for widespread use in farming represented a major contribution, but the tractor of this period was still a relatively unsophisticated product. As Mr. J. D. Wormley of the Oliver Corporation told the Commission, "The tractor in 1945 consisted principally of an engine, a simple transmission, some sort of a fixed or swinging drawbar, a set of wheels and a steering wheel, and that is about all."[1] Engineering and development expenditures by Massey-Harris, the major Canadian firm, averaged $361,000 per annum between 1925 and 1929, just a little over 1 per cent of sales. In the early thirties these expenditures were increased to an average annual level of some $510,000 or about 4 per cent of the depressed sales level of this period.

Unlike the industry in the United States, which had already moved to a dealer distribution system, the industry in Canada in the 1930s was still selling through agents who worked on a commission of about 16 per cent of the cash price to the farmer. The agents agreed to sell implements and parts only on the terms specified in the company's published price lists although, in fact, agents apparently sometimes gave away part of their commission in order to make sales. It was reported to the 1937 Special Committee on Farm Implement Prices that, in 1935, the three major companies had 7,300 agents. In terms of this total, annual net sales (net to the company) per agent in 1935 would be less than $2,000. These agents were supported by a network of branch houses (at that time International had 17, Massey-Harris 13, and Cockshutt 13) which maintained a stock of implements and parts, and supported and supervised the company's sales and collections. In addition to selling, the agent was frequently required to set up and deliver machines, and assist in the collection and settlement of accounts. Each agent was given a number of machines for display purposes and was supplied with a stock of parts on consignment. When a sale was made the machine was usually forwarded from the nearest branch house. New machinery was usually sold either for cash or with a 25 per cent down payment, the balance coming due in one or two payments on the 1st of October of the current and the following year.

With a third of the market, International Harvester was the acknowledged price leader in the industry and, given the dominant position of the major firms, it was possible for the industry to maintain a remarkably stable price level throughout the twenties and thirties. An index of farm machinery prices in Canada remained almost unchanged from 1925 to 1930, declined about 5 per cent between 1930 and 1933, and had regained its 1929 level by 1936. Partly because of the sharply higher tariffs imposed in 1930 and the shift to Canadian sources for a larger part of Canadian supplies, the price decline in Canada was substantially less in the early thirties than the 16 per cent decline that took place in the United States. In testimony before the House of Commons' Special Committee on Farm Implement Prices in 1937, a vice-president of Massey-Harris argued that any price reduction at

[1]Royal Commission on Farm Machinery, Trancript of Evidence, *Hearings*, Vol. No. 28, November 13, 1967, p. 2899.

that time would merely have added to the company's losses without stimulating any significant increase in the volume of sales.

To sum up, at the end of the 1930s the industry was dominated by a small number of firms that controlled both the production and distribution of farm machinery. Although the increasing sales of tractors and combines and the growing sophistication of equipment generally was gradually to make the existing distribution pattern untenable, the industry at the time assumed the major responsibility for supplying repair parts and service. Trade-ins were not then a significant problem, and implements were, for the most part, of a type that farmers could service themselves if the necessary repair parts were provided. Further, before the advent of the combine, the timing of harvesting operations was less critical; farmers had apparently not become fully aware of the importance of timely seeding and tillage operations. Thus service and repair parts supply could be handled adequately through the company's regional system of branch houses.

Chapter 4

STRUCTURE OF THE INDUSTRY IN CANADA

The farm machinery companies that distribute their product in Canada can be conveniently classified into four groups – full-line, long-line, short-line, and short short-line companies. Full-line companies are those offering the most complete range of all types of farm machinery, supplying models and sizes suited to all types of soils and crops, and having their own national distribution systems. This includes Massey-Ferguson, John Deere, and International Harvester. Long-line companies are those which offer a fairly extensive range of farm machinery, but often specialize in equipment suited to particular areas or for particular farm operations. These companies usually have their own distribution system but do not offer as complete a range of equipment, and what they do offer is often available in fewer sizes and models. This group includes New Holland, Ford, Versatile, and Canadian Co-operative Implements Limited (C.C.I.L.). Short-line firms are those which produce and sell a specialized range of products. They sometimes distribute these through their own exclusive dealers but more often sell through the dealers of full- or long-line companies. Firms in this category would include New Idea and Allied Farm Equipment. The short short-line firms are those who specialize in the manufacture of a single line of equipment. They often sell their product through independent distributors who handle the products of a number of farm machinery manufacturers. This group would include firms such as Morris Rod-Weeder Co. Ltd., Noble Cultivators Limited, and Thomas Equipment Ltd. None of these categories are precisely defined and there may at times be some doubt whether a particular firm should fall in one category or another. Nevertheless, this classification provides a useful approach to the industry and will be used in the following discussion of the industry's structure.

The Full-Line Companies

There now are six companies selling farm machinery in Canada that fall fairly clearly into the category of full-line companies. These are, in addition to the three cited above, Case, Allis-Chalmers, and the White Motor Company which sells its Minneapolis-Moline products in Western Canada and Cockshutt equipment in all parts of Canada except Quebec where it markets under the Oliver name. Recent

changes in the size and characteristics of each of these firms will be discussed briefly.

Massey-Ferguson – The only Canadian farm machinery company that has acquired international status, Massey-Ferguson has experienced rapid growth over the past few decades. Between 1939 and 1968 the company's total world sales increased from $21 million to $917 million (Can.). A number of factors accounted for this dramatic growth and of these, the following appear to have been the most important. In the early postwar years, 1947 and 1948, the predecessor company, Massey-Harris, acquired manufacturing facilities or interests in Britain, South Africa, and California. In 1953, Massey-Harris and Harry Ferguson merged their interests, giving the successor company the rights to the Ferguson system of hydraulics and three-point-hitch linkage for mounted implements, along with a tractor assembly plant in Detroit. In ensuing years the new company built a new combine plant in Eschwege, Germany, acquired complete control of H. V. McKay Massey-Harris in Australia, purchased a plant to build industrial and construction machinery in Kansas, started a tractor plant at Sao Paulo, Brazil, and acquired the Borg-Warner transmission and axle plant in Detroit. A major new development occurred in 1959 when Massey-Ferguson acquired F. Perkins, Limited, of Peterborough, England, the world's largest manufacturer of diesel engines. In subsequent years, Massey-Ferguson acquired Standard Motors' tractor plants in England and France and the Landini tractor plant in Italy; completed a new tractor plant in Beauvais, France; began to manufacture combines, trucks, and tractors in Spain, and tractors and other farm equipment in India; constructed a new combine plant in Brantford, Ontario; acquired Badger Northland, a farm materials-handling firm in Wisconsin; acquired a plant for the manufacture of farm implements in Des Moines, Iowa; and purchased a plant near Akron, Ohio, for the manufacture of new and heavier industrial and construction machinery. It has also built an industrial and construction machinery plant near Rome, Italy. By 1968, farm machinery accounted for 66.4 per cent of Massey-Ferguson's sales, engines for 12.1 per cent, industrial and construction machinery for 10.4 per cent, and parts for the remaining 11.1 per cent. Of its total 1968 sales, 7.9 per cent were in Canada, 30.2 per cent in the United States, 36.8 per cent in Western Europe, 7.1 per cent in Australasia, 6.9 per cent in Africa, 7.2 per cent in Latin America, and the remaining 3.9 per cent in Asia.

Compared with its position in 1939, the company had clearly become not only very much larger, but also much more diversified on both a country and product-line basis. In 1939, 35 per cent of the company's sales were in Canada. The company had not yet entered the industrial and construction equipment field, and had not yet acquired a major manufacturer of diesel engines. The acquisition of Perkins was part of a general move towards a more completely integrated operation under which the company began to manufacture a much higher percentage of the components contained in its various products. In addition, as described elsewhere in this Report, the company has moved substantially in the direction of a worldwide

standardization of products and worldwide specialization in the production of basic components. Thus, if Massey-Ferguson were to be judged on the basis of its position in the Canadian market alone, its strength and competitive power would be seriously underestimated. Through its worldwide operations Massey-Ferguson obtains cost advantages arising from economies of scale on longer production runs and from its ability to position its manufacturing operations in low-cost locations. Its large scale undoubtedly provides it with substantial economies in research and engineering and perhaps also in marketing and managerial skills.

International Harvester – In the late twenties International Harvester was the dominant firm in the Canadian market and was estimated to sell about one-third of all the farm machinery sold in Canada. Since then, its relative position in the Canadian market has declined substantially. On a worldwide basis International Harvester is a very large firm. In 1968, its total sales were more than $2.5 billion (U.S.), of which some $883 million was farm equipment and service parts, $1,145 million motor trucks, and $329 million construction equipment. Although the company has an important international business, almost 75 per cent of its total sales are in the United States with Canada accounting for just over 6 per cent. The firm's important position in trucks and construction equipment provides a basis in technology which must be of substantial assistance to the company's farm equipment operations. In 1968, the company reported research and engineering expenditures of $80.8 million, just over 3 per cent of total sales, a ratio the company has maintained for a number of years. Since the cost of research on components such as engines and transmissions can be spread over all three of the company's major product divisions, the advantage to the farm equipment division is evident. In 1967, International became the first company to make hydrostatic transmissions available on farm tractors. Although the company does not make available a breakdown of its farm equipment sales by region, it manufactures farm machinery in Australia, Britain, France, Mexico, South Africa, Sweden, and West Germany, as well as in Canada and the United States. Its highest market penetration is believed to be in the United States.

John Deere – A third major firm, Deere & Company, sells in Canada through John Deere Limited. In the late twenties and early thirties it was estimated to hold about 12 per cent of the Canadian market. At that time it was concentrating its sales effort in Western Canada. Since then, it has expanded its sales effort in Eastern Canada, and its share of the Canadian market has increased. Its 1968 sales of farm equipment of $843.2 million (U.S.) were just marginally lower than those of International Harvester. Until the mid-fifties, the company concentrated its sales effort mainly in North America but since that time it has been making a major effort to increase its share of European and other world markets by acquiring or building manufacturing facilities abroad. By 1966, Deere had manufacturing facilities in Germany, France, Spain, Mexico, Argentina, and South Africa, and had licensed some of its tractors and implements for production in Japan. In recent years Deere & Company has placed a major effort on research and development and

in 1963 it opened an advanced research centre. In 1968 its expenditures on research and development totalled $49 million, about 4.8 per cent of sales. Deere has also entered the industrial equipment field and its sales in this field amounted to $145 million in 1968. In addition, it sold about $43 million worth of lawn and garden equipment. Deere does not publish an international breakdown of its sales, but in 1968 about 74 per cent of its total assets were in the United States, 7 per cent in Canada, 12 per cent in Western Europe, and the rest in Latin America and elsewhere.

Cockshutt–White Motor – The White Motor Corporation, a long-time manufacturer of cars and trucks, entered the farm machinery business in the early sixties, acquiring the Oliver Corporation in 1960, Cockshutt Farm Equipment Limited – one of the two major Canadian firms – in 1962, and Minneapolis-Moline in 1963. Prior to this time, all three of these firms were in active competition with one another in the Canadian market. After their acquisition by White Motor, the Cockshutt name was dropped in the United States and the Oliver name in Canada (except in Quebec), while Minneapolis-Moline continued to sell under its own name in both countries. However, the manufacturing operations of the three firms were consolidated, with Cockshutt producing combines and swathers for all three brands at Brantford (swather production was later shifted to Winnipeg), and with Oliver producing tractors and other farm equipment under both the Cockshutt and Oliver name. Minneapolis-Moline continued to produce its own line of large tractors and some other tillage equipment but also sold the Cockshutt combine and many Oliver implements under its own brand name. Under the new management, all three firms placed a major emphasis on catering to the larger, more progressive farms, and concentrated their sales in the corn and wheat belts in Canada and the United States. At the end of 1968, the farm machinery operations of the three divisions were consolidated as the White Farm Equipment Division, with the brand names Cockshutt and Minneapolis-Moline retained in Canada. At this writing, White Motor's farm equipment sales are largely confined to the North American market, although some steps have been taken to expand its sales in Europe. In 1966, the company acquired a major interest in Arbos, an Italian combine manufacturer. In addition, the smaller-horsepower line of tractors, sold under both the Oliver and Cockshutt brand name, are produced by Fiat in Italy. Both Oliver and Minneapolis-Moline also produce and sell industrial equipment, but Cockshutt has not entered this field.

In the late twenties and early thirties, Cockshutt ranked fourth in Canada with about 11.6 per cent of the total farm machinery market, just behind John Deere. However, in the postwar period it failed to expand as rapidly as other major firms and when farm machinery sales slumped after 1953 it suffered losses in four out of five years from 1954 to 1958. Faced with the prospect of increased competition in the Canadian market after the removal of the Canadian tariff in 1944, Cockshutt made a major attempt to penetrate the U.S. market in order to establish a larger-volume operation. About the same time, it began to produce

tractors and self-propelled combines. It first attempted to enter the U.S. market by selling through a number of co-operative distributors of farm supplies. However, in the face of continuous losses, the co-operatives gradually abandoned the distribution of farm equipment, and Cockshutt was forced to set up its own dealers in an attempt to maintain its sales and provide service to the farmers who purchased Cockshutt equipment. It also acquired the manufacturing plant at Bellevue, Ohio, that had been owned by National Farm Machinery Cooperative, and Gamble Stores, Inc., but this had to be closed down a few years later. Because of its limited volume, Cockshutt found it difficult to compete effectively against the major firms in the industry.

Testifying before a House of Commons Committee in 1961, Mr. J.D.V. Adams, Cockshutt's Market Research Manager, stated:

> In spite of the fact that there has been no American tariff on farm machinery since 1913, no Canadian producer has ever secured substantial sales in the United States without first acquiring substantial productive facilities in that country. In our own case, we attempted to circumvent this necessity through selling arrangements with the national farm machinery cooperative in the United States after the war. Despite some early success, these have all but broken down in the depressed markets of recent years.[1]

In Canada, too, the company faced certain difficulties. In the early postwar years, it sold its equipment on the Prairies through the newly formed Canadian Co-operative Implements Limited as well as through its own franchised dealers. This competition from a co-operative distribution network was a source of dissatisfaction among Cockshutt dealers. Although the Cockshutt tractor had some success, the self-propelled combine secured greater acceptance. Indeed, one of the major reasons why White Motor acquired Cockshutt was to obtain the rights to its combine. White also saw the Cockshutt acquisition as a way of strengthening the distribution of Oliver products in Canada, and the two dealer networks were consolidated shortly thereafter.

Total sales of White Motor, the parent company, were $851 million (U.S.) in 1968, of which 61 per cent were trucks, 23 per cent farm equipment, and 16 per cent industrial equipment. Its total sales of farm machinery in 1968 would therefore be about $197 million. Sales of repair parts and service, for all groups including truck repair depots, were 19 per cent of total sales. The company acquired in 1968 the Euclid division of General Motors, a major producer of earth-moving and mining machinery.

J. I. Case – Another full-line company, the J. I. Case Company, has no manufacturing plants in Canada but supplies its Canadian market from plants in the United States, except for a few products such as swathers and chisel plows which

[1]Canada, House of Commons, Standing Committee on Agriculture and Colonization, *Minutes of Proceedings and Evidence*, No. 14, Fourth Session, Twenty-fourth Parliament, 1960-61, p. 1139.

are manufactured under contract by smaller firms in Western Canada. In its early stages the company specialized in threshing machines and steam engines, but it began producing plows in 1919 and had become a full-line manufacturer by 1929. After the Second World War it began producing construction and earth-moving equipment as a result of its merger with the American Tractor Company in 1957. The company has experienced a number of difficulties over the past two decades. Its sales declined from $186 million (U.S.) in 1949 to $82 million in 1956 and its profits dropped during the same period from $17.6 million to less than $1 million. After its merger with American Tractor it enjoyed a brief revival, only to experience losses totalling $73 million in the three years 1960 to 1962. In 1964 the Kern County Land Company acquired a controlling interest in the company, and the company has subsequently enjoyed a significant recovery, its sales rising from $167 million in 1963 to $357 million in 1968. Of its total sales of all products in 1968, 73 per cent were in the United States, 16 per cent were in Canada, and 11 per cent were in other countries. No breakdown is available on the distribution of the company's sales as between farm machinery and other products. Although the company's sales position has improved greatly, its net profit after tax in 1968, about $3.6 million, was only about 1 per cent of its total sales. J.I. Case came under the control of Tenneco Corporation in 1967 when Tenneco purchased Kern County Land Company which held 57 per cent of J. I. Case Co. common stock.

Allis-Chalmers — Still another full-line company is Allis-Chalmers, Rumely, Ltd. Like Case, the Allis-Chalmers Manufacturing Company supplies its Canadian market from its U.S. plants. Allis-Chalmers started out as a manufacturer of flour-milling equipment in 1847, later added pumps, steam engines, and mining equipment, and after 1900 became a highly diversified company. In addition to farm machinery it manufactures construction machinery, lift trucks, heavy electric products, and a wide range of defence and other products. It also operates farm machinery plants in Britain and Australia. The company's total sales in 1968 were $767 million (U.S.), of which some 30 per cent are estimated to be tractors and other farm equipment.

The major full-line firms in the farm machinery industry are all industrial giants ranking well up among the largest corporations in North America. On the basis of *Fortune*'s list of the 500 largest corporations in the United States (1969), the above six companies ranked as follows: Massey-Ferguson 117th, International Harvester 31st, Tenneco (the Case parent holding company) 34th, Deere & Company 112th, White Motor 118th, and Allis-Chalmers 140th. In addition, three other major industrial firms, Ford, Sperry Rand, and Avco, have significant farm machinery operations, described below. These three firms ranked 3rd, 60th, and 129th in *Fortune*'s 1969 list of largest industrial corporations. The rank given for Massey-Ferguson is the rank it would have held if it had appeared in *Fortune*'s list of industrial corporations in the United States.

The Long-Line and Short-Line Companies

The full-line companies, which stock and sell a wide range of equipment including a line of tractors, and harvesting and haying equipment, are subject to varying amounts of competition from long-line and short-line companies. Many of the smaller firms concentrate on a single product or on a very limited range of products. Often they market their products in a single area or region. In some instances they may sell part or all of their output to one or more of the major full-line companies. In a few cases a short-line firm may concentrate exclusively on manufacturing, under contract, the products being sold under a major company's brand name. In other cases, part of the firm's output may be manufactured under contract for the major company, with the balance being sold through distributors. Still other firms may hire their own salesmen and supply their product directly to farm machinery dealers. Often these will be dealers who are franchised by one of the full-line companies. Less frequently a dealer may operate by representing a number of short-line companies. In some instances this occurs when a long-line franchise has been cancelled and the dealer wishes to continue.

While competition from the short-line firms helps to keep selling prices responsive to costs and helps prevent the emergence of monopoly profits, this advantage to the farmer may be partially offset by more uncertainty as to the suitability and durability of their machines and by the greater risk that repair parts may not be readily available from the short-line companies. This latter risk arises out of the higher rate of turnover of short-line companies. From time to time a number of these firms fail, or go out of business for other reasons, and the farmer who has purchased the firm's equipment may be unable to secure repair parts. The Province of Saskatchewan has attempted to reduce this risk by requiring every firm who sells farm machinery in the province to appoint a distributor who will undertake to stock repair parts for the firm's equipment for a period of 10 years after the date of sale. However, it may in fact be difficult to enforce this provision for firms that have ceased to manufacture. In these circumstances the farmer's only alternative may be to have the repair part made to order by a local machinist. There are, of course, many short-line companies that have been in business for a long time and provide a service to their customers that is as reliable and complete as that of the full-line firms.

This rather varied reliability of the products and service provided by short-line firms was underlined before the Commission in the submission made on behalf of the Farm Equipment Manufacturers Association, an association of short-line manufacturers in North America. The Association, whose membership is largely in the United States, grants the use of its seal of quality to members who meet the following rather limited conditions: have produced and distributed farm equipment for three years; undertake to provide repair parts promptly and at a fair price for a minimum of 10 years after the date of sale; issue a repair parts list and operating instructions manual with new machines, and provide a written warranty.

It was stated that over the years the Association had been able to get about one-half of its members, around 100 companies, to qualify for the seal of quality.[2]

It is clear that some short-line companies may provide farm machinery under conditions and circumstances that would not be tolerated from a major full-line company. They may provide equipment that is not well engineered or adequately tested. They may abandon markets after a few years because they prove unprofitable, leaving the farmer to obtain repair parts as best he can. Warranties may be inadequate and service may be slow. The risk to the Canadian farmer may be particularly severe because of the large number of short-line companies operating in the United States that may at times distribute their product in Canada. In the U.S. *Census of Manufactures* for 1963 it was reported that the farm machinery industry had 1,568 establishments. Nevertheless, it was argued before the Commission that these many small firms should not be required to meet any very rigid standards. Many new innovations come from these small firms, it was contended, and the benefits from the progress obtained in this way was well worth the cost and inconvenience to a few individual farmers.[3] However, some of the farmers who had been inconvenienced in this way were less confident about the beneficial results. There is, in fact, a large element of "let the buyer beware" in many parts of Canada when a farmer buys equipment from small and relatively unknown short-line companies.

In general, competition from short-line companies is strongest either in relatively simple products that do not require extensive engineering and for which an efficient manufacturing operation is fairly small in scale, or in new and relatively specialized products. Often the total market for these products will be somewhat limited, perhaps because they are used in only one particular area or region or in a rather specialized type of farming. Because of these market characteristics, the manufacture of such products is relatively unattractive for a full-line company, which prefers a line of products that can be sold to all of its dealers or at least a major group of dealers. The extent to which full-line companies participate in the manufacture and sale of specialized products varies widely. For example, only three of the full-line firms offer for sale cotton pickers and potato harvesters or diggers.

Competition from short-line firms is supplemented by the competition provided by intermediate-sized companies who produce or sell a long line of equipment but not a full line. There are at least three long-line firms whose sales in Canada exceed $15 million annually. One or two of these firms may be approaching the status of full-line firms since they sell both tractors and combines (although they need not manufacture these themselves). There are a number, perhaps 10 or 12, of additional long-line companies operating in the United States which sell some equipment in the Canadian market. The following brief description of the

---

[2]Royal Commission on Farm Machinery, Transcript of Evidence, *Hearings*, Vol. No. 42, January 19, 1968, pp. 4746-49.

[3]*Ibid.*, pp. 4799-4804 and 4817-22.

operations and policies of four firms will serve to illustrate the impact of these long-line companies on competitive conditions in the Canadian market.

Allied Farm Equipment – As of 1968 the Allied Farm Equipment, Inc. had sales of around $23 million (U.S.) of which about 75 per cent were in Canada. It started out as an export sales organization based in Chicago just prior to the Second World War. However, its major growth has been since 1945. Although it regards itself primarily as a marketing organization, it manufactures about 40 per cent of the products it sells. Its major products include front-end loaders, grain augers, bale elevators, harrow drawbars and sections, field sprayers, and tractor cabs.

Allied's success has been based to a large extent on providing a guarantee of stability and reliability of service that many short-line companies are incapable of giving. In his appearance before the Commission, Mr. J. I. Kanter, the President of Allied, described the short-line industry as "a vast fragmented industry consisting of literally hundreds and thousands of small and medium-sized, badly fragmented in many instances, not particularly well organized small manufacturers".[4] In some instances Allied has purchased the entire stock of components and repair parts of a manufacturer who has gone out of business or discontinued a line of equipment that Allied had introduced in Canada. By providing some guarantee that parts and service would be available and by backing up the equipment it sells with warranty provisions, it has helped provide a stable and expanding market for the products of short-line companies. In some degree, also, Allied sees its role as that of "bringing to the Canadian farmer new developments, specialty lines, which have a potential for labour saving and increased efficiency on the farm, bringing them to the Canadian farmer sooner, and in a more meaningful way than they would be otherwise brought to Canada".[5]

The company sells its products through existing dealers and may sell some pieces of equipment to as many as 80 or 90 per cent of the dealers in any one province. Only in the case of more complex types of equipment that require more stocking of parts and specialized service will Allied franchise one particular dealer in a given location. Because many of the products it handles are complementary to, rather than competitive with, the equipment sold by the full-line companies, it has encountered little difficulty in persuading dealers for these latter companies to handle Allied products.

New Holland – The New Holland Division of the Sperry Rand Corporation commenced production of farm machinery in a significant way in 1939 when it acquired the rights to an automatic pick-up baler that had been developed by a local farmer. Since that date it has experienced rapid growth, although it still confines its operations mainly to haying and harvesting and related equipment. In 1967, New Holland was the leading brand in terms of total volume shipped in North

[4] *Ibid.*, Vol. No. 26, November 1, 1967, p. 2738.
[5] *Ibid.*, p. 2737.

America of a number of products including bale throwers, hay-balers, forage harvesters, hay rakes, hay conditioners, and manure spreaders.

The company attributes a major part of its success to the fact that it has pioneered many new developments designed to reduce the cost of farming operations. For a number of products, including the automatic self-tying baler and the Haybine mower-conditioner, New Holland has been the innovator. For other products it has developed and improved machines introduced by other manufacturers.

This company entered the combine market when it purchased the Clayson factory in Belgium in 1963. It currently exports combines from its Belgian plant throughout Western Europe and to Australia, and ships the basic shell of its combine to North America where other components are added to produce a machine suited to this market. New Holland has also recently constructed plants in France, Britain, and Australia. These plants produce mowers, balers, haybines, manure spreaders, and related products.

In Canada the company distributes its products through its own branch house and dealer organization. About half of its dealers are also dealers for full-line companies who manufacture and sell products directly competitive with those of New Holland. Of the remaining dealers, about two-thirds are exclusive New Holland dealers and the balance handle other short-line manufacturers' products. A number of dealers combine their New Holland line with the David Brown tractor line.

The fact that New Holland has been able to grow to a position of such major importance in a particular sector of the farm machinery market is evidence that new entry to this industry is still possible. Although the New Holland Machine Company started out as a small independent manufacturer, in 1947 it was acquired by The Sperry Corporation. In 1955 Sperry merged with Remington Rand Inc., to become Sperry Rand Corporation, a large multi-product firm with annual sales exceeding $1,500 million (U.S.). Some of New Holland's recent success undoubtedly reflects its access to the management skills and research capability of a large international company.

Versatile – Versatile Manufacturing Ltd. was formed in 1963 as the result of the amalgamation of a number of short-line companies. The principal predecessor company had been formed in 1947 and initially concentrated on the production of sprayers and grain augers. In 1953, for example, the company produced 500 sprayers, 4,500 grain augers, and 500 drawbars. It subsequently added swathers and combines to its product line and in 1966 it began to produce large four-wheel-drive tractors. Its growth has been very rapid, total sales having increased from $9.2 million (Can.) in 1964 to $22.5 million in 1967. This was also a period of very profitable growth, with earnings after tax increasing from $1.2 million in 1964 to $2.8 million in 1967. Although Versatile's sales have continued to expand in the

less buoyant market conditions of recent years, to reach $33.8 million in 1969, its profits declined sharply to $551,000.[6]

Versatile's successful and profitable penetration of the farm machinery market in competition with the large full-line companies appears to have been based on a number of key elements. Thus far it has concentrated almost entirely on products designed to be sold in the Prairie grain-farming area of Canada and the United States. Because of its location on the edge of this market it has been able to ship directly from its factory to dealers and avoid some of the branch-house distribution costs incurred by the full-line firms. Initially it relied on selling products through the existing dealers of other companies, offering them a larger discount from list price than is customary in the trade. However, it has now begun to build up a dealer network of its own. In addition, Versatile has not attempted to carry a full line of sizes and varieties of all the equipment it supplies, but has concentrated on the sizes and types where volume is largest. At the same time, by simplifying its design and building products which emphasize function rather than style or appearance, it has been able to offer its products at a price substantially below those of the full-line companies. Versatile's prices on a given product have often been from 20 to 30 per cent below those of their competitors. Thus the company has catered to farmers who want to buy a cheaper but functionally adequate product. Its lower prices and larger dealer discounts have helped build sales, and to some degree it has avoided the need to build an elaborate dealer network.

C.C.I.L. – Another significant long-line competitor in the farm machinery market in Western Canada is Canadian Co-operative Implements Limited. Formed during the war years, C.C.I.L. began the manufacture and sale of farm machinery in 1946. In its early years it had a contract for the distribution of Cockshutt machinery in competition with regular Cockshutt dealers. In addition, it manufactured some machines in its own small factory in Winnipeg. When Cockshutt was taken over by the White Motor Company in the early sixties, C.C.I.L. was forced to discontinue the distribution of Cockshutt equipment and turned to Europe for its source of combines and tractors. Initially it distributed the Clayson combine, but when New Holland acquired an interest in the Belgian firm that manufactured it, C.C.I.L. was forced to find a new source of combines and began to distribute a combine manufactured by the Claas firm in Germany. Still more recently Ford has begun to distribute Claas-made combines under the Ford name in both Eastern and Western Canada and in the United States. Currently C.C.I.L. imports Deutz tractors from Germany and Volvo tractors and combines from Sweden. Volvo combines are imported as semi-finished machines and completed with tables and grain tanks suitable for western conditions (i.e. pick-up tables instead of tables with cutting parts and a much larger grain tank). Using only the threshing body of the Volvo combine, C.C.I.L. builds its own pull-type combine.

[6]For its 1969 fiscal year, Versatile changed its year end to October 31 from August 31. These figures, therefore, cover 14 months instead of 12 months.

Starting with an initial subscribed capital of around $750,000 in 1946, the firm expanded until in 1966 it had assets of almost $16 million and annual sales of around $20 million (Can.). Slightly over half of its sales are of machines and parts manufactured in its own plant. In the early years of its operation, C.C.I.L. paid out significant cash dividends to its member customers, varying between 5 and 10 per cent from 1946 to 1952. Since then it has for the most part retained a major part of its earnings to provide for expansion, giving members credit in the form of additional shares. Its total earnings in 1966, before tax, amounted to about 16.8 per cent of its total assets and 13.3 per cent of gross sales (of new machines and parts). The firm currently supplies about 5 per cent of the Prairie market. By 1969, in line with the experience of the industry on the Prairies, C.C.I.L.'s sales had fallen sharply and the firm incurred a loss of $846,000.

One of the firm's principal innovations was the establishment of a rationalized distribution system. Sales and service is provided through 60 depots located at strategic points designed to serve the entire Prairie region. Each depot is provided with a well-equipped service facility and carries a stock of repair parts. C.C.I.L. also pioneered in the development of several new farm implements. It was the first firm to introduce the "disker" and it secured a copyright on that name. It also developed and marketed the "harrower", an improvement on the traditional drag harrow, and a folding harrow drawbar. However, C.C.I.L. has no formal research and development division, relying for new ideas on suggestions or inventions of farmer members or of its regular staff. The role of co-operatives in the industry is discussed further in Chapter 10. A more detailed appraisal of the firm's performance is provided in one of the Commission's special duties.[7]

Other Companies – The operations in Canada of several other companies may be more briefly noted. The Ford Motor Company, the second largest producer of wheeled tractors on a worldwide basis (next to Massey-Ferguson), sells its tractors and a moderate range of other equipment through its dealer organization in Canada. Ford appears to be gradually expanding its line of farm machinery. It has a fairly complete line of haying equipment, recently introduced a line of deep-tillage cultivators in Western Canada, and now sells the Claas-made Ford combine throughout North America. Though it must still be considered a long-line rather than full-line farm machinery organization, it is nevertheless one of the world's industrial giants and could easily extend its range of implements and become a full-line firm. Ford sold about 3,500 tractors in Canada in 1966, between 11 and 12 per cent of the total. It does not manufacture any farm machinery in Canada.

New Idea Farm Equipment is a division of the Avco Corporation which in Canada sells mainly in Ontario. Its chief product emphasis has been on haying and corn-harvesting equipment, but it also sells some barnstead equipment including manure spreaders. One of its major product lines is the Uni-system which it

---

[7] R. Simkin, *The Prairie Farm Machinery Co-operative*, Royal Commission on Farm Machinery, Study No. 5 (Ottawa: Queen's Printer, 1970).

acquired from the old Minneapolis-Moline organization in 1963. This features a self-propelled power unit which can be attached to a number of other machines, primarily haying or corn-harvesting machines. It has no manufacturing facilities in Canada.

Two other firms which are significant in the Canadian tractor market are David Brown Tractors Limited and the British Leyland Motor Corporation. Both have Canadian subsidiaries which import a line of smaller horsepower tractors which are sold primarily in the East.

Chapter 5

MAJOR CHARACTERISTICS OF THE MARKET FOR FARM MACHINERY

Farmers' Attitudes and Requirements

To the farmer, farm machinery represents essential capital equipment. When he buys a major piece of equipment he normally excepts it to continue in use for 5, 10 or 20 years either on his own farm or, after resale, on some other farm. If the equipment is to be fully productive it must be kept in good repair and the farmer must be able to have it repaired promptly when it breaks down. Over the past few decades, a number of developments have increased the importance to the farmer of good servicing facilities and repair parts availability as an essential complement to the equipment he buys. With the increased use of hydraulics, advanced types of transmissions, power steering, sensing devices, diesel engines with fuel injection systems, and with the growing sophistication of machinery generally, the farmer is less frequently able to repair his own equipment and so must depend more and more on the service facilities and skilled mechanics supplied by a farm machinery dealer. Further, the use of the combine has made the timing of harvesting operations more critical. Since a farmer may have only 18 or 20 good combining days in a season, it is of extreme importance to him when his machine breaks down that he should be able to obtain any repair parts he needs with a minimum of delay. Timing has either become more critical, or is now recognized to be more critical, at other periods of the year as well. Whether he is preparing the land in the spring, seeding, fertilizing, applying weed killers or insecticides, harvesting a hay crop or performing his summer fallow operations, timing may be of the essence, with a few days' delay resulting in a substantial loss of potential farm income. To some degree the timeliness of farming operations has always been important. But its critical importance now is more fully recognized. And with advances in farming techniques, a larger number of field operations may be carried out and more inputs of various kinds applied. Thus by the time the crop is ready to be harvested the farmer has often invested a large amount in bringing it to that stage. All of these considerations help explain the extreme importance the farmer now attaches to the repair parts and servicing facilities that complement any piece of farm equipment he buys.

This attitude was evident in the results of a survey of farmers carried out on the Commission's behalf in the Prairie Provinces. When questioned about the

various reasons why they patronized a particular dealer, the three reasons farmers singled out as the most important were that (1) the dealer had a reputation for standing behind the machinery he sells, (2) the dealer had a reputation for honesty, and (3) the dealer had a good repair and service department. In contrast, brand loyalty ranked fairly well down the list in terms of the importance attached to it. The complete results for this particular question are given in Table 5.1.

TABLE 5.1 – IMPORTANCE OF VARIOUS REASONS IN INFLUENCING FARM OPERATORS' DECISIONS TO PURCHASE FARM MACHINERY WHERE THEY DO

Reasons	Degree of Importance		
	Very Important	Not Very Important	Unimportant
		(Per cent)	
Dealer has a reputation for standing behind machinery he sells	88	7	5
Dealer has a reputation for honesty	88	8	4
Dealer has a good repair and service department	87	12	1
Dealer gives me a good deal	70	29	1
Dealer doesn't try to force me to buy until I'm ready	54	13	33
Dealer has a complete line of machinery	60	26	14
Dealer is always friendly	60	21	19
Dealer's place of business is easy to get to	70	17	13
Dealer-owned rather than company-owned store	18	18	64
Adequate parking place available close to dealer's place of business	35	18	47
He is the only dealer in my area selling the brand I want	20	27	53
Dealer carries adequate line of farm supplies as well as machinery	40	14	46
Co-operative store rather than company-owned store	28	11	61

Source: A. Segall, *Farmers' Attitudes to Farm Machinery Purchases*, Royal Commission on Farm Machinery, Study No. 4 (Ottawa: Queen's Printer, 1969), Table 21.

When the farmer purchases a piece of equipment he is also normally in the market for the money capital required to finance it. Thus his decision as to how much machinery to buy and from whom to purchase may be influenced by the terms and amount of finance that is available. With the growing size and complexity of farm equipment, the amount of funds required to finance the farmer's investment in machinery has increased manyfold. Some thirty years ago, in 1939, a farmer might have typically been in the market for a small tractor at a cost of $1,500, or a binder at $300 or a threshing machine for $1,200. Today, in 1971, he may find himself buying a large 80 or 100 HP tractor for $10,000 or a self-propelled combine for $12,000. If he is a well-established farmer, he may be able to finance a large part of his purchase by trading in a similar machine which is

only a few years old. Indeed, some farmers may trade in their major pieces of equipment every year in order to minimize the risk of any breakdown in critical periods. But if he is just starting out as a farmer or is expanding his operations, he will often be in the market for a substantial loan to finance his machinery purchases.

The size of the investment a farmer makes in many individual pieces of equipment and the complexity of the machinery he buys has increased his concern about the reliability of the equipment. If a machine breaks down because of some defect in workmanship or material, he wants assurance that its manufacturer will be responsible for restoring it to proper operating condition promptly. This same complexity and size has made the farmer's purchasing decisions more critical. Because he is often investing much larger amounts it becomes more important that he evaluate carefully every piece of machinery he buys as to its suitability for his own farming operations. Yet the increasing pace of change in farm equipment, a product of the much larger amounts that are now being spent on research and development, has made the traditional sources of information on which farmers have based their decisions less reliable. The study of farmer attitudes and behaviour cited above indicates that farmer still rely heavily on talking with friends, neighbours, and relatives or on watching machinery in operation on a neighbour's farm as sources of information on which to base their buying decisions. When asked to rank various sources of information on farm machinery in order of importance, 32 per cent ranked the former as most important and 19 per cent cited the latter. Government agricultural representatives and extension staff were ranked close to the bottom of the list. Regarded as intermediate in importance were articles in farm magazines. Literature supplied by the farm machinery companies and information obtained from implement dealers and salesmen were ranked fairly well down the list (see Table 5.2).

It is worth noting that the source of information that farmers rely on most heavily – talking with friends, neighbours, and relatives – is not an independent source of information about new equipment except to the extent that someone has purchased and used this equipment or has himself obtained information from some other source. Thus, as model changes become more frequent and the pace of technical advance in farm machinery accelerates, farmers will be forced to resort increasingly to other sources of information. To some degree, the concern expressed by farm organizations about the frequency of model changes and the importance of an independent testing agency may reflect a recognition that the traditional sources of information are no longer adequate. In the survey below, although some 62 per cent of farmers expressed satisfaction with their existing sources of information, about one-third felt additional information was needed. When asked to enlarge on their views, the most frequently cited suggestion was for additional information provided by an independent testing agency.

TABLE 5.2 – EXTENT TO WHICH VARIOUS SOURCES OF INFORMATION ABOUT FARM MACHINERY ARE UTILIZED BY FARM OPERATORS

	Ranked as Most Important	Extent Used		
		Frequently	Now and Then	Seldom or Never
	(Percentage)		(Per cent)	
Articles in farm magazines	10	35	47	18
Machinery company literature	5	18	45	37
Talking with implement dealers and salesmen	8	15	38	47
Watching machinery demonstrations at farms	13	17	33	50
Talking with friends, neighbours and relatives	19	62	27	11
Agricultural representatives	5	11	23	66
Radio and T.V. programs	2	19	39	42
Articles in newspapers	5	25	55	20
Advertising	1	12	38	50
Agricultural extension staff	0	2	30	68
Watching machinery in operation on neighbour's farm	32	55	30	15

Source: A. Segall, *Farmers' Attitudes to Farm Machinery Purchases,* Royal Commission on Farm Machinery, Study No. 4 (Ottawa: Queen's Printer, 1969), Tables 9 and 10.

The survey also attempted to assess the basis on which farmers make their machinery investment decisions. Although the study is far from conclusive, it suggests that most farmers have no very specific method for determining how much machinery they need. Concerning their most recent purchase, farmers cited, as the most important reasons affecting their decisions, that (1) they wanted a larger model in order to get the job done on time, (2) the old unit was wearing out and giving considerable trouble, (3) they wanted a larger model in order to make better use of available labour, (4) they needed a new machine and their economic situation had improved so they could afford it, and (5) they wanted a newer model because of the big improvements made over the one they owned. The 11 reasons that farmers were asked to rate are given in Table 5.3. In general, the shift to larger units as farming operations expanded, or because timing of operations required more power, emerge as the most important reasons affecting farmers' purchases of new equipment.

Existing farms vary widely in size, location, type of soil, and kind of farming activity. This creates a demand for a wide variety of different sizes and types of equipment. In some areas, farmers are engaged primarily in row crops such as corn or sugar beets and their demand is for a tractor suited to this type of farming. In other areas, the main crop is wheat or coarse grain which is grown in large fields.

The land may be flat in some areas and hilly in others. Soil varies widely in its texture and workability. Climatic conditions, too, vary greatly in different parts of Canada. On the Prairies and especially in northern regions, the growing season is very short and the risk of early frosts affects the kind of crop that may be grown and the type of harvesting equipment used. In contrast, in the Atlantic region, rainfall is heavier than on the Prairies, and the combine used must be able to handle more straw and green material.

TABLE 5.3 – IMPORTANCE OF VARIOUS REASONS IN INFLUENCING FARM OPERATORS' DECISIONS TO PURCHASE MOST RECENT UNIT OF FARM MACHINERY

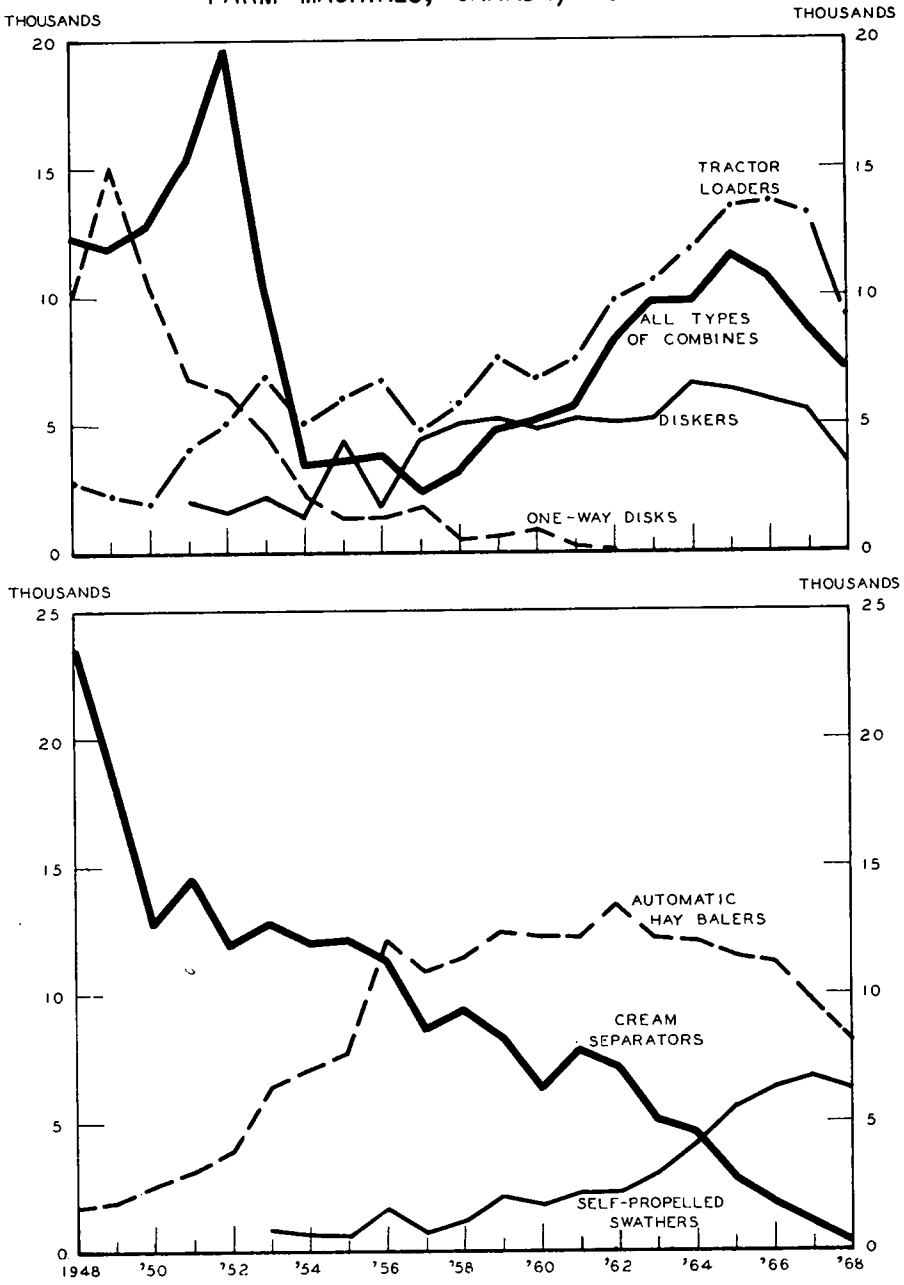
(Percentage)

Reasons	Degree of Importance		
	Very Important	Not Very Important	Unimportant
Old unit was wearing out and giving considerable trouble	56	13	31
Wanted a newer model because of the big improvements made over the one owned	42	18	40
Have increased size of farming operation and needed a larger model (more power)	40	11	49
Not satisfied with brand owned, felt a different brand would do a better job	22	11	67
Have needed a new one and situation improved so could afford it	46	14	40
Dealer made such a good offer I thought I better take it	34	11	55
Owning a full line of well-kept machinery	34	6	60
It is just good business to keep up to date in machinery	39	15	46
Wanted a larger model in order to get job done on time	70	13	17
Wanted a larger model in order to make better use of available labour	50	12	38
Decided not to hire machine-work any longer	16	4	80

Source: A. Segall, *Farmers' Attitudes to Farm Machinery Purchases,* Royal Commission on Farm Machinery, Study No. 4 (Ottawa: Queen's Printer, 1969), Table 20.

Farmers also differ in the extent to which they want their machines to be comfortable and easy to handle. This is not just a matter of comfort. When the machine operator is protected from noise and heat, he will tire less quickly and may not only be able to work a longer day, but can guide his machine more accurately and effectively when he is using it. Where timing of farm operations is critical and seasonal labour supplies are scarce, the increased work made possible by air-conditioned cabs, power steering and similar features of the newer farm machines may fully justify their extra cost.

FIGURE 5.1-ANNUAL SALES OF SELECTED FARM MACHINES, CANADA, 1948-68



SOURCE: DOMINION BUREAU OF STATISTICS FARM IMPLEMENT AND EQUIPMENT SALES, VARIOUS YEARS, CAT. NO. 63-203 (OTTAWA: QUEEN'S PRINTER).

Because of the fluctuations that occur from year to year in the size of his crop, the farmer normally prefers to defer his purchase of a major piece of equipment until shortly before he expects to use it. This is particularly true of harvesting equipment. If the crop is light and easy to harvest he may decide to make his existing equipment last another year. This means that purchases of machinery are rather heavily concentrated in the spring and summer months. During recent years about 85 per cent of all new machines have been sold during the seven months from April to October. For some farm machines, particularly newer types of equipment, sales may rise quickly during the period when the machine is being adopted and then fall back to a replacement level. Changes in the pattern of demand for a number of machines for Canada are illustrated in Figure 5.1. If the machine is an important one, the various machinery companies will be under strong pressure to have a competitive model of this machine in the market at the right time.

Finally, it should be noted that in a period when the rate of technical change is increasing, farmers face a higher risk of obsolescence on their equipment. Farmers may attempt to minimize this risk and the uncertainty associated with it by trading in their major pieces of equipment frequently; this is probably one of the major reasons why the trade-in and the second-hand market has become characteristic of the industry. Thus the rapid trend towards larger tractors, which has made it possible for one operator to manage a larger farm, has also created a demand for larger equipment of all types to complement the larger power unit. To the farmer moving to a larger tractor and larger acreages, much of his existing equipment may no longer be suitable and may have to be traded for larger units. His ability to make such trades and the cost to him of doing so will depend on the strength and effectiveness of the second-hand market for machinery.

Recent Changes in Product Line and Distribution Policy

The farm machinery companies have responded to this changing pattern of farm demand in a number of ways. Shortly after the Second World War they shifted from selling through commission agents to a system of selling through independent dealers. The independent dealer system has proven a much more satisfactory method of handling sales involving trade-ins, and of providing the service and repair parts required on modern farm equipment. The quality of the service provided to the farmer, however, is critically dependent on the capability of the dealer, as all the companies have gradually come to recognize. This recognition has been reflected in policies designed to eliminate the weaker dealers and to improve the quality of the service provided by the remainder. The result has been a very marked reduction in the number of dealers during the past two decades. All of the major companies place a major emphasis on recruiting competent dealers. In addition, many of them provide their dealers with a variety of facilities and aids to help them give good service to the farmer. These facilities and aids include special instructional courses for dealer mechanics and parts men, repair manuals, guides as to suitable

dealer premises and repair-parts stocking, special discounts to induce stocking of parts in advance of the season of use, and some assistance in dealer financing. All of these changes will be described in detail in subsequent chapters.

An alternative to the independent dealership system would have been company-operated sales and service establishments. The major companies have established such facilities in locations where they have been unable to find a suitable independent dealer. However, they have invariably found the company-owned store a less satisfactory basis of operation. This may be partly due to the fact that salaried employees do not work as hard or show as much initiative as independent businessmen, and partly because sales involving trade-ins can easily become the source of considerable loss when they are handled by an employee. The experience of Canadian Co-operative Implements Limited with their depot system has been similar. C.C.I.L. has admitted that their depots are not as efficiently operated as the independent dealerships.

Because of the increasing cost of many farm machines, a reflection of their increasing size and complexity as well as rising prices, many companies finance sales of their equipment at both the dealer and farm level. When the dealership system was first introduced in Canada at the end of the war, dealer financing was not a significant problem because farm machinery was in short supply and most machines moved directly into some farmer's hands as soon as they reached the dealership. However, about a decade later, when the backlog of demand had been largely eliminated, the farm machinery companies found it necessary to assist their dealers financially if they were to be induced to keep an adequate stock of the company's machines on their premises. Accordingly, the practice of "floor planning" machines in the dealers' hands on an interest-free basis became general in the industry. At the war's end, too, financing the farmer's purchases was not a significant problem. Many farmers had accumulated funds in the form of bonds or bank deposits which could be drawn upon to purchase new machinery, and for those who needed to borrow, the newly adopted Farm Improvement Loans Act (F.I.L.A.) was available to facilitate their access to funds. In time, however, these sources became insufficient to meet all requirements for funds and a number of companies found it desirable to introduce finance plans of their own to help them compete more effectively for the farmer's business. There has also been a growth of special inducements for the farmer to buy well in advance of his normal period of use. These developments are described in some detail in later chapters.

In recent years competition among companies has also taken the form of offering an increasing number of options and sizes on various machines. For example, International Harvester reported that a farmer now can buy from them a combine in 11 different cutting widths. Moreover, a selection of 2-, 3-, 4-, and 6-row corn heads is available to increase the machine's versatility. The same company offers 7 different hay-balers, 9 different mowers and 3 hay conditioners. This development has been comparatively recent. International Harvester reported that a dozen years ago they marketed in Canada only 11 different models of

tractors, 4 combines, and 3 different hay-balers. Now they offer 32 tractors, 8 combines, and 7 hay-balers. There has also been a strong trend in recent years towards providing more comfort and convenience on farm machines. Included are sophisticated hydraulic systems that enable the tractor operator to preset his ground-working tools and maintain them precisely at that depth. He may be provided with sensors that detect changes in terrain and soil conditions and automatically adjust for them. He may obtain power steering, power brakes, and a number of advanced types of transmissions. He may purchase cabs for his combine and tractor that are complete with windshield wipers, tinted glass, and air conditioning. Many of these items are furnished as options which the farmer does not have to buy. But there is a tendency for today's option to become a standard part of tomorrow's machine.

This trend towards more types and sizes of equipment and an increasing number of options reflects in part the research and development that all major companies now carry out. Continuous R&D has become a major concern of any farm machinery company that wants to remain fully competitive in the farm machinery market. A few companies have recently set up research units concerned with pure or advanced research in areas related to the use of farm machinery. This competitive aspect of research and development is examined in some detail below. In some measure also, the emphasis on the number of types and sizes of machines and on many different options is a reflection of the industry's emphasis on non-price forms of competition. This characteristic of the industry will also receive further attention in a later chapter.

Variety and Volume of Major Products

Not only have existing machines become larger, more sophisticated, and available with more options and a larger range of sizes, but there has also been a very considerable increase in the number of different kinds of machines on the market. Some of these newer machines reflect advances in agricultural methods which have resulted in much greater use of fertilizers, insecticides, herbicides, and other products requiring special machines to apply them. Others reflect the strong incentive to create more labour-saving methods of performing traditional farm jobs. Often demand may shift quickly from one product to a new substitute. In addition, the machines – like the farms – have become larger and fewer in number. Both the variety of machines and the decline in numbers have important implications for production costs. The industry has tended to lose economies in scale and move in the direction of the custom-made product.

Some indication of the current relative importance of different products and of some of the changes that have occurred over the past two decades is provided by Table 5.4. In 1967, wheeled tractors accounted for just over one-third of the wholesale dollar value of total sales. In order of importance tractors were followed by combines (15.1 per cent), swathers (5.8 per cent), hay-balers (3.6 per cent), field cultivators (3.6 per cent), and diskers (2.0 per cent).

TABLE 5.4 – SALES OF FARM MACHINERY, CANADA, MAJOR MACHINES, 1949 AND 1967

(Value at wholesale, Canadian dollars)

	1949	1967	
	No.	No.	($'000)
Tractors, wheel type, farm	62,205	29,814	147,612
9–34 HP		1,148	2,756
35–39 HP		6,936	19,674
40–49 HP		2,824	9,903
50–59 HP		4,516	19,700
60–79 HP		5,477	30,264
80 HP and over		8,903	65,314
Combines			
Pull-type	6,239	2,307	10,685
Self-propelled	5,746	6,464	54,801
Swathers and windrowers			
Pull-type	7,926	5,333	7,030
Self-propelled		6,722	17,880
Automatic hay-balers	1,914	9,761	15,605
Field cultivators	19,987	19,540	15,749
Diskers	8,894[1]	5,599	8,550
Tractor loaders	2,398	13,216	6,385
Disk harrows	24,393	9,110	6,316
Manure spreaders	9,904	7,836	6,188
Rod weeders	2,431	3,734	2,801
Grain augers	n.a.	18,162	3,055
Moldboard plows	15,453	10,624	5,855
Barn equipment			12,775
Dairy equipment			9,006
Farm wagons, boxes and sleighs			5,772
Field sprayers		8,156	3,060
Mowers		7,218	3,161
All other machinery			90,013
Repair parts			61,999
Total machinery and parts			494,298

[1]Data are for 1952; n.a. for 1949.

Source: Dominion Bureau of Statistics, *Farm Implement and Equipment Sales,* Cat. No. 63-203, 1949 and 1967.

The changing nature of the market is also evident. Although the number of tractors sold declined by one-half between 1949 and 1967, the average size of tractors sold increased from 19 HP to 63 HP. In terms of value, 85 per cent of the market in 1967 was in the size range above 39 HP, a range in which sales were only minimal in 1949 and only 23 per cent as late as 1957. Further, almost 80 per cent of the tractors sold in 1967 had diesel engines. In 1949 tractors were almost entirely powered by gasoline engines. The number of moldboard plows sold declined by about one-third between 1949 and 1967. In contrast with the decline in numbers for tractors and plows has been the growth in the baler market from less than 2,000 in 1949 to almost 10,000 in

1967. Similarly, sales of tractor loaders have increased from around 2,400 in 1949 to over 13,000 in 1967. The table also shows quite clearly the comparatively small volume in the Canadian market for all machines. For most products Canadian sales are fewer than 10,000 units and this often includes a wide variety of types and sizes.

Sales of farm machinery in Canada are, of course, only a fraction (in recent years about one-sixth) of sales in the large immediately adjacent market in the United States. All the major firms treat the entire area as a single market. Thus the total North American market will usually offer a total volume some seven or eight times that of the Canadian market alone. Data on total sales in the United States are not available but the value of shipments to the domestic market by U.S. manufacturers of farm machinery amounted to some $2.6 billion in 1966 (see Table 5.5). Market changes in terms of numbers, types, and varieties of machines sold have perhaps been even more marked in the United States than they have in Canada. For example, the number of corn pickers manufactured in the United States declined from about 41,000 in 1957 to just over 13,000 in 1966. Meanwhile, the output of corn heads for combines increased from around 5,000 in 1957 to over 25,000 in 1966. Or again, output of silo unloaders rose from 4,000 in 1957 to 24,000 in 1966 and output of field forage harvesters increased from 14,000 in 1957 to 30,000 in 1966. In this same period output of pick-up balers declined from 68,000 to 49,000 and output of manure spreaders declined from 58,000 to 38,000. Output of hay conditioners fell from 52,000 in 1959 to 11,000 in 1966. These marked changes in the demand for different products over a comparatively few years underline the need that manufacturers have to respond quickly to changing market conditions (see Figure 5.2).

It is evident that total North American output of farm machinery is relatively small when compared with an industry such as automobiles, which has an output in the range of seven to nine million units annually. In 1967 total wheeled-tractor production in North America was 242,000 units, combine production was around 60,000, hay-baler output was just over 50,000, swather production was around 22,000, tractor loaders about 48,000, manure spreaders 47,000, and rod weeders under 6,000. Larger-volume items were disk harrows with output of around 130,000, moldboard plows with output of 107,000, and cultivators with output around 170,000. However, both cultivators and plows include a wide variety of types and sizes. In any comparative sense, it is clear that this is an industry characterized by a relatively small volume of output.

Continental and Worldwide Market

With the removal of the Canadian tariff in 1944, competition between farm machinery companies in the Canadian market became, to an increasing degree, just one aspect of their competition in the North American market as a whole. Prior to

TABLE 5.5 – SHIPMENTS OF FARM MACHINERY FOR DOMESTIC USE, UNITED STATES, 1966

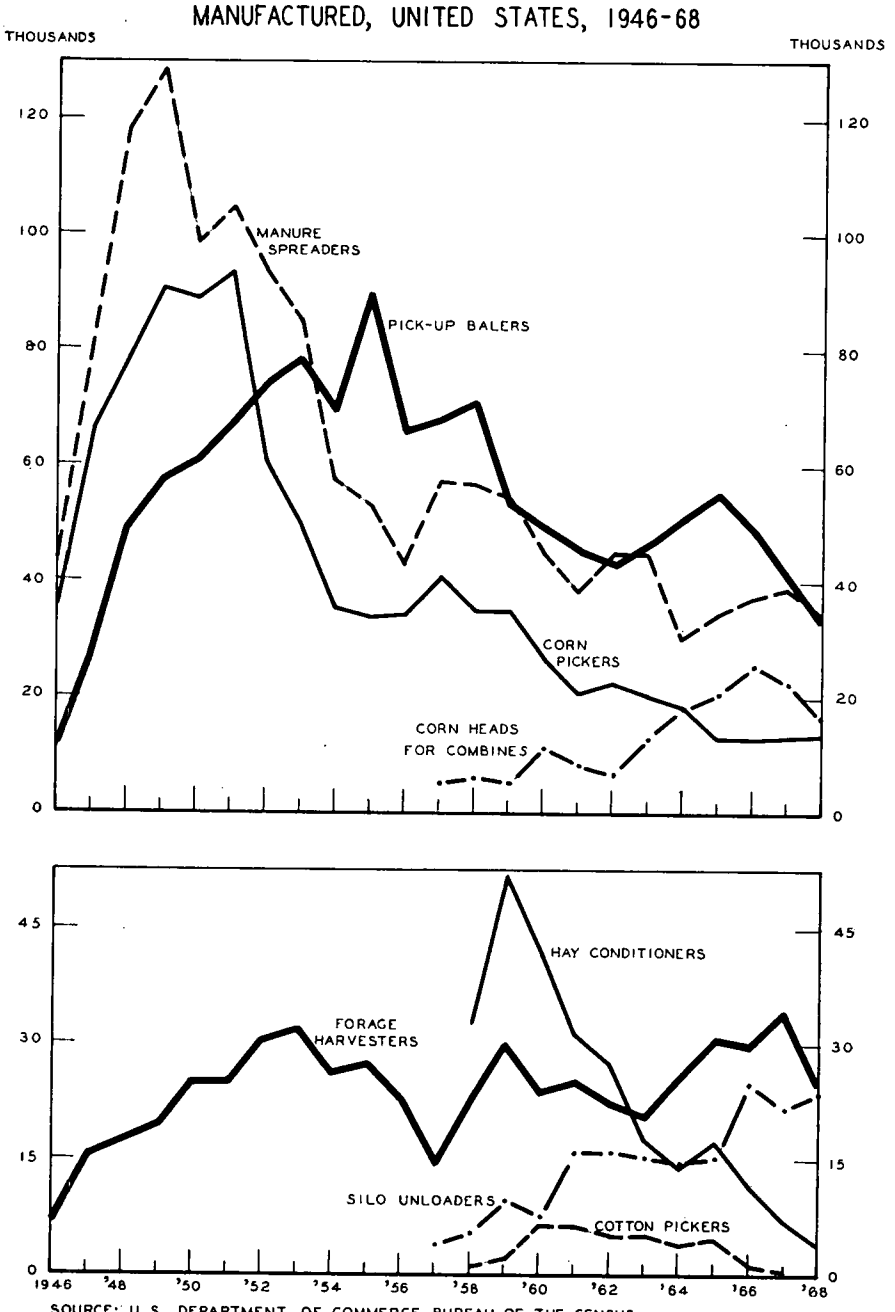
(Value at wholesale, U.S. dollars)

Product	Number ('000)	Value ($ million)
Tractors		
Under 39 HP	39.6	95.8
40–59 HP	49.6	155.4
60–89 HP	48.4	198.4
90–99 HP	44.8	221.3
100 HP and over	14.7	95.0
Misc. and other	n.a.	157.6
Total tractors	197.2	923.7
Harvesting machinery		
Combines	40.0	273.5
Swathers	6.7	17.0
Other	n.a.	223.3
Haying machinery		
Mowers	46.9	17.0
Rakes	39.6	14.7
Hay-balers	42.9	62.4
Tilling, cultivating and weeding machinery		
Harrows	106.9	71.7
Field cultivators	28.3	11.0
Plows		
Moldboard	104.8	55.4
Other	n.a.	47.1
Planting, seeding and fertilizing equipment		
Manure spreaders	33.8	25.5
Other	n.a.	123.5
Farm dairy machinery and equipment	n.a.	25.5
All other	n.a.	732.5
Total		2,623.8

Source: Based on D. Schwartzman, *Oligopoly in the Farm Machinery Industry*, Royal Commission on Farm Machinery, Study No. 12 (Ottawa: Information Canada, 1970), Table 2.2.

that date, the Canadian market appears to have received separate treatment. Many of the major companies such as International Harvester and Deere used their Canadian plants to supply Canadian and some export markets, supplementing their Canadian production with machinery produced in the United States. Others such as Case and Allis-Chalmers supplied the Canadian market entirely from their American factories. In either case, given the protection provided by the tariff during this

FIGURE 5.2-NUMBER OF UNITS OF SELECTED FARM MACHINES MANUFACTURED, UNITED STATES, 1946-68



SOURCE: U. S. DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS, SERIES MA-35A CURRENT INDUSTRIAL REPORTS, FARM MACHINERY AND EQUIPMENT, VARIOUS YEARS.

period, prices in Canada at times followed a different pattern than those in the United States.

With the creation of a common market for farm machinery covering Canada and the United States, all the major companies converted their Canadian manufacturing operations to a more specialized basis, producing certain products for the entire North American market and, to some degree, for overseas markets as well. Most companies now price their products on a uniform basis f.o.b. the point of origin. While this is the general pattern, there are still some pricing differences between the two markets. For tractors these differences were described in some detail in the Commission's *Special Report on Prices.* For the most part any pricing differences between Canada and the United States appear to reflect the somewhat different impact of European imports on the two markets. Ford, for example, markets tractors in Canada that are imported fully assembled from Europe. In the United States it markets tractors assembled in Detroit from components produced primarily in Europe. Massey-Ferguson also reported that parts supplied from Racine, their North American parts headquarters, are priced on a uniform basis in terms of U.S. dollars, but they do not add the full exchange difference[1] when parts are supplied to Canada. There were apparently also differences in the way the exchange differential was treated by various companies during the period from 1951 to 1962 when the Canadian exchange rate was fluctuating on the market.

Some six major full-line companies have established franchised dealers and sell their product line throughout most of the Canadian and American markets. Additional competition is provided by long-line and short-line companies. Although this competition differs to some degree between Canada and the United States, the extent of the difference cannot be easily measured. C.C.I.L. in Western Canada and Coopérative Fédérée de Québec provide an additional competitive influence that is not present in the American market. On the other hand there are many short-line companies in the United States that are not represented in Canada at all, or whose products are distributed in only a few regions.

Thus the pattern of competition in the Canadian market is just one part of the competitive pattern that exists in the larger North American market. Also, a number of major companies such as Massey-Ferguson, Deere, International Harvester, and Ford, find themselves competing against one another in a large number of different markets, and their pricing policies and other competitive practices in North America may be viewed as just one element in a worldwide strategy of competition. During recent years, Massey-Ferguson has been making a major effort to increase its market penetration in the United States. At the same time, Deere & Company has been attempting to expand its market position outside North America and reportedly lost about $18 million on overseas sales of $145 million during 1965. The reaction of each of these companies to the competitive efforts of the other may well be planned on a worldwide basis. Thus each may be

[1] Based on the Canadian dollar being pegged at the time at .925 (U.S.).

prepared to accept an expansion in the market position of the other which it might not accept without some stronger retaliatory steps if each market were considered in isolation.

So far, competition in the North American market from machinery imported from Western Europe has been rather limited. David Brown Tractors Limited and British Leyland Motor Corporation, two British firms, sell a range of smaller horsepower tractors, primarily in the eastern half of the continent. In addition, the Renault and Deutz tractors and Volvo tractors and combines are sold in Canada by co-operatives, the first by Coopérative Fédérée de Québec and the latter two brands, as noted earlier, by C.C.I.L. in Western Canada. A number of the major North American companies also market some tractors and combines made by or for them in Western Europe.

TABLE 5.6 – ESTIMATED PRODUCTION OF TRACTORS AND OTHER FARM MACHINERY, NORTH AMERICA AND WESTERN EUROPE, 1965

(Millions of U.S. dollars)

	Tractors	Other Farm Machinery	All Farm Machinery
Western Europe	1,278	1,507	2,785
North America	1,384	1,630	3,014
Total	2,662	3,137	5,799

Source: D. Schwartzman, *Oligopoly in the Farm Machinery Industry*, Royal Commission on Farm Machinery, Study No. 12 (Ottawa: Information Canada, 1970), Table 2.6.

Some indication of the relative importance of farm machinery production in North America and Western Europe is provided by the data in Table 5.6.

Chapter 6

EASE OF ENTRY AND THE CHARACTERISTICS OF DEMAND

Ease of entry for new firms is one of the conditions required for effective competition. When new firms can enter an industry easily, there is a tendency for prices to be driven down towards costs (per unit), for excess profits to be eliminated, and for inefficiency to disappear. This chapter and the following one explore the conditions of entry to the farm machinery industry. The focus in this chapter is on the features of demand that affect entry. The next chapter explores the cost side of the entry problem.

While the entry of a new firm into an industry is often thought of in terms of a small firm starting to manufacture and sell for the first time, many different types of entry may occur in the farm machinery industry. In particular, a short-line firm which has been successfully producing a limited range of products for some time may decide to extend its product line and become a long-line or full-line company. Versatile Manufacturing would fall into this category. A well-established short-line firm may be purchased by a large multi-product firm or conglomerate. Its new owner provides financial backing, management skills, and in some instances access to research facilities, and then expands the firm by introducing new product lines and acquiring other successful short-line firms. The New Holland Division of Sperry Rand Corporation and the New Idea Division of the Avco Corporation fall into this category. Well-established firms in fields involving a related technology, such as automobiles or trucks, may begin to produce tractors and then gradually extend their manufacturing operations until they become a full-line firm. Again the parent company can provide financial backing and access to research, management and marketing skills. The Implement and Tractor Division of the Ford Motor Company is an example of this kind of entry. Fiat in Italy, Renault in France, and the British Leyland Motor Corporation in Britain are examples of automobile manufacturers who have begun to produce tractors but have not yet extended their operations to other types of farm machinery. Still another type of entry is illustrated by the experience of Canadian Co-operative Implements Limited (C.C.I.L.). Here, a newly organized co-operative purchased a small short-line farm machinery plant and gradually expanded its manufacturing and distribution facilities. With distribution facilities

established, C.C.I.L. could provide a marketing outlet for the products of manufacturers in other countries. Its sale of the Clayson, Claas, and Volvo combines, and the Deutz and Volvo tractors are examples of this.

In the following discussion emphasis will be placed on the difficulties faced by a small firm that starts with a single product or limited range of products, and wishes to expand into a full-line firm. It will be clear that many of these disadvantages do not apply where entry is supported by the resources of a large and successful corporation in some completely different or related field.

Several different characteristics of demand will be explored. These include seasonality of demand, its stability from year to year, the long-run growth rate of demand, changes in the size and type of product purchased, the variety of sizes and models of the various products that are in demand, and the number and sophistication of the buyers. Some attention will also be given to the need for distribution facilities that arises when a manufacturer sells over a large area and in regions with different characteristics. The requirement for distribution facilities is also affected by the fact that farm machines need servicing, require repair parts, and usually carry a warranty.

Seasonal Nature of Demand

Demand for farm machinery – and especially the demand for particular machines – is highly seasonal and in any small region fluctuates from year to year. Both features discourage the entry and growth of relatively small firms. A large firm, manufacturing and selling many different products, can keep its labour force and production facilities fully employed, and thus keep its costs per unit down. In this way the larger firm avoids the high inventory costs faced by a firm producing a single product on a year-round basis. Similarly, a firm selling in different regions with different seasonal peaks of demand can spread its output of each product over a longer period, and can reduce the risk associated with erratic year-to-year demand fluctuations that often affect particular areas. This spreading of risk reaches a peak in the larger international companies which sometimes supply markets around the world from a single plant.

The seasonality of demand for farm machinery is shown in Table 6.1. In Canada, a very large proportion of the sales of many farm machines occurs within a three-month period. During the three-year period 1965-67, 91 per cent of all combines, 81 per cent of all swathers, 78 per cent of all diskers, and 72 per cent of all hay-balers, were sold in the three consecutive months of maximum sales for each product. Though significantly lower, the maximum three-month sales for tractors at 44 per cent and cultivators at 50 per cent were still higher than for automobiles. This high seasonality of demand for farm machinery reflects the fact that the farmer usually waits until the season of use is at hand before he buys a new machine. Thus machines must be produced in advance and stocked at convenient locations to meet such demand. Since farm

TABLE 6.1 – SEASONALITY OF RETAIL SALES OF FARM MACHINERY IN COMPARISON WITH RETAIL SALES OF MOTOR VEHICLES (AVERAGES 1965-67, CANADA)

(Percentages of total annual sales in physical units sold in individual months)

	Tractors	Combines	Hay-balers	Diskers	Cultivators	Swathers	New Motor Vehicles
January	2.4	0.8	0.8	0.7	1.0	0.2	6.8
February	3.0	0.9	0.6	0.8	1.1	0.4	6.9
March	5.3	1.7	0.9	1.9	2.0	0.5	10.4
April	12.7	1.1	1.2	11.7	11.1	0.6	10.1
May	16.3	1.0	1.5	45.7	20.9	0.7	10.7
June	10.6	1.3	6.6	16.1	14.1	3.1	10.2
July	6.3	3.3	33.4	3.9	8.0	11.8	7.3
August	6.3	27.5	26.6	3.6	7.2	38.8	6.8
September	7.9	34.2	12.5	2.8	8.7	28.9	5.7
October[1]	21.6	23.7	12.3	10.8	20.9	13.2	8.3
November	4.0	2.6	2.2	1.0	2.9	1.0	8.7
December	3.6	1.9	1.4	1.0	2.1	0.8	8.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[1]October data for farm machinery are believed to contain sales made in earlier months.

Source: Dominion Bureau of Statistics, Special Statement, *Farm Implement Sales,* Nos. 6423-519, December 1965; 6403-510, December 1966; and 6403-510, December 1967.

DBS, *Annual Supplement to the Canadian Statistical Review 1967,* Cat. No. 11-206.

machinery dealers are typically unable to finance any substantial inventory of machines, the farm machinery companies must make arrangements to finance the build-up in inventory. The large firm with well-established financial connections will accomplish this more easily than the small new entrant.

Year-to-Year Fluctuations

The year-to-year instability of demand for farm machinery in particular regions reflects agriculture's dependence on weather conditions and to some degree the sharp variations that can occur in prices and in the longer-run market outlook. Farm machinery is a durable asset. Many machines remain in use for 10 to 20 years. Thus a substantial part of the demand for new machines is for the replacement of older equipment. But the exact timing of replacement can easily be varied by a few years, if the crop outlook is unfavourable, or if prices of farm products are low. The instability of farm machinery sales is indicated in Figure 6.1. The sensitivity of farm machinery sales to variations in farm income is discussed in Chapter 19.

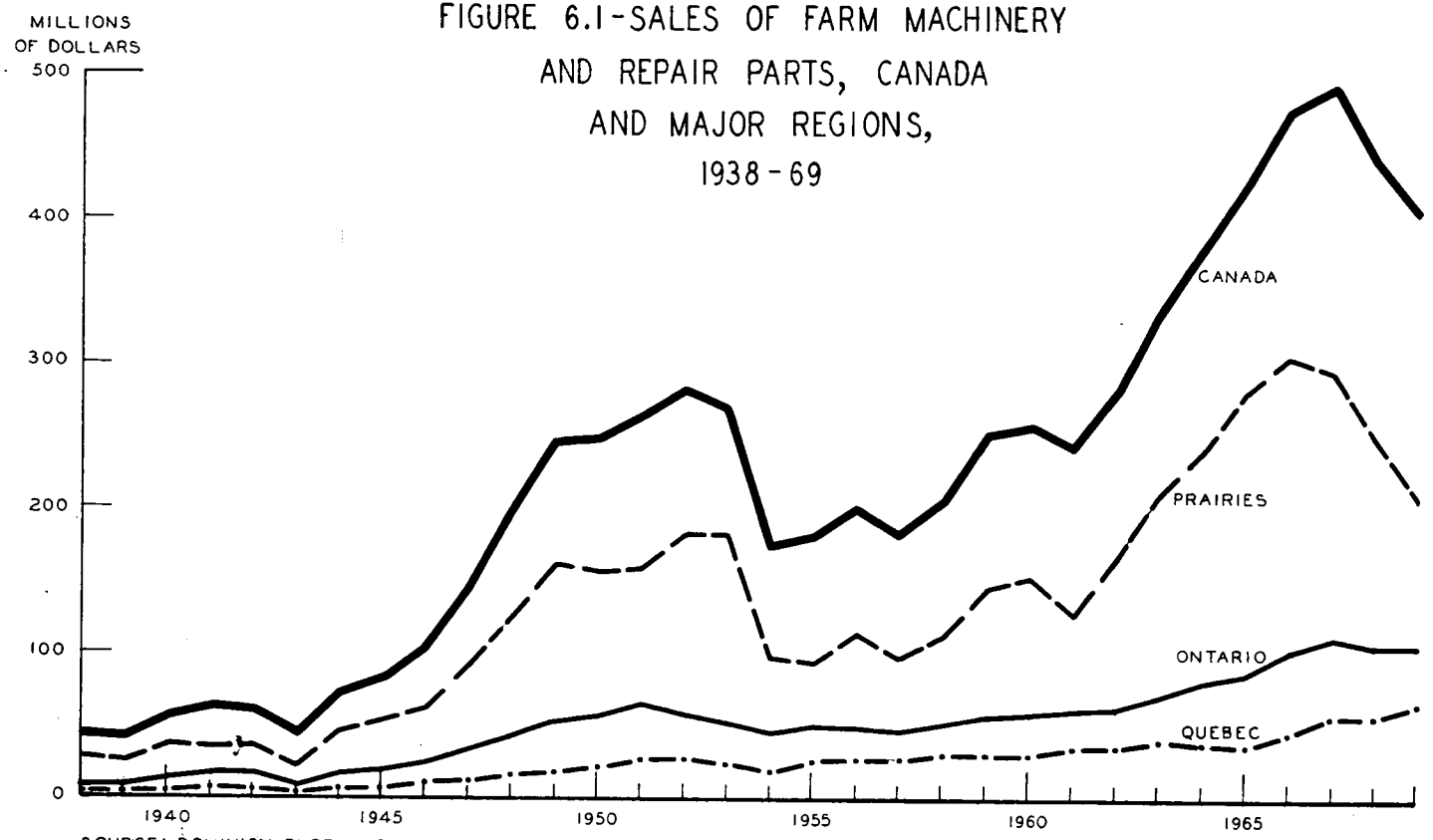
When demand drops sharply between one year and the next, the farm machinery companies may be faced with a substantial carry-over of machines. If many of these machines have already been sold to dealers, special arrangements may be necessary to enable the dealers to carry them over to another season. Again, the larger firm will be in a better position to finance this carry-over. Moreover, for the larger firm selling in many different regions, the proportion of total sales affected by this sharp drop is likely to be much smaller than for the small firm selling in a single region or area. Although transport costs will keep many machines from being moved long distances once they are on the dealers' premises, the larger firms, by keeping some machines in central locations, can divert them to areas where demand is strongest, thus minimizing their carry-over.[1]

Slow Long-Term Growth

If the total market for an industry is growing rapidly, it will be easier for a new firm to obtain a foothold and secure a share of this market. In contrast, if the longer-term growth in demand is slow or declining, competition from the older established firms, with ample capacity to meet the market's requirements, will make entry for a new firm difficult. In the farm machinery field, the total market is not only growing slowly in terms of the total value of production, but it is also actually declining in terms of the number of units sold. For example, in 1956 wholesale prices, the total value of farm machinery sold in Canada (excluding repair parts), increased from $277 million in 1950 to $298 million in 1966, an increase of only 7.5 per cent in 16 years. As Figure 6.1 shows, both

[1] Additional evidence on the fluctuations in demand in different parts of North America and for different types of machine is given in D. Schwartzman, *Oligopoly in the Farm Machinery Industry*, Royal Commission on Farm Machinery, Study No. 12 (Ottawa: Information Canada, 1970), Ch. 3.

FIGURE 6.1 - SALES OF FARM MACHINERY AND REPAIR PARTS, CANADA AND MAJOR REGIONS, 1938 - 69



SOURCE: DOMINION BUREAU OF STATISTICS, FARM IMPLEMENT AND EQUIPMENT SALES, CAT. NO. 63-203 (OTTAWA: QUEEN'S PRINTER), VARIOUS YEARS 1938-69.

years are near the peak of periods of buoyant machinery sales. Moreover, for a lengthy period between these peak years sales were severely depressed. For the nine years from 1954 to 1962, annual sales (again in 1956 prices) averaged only $165 million, and in all except two of these years sales were within 10 per cent of this average. Such a long period of depressed sales would not encourage new firms to enter the market. In contrast, the two periods of buoyant sales – 1945 to 1953, and 1963 to 1968 – were much more favourable to the entry of new firms. C.C.I.L. got established during the earlier period. Much of Versatile's rapid growth and its development from a short-line to a long-line firm occurred in the later period.

The decline in number of units for particular machines is illustrated by tractor sales. In 1950 there were almost 56,000 tractors sold in Canada. By 1967 the number sold had fallen to just under 30,000. Yet the total horsepower of the tractors sold had increased from about 1.1 million horsepower in 1950 to 1.9 million in 1967. The pattern has been similar in the United States. In the case of combines, in 1950 only 12 per cent of the combines produced in the United States had headers of 16 feet or larger, but by 1960 over 50 per cent were in this class. The rapid increase in the average size of farms, itself a reflection of changes in farm machinery technology, has shifted demand towards a smaller number of much larger machines. For example, the number of grain combines on U.S. farms declined from 1,015,000 in 1957 to 870,000 in 1968. This decline in numbers creates cost difficulties for the new entrant, which will be examined in the next chapter. However, the changes in farm machinery technology which it reflects may create new opportunities for smaller firms.

Even on a worldwide basis (excluding Communist countries) the tractor industry has experienced little growth in the number of tractors produced over the postwar period. As Table 6.2 shows, tractor sales in 1966 at 725,000 units were about 50,000 units lower than in the previous peak year of 1951. In the United States the number of tractors produced declined by about one-half during this same period. A forecast of output for 1970 prepared in 1967 by a major producer, Ford, projected no further growth in unit world sales. This clearly is not the kind of market that encourages the entry of new firms.

Additional evidence of the limited growth prospects for farm machinery in North America is provided by the recent trend among major firms towards the production of other products. Both Deere and Massey-Ferguson have been increasing their output of light industrial equipment and lawn and garden tractors. Massey-Ferguson has begun to move into the heavy construction machinery field, and has also added a snowmobile to its line. Further evidence on the growth prospects in the demand for farm machinery is provided in Chapter 19 and in two of the studies the Commission is publishing separately.[2]

[2]H. G. Scott and D. J. Smyth, *Demand for Farm Machinery – Western Europe*, Royal Commission on Farm Machinery, Study No. 9 (Ottawa: Queen's Printer, 1970), and D. Schwartzman, *op. cit.*

TABLE 6.2 – ANNUAL SALES OF TRACTORS, BY COUNTRY, 1950-66, WITH A FORECAST FOR 1970

(Thousands of units)

	Canada	U.S.	U.K.	Other Europe	Latin America	Other Areas	Total Non-Communist World
1950	54	400	36	187	25	11	713
1951	50	437	32	195	37	26	777
1952	44	363	30	203	29	26	695
1953	39	342	31	198	19	58	687
1954	26	225	32	204	32	82	601
1955	26	275	35	253	29	125	743
1956	25	215	28	290	28	39	625
1957	23	202	36	285	31	94	671
1958	23	223	46	270	34	91	687
1959	28	222	41	269	28	148	736
1960	27	190	39	261	33	72	622
1961	25	177	42	279	36	73	632
1962	25	183	38	259	35	80	620
1963	28	186	41	266	38	106	665
1964	29	192	36	274	47	107	685
1965	28	200	35	269	43	102	677
1966	32	227	38	276	37	115	725
				Forecast			
1970	30	190	39	270	49	118	696

Source: Ford Motor Company of Canada, Limited, *Tractor and Equipment Operations*, Brief to the Royal Commission on Farm Machinery, Ottawa, November 16, 1967, Table I.

The fact that the farm machinery industry has faced continuous and even rapid changes in technology creates both opportunities and difficulties for the new entrant. To the important extent that many of the innovations in the industry still originate with individual farmers, the small firm or the new entrant who takes up and exploits one of these new ideas may find entry much easier than it would in an industry with a static technology. C.C.I.L. was the first firm to manufacture the disker on a commercial basis and still has a significant share of that market; it was one of the products that helped to establish C.C.I.L. New Holland owes much of its growth to its role in pioneering new labour-saving machines for the harvesting and handling of hay. During the Commission's hearings executives of that firm claimed that a smaller firm can respond more quickly to new opportunities for new product developments than a large established firm. New Idea's entrance into the farm machinery business is literally based on a new idea, that of having a single power unit that can be attached to a number of different implements so that each becomes, in effect, self-propelled. Versatile's entrance into the tractor market is based on the design of a four-wheel-drive tractor suited to the needs of many large Prairie farms.

On the other hand, to the degree that machinery is becoming more sophisticated and complex with hydraulic units, sensing mechanisms and hydrostatic transmissions, the larger firm with a substantial research and development operation may have a significant advantage. However, this factor should not be over-emphasized. Even as late is 1953, as large a firm as Massey-Harris had not succeeded in incorporating into its line of tractors the three-point hitch and the Ferguson system, although Ferguson had been producing tractors with this feature since 1939 and a number of other firms had adapted it for their use. Relatively small R&D units are sometimes more productive than large ones. Thus the medium-sized firm may not face any handicap on this score compared with the large firm. The firm that is too small to have an R&D unit at all may face the most serious disadvantage. Sometimes new firms are established by individuals who have gained experience in larger firms. This was true of Versatile. But the position of the small firm would be stronger if there was a research program of some size in the universities and at government research stations. Not only would the research program provide a flow of ideas that would be accessible to small firms as well as large, but there would be a larger stock of trained personnel available for the small firms to draw on as consultants or to hire when experienced personnel in this category were needed. In addition, as has often happened in other industries, some of the personnel involved in the research programs might establish their own firms to exploit new developments.

As mentioned earlier, there has been a trend in recent years for the major firms not only to offer a large number of options on their basic machines, but also to offer machines in a larger number of different sizes. Production of a large range of options and sizes at a reasonable cost would be much easier for the larger firm. To avoid prohibitive costs, the small firm may have to concentrate on a few options and sizes that are in greatest demand. If the small firm sells in a single homogeneous agricultural area, the option problem would be easier since the range of options demanded would be limited. The size problem may create more difficulty. The demand for machines of different sizes reflects the great variety in the size of farms. The rapid increase in the average size of farms in recent years may have accentuated this problem. As the following data for Canada indicate, the distribution of commercial farms by different size categories was more dispersed in 1966 than it was 15 years earlier.

However, the fact that the structure of farm sizes is changing rapidly creates an opportunity for the new entrant who concentrates on supplying the range of farm sizes that is growing most rapidly. In recent years this has been the larger farms. A further advantage in concentrating on this sector of the market is the comparative lack of competition for second-hand equipment since the latter is typically of a smaller size. The cost side of the option and size-range problem will be examined in the next chapter.

The rapid growth in the average size of farm has been accompanied by a sharp reduction in the total number of farms and by an increase in the capitalization of the surviving units. All of this decline in numbers has been for small farms. The number of commercial farms increased from 235,000 in 1951 to 277,000 in 1966.

Size of Farms in Acres	Number of Commercial Farms	
	1951	1966
Under 3	465	1,056
3–9	2,092	2,937
10–69	13,287	15,448
70–239	95,639	90,343
240–399	44,093	51,014
400–559	26,886	33,740
560–759	21,167	28,220
760–1,119	17,454	28,140
1,120–1,599	8,286	14,656
1,600 and over	5,721	11,281

Source: Dominion Bureau of Statistics, *Ninth Census of Canada, Agriculture,* 1951, Vol. No. VI, Part I (Canada) (Ottawa: Queen's Printer, 1953), Table 41.
DBS, *1966 Census of Canada, Agriculture,* Cat. No. 96-601, Vol. III (Ottawa: Queen's Printer, February 1968), Table 30-1.

Average investment in machinery and equipment per commercial farm increased from $8,500 to $11,000 (in 1956 prices) over the same period. As these data make evident, the firm selling farm machinery must now sell to a smaller number of larger farms, typically operated by better educated, more sophisticated individuals. These changes have been accompanied by a large reduction in the amount of labour used by agriculture. In 1951 there was one person employed in Canadian agriculture for every 103 acres of improved land. By 1966 this ratio had fallen to one person for every 200 acres. With labour less available and more expensive, there has been a strong incentive to adopt labour-saving innovations in all phases of farming. This has created new opportunities for small firms. Grain augers, bale loaders, and front-end loaders, were all pioneered by small firms. The adoption of new farming methods has also created a demand for new types of equipment. The increased use of herbicides and pesticides has created a demand for sprayers, often supplied by smaller firms. Attachments for applying fertilizer and lime provide another example. On the other hand, many of the operators of the increasingly important larger farms are placing more emphasis on comfort, ease of operation and safety in their equipment. The larger firm may often be better able to meet these requirements.

The small firm who pioneers a new product may not be competing directly with the dominant firms in the industry and may have little effect on competitive conditions in the industry if he restricts his activities to these products. Still, firms who begin with a new product become potential entrants to other product lines. In 1953 Versatile's product line consisted mainly of sprayers, grain augers, and harrow drawbars. By 1968, its principal products were swathers, combines, and four-wheel-drive tractors.

Distribution Network

When a farmer buys a new machine he expects it to remain in use for 10 or 15 years or more, and he wants to be able to obtain replacement parts when needed over this period. For many machines such as tractors, seeders, and haying and harvesting equipment, he wants to obtain needed parts very quickly if the machine breaks down in a busy season. A new firm starting out in the farm machinery industry may find it difficult to provide the farmer with an assurance that the firm will be in business and able to supply the required parts over the lifetime of the machine. For this reason, new firms often produce machines that have fewer working parts, are less vulnerable to breakdown, and are used in farming operations where timing is less critical.

To provide the necessary sales and service for their machines, the major companies have established systems of franchised dealers backed up by a branch-house system, described in Chapter 11. The companies support their dealers by "floor planning" their stock of whole goods, by special credit terms on parts supply, through special training courses for dealer personnel, and in other ways. The dealers of the major firms are usually free to handle products of short-line firms that do not compete directly with the major firm's line of machines, but they are strongly discouraged from handling competitive machines. Thus, perhaps the major difficulty faced by a new firm attempting to establish itself as a long-line or full-line firm, or even in producing a few machines competitive with those handled by the major firms, is to get dealers who will handle its products. There are always a few dealers who handle more than one brand. But these are sometimes the less able and aggressive ones. And until the new entrant is able to offer a substantial range of machines, it may not be able to support its own independent group of dealers. To establish, finance and support the dealership system needed to provide the firm with a significant volume of sales is a difficult task. To overcome this obstacle successfully, the firm will need either a significant cost advantage that will make it possible to offer attractive terms to dealers, or some other equivalent attraction. Failing this, it will need substantial financial backing during the period of sales build-up.

In summary, it can be concluded that demand conditions in the farm machinery market make the entry of new firms difficult. This is particularly true for small firms. Entry is somewhat easier where a firm is owned by a large corporation that operates in related fields, such as automobiles or other industrial products. Entry into the North American market may also be easier for farm machinery firms that are already well established in Western Europe.

The demand conditions that make entry difficult are several. Demand for farm machines is highly seasonal and fluctuates erratically from year to year. Further, the longer-term growth in the total demand for farm machinery in North America has been only moderate, and in terms of the number of units demand has been falling as farms have become larger and fewer in number. In addition,

technological change in the industry has been fairly rapid. All of these considerations have probably favoured the larger established companies. Further, the importance of providing reliable repair parts and service facilities and the cost of financing marketing inventories also creates a significant barrier to entry. Small firms may have difficulty providing farmers with the assurance of a good repair parts service and in financing inventory at the dealer level.

Nevertheless, demand conditions are not uniformly unfavourable to entry. Rapid technical changes may create opportunities that small firms can successfully exploit and provide a basis on which they can successfully establish themselves. However, it will still be difficult for them to expand to a full line of machinery.

Chapter 7

ECONOMIES OF SCALE IN MANUFACTURING, AND OTHER COST CONDITIONS RELATED TO THE ENTRY OF NEW FIRMS

Economies of scale in manufacturing refer to the savings in production costs that arise at larger output volumes. If these economies are important, firms with larger volume should be able to undersell firms with smaller volume and the latter should disappear. If firms with small volume survive even though significant economies of scale in manufacturing exist, it suggests monopoly pricing on the part of the larger firms. The result is inefficiency in the sense that industry costs of production are higher than they need be. This chapter first examines economies of scale in tractor manufacturing. It then considers similar economies for combines and other kinds of farm machinery. The costs of a large number of options and a multiplicity of sizes are also examined.

Economies of Scale in Tractor Manufacturing

Estimates of economies of scale in tractor manufacturing are based on an engineering study carried out for the Commission by the management engineering firm of Booz, Allen & Hamilton Canada Ltd., which has had extensive experience in the planning of new plants in the metal fabrication field. Members of the Commission's staff worked closely with the firm in carrying out this study.[1] The results are believed to be reliable, and provide the only substantial body of firm data in this field. The study examines economies only at the manufacturing level. It does not consider possible economies in selling, distribution, finance, or research and development.

Estimates were prepared of the cost of manufacturing wheeled tractors for plants with annual outputs of 20,000, 60,000, and 90,000 tractors a year. This covers the range of output of all plants currently producing wheeled tractors in North America. Total tractor output in 1968 in North America was only 275,000.

---

[1] N.B. MacDonald, W. F. Barnicke, F. W. Judge, and K. E. Hansen, *Farm Tractor Production Costs: A Study in Economies of Scale,* Royal Commission on Farm Machinery, Study No. 2 (Ottawa: Queen's Printer, 1969). An independent evaluation of this study is contained in D. Schwartzman, *Oligopoly in the Farm Machinery Industry,* Royal Commission on Farm Machinery, Study No. 12 (Ottawa: Information Canada, 1970), Ch. 4.

The largest plants in North America produce no more than 50,000 to 60,000 annually, and a number have annual outputs of less than 20,000.

Each plant, as defined in the engineering study, was assumed to produce three different sizes of tractors, as follows:

Model	Horsepower Range Covered	Percentage of Plant Volume
About 40 HP	Less than 50	30
About 90 HP	51 to 99	60
About 130 HP	100 and over	10

This approximates the size pattern of current tractor sales in North America. A limited range of fairly standard options was included, and provision was made for sufficient factory space to manufacture a complete range of sizes and options.

To carry out this study the Commission, with the generous co-operation of the companies involved, supplied Booz, Allen & Hamilton with three tractors of the required sizes from each of six major tractor manufacturers. The firm then selected one line of tractors as representative of current tractor design, and completely dismantled each machine. A tractor contains just under 2,000 different parts. Some 1,365 parts, making up about 41 per cent of the component cost of a tractor, were evaluated as parts that a plant would normally *buy* at any of the above output volumes – parts such as tires, batteries, and generators (which reflect an entirely different manufacturing technology) or standard items such as nuts, bolts, and washers. From the remaining 600-odd parts, a selection was made of parts constituting just under 70 per cent of the total cost of components that would normally be manufactured in the tractor plant at an output level of 60,000. Engineers then prepared detailed specifications of how these parts should be manufactured, and estimated their manufacturing costs at the three output volumes. From these cost estimates the cost of the remaining 30 per cent of the components were then projected for each level of output. Cost of assembly and administrative and support costs were analyzed in detail.

The tractor factory was planned to incorporate the latest proven technology. A two-shift, five-day week was specified. Wage payments were made on the measured day work system. Cost estimates were prepared for each of the three basic stages of manufacture – the foundry, the machine shop, and the stamping plant. Buildings were depreciated at 5 per cent, machinery at 10 per cent, and special equipment at 33 per cent. The cost estimates do not provide specifically for profit but include a 7.5 per cent return to capital investment. The capital cost was taken at the 80 per cent level, to represent a plant that had been in operation for two years. To accommodate the fluctuations in output that are characteristic of the industry, the plants were designed to produce an output 20 per cent above the designated levels. Costs were estimated also for outputs 20 per cent above and below the specified annual volume.

Cost estimates for individual parts were based on planning sheets for each part at each stage of manufacture. A typical planning sheet would describe the operation; specify the crew size, the time required for each operation, and the set-up time; and describe the equipment, stating the cost of each piece of equipment. Manning tables, material requirements, capital requirements, and cost estimates were prepared for each of the three basic stages of manufacture. In addition, a complete plan for the factory was prepared including the number of administrative and support staff required, and the facilities needed for materials handling, storage, and other overhead functions. For the most part, costs were estimated on the basis of those prevailing in 1967-68 in the Chicago-Moline area. However, salary and wage rates and fringe benefits were taken at Brantford levels. Building and machinery costs, and salary and wage rates, were priced at the same level for all plant sizes. The cost of materials and purchased parts reflects the economies that accrue to a larger-volume purchasing operation.

In carrying out the analysis, a basic decision required at each level of output was whether to make or buy a given part. This required an estimate of the cost of manufacturing the component, and the price at which it could be purchased in the required volume. In arriving at this decision, an exception was made for the normal provision of a 7.5 per cent return on capital. Where new production facilities were required to manufacture a component, a pre-tax return of 20 per cent was considered necessary to justify such an installation. But once the basic decision had been made to have a foundry, a machine shop, or a stamping plant, any excess capacity would be utilized as long as it yielded a small return over actual costs. While the decision to make or buy basically reflects a cost comparison, the final decision reflects a number of non-economic considerations. Quality, reliability, flexibility and availability of supply, use of research and development facilities, and control of patents, favour in-house manufacture. Alternative sources of supply, and vendor goodwill and reciprocity, favour outside purchase. Other considerations favouring fabrication were bulkiness and difficulty of shipping, and risk of damage during transport.

Of the 600 parts referred to above on which make or buy decisions had to be made at the three volume levels, 259 were bought at the 20,000 level, 177 were bought at the 60,000 level and only 40 were bought at the 90,000 level. In the following analysis, the combination of parts made and bought at the 60,000 volume level will be referred to as the constant make-buy mix. The differing combinations made and bought at the three different volume levels will be referred to as the actual make-buy mix.

Estimated Cost Savings – The estimates prepared in the *Farm Tractor Production Costs* study show that economies of scale in tractor manufacturing are substantial. The cost reductions achieved by larger volume are shown in Table 7.1 on three different bases. The first estimate includes the saving obtained by manufacturing a larger number of components and by buying materials and parts in larger volume. It shows that a tractor plant with an annual output of 90,000 could

manufacture a tractor for 81 per cent of the cost of a 20,000-tractor plant. The difference in cost is $754 per tractor. At an output level of 60,000, unit costs are 88 per cent of costs in the 20,000-tractor plant, a difference of $463. Even if we assume a constant make-buy mix (the same components, of the 60,000 plant, manufactured in all three plants), the saving is $549 per tractor in the 90,000-unit plant as compared with a 20,000-tractor plant. A third approach considers only manufacturing costs in the sense of value added within the plant. This assumes a constant make-buy mix in all three plants and excludes savings that arise when parts and materials are bought in larger volume. On this basis manufacturing costs per tractor at 90,000 units are 74 per cent of those at 20,000. Costs per unit at 60,000 are 81 per cent of those at 20,000.

TABLE 7.1 –ESTIMATED ECONOMIES OF SCALE IN TRACTOR MANUFACTURING, NORTH AMERICA, 1967-68

	Annual Output of Tractors		
	20,000	60,000	90,000
Actual make-buy mix			
Total cost per tractor	$3,875	$3,412	$3,121
Index[1]	100	88	81
Constant make-buy mix			
Total cost per tractor	$3,824	$3,412	$3,275
Index[1]	100	89	86
Constant make-buy mix, excluding materials and purchased components[2]			
Cost, in sense of value added	$1,303	$1,052	$ 968
Index[1]	100	81	74

[1] Costs at 20,000-unit volume equal 100.
[2] Estimated as the sum of labour, support, facilities, and capital costs.
Source: N.B. MacDonald, W.F. Barnicke, F. W. Judge, and K.E. Hansen, *Farm Tractor Production Costs: A Study in Economies of Scale,* Royal Commission on Farm Machinery, Study No. 2 (Ottawa: Queen's Printer, 1969).

It is useful to evaluate these cost savings in terms of their implications for the return on investment that can be earned at different levels of output. Rates of return for the actual make-buy mix are shown in Table 7.2. These estimates assume a realistic price per tractor at the factory door of $4,000. On this basis, with the actual make-buy mix, a price per tractor that would yield a return of 11.8 per cent to the 20,000-unit tractor plant would earn 32.7 per cent for the 60,000 plant and 44.8 per cent for the 90,000 plant. All rates are before corporate income tax. For plants with a constant make-buy mix the corresponding rates of return are 13.3 per cent, 32.7 per cent, and 41.6 per cent.

The tractor price assumed and the absolute level of these rates of return are to some degree arbitrary. The significant fact is the large increase in the rate of return that results from a larger scale of output. Moreover, the study indicated that economies of scale are not exhausted by a 90,000-unit tractor plant. Explicit

estimates for larger volumes were made only for the stamping plant, where costs were shown to continue to decline at least up to a 200,000-unit volume. Further, while these cost estimates include tooling costs they do not include the cost of designing, building prototypes, and testing a new line of tractors. In its submission to the Commission, Massey-Ferguson estimated its cost of developing a new line of tractors with appropriate engines at $17.5 million. Allocated over a 10-year period, this would amount to $87.50 per tractor for a 20,000-tractor plant, $29.17 at 60,000 units, and $19.45 at 90,000 units. Thus design and development costs would add significantly to the cost differences given in Table 7.2.

TABLE 7.2 – ESTIMATES OF RATES OF RETURN ON INVESTMENT IN TRACTOR PLANTS, BY PRODUCTION VOLUME AND MAKE-BUY MIX

	Annual Output of Tractors					
	Constant Make-Buy Mix			Actual Make-Buy Mix		
	20,000	60,000	90,000	20,000	60,000	90,000
	(Dollars)					
(1) Price of tractor	4,000	4,000	4,000	4,000	4,000	4,000
(2) Unit cost, including 7.5% return on investment	3,824	3,412	3,275	3,875	3,412	3,121
(3) Unit profit	176	588	725	125	588	879
(4) Total profit ('000)	3,520	35,280	65,610	2,500	35,280	79,110
(5) Total cost of building, land, equipment, tooling, inventory ('000)	60,299	140,062	192,629	58,025	140,062	211,851
	(Per cent)					
(6) Rate of return on investment, incl. 7.5% noted in (2)	13.3	32.7	41.6	11.8	32.7	44.8

Source: N.B. MacDonald, W. F. Barnicke, F. W. Judge, and K. E. Hansen, *Farm Tractor Production Costs: A Study in Economies of Scale*, Royal Commission on Farm Machinery, Study No. 2 (Ottawa: Queen's Printer, 1969), Tables 40, 44 and 47.

Sources of Economies of Scale – Economies that result from a larger scale of plant can be analyzed in two different ways – in terms of the type of cost involved and in terms of the stage of manufacture.

A breakdown of the cost of tractor manufacture into such components as materials, labour, operating expenses, support, facilities, and capital cost is provided in Table 7.3. This table also shows the extent to which each of these costs declines, per tractor, for the constant make-buy mix, as the size of tractor plant increases.

TABLE 7.3 – ESTIMATED UNIT COSTS OF FARM TRACTORS BY TYPE OF COST AND VOLUME OF OUTPUT

Constant make-buy mix	Annual Output of Tractors					
	20,000	60,000	90,000	20,000	60,000	90,000
	(Dollars)			(Costs at 20,000-unit volume = 100)		
Material						
Parts (not subject to make-buy decision)	1,519	1,420	1,377	100	93	91
Parts (subject to make-buy decision)	437	408	396	100	93	91
Foundry, stamping plant, and machine shop materials	412	397	391	100	96	95
Material costs	*2,368*	*2,225*	*2,164*	*100*	*94*	*91*
Labour costs	432	385	364	100	89	84
Operating expenses	153	135	133	100	88	87
Support costs	279	231	215	100	83	77
Facilities costs	413	293	268	100	71	65
Capital costs	179	143	131	100	80	73
Conversion costs	*1,456*	*1,187*	*1,111*	*100*	*82*	*76*
Total unit costs, constant make-buy mix	3,824	3,412	3,275	100	89	86
Total unit costs, actual make-buy mix	3,875	3,412	3,121	100	88	81

Note: Estimates of components of total unit costs based on constant make-buy mix. Differences in material costs reflect purchase price differences. "Labour" includes wages and salaries of all workers including maintenance, clerical, and supervisory workers charged to foundry, stamping plant, machine shop, and assembly plant. Operating expenses include utilities, factory and clerical supplies, hand tools, heat, and sundries. Support costs include wages and salaries and other expenses of administration not charged to individual shops. Facilities costs include depreciation of plant and equipment. Capital costs include interest charges on funds invested in plant, equipment, and inventories.

Source: N.B. MacDonald, W. F. Barnicke, F. W. Judge, and K. E. Hansen, *Farm Tractor Production Costs: A Study in Economies of Scale,* Royal Commission on Farm Machinery, Study No. 2 (Ottawa: Queen's Printer, 1969), Table A49-1.

As the data in Table 7.4 show, the saving in total cost per tractor obtained by increasing the size of plant from 20,000 to 90,000 can be almost equally divided among savings on materials, on capital and facilities costs and on all other costs (all with the make-buy mix held constant) and the increased fabrication of components, instead of their purchase, made possible by the higher production volume. However, the significance of these different costs changes as volume increases. The saving on materials, and on capital and facilities costs, accounting for 31 and 34 per cent of the total saving, are the most significant factors, as output increases from 20,000 to 60,000. Beyond 60,000 units, the saving from increased in-house fabrication is the most significant factor, accounting for 53 per cent of the total. Let us examine each of these cost savings.

TABLE 7.4–REDUCTION IN UNIT TRACTOR COSTS AS VOLUME INCREASES

	Increase in Annual Output of Tractors					
	20,000 to 60,000		60,000 to 90,000		20,000 to 90,000	
	$	%	$	%	$	%
Reduction in cost (with make-buy mix held constant)						
Material	143	31	61	21	204	27
Capital and facilities	156	34	37	13	193	26
All other	113	24	39	13	152	20
Sub-total	412	89	137	47	549	73
(with make-buy mix changed to reflect opportunities related to higher volume)						
Increased fabrication of components	51	11	154	53	205	27
Total	463	100	291	100	754	100

Source: N. B. MacDonald, W. F. Barnicke, F. W. Judge, and K. E. Hansen, *Farm Tractor Production Costs: A Study in Economies of Scale*, Royal Commission on Farm Machinery, Study No. 2 (Ottawa: Queen's Printer, 1969), based on Table A49-1.

The saving on materials in a larger plant reflects the economies of packaging and shipping in larger volume, together with the saving that results when more specialized buyers can be employed. It was estimated that on purchased parts, when compared with a 60,000-unit operation, costs would be 7 per cent higher at 20,000 units and 3 per cent lower at 90,000 units. No comparable savings were assumed on the purchase of standard materials such as steel or pig iron.

The savings that result when a plant manufactures a larger proportion of a tractor's components reflect a variety of factors. To some degree it reflects a saving in transport and shipping costs. But, since inbound transport costs in this industry are small–less than 1.5 per cent of shipments–this must be a minor factor. It also reflects the avoidance of the monopoly profits that specialist suppliers can earn on components. However, the most important source of saving is the more complete utilization of capital and support facilities. This is evident from the following comparison of costs for two plants of the 90,000-unit size, one with a make-buy mix suited to the 60,000-unit level, and the other with a make-buy mix that allows a much larger number of components to be manufactured within the plant. As these data show, it costs only $201 to manufacture parts whose purchase price is $355. The major saving is on support, facilities, and capital costs. No additional cost for support and administrative staff was considered necessary to produce the additional parts, and the additional costs for capital and facilities were comparatively small. This undoubtedly reflects the fact that certain facilities that are

needed in a constant-mix, 90,000-tractor plant will be more completely utilized when a larger number of components is manufactured.

	Unit Costs of 90,000-Tractor Plant[2]		
	Constant Make-Buy Mix	Actual Make-Buy Mix	Difference
		(Dollars)	
Costs of:			
Parts (not subject to make-buy decision)	1,377	1,377	–
Parts (subject to make-buy decision)	396	41	-355
Materials	391	482	91
Labour	364	416	52
Operating expenses	133	147	14
Support	215	215	0
Facilities	268	297	29
Capital	131	146	15
Total in plant	1,502	1,703	201
Total cost per tractor	3,275	3,121	-154

Even when a constant make-buy mix is assumed, the saving on facilities and capital is very substantial. Unit costs for facilities and capital combined are almost one-third lower for a 90,000-tractor plant than they are in a plant that produces only 20,000 tractors a year. The saving on facilities, which comprises depreciation on plant and equipment, the write-off of tooling, and a few related costs such as insurance and property taxes, amounts to 35 per cent. It is particularly large for tooling, with unit costs for a 90,000 plant being only one-third of those for a 20,000 plant. However, tooling accounts for only a small part of total facilities costs. The corresponding saving on capital costs, which comprise the 7.5 per cent return on investment, is 27 per cent (see Table 7.3).

In this analysis labour costs include the wages and salaries of all workers at the factory level including maintenance, clerical, and supervisory workers. The savings here are less substantial. Unit costs fall only 16 per cent as the size of plant increases from 20,000 to 90,000. Savings in the use of set-up labour are quite substantial. But set-up labour is only a small part of the total. The saving in operating expenses is also comparatively small, with unit costs falling 13 per cent as the plant size increases from 20,000 to 90,000.

Savings in support costs are more substantial. Unit costs here fall 23 per cent over the range of plant sizes considered. Support costs include the wages and salaries and other expenses of administration that are not charged to individual shops in the factory. They include these costs for materials handling and storage.

[2]MacDonald, Barnicke, Judge, and Hansen, *op. cit.*, Table A49-1.

Analysis of Economies by Process and Function – Table 7.5 shows how costs per tractor vary for the three different plant sizes in the foundry, the stamping plant, the machine shop, and the assembly operation. It also shows the variation in the cost of purchased parts and in administrative and support costs. The data are for a plant in which the same parts are made or bought at all volume levels.

Economies of scale are substantial in all these areas. They are largest for stamping. Stamping costs per unit in a 90,000-tractor plant are only 72 per cent of those for a 20,000-unit plant. However, because stampings make up only a small part of a tractor, the total saving on stampings between 20,000 and 90,000 is only $49 per unit, about 9 per cent of the total saving. The savings on administrative and support costs, and on foundry, machine shop, and assembly costs, are all similar in size, unit costs at 90,000 volume being, respectively, 79, 81, 82, and 84 per cent of those at 20,000.

Although the saving in the cost of purchased parts is only 9 per cent as the size of plant increases from 20,000 to 90,000 units, this item makes up such a large part of the tractor's total cost that this saving accounts for one-third of the total cost reduction. An additional 20 per cent of the total cost saving occurs in the foundry and 19 per cent in the machine shop. The assembly operation contributes least to the total cost reduction, providing a saving of just $31 per tractor, about 6 per cent of the total.

TABLE 7.5–TOTAL UNIT COSTS OF FARM TRACTORS BY VOLUME OF OUTPUT AND BY MANUFACTURING PROCESS AND FUNCTION

(Constant make-buy mix)

	Annual Output of Tractors					
	20,000	60,000	90,000	20,000	60,000	90,000
	(Dollars)			(Index: Costs at 20,000-unit volume = 100)		
Costs of:						
Purchased parts	1,956	1,828	1,773	100	93	91
Foundry	581	490	469	100	84	81
Stamping	177	138	128	100	78	72
Machining	581	502	478	100	86	82
Assembly	193	171	162	100	89	84
Administrative and support	336	283	265	100	84	79
Total costs	3,824	3,412	3,275	100	89	86

Source: Data in dollars from N. B. MacDonald, W. F. Barnicke, F. W. Judge, and K. E. Hansen, *Farm Tractor Production Costs: A Study in Economies of Scale,* Royal Commission on Farm Machinery, Study No. 2 (Ottawa: Queen's Printer, 1969), Table 40.

Evaluation – This analysis has shown that the manufacturing cost of a tractor for a plant with a 90,000-unit output is almost 20 per cent less than for a plant producing only 20,000 tractors a year. At the 90,000 level, a plant uses about 26

per cent fewer resources than at 20,000. Since North American production of wheeled tractors is currently only about 250,000 units annually, and production in the non-Communist world is only around 800,000 units, it is clear that there is room in the industry for only a small number of firms with output of 90,000 tractors or more. The significant decline in costs and the increase in profitability as the size of annual output increases clearly demonstrates that economies of scale are a very significant barrier for the entry of new firms to the industry. The implications of this for the pattern of competition in the industry are assessed in Chapter 9.

Economies of Scale in Combine Manufacturing

No independent estimate of the size of economies of scale for combines and other farm machines is available. However, some conclusions will be attempted on the basis of the data provided in *Farm Tractor Production Costs.* Combines will be considered first and then other farm machines.

Combines are large complex machines containing many components such as engines, transmissions, and hydraulics, which are similar to those found on tractors. However, a combine involves much more stamping and less machining and foundry work. The difference is shown in Table 7.6. Stampings account for some 39 per cent of the value added by manufacturing in combine production, compared with only about 8 per cent in tractor manufacture. Since economies of scale are more important in stamping than in casting, machining, or assembly, this would suggest that economies of scale for combines are even larger than for tractors. On the other hand, combine production also involves a significant amount of welding, and economies of scale are believed to be less important here.

TABLE 7.6–PERCENTAGE OF VALUE ADDED, BY PLANT PROCESS, TRACTORS AND COMBINES, NORTH AMERICA, 1968

Plant Process	Tractors	Combines
Foundry castings	33	18
Machining	40	22
Stamping	8	39
Assembling	19	21
Total	100	100

Source: Tractors derived from data in N. B. MacDonald, W. F. Barnicke, F. W. Judge, and K.E. Hansen, *Farm Tractor Production Costs: A Study in Economies of Scale,* Royal Commission on Farm Machinery, Study No. 2 (Ottawa: Queen's Printer, 1969); Combines from Commission estimates.

The *Farm Tractor Production Costs* study provided some additional data on the cost of combine stampings. The decline in the cost of a set of stampings as volume increases varies with the ratio of conversion cost to the cost of materials.[3] Using these data provides the following estimate of stamping cost on the basis of

[3]Conversion costs are the cost of converting the raw material into finished stampings.

cost at an output of 20,000 units equalling 100, and assuming a ratio of conversion cost to materials at that volume level of 180 to 100.

Annual Output of Combines	Index of Stamping Cost	
	Conversion Costs	Total Cost
500	214	182
2,500	184	160
5,000	159	142
10,000	134	123
20,000	100	100

These data suggest that a set of combine stampings for a 5,000-unit plant would cost 42 per cent more than for a plant with an annual output of 20,000. For a plant with an output of only 500 combines and no other production the cost would be about 28 per cent higher than at 5,000.

Using this set of stamping costs and combining them with the cost of foundry, machining, assembly and support costs, as shown in the tractor study, it is possible to obtain the rather rough estimates of economies of scale for combines shown in Table 7.7.

TABLE 7.7–INDEX OF ECONOMIES OF SCALE IN COMBINE MANUFACTURING COSTS, CANADA, BY VOLUME OF OUTPUT

(Costs at 20,000-unit volume = 100)

	Annual Output of Combines				
	500				
	Single Purpose	Multi Purpose	5,000	10,000	20,000
Costs of:					
Machining	110.3	107.7	106.6	103.7	100
Stamping	182.2	155.8	141.6	123.3	100
Assembly	133.9	122.6	114.5	104.5	100
Finished parts	111.7	110.1	108.9	105.3	100
Total costs	128.4	120.2	115.4	108.0	100

Source: Estimates by Commission staff. Further details are provided in a note to this chapter.

These estimates indicate that manufacturing costs for a combine at the 5,000-unit level would be about 15 per cent higher than at the 20,000 level, adding about $750 to the cost of a medium-sized self-propelled combine. At an annual output of 500, total manufacturing costs would increase a further 4 per cent, or by $235, on the assumption that at this low volume the combine would be produced along with other farm machines in a multi-purpose plant. A plant producing combines only, at a volume of 500 a year, would have still higher costs. These

estimates assume the same mix of components manufactured in the plant at each volume level. The tractor cost study indicates that a larger number of components would be fabricated at the higher volumes of output, and that this would yield additional cost savings. On the other hand, except for the special estimate for a multi-purpose plant at the 500 level, the estimates assume that the combine plant is being operated by an independent company with no related manufacturing activity. In fact, most combine manufacturers also produce other farm equipment and may thus gain some economies not reflected in the above estimates. These two considerations would partially offset one another.

Some additional points about these estimates should be noted. First, the estimates assume that fully assembled engines are purchased. Several of the major combine producers manufacture their own engines in separate plants. Second, it was assumed that none of the plant sizes considered would justify a foundry operation. Castings are included in purchased parts and any reduction in the cost of castings with larger output are those that accrue to a larger volume purchasing operation. In fact, a number of the firms have foundries that supply castings for combines, tractors, and other farm machines. Third, economies of scale in administration and support activities were not estimated separately; they were included as part of the various processes listed.

The above estimates cover the range of output of most combine manufacturers outside of the Soviet Union. Total output in 1965 in North America was estimated at 53,000, of which Deere produced 13,500, International Harvester 10,000, Massey-Ferguson 9,600, Allis-Chalmers 8,500, Case 4,800 and Cockshutt 4,000. The only combine operations on this continent with very small volume were those of Versatile which produced 500 in a multi-purpose plant in Winnipeg, International Harvester which produced about 500 in a multi-purpose plant in Hamilton, and New Holland which manufactured about 1,000 in Nebraska. The latter operation is largely assembly, with many of the major components of the combine being manufactured in the large Clayson plant in Belgium. In Western Europe, the largest single producer is Claas whose output in 1965 has been estimated at 22,000. In the Soviet Union, the world's largest combine plant at Rostov produces an estimated 80,000 combines a year.

As the estimates in Table 7.7 indicate, economies of scale in the manufacture of combines are realized at least up to an annual output of 20,000 units per year and there may well be significant economies beyond that point. Conversion costs for combine stampings, which make up over two-thirds of total stamping costs for a plant with an output of 10,000 combines, decline by 25 per cent as output increases from 10,000 to 20,000 units. Thus a further significant decline in stamping costs beyond 20,000 units could be expected. It is evident from these data that economies of scale provide a significant barrier to entry for smaller firms desiring to enter the combine manufacturing field. The significance of this for the pattern of competition is discussed in Chapter 9.

As noted earlier, the estimates of economies of scale for tractors and combines described above were based on an assumption that each product was produced separately by a firm having no other related manufacturing operations (except for the estimate for the multi-purpose plant for combines at the 500-unit level). In fact, most of the farm machinery companies produce a variety of farm machines and often other related products. Thus some of the companies who have small volume on individual products may gain some economies by producing components for tractors, combines, and other products in the same plant. For example, a single plant may produce transmissions for both tractors and combines. A foundry may produce castings for tractors, combines, and a number of other farm machines. The same may be true of stamped and machined products. Some allowance must be made for these considerations in interpreting the significance of the estimates of economies of scale outlined above.

Using these estimates of manufacturing economies of scale for tractors and combines, it is possible to estimate roughly the additional cost involved in the smaller-scale manufacturing operations that actually exist in this industry. In a study prepared for the Commission, David Schwartzman has estimated that these added costs amount to from 7 to 8 per cent for tractors and to 8 per cent or more for combines.[4] Both estimates apply to production in North America and make some allowance for the considerations outlined in the preceding paragraph.

Economies of Scale for Other Farm Machines

No attempt has been made to estimate in any quantitative fashion the economies of scale involved in the manufacture of other farm machines. However, it is clear that most of these machines are less complex and sophisticated than either tractors or combines, and it is reasonable to assume that economies of scale will be less significant. For many machines, such as cultivators and harrows, relatively little stamping, machining, or casting is required. Much of the work consists of simpler manufacturing operations such as cutting, drilling holes, painting, and assembly. Because the overhead capital required for these operations is smaller, the economies of scale that accompany them are smaller as well. Further, it was shown for tractors that a significant part of the economies of scale resulted from purchasing parts and components in larger volume. For simpler machines, most of the purchased inputs are bulk materials that do not yield the economies that result from specialized buying.

Evidence to be presented later on the extent to which manufacturing of various machines is concentrated in the hands of a small number of firms also supports the conclusion that economies of scale are less significant for these other farm machines than they are for tractors and combines. In this part of the industry, concentration ratios are generally lower, and in many cases they have declined over

[4] D. Schwartzman, *Oligopoly in the Farm Machinery Industry*, Royal Commission on Farm Machinery, Study No. 12 (Ottawa: Information Canada, 1970).

the past decade. The lowest concentration ratio in Canada is for weeding, cultivating, and tilling machines. However, this picture is not uniform: the share of the haying machinery market held by the four largest firms is slightly higher than for tractors and about the same as for combines.

Non-Plant Economies of Scale

Economies of scale may well exist in a number of areas outside manufacturing. However, little is known about their size and there is no easy way to estimate them. Nevertheless, some brief consideration will be given to a number of these activities. Most of the full-line and long-line firms in the industry are large multi-plant firms. Each of them should realize many, if not all, of the economies that are available beyond the plant level.

Elsewhere in this Report it is estimated that for a major farm machinery company, general and administrative expenses amount to about 3 per cent of net sales, branch-warehouse operating expenses to about 7 per cent, inventory financing to about 5 per cent, and research and development costs to about 3 per cent. Thus, in total, some 18 per cent of net sales are for activities beyond the plant manufacturing level. Consider each of these in turn.

General and Administrative Expenses – The study *Farm Tractor Production Costs* estimated economies of scale in central-office general and administrative costs, for a plant with a variable make-buy mix of tractors as follows:

Annual Output of Tractors	Administrative and Support Costs per Tractor	Index of Cost per Tractor
	(Dollars)	
20,000	336	100
60,000	283	84
90,000	265	79

A firm with an annual tractor output of 20,000 would have annual sales at the factory of about $80 million. This would increase to $240 million at 60,000 and $360 million at 90,000. Thus these data suggest that administrative and support costs would fall about 16 per cent as sales (at 1967 prices) increased from $80 to $240 million and would fall a further 6 per cent when sales increased to $360 million. If a small firm is considered to be one with annual sales of $80 million or less, compared with a large firm of over $360 million, then it can be estimated that general and administrative expenses would be about 4 per cent rather than 3 per cent of sales.

Distribution – Wholesale distribution costs of large firms are about 7 per cent of sales. As will be demonstrated later, there are some economies of distribution, mainly relating to the average size of dealer. In Canada, branch-house distribution

costs of the major companies fell from 9.6 per cent of sales in 1961 to 7.0 per cent in 1966. During the same period industry sales increased from $202 million to $417 million. Some of this decline in distribution costs undoubtedly reflected economies that accrue to a larger-scale operation. However, other factors would be involved as well. It cannot be assumed that the company's distribution organization would have been operating exactly at planned capacity in either 1961 or 1966. It may have been operating below capacity in the early year and above normal capacity in the later year. In addition, there is evidence that some of the economies of scale that accrue as average sales per dealer increase could be obtained by the smaller companies simply by reorganizing their dealership system. A reasonable estimate for branch-house distribution costs for smaller firms would be about 9 per cent. This is still substantially below the margin that would be charged by an independent distributor, which has been estimated at 16 per cent. However, it is not an estimate in which one can have great confidence, because wholesale distribution costs appear to vary substantially from company to company, irrespective of size, and apparently involve a large element of management discretion.

Interest-Free "Floor-Planning" – The cost of interest-free "floor-planning" of inventory in the hands of the dealer has been estimated, in the case of the larger companies, at about 5 per cent of net sales. There is also evidence that large dealers have an inventory turnover that is at least 50 per cent larger than for small dealers. On this basis it could be estimated that the cost of floor-planning for a small company might be around 7 per cent of sales. However, there is some doubt as to whether all of this represents a genuine cost to the industry that should be included as part of non-plant costs (see discussion in Chapter 11).

Research and Development – Research and development expenditures undoubtedly also yield significant economies of scale. Deere's R&D expenditures are currently about 4 per cent of sales. Such a ratio would yield a very much larger research expenditure for the major firms than it does for small firms. On the other hand, there is at least some evidence that relatively small research laboratories have often produced more new ideas than very large research establishments. In addition, the individual with unusual inventive ability may earn a much larger income if he can successfully establish his own firm than he would ever make on a salaried basis in a large firm. Still, there must be some advantage accruing to the large firm. It will be assumed that an expenditure of 3 per cent of net sales for a large firm will yield the same return as 5 per cent for a small firm.

Consideration of all these factors outside the actual manufacturing process suggests that non-plant economies of scale amount to about 25 per cent of net sales for a small firm and 18 per cent for large firms. This suggests a rather larger decline than is true for costs at the plant level. However, since these estimates are subject to a considerable margin of error, and since non-plant costs are only about one-fourth or less of the total, it is assumed that the behaviour of total costs per unit as volume increases does not differ significantly from costs at the manufac-

turing level. In brief, it is assumed that total costs per unit for a large firm, with annual sales of $450 million or over, are only about 80 per cent of those of a small firm, one with annual sales of $100 million or less.

Conclusion on Scale Economies

It is clear that economies of scale of plant and firm are formidable barriers to the entry of new firms in this industry. This is particularly true for major products such as tractors and combines. It undoubtedly applies in some measure also to a number of other products such as hay-balers and swathers. If the existing level of output were concentrated in a smaller number of plants, there would be significant cost savings. For North America the saving has been estimated at from 7 to 8 per cent for tractors and at 8 per cent or more for combines.

Costs of Additional Sizes, Options, and Models

In recent years the farm machinery industry has greatly increased the number of sizes, options, and models it offers on most of its major machines. While it is not easy to quantify the addition to cost involved in this added variety, some consideration will be given here to the factors involved.

The added cost of an option will depend on the volume in which it is sold, whether it is an "off the shelf" item or has to be specially manufactured, and whether it is a simple "add or omit" item or can only be included with additional labour and other costs. Apart from the cost of the option itself, the cost penalties associated with its inclusion consist of the cost of incorporating the added feature into the design of the machine, the cost of procuring and testing the parts or manufacturing them "in house", the added cost of storage and handling the additional parts, and the net cost of their assembly into the final product.

Some of the costs involved in any option are fixed, in the sense that they remain unchanged no matter how many units of the particular option are sold. In respect to these fixed costs, the cost of each option will depend on the volume sold. These fixed costs include the engineering and other work in specifying the part and making provision for its addition to the machine. If the part is to be manufactured, an order must go to the plant specifying how it is to be made, to what dimensions, and with what materials and finishes. If the part is bought and is not readily available as a standard item, similar instructions must be provided to the outside supplier. Instructions also have to be provided as to how and where it is to be included in the final machine.

Once the option has been specified, it has to be scheduled. This requires purchase orders to vendors, or manufacturing instructions to the firm's own plants, indicating the timing and volume of the option to be provided. As the number of possible options increases, the task of forecasting potential demand for each becomes more difficult, and manufacturers may find they have to carry some safety margin with an additional inventory cost to satisfy their customers. This is

particularly true of options that have to be produced to order, usually on a batch basis.

The volume of any option and the frequency with which it is included on a machine seriously affects its cost. Larger volume allows the cost of setting up and administering the option to be spread more widely. Frequency of inclusion reduces penalty costs associated with dealing with an unfamiliar item on the assembly line.

"Off the shelf" items, such as tires, are less expensive than items that are specially designed and manufactured. The same is true of standard items such as starters, generators, belts, pulleys, and bearings. Items manufactured in the firm's own plant will be less expensive if they are compatible in manufacturing technique with the rest of the machine. Additional gear ratios in a transmission will cost less if the transmission case is already large enough to handle them. "Add on" options may make it more difficult to schedule an assembly line and avoid idle time at some work stations. All options involve some penalty in the form of the cost of scheduling, additional inventory, and material handling.

One example of where a manufacturer provides an additional tractor model at a modest extra cost is the use of a turbo-charger to obtain higher horsepower from the existing engine. This involves a "hang on" option to a largely unchanged engine. But the transmission must be designed so it can transmit the extra power with the same service life. Some firms have attained this extra transmission capacity by micro-finishing all the gears so that the gear teeth mate together better for less wear and longer life. In this way, a larger horsepower tractor was obtained at modest additional cost. Thus, while it is clear that the trend towards additional variety in terms of sizes, options, and models has added to farm machinery costs, it is not possible to quantify these added costs in any simple way. In some instances, at least, the additional features have been provided at modest additional cost. Because the additional variety involved is cheaper for a larger-volume operation, this recent trend has undoubtedly provided some additional advantage to the larger firm. As such, it has added further to the entry barriers that exist in the industry.

Note to Chapter 7

ECONOMIES OF SCALE IN COMBINE MANUFACTURING

This note describes how economies of scale in combine manufacturing were estimated. The basic resources used were combine manufacturing costs supplied for 1966 by three companies, Massey-Ferguson (for the 410 model at its Brantford plant), Cockshutt (for its 542 model at Brantford) and Versatile (for its 420 model built in Winnipeg). Because of differences in manufacturing processes, degree of vertical integration, and input factor costs, the costs for the three companies could not be compared directly. Instead, costs for the Massey-Ferguson machine were analyzed using the additional detail supplied for the two other plants. Costs were estimated for annual outputs of 500, 5,000, 10,000, and 20,000 units. Costs are presented as relative numbers only.

Two limitations of the analysis should be noted. Except for the 500-volume level, costs are estimated for special-purpose plants, making no other products but combines. A constant make-buy mix is assumed at all volumes. The latter assumption means that cost reductions with increased volume will be significantly understated. The former assumption has an opposite effect. Many existing farm machinery manufacturers obtain economies by producing components for different products in a single plant, thus obtaining larger volume output and some associated cost savings. The net effect of these two partially offsetting considerations is indeterminate.

Procedure Used in Developing Cost Estimates

For every cost area of a combine (17 in all), data were available on the value of assembly plant end-items divided between "made" and "bought" items. The "made" items were divided among stampings, assemblies of stampings, and machined parts. Estimated costs for stamping and machined parts were then divided between raw materials and conversion costs (labour and overhead) using ratios developed in the tractor cost study. Assembly costs were provided separately for labour and overhead costs. The resulting cost breakdown shown in Table 7.8 was taken as approximating combine manufacturing costs at a 10,000-unit volume. Changes in costs with volume were then estimated for each of the various cost areas of a combine plant.

TABLE 7.8 – BREAKDOWN OF COMBINE MANUFACTURING COSTS AT 10,000-UNIT VOLUME

	Percentage of Total Costs
Materials and parts	
Castings	7.1
Forgings	1.7
Other machining materials	0.6
Stamping materials	6.3
Finished parts	38.0
Total materials and parts	53.7
Machining	13.8
Stamping	14.5
Assembly	18.0
Total costs	100.0

Source: Commission estimates.

While there are specialized plants producing only combines in the output range of 5,000 units or more, plants producing only 500 per year do so on a batch basis in a multi-product facility. For this reason costs at the 500-unit level were estimated both for a single-purpose and a multi-purpose plant. For the multi-purpose plant it was assumed that material costs would be close to those in a 5,000-unit plant, but labour would incur some penalty by being forced to change more frequently from one job to another. The same would apply to indirect labour. Building costs and the cost of machines should not diverge greatly from those achieved in a higher-volume, single-purpose plant. Inefficiencies will arise because more storage space is required, from "down time" while machines are changed over, and from idle time on special-purpose machines. Tooling used for combines only will be a unique penalty cost to the low-volume plant. Factory expense is unlikely to involve any significant penalty.

Analyzed in detail for each volume level were machining costs, stamping costs, finished parts costs, assembly costs, and total costs. It was assumed that the combine plant would not have its own foundry. While the Massey-Ferguson combine plant at Brantford draws castings from the M-Foundry, this is economically justifiable only because of the added volume provided for other production, including tractor production at Detroit. Hence, all castings for all plants were assumed to be purchased outside.

Machining Costs – The pattern to be used in subsequent tables is shown in Table 7.9. Materials costs and conversion costs are each shown relative to costs at the 20,000-unit volume. The same is true for total manufacturing cost.

TABLE 7.9–INDEX OF COMBINE MACHINING OPERATIONS COSTS

(Costs at 20,000-unit volume = 100)

	Annual Output of Combines				
	500				
	Single-Purpose	Multi-Purpose	5,000	10,000	20,000
Materials					
Castings	32.4	32.3	32.2	31.8	31.2
Forgings	7.9	7.8	7.8	7.7	7.5
Other materials	2.9	2.8	2.8	2.8	2.8
Total materials	43.2	42.9	42.8	42.3	41.5
Conversion					
Labour	17.3	16.1	15.6	15.2	14.8
Overheads	49.8	48.7	48.2	46.2	43.7
Total conversion	67.1	64.8	63.8	61.4	58.5
Total costs	110.3	107.7	106.9	103.7	100.0

Source: Commission estimates.

The cost of castings bought outside are shown as rising only moderately as volume declines, on the assumption that they are being supplied from a modern foundry with sufficient over-all volume to achieve available economies of scale. Assuming that the parts required by the lower-volume combine plants are compatible with other parts being made in the foundry (so that flask sizes, moulding lines, core machine sizes, etc., do not have to be changed over), the extra costs at lower volumes would be largely limited to the required patterns being written off over a lower volume for each part.

Forgings would probably be subject to greater economies of scale than castings because of higher set-up and tooling costs. Labour and overheads are shown as increasing only moderately up to the 500-volume multi-purpose plant, but rising steeply for the single-purpose plant at that volume. The cost of machining materials increases only slightly as volume decreases.

Stamping Costs – It was estimated that the unit cost of stamping materials would rise about 25 per cent between the 20,000-unit plant and the 500-unit single-purpose plant. The large plant could buy its steel in bulk–in most cases directly from the mill–whereas the smaller plant, using only one-fortieth as much steel annually, would be forced to buy from steel warehouses in small lots. The multi-purpose 500-unit plant is shown as having only slightly higher material costs than a 5,000-unit plant. Some added costs arise from the purchase of small amounts of special sizes and specifications of steel.

TABLE 7.10–INDEX OF COMBINE STAMPING OPERATIONS COSTS

(Costs at 20,000-unit volume = 100)

	Annual Output of Combines				
	500				
	Single-Purpose	Multi-Purpose	5,000	10,000	20,000
Materials	44.8	40.9	39.7	37.4	35.9
Conversion					
Labour	44.8	38.1	33.6	32.5	30.8
Overheads	92.6	76.8	68.3	53.4	33.3
Total conversion	137.4	114.9	101.9	85.9	64.1
Total costs	182.2	155.8	141.6	123.3	100.0

Source: N.B. MacDonald, W.F. Barnicke, F.W. Judge, and K.E. Hansen, *Farm Tractor Production Costs: A Study in Economies of Scale*, Royal Commission on Farm Machinery, Study No. 2 (Ottawa: Queen's Printer, 1969), Table 20.

Estimates for both the materials and conversion costs of combine stampings were provided in the tractor cost study.[5] Analysis of combine weights and the ratio of stamping costs to total costs indicated that for a 10,000-unit plant, conversion costs would amount to about 240 per cent of materials costs. Total stamping costs were estimated using this ratio. As Table 7.10 shows, stamping costs rise steeply with the 500-unit multi-purpose plant having costs more than 50 per cent higher than those of a 20,000-unit plant. Because stampings are such an important part of a combine, this steep rise in costs is a major contributor to economies of scale in combine production.

Finished Parts Costs – Because many of the bought-outside finished items are produced by specialist producers able to take advantage of long production runs, the cost penalties associated with lower-volume production are moderate in size. These costs are shown in Table 7.11.

[5] MacDonald, Barnicke, Judge, and Hansen, *op. cit.*, Table 20.

TABLE 7.11–INDEX OF ESTIMATED COSTS OF PURCHASED PARTS FOR COMBINES

(Costs at 20,000-unit volume = 100)

	Annual Output of Combines				
	500				
	Single-Purpose	Multi-Purpose	5,000	10,000	20,000
Purchased parts costs	111.7	110.1	108.9	105.3	100.0

Source: Commission estimates.

Assembly Costs – The costs of assembly are shown in Table 7.12. The assembly of a combine differs from that of a tractor in that a great deal of gas welding is required, particularly in the main frame or body. This process is not subject to much economy of scale, with additional volume being attained by more machines and more workers, rather than machines with increasing productivity. Some economies of scale are possible, however, by greater specialization in the welding of particular areas. Diseconomies will be evident if the welding equipment in the low-volume plant, single- or multi-purpose, is not utilized fully.

TABLE 7.12–INDEX OF ESTIMATED COSTS OF COMBINE ASSEMBLY OPERATIONS

(Costs at 20,000-unit volume = 100)

	Annual Output of Combines				
	500				
	Single-Purpose	Multi-Purpose	5,000	10,000	20,000
Labour	37.1	36.8	35.5	33.9	32.2
Overheads	96.8	85.8	79.0	70.6	67.8
Total costs	133.9	122.6	114.5	104.5	100.0

Source: Commission estimates.

It is in assembly operations that batching tends to be most evident. Even a plant of the size of the Massey-Ferguson plant at Brantford cycles the production of its combines between models, and produces specialty machines, such as rice combines, at intervals. Smaller companies produce fewer models. Versatile, for example, produces only one.

The ratio of labour to overhead costs at the 10,000-unit volume was calculated directly from the company costs supplied to the Commission. If labour is taken as 100 at the 20,000-unit level, it will be somewhat higher at the 10,000 level and higher still at the lower levels. Overhead costs were held constant between the 10,000 and 20,000 levels at 210 per cent. For the 5,000-unit level, they were increased to 223 per cent, and for the 500-unit single-purpose plant to 260 per cent. For the 500-unit multi-purpose plant, the intermediate level of 225 was taken.

Below a volume of 10,000 units, and certainly below 5,000, the use of an assembly line becomes more difficult or completely ineffective. The slow pace required to produce so few, or the batch system between unrelated products, produces inefficiencies by requiring each worker to undertake many more operations.

Total Costs – Tables 7.13 and 7.14 record total costs of combine manufacturing at different volumes for the different operations and the various cost factors. It is apparent that

the stamping operation is most subject to economies of scale, and that machining is least affected by volume changes. This would apply only to the volume ranges and types of machining under consideration. As would be expected, overhead costs are more subject to change than other cost factors, with costs of materials changing least.

TABLE 7.13–INDEX OF ESTIMATED COSTS OF COMBINE MANUFACTURING OPERATIONS

	Annual Output of Combines				
	500				
	Single-Purpose	Multi-Purpose	5,000	10,000	20,000
a) With each operation compared to 20,000-unit volume costs = 100					
Machining	110.3	107.7	106.6	103.7	100.0
Stamping	182.2	155.8	141.6	123.3	100.0
Assembly	133.9	122.6	114.5	104.5	100.0
Finished parts	111.7	110.1	108.9	105.3	100.0
Total costs	128.4	120.2	115.4	108.0	100.0
b) With total costs at 20,000-unit volume = 100					
Machining	26.7	26.1	25.8	25.1	24.2
Stamping	33.3	28.5	25.9	22.5	18.3
Assembly	24.9	22.8	21.3	19.5	18.6
Finished parts	43.5	42.8	42.4	40.9	38.9
Total costs	128.4	120.2	115.4	108.0	100.0

Source: Commission estimates.

TABLE 7.14–INDEX OF ESTIMATED COSTS OF COMBINES BY COST FACTOR

	Annual Output of Combines				
	500				
	Single-Purpose	Multi-Purpose	5,000	10,000	20,000
a) With each factor compared to 20,000-unit volume costs = 100					
Materials					
Finished parts	111.7	110.1	108.9	105.3	100.0
Other materials	112.3	107.7	106.0	103.0	100.0
Total materials	111.9	109.3	108.1	104.6	100.0
Labour	126.8	116.4	108.7	104.7	100.0
Overheads	160.5	142.8	132.7	116.4	100.0
Total costs	128.4	120.2	115.4	108.0	100.0
b) With total costs at 20,000-unit volume = 100					
Materials					
Finished parts	43.5	42.8	42.4	41.0	38.9
Other materials	18.6	17.9	17.6	17.0	16.6
Total	62.1	60.7	60.0	58.0	55.5
Labour	19.3	17.7	16.6	15.9	15.2
Overheads	47.0	41.8	38.8	34.1	29.3
Total costs	128.4	120.2	115.4	108.0	100.0

Source: Commission estimates.

In reviewing the estimation of cost changes relating to combine production volumes, it should be emphasized that these are very broad estimates, and should not be related directly to estimated real costs of production in particular plants. The fact that all estimates are based on the constant mix between "made" and "bought" parts at the 10,000-unit level makes them unreal by ignoring the largest source of cost reduction found in the tractor cost study—the shift from "bought" to "made" parts as volume increased. There is no reason to assume that similar cost reductions would not be found in combine manufacturing if the shift in make-buy decisions between the different volumes were fully analyzed.

Chapter 8

MARKET SHARES AND CONCENTRATION RATIOS

The strength of competition in any market is partially determined by the number and size of the firms that are competing with one another and by the ease with which new firms can enter. A market in which a small number of firms have the lion's share of the business is likely to be less competitive than one where sales are distributed among a comparatively large number of firms. A lower level of competition will often be reflected in higher prices and profit levels. If a few firms dominate the market, they will all be aware that a price that is higher than vigorous competition would allow will be profitable to all concerned. However, well-established firms are likely to take a longer-range view in their pricing, and often they will not raise their prices to take advantage of temporary shortages. Moreover, in setting their prices they may pay considerable attention to the risk that a high profit level might attract new competitors into the industry. Thus the ease with which new firms can enter and gain a secure foothold in the industry will temper the pricing policies pursued by the dominant firms.

However, there is no simple relation between ease or difficulty of entry and the degree of concentration—that is, the extent to which the market is dominated by a small number of firms. Where entry is normally difficult, it may nevertheless take place if the entrenched companies pursue high-price policies, and thus the degree of concentration would be reduced. Yet if the larger firms have significant cost advantages over the smaller new entrants, prices and the profits of the larger firms may remain well above competitive levels. In contrast, if more moderate pricing policies are pursued by the larger firms, concentration may remain high, with the smaller new entrants not being encouraged.

Two instances of where high concentration ratios are accompanied by moderate prices may be cited. Britain has the lowest level of tractor prices in the world; yet the market is highly concentrated. Two firms, Ford and Massey-Ferguson, are reported to sell over 70 per cent of all the tractors sold in Britain. The situation for combines in West Germany is similar. Prices of combines there appear to be significantly lower than in most other countries. Yet Claas produces two-thirds of all the combines manufactured there and is believed to have a large share of the market.

A widely used measure of the extent to which any market is dominated by a few firms is the concentration ratio. The concentration ratio measures the percentage of the total sales made in a given market by, for example, the largest four, the largest eight, or the largest 20 firms in the industry. The particular number of firms used as a measure is to some degree arbitrary, except to the extent that some limits are set by the necessity to avoid disclosing confidential information. However, the largest four and largest eight firms have been widely used in other countries and, for the sake of comparability, will be used here as well. In addition, some attention will be given to the largest six firms and to the Big Three—the three firms that have had the largest share of total sales on the average over the past decade. Some comparisons will be made with the situations in the United States and a number of countries in Western Europe.

For Canada, the data used are sales of farm machinery as reported to the Dominion Bureau of Statistics. For the United States, sales data are not available and resort must be had to data on manufacturers' shipments. For Western Europe the data available are limited to tractors and are estimates of the total number sold by different companies.

Concentration Ratios in the Canadian Market

The extent to which the Canadian market is dominated by the major full-line companies has declined appreciably since the late twenties and early thirties. In that period it was estimated that the four largest firms had 76 per cent of the total market. By 1967 the share of the four largest firms had fallen to 51 per cent and even the eight largest firms had just 71 per cent of the market (see Table 8.1). On a regional basis, the share of the four largest firms in 1967 varied from a low of 44.1 per cent in Ontario to a high of 63.6 per cent in the Atlantic Provinces. For the eight largest firms the variation was from 64.1 per cent in Ontario to 84.3 per cent in Saskatchewan. Concentration ratios for both Ontario and Quebec are appreciably below the national average. This probably reflects the more varied nature of agricultural production in these provinces, which attracts to the market a number of short-line firms selling specialized equipment. The comparative closeness of these two provinces to the major centres of farm machinery production in the United States undoubtedly encourages the entry of short-line firms. In contrast, the higher concentration ratios for the Atlantic Provinces and British Columbia may reflect the location and small size of these two markets. Over the past decade, sales of farm machinery in the Atlantic Provinces have amounted to only 3.0 per cent of the national total and in British Columbia to only 2.4 per cent.

Table 8.1 also indicates that the four largest firms are not always the same in all parts of the country. If we use the term "Big Four" to designate the four firms that have the largest sales in all Canada, we find that in the Atlantic Provinces, Quebec, and British Columbia, their share of sales is appreciably below the share of the four largest firms in each of these markets.

TABLE 8.1– CONCENTRATION RATIOS FOR FARM MACHINERY SALES, CANADA AND PROVINCES, 1967, AND PERCENTAGE OF TOTAL SALES ACCOUNTED FOR BY PROVINCES, 1957-67

	Percentage of New Farm Machine Sales Accounted for by			
	Four Largest Firms[1]	Big Four[2]	Eight Largest Firms[1]	Total Sales 1957-67
				(Per cent)
Canada	51.3	51.3	70.8	100.0
Atlantic Provinces	63.6	59.0	79.4	3.0
Quebec	50.3	36.3	69.9	12.4
Ontario	44.1	43.7	64.1	22.6
Manitoba	52.0	52.0	74.1	11.7
Saskatchewan	57.6	57.6	84.3	26.1
Alberta	59.7	59.7	81.5	21.7
British Columbia	61.4	55.3	81.6	2.4

[1] The columns headed "Four Largest Firms" and "Eight Largest Firms" include the group of four or eight companies which had the highest total sales in the area in question, Canada as a whole and in each province or region.

[2] The term "Big Four" is used to designate the four firms with the largest sales in Canada as a whole.

Source: Company confidential returns to Dominion Bureau of Statistics, provided to the Commission with the companies' permission, and DBS, *Farm Implement and Equipment Sales*, Cat. No. 63-203, various years.

An analysis of the changes in the market position of different firms over the past decade indicates that the "Big Three" have lost ground appreciably, with almost all of the loss occurring since 1963 (see Table 8.2). The Big Three are the three firms that have for many years been the three leading sellers of farm machinery in Canada–John Deere, International Harvester, and Massey-Ferguson (listed here in alphabetical order). About half of this recent loss by the Big Three has been picked up by the five firms that rank immediately below them and the remainder by still smaller firms. However, it must be recognized that there was a considerable change in the firms involved over this period. In particular, three firms that were operating indepently at the beginning of this period in 1957–Cockshutt, Oliver, and Minneapolis-Moline–were taken over by the White Motor Company in 1961 and 1962 and thereafter are considered as a single firm for the analysis here. In addition, C.C.I.L. fits rather uneasily into any concentration-ratio analysis; it was selling Cockshutt tractors and combines along with its own tillage and seeding equipment in the earlier part of the period, but after Cockshutt was taken over it began to sell European tractors and combines.

Concentration by Region – The decline in the degree of market concentration has varied across the country. The largest decline in the share of the four largest firms

TABLE 8.2–PERCENTAGE OF ANNUAL SALES IN CANADA OF FARM MACHINERY, INCLUDING REPAIR PARTS, ACCOUNTED FOR BY THE BIG THREE, AND BY THE SIX AND EIGHT LARGEST FIRMS, 1957-67

	Big Three	Six Largest Firms	Eight Largest Firms
1957	50	68	73
1958	50	69	74
1959	51	70	75
1960	50	70	74
1961	48	67	72
1962	50	69	74
1963	50	70	75
1964	49	69	75
1965	47	68	74
1966	44	65	71
1967	42	64	71

Note: The column headed "Big Three" includes Deere, International Harvester and Massey-Ferguson for all years. The columns headed "Six Largest Firms" and "Eight Largest Firms" include the group of six or eight companies which had the highest total sales in Canada each year; membership in the six and eight may therefore vary from year to year.

Source: Company confidential returns to Dominion Bureau of Statistics, provided to the Commission with the companies' permission, and DBS, *Farm Implement and Equipment Sales*, Cat. No. 63-203, various years.

occurred in British Columbia and Saskatchewan; the smallest, in Ontario and Quebec. The picture that emerges is one where the nine largest firms have retained about the same over-all share of the market, about 75 per cent, but where the market is somewhat more equally distributed among the different firms. In a rough way, we can say that the share of the four largest firms has fallen from an average of about 15 per cent per firm to around 13 per cent per firm and the share of the second four has risen from an average of 3.5 per cent to 5 per cent per firm. Further, it is clear that no single firm dominates the market to nearly the extent that International Harvester did in the late twenties, when it had about one-third of the total market. Moreover, this decline in the share of the four largest firms occurred despite White Motor's takeover of Cockshutt, Oliver, and Minneapolis-Moline. Taken by itself, this merger would have increased the share of the market taken by the four largest firms. But this was offset by the strong growth in sales enjoyed by a number of newer companies–in particular, Versatile, New Holland, C.C.I.L., and David Brown. The successful emergence of a number of new firms during the past decade provides considerable evidence that new entry is still possible in this industry. The market share of these four firms grew from 4 per cent in 1957 to 11.1 per cent of the Canadian market in 1967.

Concentration by Product – The degree to which sales are concentrated in the hands of the four largest and the eight largest firms also varies not only among different parts of Canada but also among different product lines. The concentration in a number of product lines is significantly higher than it is for farm machinery sales as a whole. Thus, as the data in Table 8.3 show, the concentration ratio is highest for combines and tractors, although the ratio for haying machinery is also comparatively high. The four largest firms have 68.6, 66.9, and 68.6 per cent, respectively, of the total Canadian sales of these products (see Table 8.3). For the eight largest firms the corresponding ratios are 93.4, 93.1, and 83.6 per cent. These three product groups accounted for about 65 per cent of the total market over the past decade. The lowest level of concentration occurs for tillage, cultivating, and weeding equipment. In 1967 the four largest firms had 42.4 per cent of this market and the eight largest firms 61.2 per cent.

TABLE 8.3–CONCENTRATION RATIOS FOR FARM MACHINERY IN CANADA, BY PRODUCT GROUPS, 1967, AND PERCENTAGE OF TOTAL SALES ACCOUNTED FOR BY PRODUCT GROUPS, 1957-67

	Percentage of New Farm Machinery Sales Accounted for by		
	Four Largest Firms	Eight Largest Firms	Total Sales 1957-67
			(Per cent)
Tractors	66.9	93.1	35.8
Combines	68.6	93.4	16.3
Swathers and windrowers	60.3	88.5	3.6
Haying machinery	68.6	83.6	12.6
Plows	59.6	76.1	5.1
Tillage and cultivating machinery	42.4	61.2	5.9
Planting, seeding and fertilizing machinery	62.9	71.2	4.1
All other machinery			16.4

Note: The columns headed "Four Largest Firms" and "Eight Largest Firms" include the group of four or eight companies which had the highest total sales in Canada as a whole in each product group; membership in the four or eight may vary among product groups.

Source: Company confidential returns to Dominion Bureau of Statistics, provided to the Commission with the companies' permission, and DBS, *Farm Implement and Equipment Sales*, Cat. No. 63-203, various years.

There has also been a significant decline in the extent to which the Big Three dominate the market for different products. For a number of product groups, there was an appreciable decline in the market share of the eight largest firms as well,

TABLE 8.4–PERCENTAGE OF ANNUAL SALES OF SWATHERS AND WINDROWERS; HAYING MACHINERY; PLOWS; TILLING, CULTIVATING, AND WEEDING MACHINERY; AND PLANTING, SEEDING AND FERTILIZING MACHINERY; IN CANADA, BY BIG THREE, AND BY THE FOUR, SIX, AND EIGHT LARGEST FIRMS, 1957-67

	Big Three	Four Largest Firms	Six Largest Firms	Eight Largest Firms	Big Three	Four Largest Firms	Six Largest Firms	Eight Largest Firms
	A. Swathers and Windrowers				B. Haying Machinery			
1957	50	83	92	–	46	68	78	82
1958	54	77	90	95	53	67	79	83
1959	39	73	91	95	49	67	78	82
1960	35	76	94	96	49	68	80	83
1961	26	80	94	96	48	68	80	85
1962	34	78	90	92	51	71	82	86
1963	41	67	82	90	49	70	79	83
1964	36	63	82	90	47	71	80	85
1965	39	64	82	90	46	70	79	84
1966	35	61	78	88	45	70	78	83
1967	31	60	78	88	43	69	77	84
	C. Plows				D. Tilling, Cultivating, Weeding Machinery			
1957	58	67	77	83	56	66	72	76
1958	52	61	72	77	56	65	71	75
1959	52	61	71	76	54	62	70	74
1960	52	61	74	76	50	58	69	74
1961	50	59	71	74	42	51	63	70
1962	50	61	73	76	38	51	64	69
1963	50	61	76	79	38	47	61	65
1964	52	65	78	80	38	46	59	63
1965	52	66	77	80	35	45	57	63
1966	50	62	74	77	34	43	55	61
1967	46	60	72	76	32	42	55	61
	E. Planting, Seeding, Fertilizing Machinery							
1957	55	69	77	78				
1958	58	65	74	80				
1959	56	62	72	79				
1960	57	64	73	77				
1961	53	60	68	74				
1962	58	66	75	80				
1963	62	69	76	79				
1964	62	70	75	78				
1965	62	70	75	78				
1966	57	63	68	71				
1967	56	63	68	71				

Note: The column headed "Big Three" includes Deere, International Harvester and Massey-Ferguson for all years. The columns headed "Four Largest Firms", "Six Largest Firms", and "Eight Largest Firms", include the group of four, six, and eight companies which had the highest total sales of each product group in Canada as a whole in each year; membership in the group of four, six, and eight companies may therefore vary from year to year.

Source: Company confidential returns to Dominion Bureau of Statistics, provided to the Commission with the companies's permission, and DBS, *Farm Implement and Equipment Sales*, Cat. No. 63-203, various years.

indicating that the smaller firms below this level had increased their share of the market. Between 1957 and 1967 the share of the four largest firms in sales of tillage and cultivating equipment declined by 24 percentage points, and the share of the eight largest firms declined 15 percentage points. This means that firms ranking fifth to eighth in size increased their share of the market by 9 percentage points and still smaller firms by 15 percentage points. Another major decline in the share of the top four, 16 percentage points, occurred in combine sales. But here most of the decline was acquired by the four firms in the fifth to eighth category. Their share rose by 13 points from 11 per cent to 24 per cent. The four largest firms also lost ground in tractors, with a decline of 5 percentage points; in swathers, with a decline of 23 points; in plows, with a decline of 7 points; and in planting, seeding, and fertilizing equipment, with a decline of 6 points. Only for haying equipment did the share of the four largest firms increase, and then only by 1 per cent. For some products, such as tractors and swathers, much of this loss in the share of the four largest firms occurred during the last half of the decade, between 1962 and 1967. However, for other products it was spread over the entire decade (see Tables 8.4, 8.5 and 8.6). In a number of product lines the four leading firms in 1967 were not the same as the four leading firms in 1957.

TABLE 8.5–PERCENTAGE OF ANNUAL SALES OF COMBINES IN CANADA, BY BIG THREE, AND BY THE FOUR, SIX, AND EIGHT LARGEST FIRMS, 1957-67

	Big Three	Four Largest Firms	Six Largest Firms	Eight Largest Firms
1957	61	85	94	97
1958	64	83	96	98
1959	66	81	96	98
1960	64	84	95	97
1961	68	86	99[1]	99[1]
1962	65	79	96	98
1963	62	77	93	98
1964	62	75	91	96
1965	61	73	91	96
1966	56	69	86	94
1967	55	69	86	93

[1]Total figure published by Dominion Bureau of Statistics not complete because of disclosure rule. Percentages shown based on this incomplete total.

Note: The column headed "Big Three" includes Deere, International Harvester and Massey-Ferguson for all years. The columns headed "Four Largest Firms", "Six Largest Firms", and "Eight Largest Firms" include the group of four, six, and eight companies which had the highest total sales in combines in Canada as a whole in each year; membership in the group of four, six, and eight companies may therefore vary from year to year.

Source: Company confidential returns to Dominion Bureau of Statistics, provided to the Commission with the companies' permission, and DBS, *Farm Implement and Equipment Sales*, Cat. No. 63-203, various years.

TABLE 8.6–PERCENTAGE OF ANNUAL SALES OF WHEELED TRACTORS IN CANADA, BY BIG THREE, AND BY THE FOUR, SIX, AND EIGHT LARGEST FIRMS, 1957-67

	Big Three	Four Largest Firms	Six Largest Firms	Eight Largest Firms
1957	62	72	86	92
1958	60	70	85	93
1959	60	74	87	92
1960	57	69	85	91
1961	57	68	85	91
1962	60	72	88	94
1963	60	72	89	94
1964	59	72	89	95
1965	55	70	89	94
1966	54	69	89	94
1967	51	67	87	93

Note: The column headed "Big Three" includes Deere, International Harvester and Massey-Ferguson for all years. The columns headed "Four Largest Firms", "Six Largest Firms", and "Eight Largest Firms" include the group of four, six, and eight companies which had the highest total sales in tractors in Canada as a whole in each year; membership in the group of four, six, and eight companies may therefore vary from year to year.

Source: Company confidential returns to Dominion Bureau of Statistics, provided to the Commission with the companies' permission, and DBS, *Farm Implement and Equipment Sales*, Cat. No. 63-203, various years.

The changes, shown in some detail in Tables 8.4, 8.5, and 8.6 are summarized in the following tabulation:

Change in Market Shares (in Percentage Points)

	1957 to 1967		1962 to 1967	
	Four Largest Firms	Eight Largest Firms	Four Largest Firms	Eight Largest Firms
Tractors	−5.0	+1.0	− 5.0	−1.0
Combines	−16.0	− 4.0	−10.0	−5.0
Swathers and windrowers	−23.0	− 7.0[1]	−18.0	−4.0
Plows	−7.0	− 7.0	−1.0	0.0
Planting, seeding and fertilizing machinery	− 6.0	− 7.0	− 3.0	−9.0
Haying machinery	+1.0	+2.0	− 2.0	−2.0
Tillage and cultivating machinery	−24.0	−15.0	− 9.0	−8.0

The share of the tractor market held by the four largest firms in individual provinces is appreciably larger than their share in Canada as a whole. This reflects the fact that the four largest firms are not always the same from one province to

[1] Change from 1958 to 1967.

another. For Canada as a whole the four largest sellers of tractors account for 66.9 per cent of total dollar sales in 1967 (see Table 8.7). Data for individual provinces are available only on a unit basis, and they are therefore not, of course, fully comparable with data in terms of dollars, because of the differences in prices and the different sizes of tractors used in particular areas. However, for wheeled tractors, and in terms of number of units sold, the four largest firms accounted for 73.9 per cent of total sales in Manitoba, 77.2 per cent in Saskatchewan and 71.3 per cent in Alberta. These ratios are significantly above the national total. However, the comparable ratios for the eight largest firms differ from the national ratios by much smaller amounts. For self-propelled combines also, the market share by regions for the four largest and eight largest firms are fairly close to the national totals.

TABLE 8.7–CONCENTRATION RATIOS FOR TRACTORS AND COMBINES, CANADA AND FIVE PROVINCES, 1967

	Wheeled Tractors (Units Sold)		Self-Propelled Combines (Units Sold)	
	Four Largest Firms	Eight Largest Firms	Four Largest Firms	Eight Largest Firms
Canada[1]	66.9	93.1	68.6	93.4
Manitoba	73.9	94.9	70.2	97.2
Saskatchewan	77.2	98.3	68.2	96.8
Alberta	71.3	95.9	66.9	97.4
Ontario	68.2	95.2	72.1	98.0
Quebec	74.0	92.1	81.8	n.a

[1]Data for all Canada are in terms of the dollar value of all tractors and combines sold.

Note: The columns headed "Four Largest Firms" and "Eight Largest Firms" include the group of four and eight companies which had the highest total sales in each product group in 1967 in Canada as a whole and in each province; membership in the group of four and eight companies may therefore vary from year to year.

Source: Company confidential returns to Dominion Bureau of Statistics, provided to the Commission with the companies' permission, and DBS, *Farm Implement and Equipment Sales*, Cat. No. 63-203, various years.

It is also instructive to examine the changes that have occurred in the market shares of the four and eight largest firms for different size groups of tractors over the past decade. The 10-year period 1957 to 1967 witnessed the introduction and rapid adoption of very much larger tractors. The larger tractors were first introduced by a few firms and then in subsequent years adopted by an increasing number of firms, so it is not surprising to find that the market share of the four largest firms in the larger horsepower ranges of tractors was at first very large but subsequently declined appreciably. However, in 1967, the share of the four largest firms in the two largest tractor size groups–70 to 99 HP and 100 HP and over, 84.1 per cent

and 81.4 per cent, respectively—was still substantially higher than their share for all tractors. The share of the market held by the four largest firms is also comparatively higher for small tractors of 39 HP or less. It is lowest in the 40 to 59 HP size group. Detailed data for 1962 to 1967 are given in Table 8.8.

TABLE 8.8–CONCENTRATION RATIOS FOR WHEELED TRACTORS, BY SIZE CLASS, CANADA, 1962-67

	1962	1963	1964	1965	1966	1967
Under 40 HP						
Four largest firms	88.0	89.4	90.8	88.8	86.4	86.7
Eight largest firms	96.6	–	97.9	96.9	96.4	97.0
40 to 59 HP						
Four largest firms	65.0	67.5	61.1	57.5	60.4	58.6
Eight largest firms	93.9	96.7	92.0	91.0	89.9	84.5
60 to 69 HP						
Four largest firms	90.1	85.7	79.0	76.0	75.7	68.5
Eight largest firms	100.0	99.0	97.6	98.5	–	99.3
70 to 99 HP						
Four largest firms	88.0[1]	87.9[1]	97.3	94.2	80.3	84.4
Eight largest firms						
100 HP and over						
Four largest firms			97.3	94.8	85.7	81.7
Eight largest firms						

[1] Includes all tractors 70 HP and over.

Note: The lines showing "Four largest firms" and "Eight largest firms" include the group of four and eight companies which had the highest total sales in the horsepower groups indicated in Canada as a whole in each year; membership in the two groups may therefore vary from year to year.

Source: Company confidential returns to Dominion Bureau of Statistics, provided to the Commission with the companies' permission, and DBS, *Farm Implement and Equipment Sales*, Cat. No. 63-203, various years.

Canada and the United States

It would also be desirable to compare the concentration ratios in the Canadian farm machinery industry with those in the comparable industry in the United States. Unfortunately, no data for the United States are available that are precisely comparable to those for Canada. However, concentration ratios are available for manufacturing shipments of farm machinery in the United States. These will differ from domestic sales data because they include export shipments, estimated to have amounted to around 12 per cent of U.S. factory shipments in 1963, and they make no allowance for imports, which amounted to about 6 per cent of total U.S. factory shipments in 1963. Moreover, the shipments data include

parts as well as wholegoods. In the comparison which follows in Table 8.9 some allowance must be made for these differences.

TABLE 8.9–CONCENTRATION RATIOS FOR FARM MACHINERY AND EQUIPMENT, CANADA AND THE UNITED STATES COMPARED, SELECTED YEARS

		Value of Sales (Canada) or Factory Shipments (United States) Accounted for by			
		Canada		United States	
		Four Largest Firms	Eight Largest Firms	Four Largest Firms	Eight Largest Firms
		(Per cent)			
Total farm machinery	1967	51	71	–	–
	1963	58	75	42	55
	1958	58	74	44	58
Wheeled tractors	1967	67	93	–	–
	1963	72	94	72	95
	1958	70	93	72	96
Planting, seeding and fertilizing machinery	1967	63	71	–	–
	1963	69	79	48	61
	1958	65	80	63	76
	1954	–	–	52	66
Plows, listers, harrows, etc.	1967	–	–	–	–
	1963	–	–	50	64
	1958	–	–	54	65
Harvesting machinery	1967	61	92	–	–
	1963	72	97	69	80
	1958	83	97	70	81
	1954	–	–	66	82
Haying machinery	1967	69	84	–	–
	1963	70	83	74	86
	1958	67	83	72	84
	1954	–	–	73	87
Tillage, cultivating and weeding machinery	1967	42	61	–	–
	1963	47	65	–	–
	1958	65	75	–	–

Note: For Canada, the columns headed "Four Largest Firms" and "Eight Largest Firms" include the group of four and eight companies which had the highest total sales of the product group in Canada as a whole in each year. For the United States these columns include the group of four and eight companies which had the highest total value of production of the product group in the United States as a whole in each year; membership in the four and eight may therefore vary from year to year and among product groups.

Source: Company confidential returns to Dominion Bureau of Statistics, provided to the Commission with the companies' permission, and DBS, *Farm Implement and Equipment Sales*, Cat. No. 63-203, various years.
U.S. Department of Commerce, Bureau of the Census, *Concentration Ratios in Manufacturing Industry*, 1963, Part I, Table 4, p. 210.

Inclusion of imports would probably make U.S. concentration ratios at the sales level somewhat lower than they are at the manufacturing level. The difference would be greatest for harvesting equipment, due to extensive U.S. imports of combines from Canada. The effects of the failure to exclude exports are more difficult to assess. If exports were the same proportion of shipments for firms at all size levels, concentration ratios would not be affected by whether exports were included or not. However, no data are available to indicate how the ratio of exports to total shipments varies with size of firm.

Within these limitations, a comparison of concentration ratios for the farm machinery industry is given in Table 8.9. These data show that the sale of farm machinery is more highly concentrated in Canada than it is in the United States. In 1963 the four largest firms accounted for 58 per cent of total sales of farm machinery in Canada. This compares with 42 per cent for the share of the four largest firms in total factory shipments of farm machinery in the United States. The comparable figures for the eight largest firms are 75 per cent for Canada and 55 per cent for the United States. Since 1963 there has been an appreciable decline in the share of the four and eight largest firms in Canada. The Commission has not determined whether a similar decline has occurred in the United States.

To some degree a lower concentration ratio can be expected for a country with a larger and much more varied agricultural industry. One or more of the four and eight major firms frequently may not produce many specialized types of equipment. And in the United States, because of the great variety of soils, crops and climatic conditions, these specialized products are more numerous. Support for this thesis is provided by the fact that in the case of the industry's major product, tractors, the concentration ratios in the two countries are very similar. In 1963 the ratios were identical at the four-firm level, the four largest firms accounting for 72 per cent in each case, and were very close at the eight-firm level, 95 per cent for the United States and 94 per cent for Canada. For haying machinery, concentration ratios for Canada were slightly lower, 70 per cent compared with 74 per cent in the United States at the four-firm level, and 83 versus 86 per cent at the eight-firm level. In contrast, although the classifications are not fully comparable, concentration ratios at the four- and eight-firm level for Canada were appreciably higher than those in the United States for planting, seeding, and fertilizing equipment, and for harvesting equipment. However, as was pointed out above, the inclusion of imports would significantly reduce the U.S. ratio for harvesting equipment. Massey-Ferguson and White Motor both import from Canada all the combines they sell in the United States, and Ford now imports and sells the Claas combine. In addition, the International Harvester plant at Hamilton produces an extensive line of planting and seeding equipment for the entire North American market.

Concentration in Western Europe

Estimates of the concentration in the sale of farm tractors are available for 1964 for Britain, France, West Germany, Italy, and Sweden.[1] The British market is highly concentrated. The three largest firms sold 80 per cent of all the tractors in Britain in 1964, with Ford and Massey-Ferguson together accounting for 72 per cent of the total. However, for these two firms, sales in Britain are a comparatively small part of their manufacturing output in that country. Most of the tractors they produce in England are exported.

In Italy, too, sales are highly concentrated, with Fiat, a local producer, accounting for nearly half of the total. Massey-Ferguson comes second with an estimated 12.3 per cent of the total market. However, the rest of the market is shared by a large number of different firms.

The Swedish market for tractors as well is highly concentrated. Again, a local firm, Volvo, is the leading seller with an estimated 40 per cent of the market. Massey-Ferguson is second with some 29 per cent of the market. Massey-Ferguson tractors in Sweden are sold through a distributor, rather than directly through the company's own wholesale distribution network as in most other countries.

The French market was less concentrated than that of the above three countries. The three largest sellers in France were Massey-Ferguson, Renault, and International Harvester. Together they accounted for 53 per cent of sales in 1964. The major domestic producer, Renault, like Volvo and Fiat, an automobile manufacturer as well, came second with about 19 per cent of the French market. The remaining sales were distributed among a comparatively large number of companies—a dozen or more.

Sales in West Germany, too, were much less concentrated, with the three largest sellers accounting for only 44 per cent of the total. Two of the three leading sellers were domestic firms, with Deutz (Klöckner-Humboldt-Deutz), a large manufacturer of diesel engines, accounting for 21 per cent of total sales, and Fendt 11 per cent. As in France, the rest of the market is divided among a comparatively large number of firms (see Table 8.10).

Some approximate estimates are also available of the share of each of the major firms in the North American market for farm machinery (see Table 8.11). These data indicate that Deere and International Harvester dominate the market, accounting for more than two-fifths of total sales. They are followed by Massey-Ferguson, Allis-Chalmers, White Motor, and Case. The total sales in North America of these latter four firms, taken as a group, are only about equal to those of Deere.

---

[1] Donaldson, Lufkin & Jenrette, Inc., *The European Agricultural Equipment Industry and Competitive Positions of North American Producers* (New York: April 1966), Table VII, p. 10.

TABLE 8.10–PERCENTAGE OF TRACTORS SOLD IN VARIOUS WESTERN EUROPEAN COUNTRIES, ACCOUNTED FOR BY LARGEST COMPANIES, AND TOTAL NUMBER OF TRACTORS SOLD IN EACH COUNTRY, 1964

A. Britain			B. France		
Tractors sold	31,000		Tractors sold	82,000	
Massey-Ferguson	38.2%		Massey-Ferguson	21.3%	
Ford	33.3		Renault	18.9	
International Harvester	8.0		International Harvester	12.8	
Three largest firms		79.5	Three largest firms		53.0
British Leyland[1]	8.0[2]		Someca-Fiat	11.1	
David Brown	4.0[2]		Ford	10.1	
Others	8.5[2]	20.5	Deutz	6.4	
		100.0	Deere-Lanz	2.6	
			David Brown	2.3	
			Fendt	.7	
			Hanomag	.7	
			Güldner	.7	
			Eicher	.2	
			Others	12.2	47.0
					100.0

C. West Germany			D. Italy		
Tractors sold	81,000		Tractors sold	42,000	
Deutz	20.8%		Fiat	49.3%	
International Harvester	12.2		Massey-Ferguson	12.3	
Fendt	11.1		Same	11.7	
Three largest firms		44.1	Three largest firms		73.3
Massey-Ferguson	7.9		Ford	5.5	
Eicher	7.0		Lamborghini	4.3	
Deere-Lanz	6.8		Deutz	1.9	
Hanomag	6.7		Renault	1.5	
Güldner	5.9		International Harvester	1.1	
Ford	4.3		British Leyland[1]	.9	
Renault	3.5		David Brown	.6	
David Brown	.6		Fendt	.5	
Someca-Fiat	.3		Others	10.4	26.7
Others	12.9	53.9			100.0
		100.0			

E. Sweden		
Tractors sold	13,000	
Volvo	39.9%	
Massey-Ferguson	28.7	
Ford	9.5	
Three largest firms		78.1
British Leyland[1]	6.1	
David Brown	5.2	
International Harvester	4.6	
Others	6.0	21.9
		100.0

[1] Shown in source as "Nuffield".

[2] Interpolated from original estimates of 7-10 per cent, 3-6 per cent, and 5-7 per cent respectively for British Leyland Motor Corporation, David Brown, and Others in source.

Source: Donaldson, Lufkin & Jenrette, Inc., *The European Agricultural Equipment Industry and Competitive Positions of North American Producers* (New York: April 1966), Table VII, p. 10.

TABLE 8.11–SHARE OF NORTH AMERICAN FARM MACHINERY MARKET, LEADING FIRMS, 1967

	Estimated Total North American Sales of Farm Machinery[1]	Percentage of Total
	(Thousands of U.S. dollars)	
Deere	780,000	23.5
International Harvester	591,000	17.8
Massey-Ferguson	301,000	9.1
Allis-Chalmers	203,000	6.1
White Motor	189,000	5.7
J. I. Case	180,000	5.4
Others	1,074,318	32.4
Total	3,318,318	100.0

[1]The company sales figures and the figure for total North American sales are at Net Selling Prices to the dealer, i.e. 73 per cent of Company Suggested Retail Prices.

Source: D. Schwartzman, *Oligopoly in the Farm Machinery Industry*, Royal Commission on Farm Machinery, Study No. 12 (Ottawa: Information Canada, 1970), Table E. 2.

Chapter 9

COMPETITIVE BEHAVIOUR

Farm machinery firms compete on price and in various non-price ways. Non-price competition may include an emphasis on product quality, development of new products, the way dealerships are established, the quality of service provided through the dealer organization, advertising, and the provision of various ancillary services such as credit. This chapter will first examine price competition in the industry and then consider some forms of non-price competition. Other forms of non-price competition will be considered in more detail in later chapters.

A number of different companies described, either in their briefs or in the Commission hearings, the way in which they set prices on various products. Since sales are highly seasonal, prices are usually reviewed annually and any changes are announced during the off-season. Prices are established after careful comparison with the competitive machines of other companies. As described by one company, this comparison covers quality, performance, customer acceptance, special features offered, horsepower and travel speed for self-propelled machines, output for implements, grain losses for combines, complexity of repairs and maintenance, expected machine life, convenience to the operator, and any other characteristic that can be quantified to some degree. Each of these features is given a value relative to the company's own machine, and the sum of these plus and minus values are then compared with the difference in price. An underlying consideration is the need to cover production and development costs and earn a return on invested capital. Where a company has developed a distinctively new machine that has a potential for reducing farm production costs, one factor in setting prices will be the saving the machine provides in comparison with its less-up-to-date competitors.

A Model of Competitive Behaviour

In an industry such as farm machinery, where the three largest firms share 40 to 50 per cent of the market for most products, there is some reason to believe that the dominant firms will be reluctant to compete actively

on price. Smaller firms are likely to place more stress on price competition. Consider the price and cost situation facing firms in this industry. On the average, costs that vary directly with output–such as labour, materials, and supplies –account for about 45 per cent of the companies' dealer selling price. The remaining 55 per cent goes to cover various fixed or overhead costs–such as salaries, depreciation, and development costs–and to provide a profit. Given this cost picture, if the company is to gain from a 10 per cent price cut on one of its products, it must obtain a sales increase of more than 22 per cent.[1]

This relationship is illustrated in Figure 9.1 which shows a break-even analysis for a firm whose total revenue just covers total costs, including profits, at an output of 100 units. A 10 per cent price reduction would cause the total revenue line to shift down by 10 per cent. It would now intersect the total cost line at an output of 122. Thus an increase in sales (in quantity terms) in excess of 22 per cent would be required in order to make the price reduction profitable. As is evident from the diagram, this analysis assumes constant marginal and average costs.

With a 22 per cent sales increase, profits would be unchanged. For the industry's products as a whole, some studies indicate that the elasticity of demand is about 1.0–that is, a 10 per cent price cut will yield about a 10 per cent increase in sales. Thus if the price-cutting firm is to obtain a sales increase of more than 22 per cent, it will have to take sales away from other firms. If the firm is large, a price cut may well cause its competitors to cut their prices as well. And if all firms cut prices by 10 per cent, they will end up with substantially lower profits, assuming this leads to only a 10 per cent increase in over-all purchases by farmers. Indeed, in terms of the industry's average ratio of profit to sales, about 8 per cent on a before-tax basis, a 10 per cent price cut would reduce industry profits by about two-thirds.

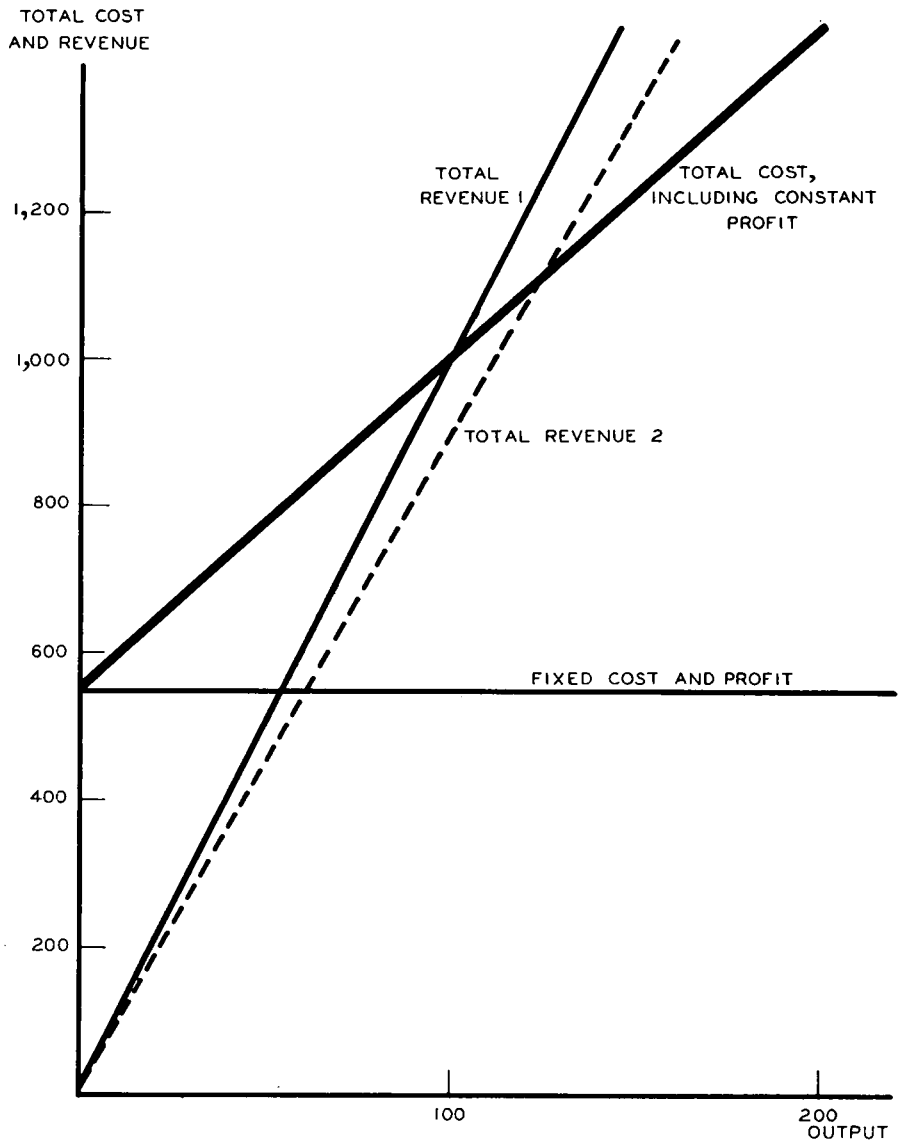
Some quantitative dimension is given to this picture by the following data, which show the effects on the sales and profits of the rest of the industry that would be caused by a 10 per cent price cut by a dominant firm–assuming that the price cut produced the required 22 per cent increase in the firm's sales, and that demand for the industry's product has an elasticity of 1.0.

In interpreting these data it may be noted that for most product lines, each of the three dominant firms in the industry has from 10 to 20 per cent of the total market. For four product lines, the market share of one of these firms exceeds 20 per cent. In another four the share falls below 10 per cent. This pattern would be more dispersed if individual models and sizes of products were considered.

---

[1] For a more detailed discussion of this point, see D. Schwartzman, *Oligopoly in the Farm Machinery Industry*, Royal Commission on Farm Machinery, Study No. 12 (Ottawa: Information Canada, 1970), Ch. 6, Table 6.1.

FIGURE 9.1 - EFFECTS OF PRICE CUT AND VOLUME ON PROFITS: BREAK-EVEN ANALYSIS



Market Share of Dominant Firm	Effects of a 10 Per Cent Price Cut by Dominant Firm, Producing a 22 Per Cent Sales Increase, on the Sales and Profits of Other Firms	
	Sales	Profits Before Tax
Per cent	Per cent	Per cent
33	−6.0	−41
25	−4.0	−27
20	−3.0	−21
15	−2.1	−10
10	−1.3	− 9
5	− .6	− 4

The data above show that if a firm with 20 per cent of the market for a given type of machine were to cut its price 10 per cent and gain a 22 per cent increase in sales, it would cause the sales of all other firms to fall an average of 3.0 per cent and their profits to fall 21 per cent. If the price-cutting firm's share were only 10 per cent, other firms would suffer a 1.3 per cent fall in sales and a 9 per cent decline in profits. These data suggest that the larger firms will be hesitant to cut prices because they can expect other firms to follow suit, and all firms would end up with lower profits. On the other hand, a small firm–say, one with 5 per cent of the market or less–may at times cut its price to increase its market share in the expectation that the effects of its price cut on other firms' sales and profits will be too small to cause them to retaliate. Since the comparative merits of the products of different firms is a matter of judgement, there will, of course, be considerable uncertainty as to the effects of any price cut. Given the model changes that take place periodically, there will always be some uncertainty as to the degree to which any price change is a readjustment in that firm's price relative to the prices of other firms, or the degree to which it is an adjustment to reflect changes in the quality and competitive merits of the product. The farm machinery firms reported to the Commission that they did not like their price to differ from those of their competitors by more than 5 per cent "either way". One firm suggested that a more realistic target was 2.5 per cent either way.

If small-scale firms secure a foothold in the industry, and if their costs are comparable to or lower than those of larger firms, they will be likely to use price cuts to expand their market share. In contrast, the larger firms are likely to prefer non-price forms of competition such as product improvement and the creation of a strong dealer organization. If the small firms continue to expand, and non-price competition by the larger firms proves ineffective in preventing this, the larger firms may retaliate by cutting prices. However, as was shown in Chapter 7 on economies of scale, for a number of products such as tractors and combines, there are significant cost economies obtainable through larger-scale production. Since the small firms cannot match the costs of the larger firms on these products, the

competition they can offer in this area is limited.[2] The larger firms may maintain prices that allow them to earn profits well above the competitive level without inviting the expansion of small firms or the entry of new firms. These prices will provide an umbrella under which the smaller firms can meet their higher costs. In these circumstances the industry will have prices and costs that are substantially higher than those that would prevail if all firms were operating at an optimum scale, yet the industry as a whole may not appear unduly profitable. The dominant firms may even prefer to keep prices at a level that attracts new firms and gradually reduces the dominant firms' share of the market, rather than a lower price level designed to keep new firms out of the industry. In effect, this means choosing high profits today—profits that are expected to decline gradually in the future—in preference to a lower, more stable profit level.

In applying this model of price behaviour to the farm machinery industry, it is necessary to recognize that there can be many variations in detail. Individual attitudes may be important. It has been reported that the late Harry Ferguson believed in pricing his tractors at a level that provided very little profit, relying on his sales of other complementary machinery to provide the bulk of his profit, even though many of his executives urged him to raise his tractor prices. In the 1920s, when Henry Ford first entered the tractor market, he expanded his market share rapidly through aggressive price competition, only to lose sales rapidly a few years later as a result of innovations introduced by International Harvester and other firms. Larger firms often favour competition through product innovation, partly because there are economies in research obtainable by larger firms, and partly because the effects of successful innovation can be less easily and quickly duplicated than a price cut.

Market Shares

The three major firms in the farm machinery industry in Canada are Massey-Ferguson, John Deere, and International Harvester. Although the relative position of these three firms has changed over the years, their over-all dominant position has been maintained for a long time. However, over the past decade their combined share of the Canadian market has fallen in every major product line with one exception—planting, seeding, and fertilizing equipment. Between 1957 and 1967 their share of the tractor market fell from 62.0 per cent to 50.6 per cent, their share of the combine market from 61.2 to 55.1 per cent, their share of swather sales from 50.1 to 30.7 per cent, of haying equipment from 46.5 to 43.4 per cent, of plows from 58.2 to 45.8 per cent, and of tilling, cultivating, and weeding equipment from 55.9 to 32.4 per cent (Table 9.1). What has accounted for this significant decline in the market share of the Big Three? Has it been a policy of

[2] Occasionally small firms may be able to take advantage of unusually low labour costs and offer effective competition to the larger firms in spite of their comparatively small volume. Versatile's entry into the production of tractors and combines is an example of this. See N. B. MacDonald, *Locational Advantages in the Farm Machinery Industry,* Royal Commission on Farm Machinery, Study No. 6 (Ottawa: Queen's Printer, 1970), Ch. 5.

pricing at too high a level, thus permitting new firms to enter the industry? Has it been a failure to improve their product line with sufficient speed? Or has some other factor been responsible for their declining share? Consider each of the major product lines in turn.

TABLE 9.1 – SHARE OF CANADIAN FARM MACHINERY SALES ACCOUNTED FOR BY THE BIG THREE, BY PRODUCT LINES, 1957-67

(Percentage of total sales in Canada)

	Tractors	Combines	Swathers	Haying Machinery	Plows	Tilling, Cultivating, and Weeding Machinery	Planting and Seeding Machinery
1957	62.0	61.2	50.1	46.5	58.2	55.9	55.4
1959	59.7	65.5	39.1	49.2	51.9	53.6	55.7
1961	57.2	67.5	26.3	48.0	49.5	42.3	52.8
1963	60.1	62.1	41.0	48.9	49.7	38.2	61.8
1965	55.4	60.9	39.4	45.9	51.8	34.7	62.3
1966	53.7	56.1	35.1	45.0	49.9	34.1	56.8
1967	50.6	55.1	30.7	43.4	45.8	32.4	56.2

Source: Company confidential returns to Dominion Bureau of Statistics, provided to the Commission with the companies' permission, and DBS, *Farm Implement and Equipment Sales*, Cat. No. 63-203, various years.

Tractors – The decline in the Big Three's share of the tractor market reflects gains by a number of smaller companies. Significant gains were made over the period from 1957 to 1967 by Case, David Brown, British Leyland and Deutz (sold by C.C.I.L.), and more recently by Versatile. Further light is thrown on these changes by an examination of data on the Big Three's share for different size groups of tractors. As Table 9.2 shows, their share of the smallest size group, under 40 HP, increased significantly over the decade ending in 1967. Unfortunately for the firms concerned, however, tractors in this size group have been a rapidly declining segment of the total market, accounting for 77 per cent of total dollar sales in 1957 but only 15 per cent in 1967. In contrast, the Big Three's share of the 40 to 59 HP size group, a group which accounted for only 23 per cent of the tractor market in 1957, has fallen very sharply from 81 per cent in 1957 to 35.9 per cent in 1967. Further, in the rapidly growing market for larger tractors (tractors of 60 HP or over accounted for 64.7 per cent of the value of all tractors sold by 1967), the Big Three's share has amounted to only about 50 per cent in recent years. Thus, in considerable measure, the failure of the Big Three to retain the market share they held in 1957 is related to their relative success or lack of it in developing and marketing the larger horsepower tractors which came increasingly into demand as the decade progressed. Case's increased market share must have been due in substantial measure to the customer acceptance gained for their larger horsepower

TABLE 9.2 – MARKET SHARE OF THE BIG THREE, TRACTORS, BY SIZE GROUP, 1957-67
(Percentage of total sales in Canada)

	Under 40 HP	40-59 HP	60-69 HP	70-99 HP	100 HP and Over
1957	58.5	81.0[1]			
1959	60.0	68.7[1]			
1961	62.5	44.1	43.9	76.5[2]	
1963	74.3	45.2	50.1	65.1[2]	
1965	73.2	35.1	47.3	63.7	53.0
1966	70.4	34.4	51.8	52.3	56.5
1967	69.5	35.9	45.8	49.6	53.4

[1] 40 HP and over.
[2] 70 HP and over.

Source: Company confidential returns to Dominion Bureau of Statistics, provided to the Commission with the companies' permission, and DBS, *Farm Implement and Equipment Sales*, Cat. No. 63-203, various years.

models. Price data for the 1967 selling season suggest that although Case's larger tractors were priced competitively, the company was not using substantially lower prices to increase its market share. The increased market shares gained by David Brown and British Leyland undoubtedly reflect the use of price to gain a share of the market in the 40-59 HP class. In 1967 the tractors of these two companies were priced lowest on a per-horsepower basis of the 13 tractor models offered in the 45 to 60 HP group.[3]

Prices and costs of tractors were examined on a broad international basis in the Commission's *Special Report on Prices of Tractors and Combines in Canada and Other Countries*. The emphasis in that report was on the price differences that exist between different countries. It will be useful here to review briefly some of the evidence presented in that report for the light it throws on the question of competitive behaviour.

As the data in Table 9.3 show, the three largest firms in the Canadian market account for about 60 per cent of U.S. wheeled tractor production and together with Ford for 74 per cent. Deere and International Harvester each have North American output levels of around 60,000 units per year. Output by Ford and Massey-Ferguson in the United States is lower than this, just under 40,000 for each company, but the North American tractor operations of both companies are primarily assembly.[4] As will be described in more detail in Chapter 14, both Ford and Massey-Ferguson's world tractor operations are highly integrated, with major components such as engines and transmissions each produced primarily in one

[3] Royal Commission on Farm Machinery, *Special Report on Prices of Tractors and Combines in Canada and Other Countries* (Ottawa: Queen's Printer, December 1969), Ch. 5.

[4] In a statement commenting on the Commission's *Special Report on Prices*, Massey-Ferguson estimated the average North American output over the period 1966-69 for three of these firms as follows: Massey-Ferguson, 32,000; John Deere, 56,000; and International Harvester, 52,000. Total output of all firms in North America was about 230,000.

TABLE 9.3–WORLD PRODUCTION OF WHEELED TRACTORS, ACTUAL AND ESTIMATED, 1966
(Except U.S.S.R., China, and East European Countries)

(Thousands of units)

Figures in italics are estimates

Company Ranking According to Market Share	World	U.S.A.	Britain	Federal Republic of Germany	France	Italy	Belgium	Sweden	Spain	India	Austria	Australia	Japan	Brazil	Finland	Others
Massey-Ferguson	153.8	38.8	78.6		29.2	3.2								4.0		
Ford	118.4	38.6	57.1				22.7									
International Harvester	*108.0*	*62.0*	*21.0*	*15.0*	8.5							*1.5*				
Deere	*78.0*	*60.0*		*18.0*												
Fiat (Fiat + Someca)	*41.5*				6.5	*35.0*										
Renault/Porsche	*19.0*				19.0											
David Brown	*18.5*		*18.5*													
J.I. Case	*17.5*	*17.5*														
Deutz	*17.0*			*17.0*												
Allis-Chalmers	*15.5*	*15.5*														
Brit. Leyland (Nuffield)	*15.0*		*15.0*													
Volvo	14.7							14.7								
Oliver (Cockshutt)	15.0	15.0														
Minneapolis-Moline	*7.0*	*7.0*														
Valmet	*4.0*													*.9*	3.1	
Other (known companies)	9.4								6.0	3.4						
Other (not identified)	*157.2*	*15.6*	*20.2*	*51.0*	2.1	*10.8*			7.1	8.6	11.7	*9.3*	9.7	*1.1*		*10.0*
World Total	*809.5*	270.0	210.4	101.0	65.3	49.0	22.7	14.7	13.1	12.0	11.7	10.8	9.7	*6.0*	3.1	*10.0*

Source: Royal Commission on Farm Machinery, *Special Report on Prices of Tractors and Combines in Canada and Other Countries* (Ottawa: Queen's Printer, December 1969), Table 2.1.

location. On a world basis, in 1966 Massey-Ferguson produced 154,000 wheeled tractors and Ford 118,000. Aside from the above four, and with the exception of Fiat which had an output in Italy of 35,000 in 1966, all the remaining tractor producers in the non-Communist world had a production of 20,000 units or less in 1966.

Thus, on the basis of the economies of scale described in Chapter 7, the four major tractor producers must clearly have very significant cost advantages over their smaller competitors. Further, there is evidence that tractor manufacturing costs in Britain are significantly lower than they are in North America. Consider each of these points in turn.

The fact that North American firms such as Case, Allis-Chalmers, and White Motor are able to survive with annual tractor output levels in the range of 10,000 to 20,000 in the face of competition of larger firms with output levels of 50,000 or more is very strong evidence that the prevailing level of tractor prices provides the larger firms with a very substantial profit on assets employed in manufacturing. As was shown in Table 7.2, a tractor selling price that would earn a company a return of 11.8 per cent at an output level of 20,000 units would yield an estimated 32.7 per cent at 60,000 and 44.8 per cent at 90,000. That this higher profit is not evident from profit data published in the companies' annual reports is due to the wide range of products manufactured by these companies and the large marketing inventories they carry. The profits earned by the industry are analyzed in some detail in Chapter 12.

The profitability of tractor prices varies not only with the level of annual output but also with the size of tractor. In general the evidence shows that larger-sized tractors are priced at a higher level in relation to estimated cost than is true for the smaller tractors. This relation between prices and costs at different output levels and tractor sizes is summarized in Table 9.4 and Figure 9.2. As these data show, on the basis of tractor prices prevailing in Canada during the 1967 selling season, for the 40 HP tractor a North American manufacturer would incur a loss at annual output levels of 20,000 and 60,000 and would earn only a small return over manufacturing cost with an output of 90,000. In fact, most of the tractors sold in this size range in Canada are manufactured in Western Europe, where cost levels are lower. In contrast, the prices for the larger-horsepower tractors yield a very substantial gross margin over manufacturing cost even for a firm with an output level of 20,000 units. For example, on the 90 HP tractor the average net wholesale (dealer) price in 1967 would yield a gross margin of 32.6 per cent at an output level of 20,000, 40.6 per cent at 60,000, and 45.7 per cent at 90,000. This compares with an average gross margin for the industry on all products of about 20 per cent (see Table 12.6).

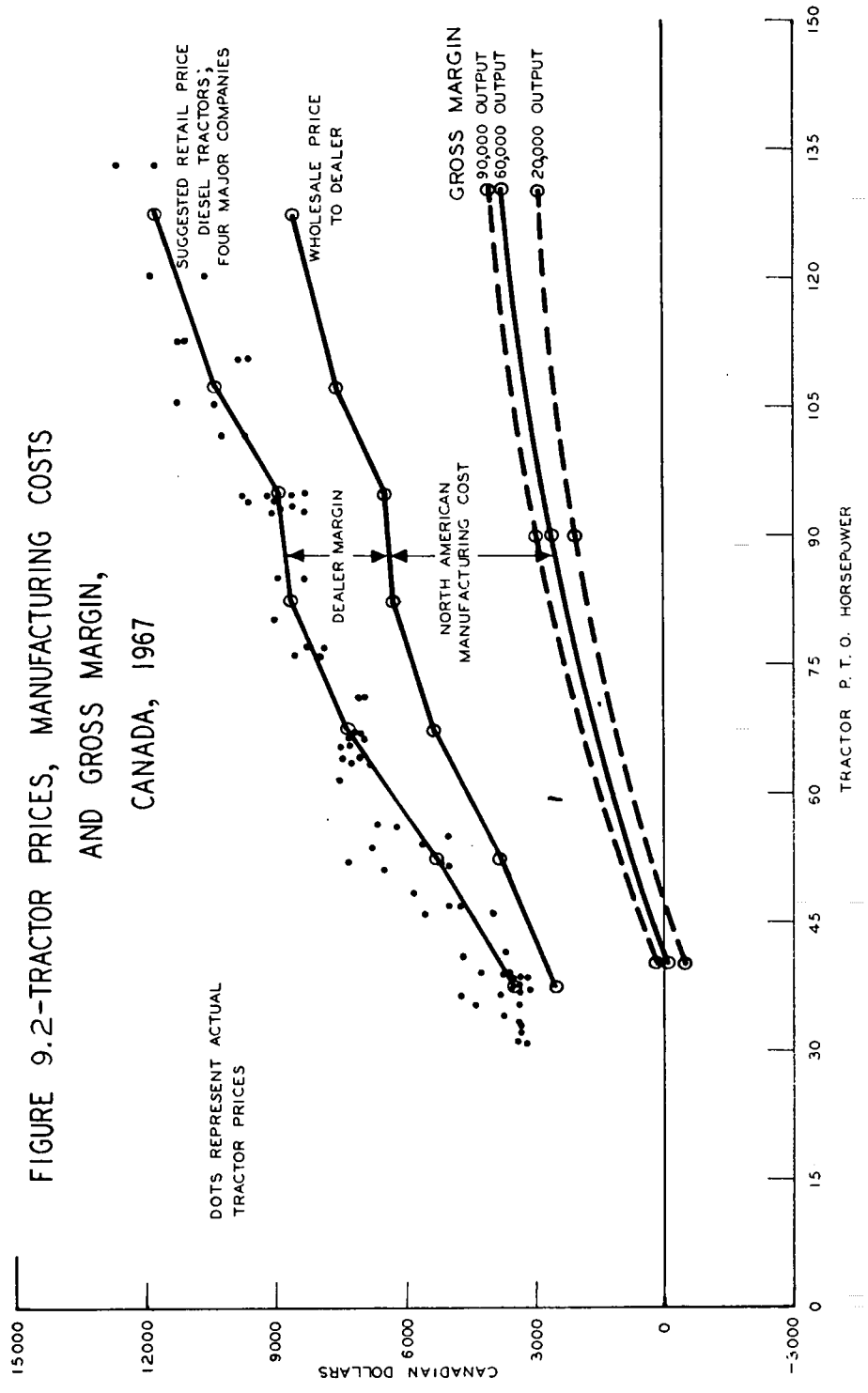


FIGURE 9.2-TRACTOR PRICES, MANUFACTURING COSTS AND GROSS MARGIN, CANADA, 1967
DOTS REPRESENT ACTUAL TRACTOR PRICES
SUGGESTED RETAIL PRICE DIESEL TRACTORS; FOUR MAJOR COMPANIES
WHOLESALE PRICE TO DEALER
DEALER MARGIN
NORTH AMERICAN MANUFACTURING COST
GROSS MARGIN
90,000 OUTPUT
60,000 OUTPUT
20,000 OUTPUT
CANADIAN DOLLARS
15000
12000
9000
6000
3000
0
-3000
0
15
30
45
60
75
90
105
120
135
150
TRACTOR P.T.O. HORSEPOWER

TABLE 9.4–GROSS MARGIN FOR DISTRIBUTION AND OTHER COSTS INCLUDING PROFIT, BY SIZE OF TRACTOR AND LEVEL OF ANNUAL OUTPUT, NORTH AMERICAN TRACTOR MANUFACTURING COSTS

(Canadian dollars)

	Size of Tractor		
	40 HP	90 HP	130 HP
Net wholesale price (NWP)	2,669	6,307	8,835
20,000 Annual Output			
Manufacturing cost	3,194	4,254	5,748
Gross margin[1]	-525	2,053	3,087
Gross margin as percentage of NWP	-19.7	32.6	34.9
60,000 Annual Output			
Manufacturing cost	2,812	3,746	5,061
Gross margin[1]	-143	2,561	3,774
Gross margin as percentage of NWP	-5.4	40.6	42.7
90,000 Annual Output			
Manufacturing cost	2,572	3,426	4,629
Gross margin[1]	97	2,881	4,206
Gross margin as percentage of NWP	3.6	45.7	47.6

[1] Gross margin equals price to dealer (Net Wholesale Price) less manufacturing cost.

Source: Royal Commission on Farm Machinery, *Special Report on Prices of Tractors and Combines in Canada and Other Countries* (Ottawa: Queen's Printer, December 1969), Table 6.4, p. 66.

By concentrating their output in the larger-size range, the smaller firms have been able to earn a good return on their manufacturing investment, even though their manufacturing costs per tractor (at 20,000 units per year) are some 13 to 14 per cent higher than they are for a firm with an output of 60,000 and some 24 per cent higher than they would be at a 90,000-unit level. These smaller firms have been able to survive in the tractor manufacturing field only because the larger firms, such as Deere and International Harvester, have chosen to price their larger tractors at a comparatively high level in relation to costs. These conclusions are based on estimated manufacturing costs in new plants incorporating the latest proven technology. Costs in existing plants may depart from this in varying degrees.

A comparison of North American and British tractor manufacturing costs suggests that British costs are currently about 25 per cent lower than those in North America. Estimated unit costs for three different output levels are presented in Table 9.5 and shown in chart form in Figure 9.3. Further, as was documented in detail in the Commission's *Special Report on Prices,* these lower costs are paralleled by lower tractor prices in the British market. However, these lower prices may still yield to the larger-volume producers in the British market, such as Ford and Massey-Ferguson, a return on capital in the range of 20 to 25 per cent, or even

higher on some models. This is well above the competitive level. Estimates of the profitability of tractor manufacturing in Britain for the 1967 and 1968 selling seasons are given in Table 9.6.

TABLE 9.5–COMPARISON OF NORTH AMERICAN AND EUROPEAN TRACTOR MANUFACTURING COSTS AT ANNUAL OUTPUT LEVELS OF 20,000, 60,000, AND 90,000 AS OF 1967

(Canadian dollars)

	Cost per Average Tractor		
	20,000	60,000	90,000
U.S. cost (1968)[1]	4,189	3,688	3,374
British cost (1967-68) post-devaluation	3,164	2,759	2,490
British cost as percentage of U.S. cost	75.5	74.8	73.8

[1] Costs are for average mix of tractor sizes and models incorporated in the study by N. B. MacDonald, W. F. Barnicke, F. W. Judge, and K. E. Hansen, *Farm Tractor Production Costs: A Study in Economies of Scale,* Royal Commission on Farm Machinery, Study No. 2 (Ottawa: Queen's Printer, 1969).

Source: Royal Commission on Farm Machinery, *Special Report on Prices of Tractors and Combines in Canada and Other Countries* (Ottawa: Queen's Printer, December 1969), Table 6.6, p. 69.

Thus far, the lower price and cost levels for tractors prevailing in Britain have not spread to North America, although the import of European tractors has caused some softening of tractor prices in the lower-horsepower ranges in Canada.[5] Indeed, as was described in the Commission's earlier report, the companies have taken strong measures to prevent or limit the importation of tractors into North America from the lower-priced British market. Tractor prices in North America appear to be set by Deere and International Harvester who occupy a dominant position in the U.S. market, and who supply tractors to the North American market mainly from their North American production facilities. As was explained above, current prices for tractors on all the larger-horsepower models provide the large-volume North American producers with an attractive return on their manufacturing investment. The return to firms like Ford and Massey-Ferguson, who manufacture many of the components for their North American tractors in their lower-cost British facilities at relatively large volumes, should be still larger. Thus far, Ford and Massey-Ferguson have not elected to take advantage of their low-cost European source to bring tractor prices down in North America. Ford is a long-line rather than full-line firm in the North American market, and may not consider itself to be in a strong enough position to use tractor prices as a basis for expanding its share of the market. Massey-Ferguson's share of the rich U.S. market for farm machinery has been well below its share in many other markets. It is currently engaged in a major effort to expand and strengthen its product line in that market, particularly in the Corn Belt. Thus this company, too, may not feel strong enough to use tractor prices as a basis for expanding its share of the U.S. market.

[5] For a discussion of the current 1970 price situation between Canada and Britain, see the note appended to this chapter.

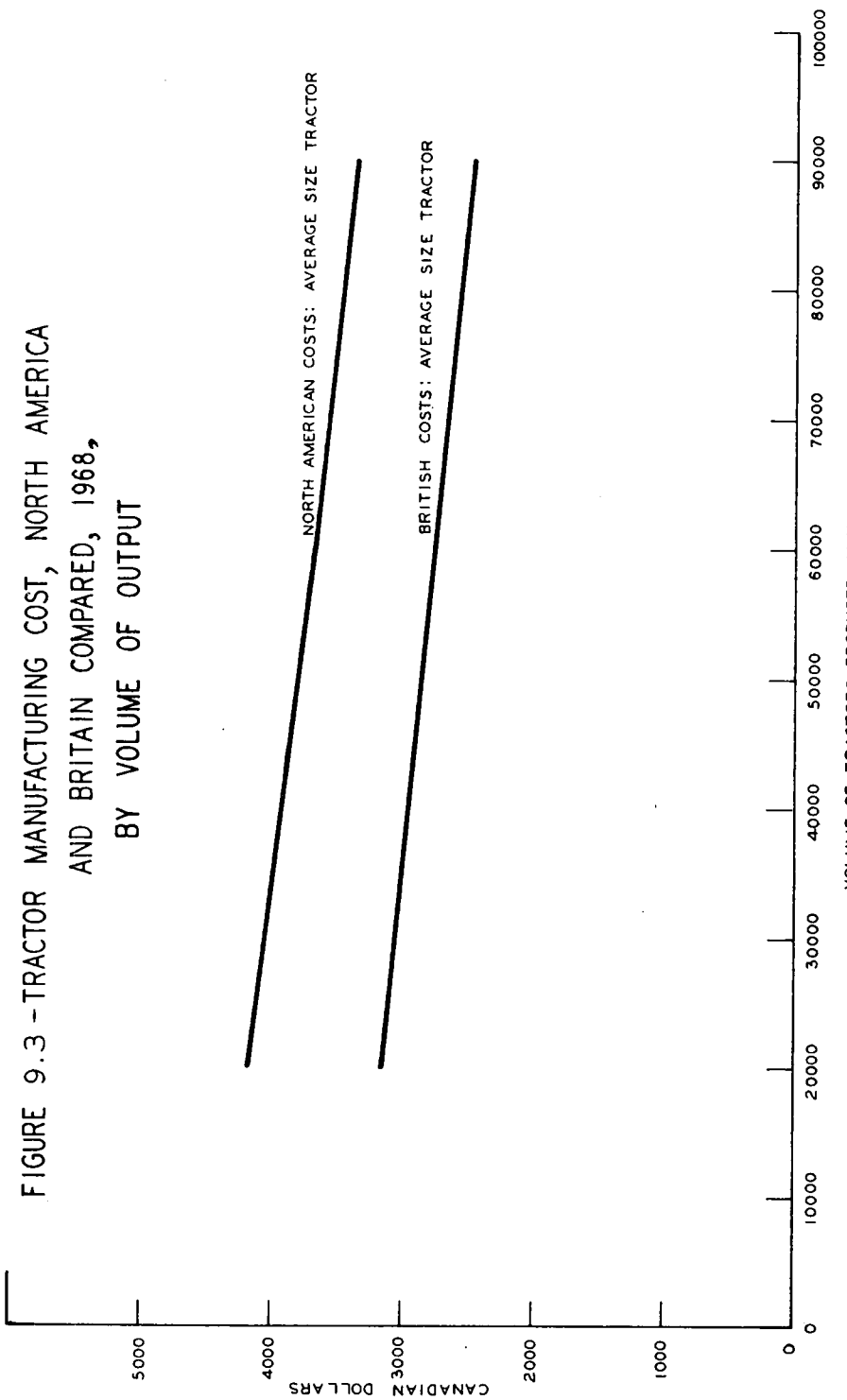


FIGURE 9.3 - TRACTOR MANUFACTURING COST, NORTH AMERICA AND BRITAIN COMPARED, 1968, BY VOLUME OF OUTPUT
NORTH AMERICAN COSTS: AVERAGE SIZE TRACTOR
BRITISH COSTS: AVERAGE SIZE TRACTOR
CANADIAN DOLLARS
5000
4000
3000
2000
1000
0
0
10000
20000
30000
40000
50000
60000
70000
80000
90000
100000
VOLUME OF TRACTORS PRODUCED ANNUALLY

TABLE 9.6–ESTIMATED PROFITABILITY OF TRACTOR MANUFACTURING IN BRITAIN, BASED ON BRITISH PRICES AND COSTS, 1967 AND 1968 SELLING SEASONS

	Index	1967	1968
Suggested retail price[1]	100	4,868	4,395
Less dealer discount[2]	18	876	791
Net price to dealer	82	3,992	3,604
Distribution margin[3]	21	1,023	923
Manufacturing price	61	2,969	2,681
Less R&D costs[4]	3	146	132
Net price to manufacturing division	58	2,823	2,549

	1967 Prices and Costs			1968 Prices and Costs		
Production Volume (Units)	20,000	60,000	90,000	20,000	60,000	90,000
Manufacturing selling price[5]	2,800	2,800	2,800	2,550	2,550	2,550
Manufacturing cost[6]	2,723	2,384	2,184	2,580	2,250	2,060
Manufacturing profit[7]	77	416	616	(30)	300	490
Total profits (millions)	1.5	25.0	55.4	(.6)	18.0	44.1
Assets employed (millions)	58.0	140.1	211.9	58.0	140.1	211.9
Profits as percentage of assets employed	2.7	17.8	26.9	(1.0)	12.9	20.8
Gross margin including 7.5%	10.2	25.3	34.4	6.5	20.4	28.3

Note: Method employed in arriving at above estimates:

[1] The suggested retail price was obtained by taking the average price per horsepower for tractors in the 35-45 HP group and multiplying this by the average size of tractor used in the study by N. B. MacDonald, W. F. Barnicke, F. W. Judge, and K. E. Hansen, *Farm Tractor Production Costs: A Study in Economies of Scale*, Study No. 2 (Ottawa: Queen's Printer, 1969).

[2] A dealer discount of 18 per cent was used as typical of the British market.

[3] A distribution margin of 21 per cent was allowed. This gives the same transfer price from manufacturing to distribution as prevails in North America. This may well understate profits to the manufacturing division because of the lower dealer margin in Britain, and the compact character of the British market which should make distribution costs lower.

[4] Research and development costs were taken at 3 per cent of suggested retail price.

[5] Prices estimated in line 7 ($2,823 and $2,549) were rounded off.

[6] Manufacturing costs for different output levels based on data given in Royal Commission on Farm Machinery, *Special Report on Prices of Tractors and Combines in Canada and Other Countries* (Ottawa: Queen's Printer, December 1969), Table D.13.

[7] Assets employed in the tractor factory were taken at the same level as estimated in the study cited above in Note 1, even though this probably overstates the value that an equivalent factory would have in Britain. In general, the estimates used are therefore likely to understate company profits.

There is also some reason to believe that the two dominant British manufacturers, Ford and Massey-Ferguson, may have been somewhat slow in moving into the larger-horsepower tractor market which has expanded so rapidly in North America during the past decade. Until recently, demand in the European and other markets has been mainly for smaller-horsepower models, and this may have led the companies whose production was mainly abroad to give less attention to the

larger tractors. The data in Table 9.7, which show the largest tractors offered for sale by each of eight major firms over the period 1949 to 1967, give some support to this view. Ford, for example, has been consistently behind the other firms in terms of the largest size of tractor offered for sale. Not until 1969 did they introduce a tractor with more than 67 HP. Massey-Ferguson has occasionally taken the lead, as it did in 1961 and 1962, but it has also often lagged significantly behind other major firms. For a period in the late fifties Oliver-Cockshutt offered the largest tractor. More recently, Deere has taken the lead.

The pattern of price competition in tractors is summarized in Table 9.8, comparing the average price per horsepower of the tractors offered for sale in 1967 by the Big Three and by other firms. Where more than one tractor appears in a given class the price is an average of the companies' different models. The table also shows for each class the three companies offering the lowest-priced tractor. The data support the view that some of the smaller firms have been using price competition to maintain or increase their market share. This is particularly true for Versatile whose large four-wheel-drive tractor is priced significantly below other tractors in this size group. It is true also of the two models sold by Minneapolis-Moline and the tractors sold by David Brown and British Leyland in the 45 to 60 HP group. There is evidence that White Motor, in particular, through its two subsidiaries, Cockshutt and Minneapolis-Moline, has placed considerable stress on price competition. In 1967, Cockshutt had the lowest-priced tractor in one group, the second lowest in two other groups, and the third lowest in still another group.

However, the pattern is not completely regular. The average price for the Big Three in the 30 to 45 HP group is lower than that of any of the other companies, suggesting that in this category the major firms place considerable stress on price competition. In addition, Deere has the lowest-priced tractor in the 90 to 100 HP category and the second lowest in the 115 and over category. Both Deere and Massey-Ferguson saw their share of the Canadian tractor market decline significantly between 1963 and 1967. International Harvester and White Motor more or less held their own, while Case and Versatile increased their market shares appreciably. Price competition undoubtedly played some part in these changes. But the timing and market acceptance of the new higher-horsepower models must also have been an important factor.

Combines – The share of the Big Three in the Canadian combine market declined from 61.2 per cent in 1957 and 67.5 per cent in 1961 to 55.1 per cent in 1967. Much of this decline has been due to the growth in sales of three companies – Versatile, New Holland, and C.C.I.L. Versatile entered the combine market for the first time in 1964, and New Holland in 1965. Versatile sells a combine of its own design. New Holland's combine is basically the Clayson combine produced in Belgium, a combine which had been sold on the Prairies in the early sixties by C.C.I.L. The latter company subsequently began to sell the Claas combine which is manufactured in West Germany. Ford has now taken over the distribution rights for this company throughout North America, and C.C.I.L. has begun to distribute

TABLE 9.7–LARGEST HORSEPOWER SIZE OFFERED FOR SALE, WHEELED TRACTORS, MAJOR MANUFACTURERS, 1949-69

	Allis-Chalmers	Case	Deere	Ford	International Harvester Company	Massey-Ferguson	Minneapolis-Moline	Oliver-Cockshutt
1949	27.6	22.3	51.0	26.4	22.2	**61.4**	48.8	45.0
1950	35.8	22.3	51.0	27.3	53.2	**61.4**	59.5	45.1
1951	35.8	22.3	51.0	27.3	53.2	**68.2**	59.5	45.1
1952	35.8	61.8	51.0	27.3	53.2	**68.2**	59.5	57.8
1953	45.4	64.8	51.0	40.6	53.2	**68.2**	59.5	57.8
1954	45.4	64.8	51.0	40.6	67.2	**68.2**	59.5	58.1
1955	45.4	64.8	67.6	46.9	67.2	68.2	68.5	**83.5**
1956	45.4	64.8	67.6	46.9	67.2	68.2	68.5	**83.5**
1957	45.4	64.8	75.6	46.9	67.2	68.2	68.5	**83.5**
1958	54.4	64.8	75.6	50.2	67.2	68.2	68.5	**83.5**
1959	54.4	71.0	75.6	50.2	81.4	63.3	78.5	**89.3**
1960	54.4	71.0	75.6	50.2	81.4	63.3	78.5	**89.3**
1961	54.4	80.6	84.0	50.2	81.4	**101.0**	78.5	89.3
1962	71.6	80.6	84.0	66.9	81.4	**101.0**	78.5	89.3
1963	71.6	80.6	**121.1**	66.9	81.4	101.0	101.0	89.3
1964	71.6	80.6	**121.1**	66.9	81.4	101.0	101.0	89.3
1965	103.1	80.6	**121.1**	66.9	94.9	101.0	101.0	105.8
1966	127.7	86.2	**133.2**	66.9	112.6	120.5	110.8	105.8
1967	127.7	101.8	**133.2**	66.9	112.6	120.5	110.8	105.8
1968	127.7	101.8	**133.2**	66.9	116.1	120.5	110.8	105.8
1969	127.7	101.8	**133.2**	105.7	116.1	120.5	111.0	132.8

Note: No four-wheel-drive or propane gas models were included. Data are maximum belt or power take-off (PTO) horsepower at rated engine r.p.m. Highest horsepower tractor offered in each year shown in bold face type.

Source: Based on tractors reported on in Nebraska Test Reports.

TABLE 9.8–DIESEL TRACTORS PRICE PER HORSEPOWER, BIG THREE AND OTHER FIRMS COMPARED AND COMPANIES WITH LOWEST PRICED MODELS, BY HORSEPOWER GROUPS, CANADA, 1967 SELLING SEASON

	Horsepower Groups						
	30-45	45-60	60-75	75-90	90-100	100-115	115-135
Companies[1]	$	$	$	$	$	$	$
Big Three	91.21	108.28	115.28	108.78[2]	96.28	98.87[2]	92.30[3]
Allis-Chalmers	130.73	127.27	–	104.72	93.36	–	92.21
British Leyland (Nuffield)	95.88	91.29	–	–	–	–	–
Case	111.10	117.64	112.77	101.03	–	97.74	–
Cockshutt	97.64	123.10	107.12	–	93.25	102.50	–
David Brown	103.36	96.66	–	–	–	–	–
Ford	99.67	106.69	106.08	–	–	–	–
Minneapolis-Moline	–	–	98.11	–	–	87.73	–
Versatile	–	–	–	–	–	–	84.71
Company with Lowest Priced Model							
Lowest	Cockshutt	British Leyland	Minneapolis-Moline	Case	Deere	Minneapolis-Moline	Versatile
Second lowest	Deere	David Brown	Cockshutt	Allis-Chalmers	Cockshutt	Case	Deere
Third lowest	International Harvester	Massey-Ferguson	Ford	International Harvester	Allis-Chalmers	Cockshutt	Massey-Ferguson

[1] In the cases where a company has more than one model in a horsepower group, the price shown is an average of the models.
[2] The Big Three is represented by International Harvester only in these two horsepower groups.
[3] Deere and Massey-Ferguson only.

Source: Royal Commission on Farm Machinery, *Special Report on Prices of Tractors and Combines in Canada and Other Countries* (Ottawa: Queen's Printer, 1969), Tables 5.2, 5.3, 5.4, 5.5, and 5.6.

its version of the Volvo combine. Claas now manufactures a combine to Ford's design for sale in North America. Thus the decline in the market share of the Big Three reflects competition from three combines that were not sold in Canada before the early (or mid-) sixties.

Some, but by no means all, of the changes that have occurred in market shares for combines during recent years reflect the influence of price competition. Versatile sells its combine at a price about 25 per cent below the average price of the Big Three. Cockshutt's price on its two larger models is about 15 per cent below the Big Three's, and Ford offers its larger Claas models at a price 8 to 10 per cent lower. In contrast, both Case and New Holland offer their combines at prices very close to those of the Big Three. Within this latter group, Deere prices its combines on the average about 4 to 5 per cent higher than International Harvester and some 7 to 8 per cent higher than Massey-Ferguson. Yet in recent years Deere's share of the combine market has increased, whereas the share of both Massey and International have declined. White Motor's market share for combines is significantly lower than the share of the predecessor companies it acquired–Oliver, Minneapolis-Moline, and Cockshutt. Some of this may have been due to the disappearance of the Oliver brand name. But the loss of Cockshutt sales through the C.C.I.L. distribution system and their replacement by first the Clayson combine and then Claas must also have had a significant influence. Because combines are such large and complex machines, these price comparisons can be approximate only. Table 9.9 summarizes prices of self-propelled combines for four major size groups in 1967. Prices are for combines with a comparable range of options and group models that are considered competitive by company sales aid literature. However, there is no precise measure of combine capacity available comparable to that provided by horsepower for tractors. Although it has lost some of its former market share, Massey-Ferguson is still the largest single seller, undoubtedly a reflection of the reputation it developed as the first firm to successfully pioneer the self-propelled combine.

Some data on production of combines in the non-Communist world is given in Table 9.10. Estimated total output in 1965 was 123,000, of which about 56 per cent was manufactured by the four largest firms–Claas, Massey-Ferguson, Deere, and International Harvester. An additional 24 per cent of the total is provided by the next four largest firms–Clayson (New Holland), Allis-Chalmers, Bolinder-Munktell (Volvo), and Case. Claas is the largest single manufacturer of combines, with 22,000 in 1965, and manufactures all of these in one plant. Massey-Ferguson's world output is almost as large as that of Claas, but Massey-Ferguson's output is divided among five different plants, with its Brantford plant accounting for about 45 per cent of this total.

Evidence as to economies of scale for combines is less solid than for tractors. However, Commission estimates indicate that production costs per unit decline about 13.5 per cent as output increases from 5,000 to 20,000. The fact that

TABLE 9.9–COMPARISON OF SELF-PROPELLED COMBINE PRICES, CANADA, 1968 SELLING SEASON

	GROUP 1			GROUP 2			GROUP 3			GROUP 4		
	Suggested Retail Price	Percentage of Group Average Price	Percentage of Average 'Big Three' Price	Suggested Retail Price	Percentage of Group Average Price	Percentage of Average 'Big Three' Price	Suggested Retail Price	Percentage of Group Average Price	Percentage of Average 'Big Three' Price	Suggested Retail Price	Percentage of Group Average Price	Percentage of Average 'Big Three' Price
	$			$			$			$		
Allis-Chalmers	9,315	110.7	115.4	–	–	–	11,448	102.6	97.1	13,555	99.1	95.7
J. I. Case	8,503	101.1	105.4	9,710	98.1	99.7	11,610	104.0	98.5	14,022	102.5	99.0
C.C.I.L. (Claas)	–	–	–	–	–	–	10,871	97.4	92.2	13,780	100.7	97.3
Cockshutt	8,446	100.4	104.6	9,982	100.9	102.5	9,953	89.2	84.4	12,034	88.0	85.0
John Deere	8,407	99.9	104.2	10,341[1]	104.5	106.2	12,357[1]	110.7	104.8	14,488	105.9	102.3
Ford Motor Company (Claas)	–	–	–	10,064	101.7	103.3	11,569	103.6	98.2	13,361	97.7	94.4
International Harvester	7,636	90.8	94.6	9,792	99.0	100.6	11,596	103.9	98.4	14,343	104.8	101.3
Massey-Ferguson	8,171	97.1	101.2	9,082	91.8	93.3	11,407	102.2	96.8	13,646	99.7	96.4
New Holland	–	–	–	10,289	104.0	105.7	11,920	106.8	101.1	13,899	101.6	98.2
Versatile	–	–	–	–	–	–	8,900	79.7	75.5	–	–	–
Average (unweighted) price for group	8,413	100.0		9,894	100.0		11,163	100.0		13,681	100.0	
Average (unweighted) price for Big Three (John Deere, International Harvester, Massey-Ferguson)	8,071	95.9	100.0	9,738	98.4	100.0	11,787	105.6	100.0	14,159	103.5	100.0

[1] Prices are for Deere models 55 (Group 2) and 95 (Group 3), made in U.S. plants. Prices for Deere German combines 430 (Group 2) $10,039 and 630 (Group 3) $12,209 are almost identical to the similarly equipped combines made in the United States. Chief specification difference is substitution of diesel engine in Europe for gasoline in North America (1969 prices).

Source: Royal Commission on Farm Machinery, *Special Report on Prices of Tractors and Combines in Canada and Other Countries* (Ottawa: Queen's Printer, December 1969), Table 5.7.

TABLE 9.10–WORLD PRODUCTION OF COMBINES IN 1965, ACTUAL AND ESTIMATED
(Except U.S.S.R., China, and East European Countries)

(Thousands of units)

Figures in italics are estimates

Company Ranking According to Market Share	World	U.S.A	Federal Republic of Germany	Canada	Belgium	Britain	Sweden	France	Denmark	Japan	Australia	Italy	Austria	Other
Claas	*22.0*		*22.0*											
Massey-Ferguson	21.4		5.4	9.6		3.7		1.1			1.6			
Deere	*15.0*	*13.5*	*1.5*											
International Harvester	*11.0*	*9.5*		*0.5*				*0.5*			*0.5*			
Clayson	*10.0*	*1.0*			*9.0*									
Allis-Chalmers	*9.0*	*8.5*				*0.5*								
Bolinder-Munktell	*4.9*						*4.9*							
Case	*4.8*	*4.8*												
Braud	*3.3*							*3.3*						
Cockshutt	4.0			4.0										
Versatile	*0.5*			*0.5*										
Other	*17.2*	*1.1*	*2.5*			*1.0*	*0.3*		*4.8*	*3.4*	*0.5*	1.6	*1.0*	*1.0*
World Total	*123.1*	38.4	*31.4*	14.6	*9.0*	5.2	5.2	4.9	4.8	*3.4*	*2.6*	1.6	*1.0*	*1.0*

Source: Royal Commission on Farm Machinery, *Special Report on Prices of Tractors and Combines in Canada and Other Countries* (Ottawa: Queen's Printer, December 1969), Table 2.7, p. 12.

combine prices in West Germany are significantly lower than in any other western country appears to confirm the view that economies of scale are substantial. The Commission's investigations showed that in 1966 dealer prices for identical combines were from 24 to 28 per cent lower in West Germany than in Canada, or in absolute terms were lower by from $1,800 to $1,950. It is probably not accidental that the lowest-priced market is also the country in which the plant with the largest volume is located. Although the evidence is less firm, it seems probable that–as is true for tractors–existing prices on combines in North America yield a substantial profit (return on manufacturing assets) to the largest-volume producers, and allow the smaller-volume, higher-cost producers to survive. If combine production in the non-Communist world were concentrated into five or six plants, or a somewhat larger number of plants with the different plants of each firm integrated so as to secure the maximum economy in the supply of basic components, combine costs and prices could be significantly reduced.

Other Farm Machines – For swathers, the decline in the Big Three's share from 50.1 to 30.7 per cent between 1957 and 1967 was largely due to the success of Versatile, which first entered the market in 1958 and by 1967 provided about one-half of all the swathers sold in Canada. Versatile's success was based on a swather that sold for 25 per cent or more below the prices of competing brands. Its swather was somewhat lighter in construction, but well suited to the Prairie grain area where Versatile's sales have been concentrated. The decade that ended in 1967 also saw a shift from the use of pull-type to the more expensive self-propelled swathers, a type with which Versatile has had marked success.

The very moderate decline in the Big Three's share of the haying machinery market was almost entirely due to the growth in the share of New Holland and Ford. For plows, which includes the disker, the decline in the Big Three's share from 58.2 to 45.8 per cent reflected mainly the growth in C.C.I.L.'s share. C.C.I.L. was the first firm to market the disker, and its share of the plow market has increased very markedly since the early sixties. In part, this reflects the completion of a depot system which gives C.C.I.L. better market coverage. Within the Big Three, there were diverse trends over the decade. Massey-Ferguson's share of this market increased moderately, whereas the share of Deere and International Harvester declined markedly. The share of White Motor is also down sharply, compared with the position of the three firms it took over.

The rather large decline in the Big Three's share of the market for tillage, cultivating, and weeding equipment, from 55.9 per cent in 1957 to 32.4 per cent in 1967, has been almost entirely due to the growth in the share of C.C.I.L., Morris Rod Weeder, and a number of smaller companies. The share of this latter group grew from about 22 per cent in 1957 to 38 per cent in 1967. The loss was shared by each of the Big Three; all of them registered significant losses in market share.

For seeding, planting, and fertilizing equipment, the Big Three's share increased slightly over the decade. However, their share has declined moderately in the past few years–from about 62 per cent in 1963 to 56 per cent in 1967. Here again, the growth of a number of very small firms and the entry of the Morris Rod Weeder into this market has accounted for much of this change. Within the Big Three, one firm increased its share, one lost ground, and the third registered little change.

This analysis suggests that a variety of factors have been important in explaining the decline in market share suffered by the Big Three during the past decade. Price competition has been a significant factor for tractors, combines, and swathers. It may have been important for other products as well; evidence is not available. But the continuous technical change and the shift in demand towards larger sizes of machines have also created opportunities for the smaller firms to exploit. The ability of C.C.I.L. to market successfully tractors and combines produced in Europe, once it had fully developed its distribution system on the Prairies, was also a factor of some significance. Price competition by medium-sized or smaller firms was probably the most important factor. But price competition alone would not explain the extent of the declines that have occurred.

For the industry as a whole, in both Canada and the United States, available data suggest that the share of the major firms has declined very substantially since before the Second World War. In Canada the share of the four largest firms has fallen from an estimated 76 per cent of total sales in 1926-35 to 51 per cent in 1967. In the United States the four largest firms accounted for 72 per cent of manufacturing shipments of farm machinery in 1935. By 1963 their share had fallen to 42 per cent.

These very large changes in market shares are not easy to explain. Both in Canada and the United States the decline reflects in some measure the loss by International Harvester of its former dominant position in the industry. In Canada, in the late twenties, International Harvester enjoyed about one-third of the total market. To some degree also, this decline in the relative position of the dominant firms probably reflects the increasing diversity in the range of machinery produced by the industry. There now are many more specialized machines for particular types of agriculture–machines such as cotton pickers, peanut combines, or tomato harvesters. Often these specialized products are produced entirely by short-line firms or by just one or two of the dominant firms and a number of smaller firms. Even for traditional farm operations such as haying, a much greater range of machines is now available. Formerly, almost every farm had a mower and a hayrake. Now farmers may use one or more of the following machines: mower, hay-baler, hay conditioner, forage harvester, or a variety of different rakes. No major firm can easily maintain a dominant position throughout the full range of machines now offered for sale. Thus the decline in the major firms' share of total farm machinery

sales has probably not been paralleled by an equal decline in their share of major products such as tractors and combines.

New Models and New Inventions as a Competitive Factor

While it is difficult to quantify the effects of the introduction of new machines or the improvement of older machines, there can be little doubt that these changes have very significant effects on the competitive position of different firms. Massey-Ferguson's present lead in world tractor production owes a great deal to the three-point hitch and other pioneering improvements by Harry Ferguson. Similarly, Massey-Harris, after their successful introduction of the self-propelled combine, at one time had captured more than half of the U.S. combine market, even though its U.S. dealer organization was not strong and it had only about 5 per cent of the U.S. tractor market. Farmers complain about the frequency of model changes. But there is also evidence that they respond fairly quickly to improvements. The company that fails to improve its products at frequent intervals may find its market share declining sharply.

Some evidence in support of this view is provided by the marked variations that have occurred in the market share of different companies over the decade ended in 1967. If the market share of different companies for their best and worst year over the decade are compared, the variations shown in Table 9.11 are revealed. It is clear that the changes in market share have been substantial. For any given product line, some firms increased their share over the decade, while others lost ground. Others increased their share only to lose it again, or lost it and then regained it. Changes in market share have often been very large within a few years. While not conclusive, these changes strongly support the view that product improvement is an extremely important competitive factor in the industry.

The significance of customer acceptance of a product is very evident from the marked variations that occur in the market share of any one company for different product lines. If, for the seven major product lines of each company for 1967, we take the difference between the product line where the market share is the highest and where it is the lowest, we obtain the following results in percentage points: Case, 15.6; International Harvester, 21.5; John Deere, 11.8; Massey-Ferguson, 18.6; White Motor, 11.2. Given the fact that the dealer organization is a constant factor for all products, and on the assumption that product pricing will be comparable throughout a company's product range, it is clear that the quality of a product and its customer acceptance is a major element in determining a company's sales in a given product line. For each of the major full-line firms, the market share may be quite high in some lines and comparatively low in others. These considerations undoubtedly underlie the emphasis that the farm machinery companies place on product improvement.

TABLE 9.11–DIFFERENCE IN MARKET SHARE BETWEEN BEST AND WORST YEAR, BY COMPANY AND PRODUCT LINE, CANADA, 1957-67

(Percentage point differences)

	Tractors	Combines	Swathers	Haying Machinery	Plows	Tilling and Cultivating Machinery	Planting and Seeding Machinery
Case	8.2	9.4	14.2	4.1	2.9	4.3	6.3
International Harvester	7.9	6.8	15.5	10.7	7.2	14.1	12.8
John Deere	5.4	8.8	10.3	3.7	7.9	6.4	4.4
Massey-Ferguson	9.4	14.4	8.8	9.8	5.6	4.7	7.0
White Motor	5.2	14.3	32.7	4.6	6.2	4.1	11.2

Source: Company's confidential returns to Dominion Bureau of Statistics, provided to the Commission with the companies' permission, and DBS, *Farm Implement and Equipment Sales*, Cat. No. 63-203, various years. Data for White Motor include combines share of predecessor companies in earlier years.

The importance of market acceptance for a firm's product line may help explain the emphasis that firms place on the introduction of new models. An analysis of the new tractor models introduced by the various farm machinery firms over the period from 1946 to 1967 indicates that during the earlier period–from 1946 to 1956, when there was a substantial backlog of demand and farm machinery sales were relatively buoyant–there was little change in the number of models offered for sale. However, during the past decade, the first half of which was a period of depressed sales, there has been a sharp rise in the introduction of new models. This is evident from the data given in Table 9.12.

Over the period from 1946 to 1956, only Allis-Chalmers and Massey-Ferguson increased the number of models offered for sale, and even then by only one and two, respectively. But over the period from 1956 to 1967 three companies–Allis-Chalmers, Case, and International Harvester–sharply increased the number of models offered. Deere added one model and Massey-Ferguson reduced their range by one. For all companies, there was also a very large increase in the number of tractor model variations made available to farmers.

One index of the industry's view of the importance of technical change is the arrangement that exists among the major firms with respect to patents. In their appearances before the Commission, all of these firms stated that it was normal to license new technical developments for manufacture by other firms. Usually, this would be after a lag of a year or two, which would give the originating firm a small headstart. In the past, new inventions have often led to large shifts among leading firms in market shares. A tacit agreement to license new inventions after a short lag reduces the risk of substantial changes in market shares for particular product lines. Given the inherently risky nature of farm machinery production, the firms have presumably recognized that such an arrangement is in the best interest of the industry as a whole.

TABLE 9.12–BASIC FARM TRACTOR MODELS AND TRACTOR MODEL VARIATIONS AVAILABLE, SELECTED COMPANIES, NORTH AMERICA, 1946, 1956, AND 1967

	Basic Farm Tractor Models			Tractor Model Variations		
	1946	1956	1967	1946	1956	1967
Allis-Chalmers	3	4	8	7	9	76
Case	4	4	7	9	28	79
Oliver	5	5	8	9		112
Cockshutt	–	4			18	
Deere	5	5	6	15	31	70
International Harvester	11	10	16	38	27	146
Massey-Ferguson	7	9	8	12	29	52
	35	41	53	90[1]	142[1]	535

[1] Totals incomplete because Cockshutt data for 1946 and Oliver data for 1956 not available.

Source: From D. Schwartzman, *Oligopoly in the Farm Machinery Industry*, Royal Commission on Farm Machinery, Study No. 12 (Ottawa: Information Canada, 1970), Tables 6.18 and 6.19.

New inventions are particularly important in the farm machinery industry because they offer the possibility of a reduction in farm production costs. These improvements may be worth a very considerable amount to the farmer, and this makes it almost impossible for other firms to compete by offering their unimproved model at a lower price–hence the industry's emphasis on research and development, described elsewhere in this Report. Even with patent licensing, the advantage of being the first firm to offer an improved product may often be substantial.

Price Leadership

In any industry where a small number of firms have a dominant share of the market, each firm, in setting its price, will be very conscious of the prices of its major competitors. In this kind of market situation the practice of price leadership often develops. The leading seller in a particular product line will usually be the first to announce any price changes, and the remaining firms will determine their own prices in the light of the change announced by the dominant firm. Does the practice of price leadership exist in the farm machinery industry? While the evidence is far from conclusive, there is some evidence that one of the major firms is a recognized price leader. For a number of products, Deere & Company, the major firm in the U.S. market, appears to be this price leader.

In examining this question it must be recognized that the entire North American market is regarded as a single unit by most companies for pricing purposes. Even where a company has separate price lists for Canada and the United States, any significant price change is likely to apply to the entire region. In the farm machinery industry it is customary to announce price changes during the slack winter season. Often these price changes will be at the time of the company's fiscal year-end. Often, they will accompany the introduction of new products or model changes. The fiscal year of major companies in this industry ends either on October 31 (John Deere, Massey-Ferguson, J. I. Case, Allis-Chalmers, and International Harvester) or December 31 (White Motor and Ford).

During the hearings, several firms noted that one major firm almost invariably announces price changes at the time of its fiscal year-end because of its contractual relations with its dealers. The firm in question was evidently John Deere. John Deere Limited, the Canadian subsidiary, has an Authorized Agricultural Dealer Agreement which provides that prices of goods sold outright to the dealer "are those in the Company's price book in effect on the date of shipment". However, while the parent company in the United States, Deere & Company, sells its goods outright to its dealers, the Canadian subsidiary normally consigns its machines to dealers. The normal dealer price of consigned goods is "that established by the Company and in effect on the date the consigned goods were delivered to the Dealer". The company, however, guarantees that the dealer's price will be the "price in effect on November 1" of the preceding year (the date upon which the immediately preceding annual contract expired and was, presumably, renewed), if certain conditions are met. For the dealer, the effect of the conditions is that, if he

orders machines up to January 15 of the selling season, he is guaranteed the price in effect at the commencement of the contract period, even if prices have risen in the interim delivery period. Thus for this company there is some pressure to ensure that its prices are issued by a fixed date, namely the beginning of its fiscal year, rather than have the date of its price list fixed entirely by marketing considerations. According to one comment"...this competitor almost without exception establishes prices at that date, whether at that date a new or different product or products with changes in them are being announced or not. Whereas other competitors, and we ourselves often defer or anticipate this date, depending upon the necessity to put into the pipe line or to introduce for various commercial reasons a minor change in the product and the price change that goes with such a minor change."[6]

An examination of the timing of price changes for major product lines in Canada during the period from 1963 to 1968 suggests that John Deere Limited has in the great majority of instances been the first company to announce a price change during a new selling season. For tractors, on all occasions but one it was first. For combines, it was also first, four out of five times. For hay and forage machines, again it was first, four out of five times. And for all other machinery it was first, three out of five times. In every product group where it was not first to announce prices, it was second.

If Deere is the industry's price leader as far as timing of price changes is concerned, how closely are its reported percentage price changes matched by other companies in the industry? In certain years the match is very close. For example, Deere increased its tractor prices for the 1964 selling season by 2.6 per cent; International Harvester and Massey-Ferguson later issued price lists which showed average increases of 2.4 and 2.7 per cent respectively; J. I. Case's increase was 2.4 per cent. For other selling seasons in tractors, the price changes, while not as close, are generally similar (see Table 9.13). Further, if the price changes for tractors over the five-year period from 1963 to 1967 are cumulated, the total price changes for major companies are very similar. Thus, for Deere, it was 14.8 per cent; for International Harvester, 15.6 per cent; for Massey-Ferguson, 13.5 per cent; and for Case, 14.1 per cent. These percentage changes are as measured by each company and reported to the Commission.

For other machines the data are less complete and there is more variation evident in the amounts of price increase. For example, over the period 1963 to 1967, a simple cumulation of annual percentage price changes on combines shows a total increase of 18.9 per cent for Case and 16.7 per cent for John Deere, but only 7.3 per cent for Cockshutt. Some of the difference for Cockshutt may well be due to the fact that it was operating under new management, and because the consolidation of the combine operations of Oliver, Cockshutt, and Minneapolis-Moline undoubtedly resulted in substantial cost savings in this period. Similarly, for all other machinery, the cumulative price increase was 9.8 per cent for Cockshutt,

[6] Royal Commission on Farm Machinery, Transcript of Evidence, *Hearings*, Vol. No. 37, January 9, 1968, pp. 4196-7.

16.3 per cent for John Deere, and 17.0 per cent for Massey-Ferguson. Thus, while there is considerable evidence to support the view that John Deere is normally the first company to announce price changes, there is a good deal of variation in the extent to which Deere's price changes are followed by other companies.

TABLE 9.13–PRICE CHANGES, TIMING OF AND PERCENTAGE CHANGE, ONE SELLING SEASON OVER PREVIOUS SELLING SEASON, MAJOR COMPANIES AND PRODUCT LINES, CANADA, 1963-68 SELLING SEASONS

(Price change announced first is in italics)

	1963	1964	1965	1966	1967	1968[2]
Tractors						
Case	1.8	2.4	2.2	3.2	4.5	5.0
Cockshutt	2.8	1.8	2.8	2.9	3.7	n.a
Deere	*2.3*	*2.6*	*2.8*	*3.1*	4.0	n.a
International Harvester	2.7	2.4	3.4	4.0	*3.1*	3.8
Massey-Ferguson	2.3	2.7	3.5*	3.0	2.0	4.2
Combines						
Case	3.2	2.6	4.0	*4.5*	4.6	n.a
Cockshutt	0.4	0.9	1.7	1.4	2.9	n.a
Deere	*2.9*	*4.2*	*3.1*	*3.3*	3.2	n.a
International Harvester[1]	2.4	2.4	2.9	3.5	2.7	3.5
Massey-Ferguson	2.0	n.a	7.8	3.5	n.a	5.9
Hay and Forage Machines						
Case	n.a	n.a	n.a	n.a	n.a	n.a
Cockshutt	3.8	1.8	1.8	(5.4)	2.5	n.a
Deere	2.9	*5.2*	*3.4*	*3.4*	*3.1*	n.a
International Harvester[1]	2.4	2.4	2.9	3.5	2.7	3.5
Massey-Ferguson	n.a	n.a	5.0*	1.0	3.0	3.0
All Other Machinery						
Case	n.a	n.a	n.a	n.a	n.a	n.a
Cockshutt	3.5	0.6	2.3	1.4	2.0	n.a
Deere	*2.9*	*4.3*	*2.8*	3.3	3.0	n.a
International Harvester[1]	2.4	2.4	2.9	*3.5*	*2.7*	3.5
Massey-Ferguson[3]	2.8	4.0	4.1	3.1	3.0	3.3

n.a–amount not available.

*Major product change year.

[1] I-H reports showed only "tractors" and "all other farm equipment".

[2] Timing data not available for all companies.

[3] It should be noted that Massey-Ferguson reported a decrease in swather prices of from 12.9 to 18.9 per cent for 1968 selling season which if the category had been indicated on the table would have been given as an average decrease of 15.9 per cent.

Source: Data supplied by companies.

Other instances of price changes which diverged sharply from the pattern of price change set by Deere can be given. For example, Cockshutt reduced its price on haying and forage machinery by 2 per cent for the 1964 selling season and by 5.4 per cent in the 1966 selling season. Deere's prices advanced by an average of 3.6 per cent a year throughout this period. Again in 1965, Ford announced a price

reduction of 17.5 per cent on a new model of their 4000 series tractor. In another instance, Massey-Ferguson announced a price reduction on haying and forage machinery (the price reduction was on swathers only) averaging 13 to 19 per cent for the 1968 selling season (Table 9.13). In each case special circumstances probably account for this change. The Cockshutt price adjustment undoubtedly reflected the new ownership and cost conditions affecting the company. For Ford, the result may have been due to lower costs resulting from the establishment of new production facilities in Basildon and Antwerp. The price reduction by Massey-Ferguson was mainly a price adjustment on swathers and was directly attributable to competition provided by Versatile. None of these price reductions appears to have provoked any immediate response from Deere.

Conclusions

Because fixed costs in the industry are so important, major firms are reluctant to compete actively on a price basis for fear they will invite retaliation from other large firms, thus reducing profits in the industry generally. Smaller firms may attempt to increase their market share by competing on a price basis but for a number of major products–such as tractors and combines–their ability to do so is limited by the absence of economies of scale. A price that yields a very substantial return on manufacturing assets for a major firm may provide a smaller-volume firm with very moderate profits.

Despite the advantage enjoyed by the larger firms from these economies of scale, their share of the market has declined very significantly over the past decade. Even at the start of this period, the market share of the four largest firms was much smaller than it had been in the late twenties and early thirties.

This decline in the market share of the three or four largest firms reflects a number of factors. In part, evidence suggests that the high prices maintained by the dominant firms on tractors and other major products has invited the survival and growth of smaller firms. But the continuous rapid technological change that has characterized the industry's product has also created opportunities for the smaller firms to maintain or improve their position. The decline in the Big Three's share of the Canadian tractor market has been due to their failure to move into and maintain their relative position in the rapidly growing high-horsepower sector of the market. At the same time, the high prices and profit margins in this sector of the market have created opportunities for smaller firms, such as Case and Versatile, to improve their market position. Increased competition from tractors and combines manufactured in Europe has also helped reduce the market share of the major firms. Some of this competition has come from firms such as British Leyland and David Brown who have been selling through their own dealer organizations. Other imports have been marketed by co-operatives such as C.C.I.L. and Coopérative Fédérée de Québec or by long-line firms adding a European model to their product line.

Note to Chapter 9

RECORD OF EVENTS AND PRICE CHANGES SUBSEQUENT TO PUBLICATION OF COMMISSION'S SPECIAL REPORT ON PRICES OF TRACTORS AND COMBINES IN CANADA AND OTHER COUNTRIES

The purpose of this note is to bring up to date (to the current 1970 selling season) the price-comparison data between Canada and Britain, and to review developments since the Commission's *Special Report* was published. The principal conclusions of that report may be summarized as follows:

1. Wholesale or dealer prices of farm tractors for all sizes up to about 75 HP have been very much lower in England and some other European countries than in Canada. For the 1968 selling season the Commission found differences ranging between 30 and 45 per cent–in dollar terms, between $837 and $2,287.

2. These lower prices reflect lower European manufacturing costs. The Commission estimated that at the exchange rates that prevailed when the *Special Report* was written, manufacturing costs in England would be about 25 per cent lower than those in North America at the same volume of output.

3. There are substantial economies of scale in tractor manufacturing. The study prepared for the Commission indicated that manufacturing costs per tractor fall about 19 per cent, or by about $812, as output increases from 20,000 units annually to 90,000 units annually.

4. In the Canadian market, gross profit margins are very much larger on the larger-horsepower tractors than they are on smaller tractors.

5. Differences in distribution costs and the costs of transportation would account for approximately half of the price difference between the two countries, but the rest of the difference must reflect an additional profit earned by the multinational corporation on its sales in Canada.

Since the publication of the *Special Report on Prices,* the Commission obtained 1970 prices from six companies that sell identical tractor models in Canada and Britain. Four of these companies manufacture in Britain. A fifth, Deere, manufactures its lower-horsepower models for the British market in West Germany. The sixth assembles in Detroit from a mixture of British, Canadian, and U.S. components. For five of these companies–David Brown, Deere, International Harvester, Ford, and British Leyland–the price difference between Britain and Canada must be either additional transport and distribution costs, or global company profit. For the sixth, Massey-Ferguson, the picture is more complex because most of the tractors it sells in Canada come from its Detroit plant, whereas those sold in Britain are manufactured at Coventry. A few MF 135s were imported into Canada from Britain in 1970 for sale at lower prices than for the same tractor built in Detroit. Thus, for Massey-Ferguson, part of the price difference between Canada and Britain may be assigned to a third factor–higher production costs in Detroit than in Coventry. This raises the question of why the company would produce tractors in Detroit for the North American market[7] rather than Coventry if it is significantly more expensive to do so. The answer may lie in the combination of a need to manufacture in

[7] Ford manufactures (assembles) farm tractors in Detroit (largely for the U.S. market) and industrial tractors, but supplies most of the Canadian market from British production.

North America for an increased sales impact, the requirement for larger tractors in North America than in Europe (although this is surely changing), and a shortage of capacity in Coventry. Whatever the reason, it would be hard to justify producing at a high-cost source over a long period of time.

Price comparisons for the 1970 selling season at the "suggested retail price" and the "net wholesale price" to the dealer are given in Table 9.14. In all cases the prices are taken from price lists supplied by the companies, with the net wholesale price (the amount retained by the company) calculated by applying percentages supplied by the companies to represent the combination of their initial dealer discount and their subsequent volume discounts. No change was reported in these levels in either Canada or Britain from the 1966-67 levels used in the *Special Report on Prices.* The suggested retail prices used were either supplied by the companies themselves on the basis of matched specifications for tractors sold in Canada and Britain, or the Commission submitted them to the companies for checking and concurrence.

As in the *Special Report on Prices,* the Commission feels that the most appropriate price on which to base comparisons between countries is the net wholesale price. This price measures the amount received by the company from the dealer. The suggested retail list price may vary from this price–and from the price actually paid by the farmer–by varying amounts in different countries, because it contains varying amounts of over-allowance for the used machine to be traded in.

Table 9.14 presents suggested retail and net wholesale prices for various models of tractors manufactured by the six companies that sell identical tractors in Canada and Britain. Table 9.15 shows, for the same tractors, the British retail and wholesale price levels as percentages of the comparable Canadian prices for the 1966 to 1970 selling seasons. Nine tractors in the 30 to 45 HP range have a current British net wholesale price that averages 78 per cent of the Canadian wholesale price, with seven of the nine tractors in the group falling in the range of 76 to 83 per cent. In Group II–the 45 to 60 HP class–the British average wholesale price is 71 per cent of the Canadian level, with a high of 72 per cent and a low of 71. In Group III–the 60 to 75 HP class–the average net wholesale price in Britain is 68 per cent of the Canadian level. Here the range is wider, with the Massey-Ferguson 178 being priced in Britain at only 57 per cent of the price for its closest Canadian equivalent, the MF 175, and the Deere 3120 priced at 86 per cent of the 3020 Canadian model.

The change in the pattern of net wholesale prices for these various classes over the period from 1966-67 to 1970 can be summarized as follows:

	I	II	III	IV	V	VI and VII
1966-67	82	73	–	–	–	–
1967	82	75	62	–	118	125
1968	70	65	55	–	110	116
1969	74	63	–	–	100	115
1970	78	71	68	71	105	114

These data show that in Groups I to III wholesale prices in Britain fell substantially, relative to those in Canada, following devaluation of sterling in late 1967, but have since moved back towards their 1966 position. This narrowing of the price differential reflects a larger price increase in Britain since 1968 than in Canada. On seven tractor models for three companies, the price increase from 1968 to 1970 averaged 15 per cent in Britain and 7 per cent in Canada. However, current 1970 prices are still lower in Britain, relative to the Canadian price for the identical tractors, than was true in 1966. Thus, for these three groups, on average, current wholesale prices are from 22 to 32 per cent lower in Britain than they are in Canada, or in absolute terms are lower by from $440 to $2,236 per tractor.

TABLE 9.14–SUGGESTED RETAIL AND NET WHOLESALE PRICES OF FARM TRACTORS, CANADA AND BRITAIN, 1970 SELLING SEASON

(Canadian dollars)

			GROUP I 30-45 PTO HP		GROUP II 45-60 PTO HP		GROUP III 60-75 PTO HP		GROUP IV 75-90 PTO HP		GROUP V 90-100 PTO HP		GROUP VI-VII 100-115 and over 115 PTO HP	
	Model No. (Max. PTO HP)	Suggested Retail Price (SRP) / Net Wholesale Price (NWP)	Canada	Britain	Canada	Britain	Canada	Britain	Canada	Britain	Canada	Britain	Canada	Britain
1. North American Based Firms														
Deere	1020 (38.9)	SRP	$4,098	$3,011										
		NWP	2,992	2,469										
	2020 (54.1)	SRP			$5,776	$3,706								
		NWP			4,216	3,039								
	3020 (71.3)	SRP					$8,271							
		NWP					6,038							
	3120 (74.7)[1]	SRP						$6,300						
		NWP						5,166						
	4020 (95.8)[2]	SRP									$10,549	$9,840		
		NWP									7,701	8,069		
	5020 (141.4)[2]	SRP											$14,961	$15,139
		NWP											10,922	12,414
Ford	2000 (31.2)	SRP	$3,605	$2,387										
		NWP	2,632	1,957										
	3000 (39.2)	SRP	$3,887	$2,625										
		NWP	2,838	2,153										
	4000 (52.7)[2]	SRP			$5,358	$3,362								
		NWP			3,911	2,757								
	5000 (67.2)[2]	SRP					$6,544	$3,609						
		NWP					4,777	2,959						

International Harvester	434 (36.0)[3]	SRP	$3,909	$2,772					
		NWP	2,836	2,273					
Massey-Ferguson	135 Std. Cl. (37.8 (Br.-made)	SRP	$3,538	$2,614					
		NWP	2,583	2,143					
	135 Std. Cl. (37.8) (U.S.-made)	SRP	$3,811	$2,614					
		NWP	2,782	2,143					
	165 Std. Cl. (52.4)	SRP			$5,229	$3,339			
		NWP			3,817	2,738			
	175 Std. Cl. (63.3) (178 in Britain)	SRP					$7,043	$3,543	
		NWP					5,141	2,905	
	1080 (81.2)	SRP							$10,337 $6,540
		NWP							7,546 5,363
2. European-Based Firms									
David Brown	780 Selectamatic (42.0)[3]	SRP	$3,740	$2,492					
		NWP	2,730	2,043					
	880 Selectamatic (42.3)	SRP	$4,380	$2,948					
		NWP	3,197	2,417					
	990 Selectamatic (52.1)	SRP			$4,880	$3,073			
		NWP			3,562	2,520			
	1200 Selectamatic (65.2)	SRP					$5,985	$3,628	
		NWP					4,369	2,975	
British Leyland (Nuffield)	344 (45.0)[4]	SRP	$4,795	$3,296					
		NWP	3,500	2,703					
	384 (56.0)[4]	SRP			$5,685	$3,591			
		NWP			4,150	2,945			

[1] Estimated PTO HP rating from 85 HP engine rating.
[2] Change in PTO HP rating since 1966-67.
[3] Manufacturer's PTO HP rating.
[4] New model, manufacturer's PTO HP rating at standard PTO r.p.m.
Source: Company price lists and correspondence with companies.

TABLE 9.15–SUGGESTED RETAIL AND NET WHOLESALE PRICES OF FARM TRACTORS IN BRITAIN AS PERCENTAGE OF CANADIAN PRICES, 1966-70 SELLING SEASONS

	1966		1967		1968		1969		1970	
	SRP	NWP	SRP	NWP	SRP	NWP	SRP	NWP	SRP	NWP
Company and Model No.	Group I: 30-45 PTO HP									
BLMC Nuffield 344	72[1]	81[1]							69	77
Brown 780	72[1]	81[1]							67	75
Brown 880	71	80							67	76
Deere 1020									74	83
Ford 2000	75	85							66	74
Ford 3000	72	81	72	81	60	68			68	76
International Harvester 434			77	86	66	74	66	74	71	80
Massey-Ferguson 135 (U.S.-made)			70	78	59	67			69	77
Massey-Ferguson 135 (Br.-made)									74	83
Average	72	82	73	82	62	70	66	74	69	78
	Group II: 45-60 PTO HP									
BLMC Nuffield 384	66[1]	74[1]							63	71
Brown 990	68	76							63	71
Deere 710			77	87	58	65	57	63		
Deere 2020									64	72
Ford 4000	68[1]	76[1]	67[1]	75[1]	60[1]	67[1]			63	71
Ford 5000	60[1]	65[1]	59[1]	66[1]	53[1]	59[1]				
Massey-Ferguson 165			64	71	59	67			64	72
Average	66	73	67	75	58	65	57	63	63	71
	Group III: 60-75 PTO HP									
Brown 1200									61	68
Deere 3020 (3120 in Britain)									76	86
Ford 5000									55	62
Massey-Ferguson 175 (178 in Britain)			55	62	49	55			50	57
Average			55	62	49	55			61	68
	Group IV: 75-90 PTO HP									
Massey-Ferguson 1080									63	71
	Group V: 90-100 PTO HP									
Deere 4020			105[1]	118[1]	98[1]	110[1]	89[1]	100[1]	93	105
	Groups VI & VII: 100-115 & over 115 PTO HP									
Deere 5020			111[1]	125[1]	103[1]	116[1]	103[1]	115[1]	101	114

[1] Relatives for predecessor model.

Source: Table 9.14.

For the larger-horsepower groups of tractors, British wholesale prices for the Deere 4020 and 5020, both of which are imported into Britain from North America, were 18 and 25 per cent higher than in Canada in 1967. These differences now have narrowed to 5 and 14 per cent, respectively. The one tractor in Group IV, Massey-Ferguson's MF 1080, manufactured in Britain, appeared for the first time in 1970, and sells in Britain at 29 per cent ($2,183) below the net wholesale price charged to a dealer in Canada.

The above price comparisons are based on official price lists. In addition, under various market conditions, companies may offer special discounts from their list prices. Sometimes a whole line of equipment may be affected; sometimes a particular slow-selling model. In these circumstances the dealer receives an extra allowance for every such sale or for every sale over a quota level. This has the effect of reducing the price to him, and in turn the price at which the tractor can be sold to the farmer. Correspondence with the companies indicate that currently these special discounts would decrease the prices listed in Table 9.14 by up to $200 for some models of some companies. Finally, it must be noted that the recent appreciation of the Canadian dollar will have increased the price differences shown in Tables 9.14 and 9.15 by some 3 or 4 per cent.

It is clear that discriminatory pricing in the sale of tractors is still being practised against the Canadian farmer. This now applies to all tractors in size classes of up to 90 HP. Although the price differences are smaller than those in 1968, they are substantially more than can be accounted for by transport charges and additional distribution costs.

Several other developments since the publication of the Commission's *Special Report on Prices* may be more briefly reviewed. It will be recalled that all of the companies had established effective barriers to the export of tractors from Britain by requiring their dealers to sign agreements that they would not sell for export. The Commission has asked the various companies involved to provide information on the current status of these restrictive clauses in their British dealer contracts. Apparently, the clauses remain unchanged for all companies except Ford. Ford stated that the restrictive clause has now been removed completely, and that British dealers can sell their tractors to anyone for resale and export without restriction. However, information received by the Commission (mid-1970) indicates that British-made Ford tractors are hard to purchase from dealers in Britain if they are to be exported. Ford dealers are reported to be on a quota system based on their 1967 sales level. Ford of Britain assured the Commission that there is no such quota system but reported a shortage of tractors from their company's Basildon plant, largely attributable to work interruptions in supplier plants.

The Commission's *Special Report,* in commenting on the companies' uniform failure to pass on to the Canadian farmer any of the benefits that followed the devaluation of sterling in 1967, made the following statement:

> While conspiracy may be too harsh a word, these data suggest at least a tacit agreement on the part of manufacturers supplying tractors to Canada from Britain to maintain the price in Canada in spite of the advantage afforded by devaluation.

The Commission has since been informed that an advisory memorandum issued by an agency of the British government to all exporting organizations at the time sterling was devalued may have been instrumental in inducing this uniform pattern of response. The memorandum suggested that it would be in order for the companies to raise their export prices to the extent consistent with remaining competitive in export markets.

Two of the recommendations in the *Special Report* suggested that the Canadian government explore the possibility of encouraging the sale in Canada of tractors from Czechoslovakia and Japan. Information has since been made available to the Commission indicating that both these avenues are closed. The Japanese trade representatives in Ottawa have

reported that Japanese firms have entered into technical and licensing agreements with major tractor manufacturers on this continent, which would prevent them from manufacturing tractors for sale in either the Canadian or U.S. markets. Similarly, the Commission has recently been informed that a large North American company has been negotiating for the Canadian and U.S. distribution rights for the Zetor tractor.

Only one company, Massey-Ferguson, has commented in public on the Commission's *Special Report on Prices.* Although this commentary raised a number of points, Massey-Ferguson took special exception to the suggestion that it was making "handsome profits" on its sale of tractors in Canada. As originally used, the term referred to the rate of return earned by the company on its manufacturing investment. Unfortunately, the phrase has frequently been cited out of its original context. As has been explained fully elsewhere in this Report, a farm machinery company may earn a large profit on its manufacturing assets, but this rate of return may be greatly diluted in its over-all return because of the large distribution assets carried by firms in the industry. The Commission regrets the fact that the use of the term "handsome profits" out of context may have created a misleading impression as to Massey-Ferguson's over-all profit position. Elsewhere in the *Special Report* the Commission had estimated that Massey-Ferguson earned an extra profit on Canadian sales as compared with British sales of $38 and $177 for its MF 135 and MF 165 tractors, respectively. The company reports that it has had operating losses on sales of farm machinery in Canada over the past three years. On a worldwide basis it estimates that it earned a profit (after tax) of 3.1 per cent on sales of tractors sold in Canada in 1966, and 3.2 per cent in 1969. No information is available as to what return this would yield on invested assets. Massey-Ferguson's losses on Canadian sales, and moderate worldwide profits on tractors sold in Canada, in spite of charging much higher prices to Canadian farmers, appear to result, in part at least, from high distribution costs. In its memorandum commenting on the *Special Report* the company estimated that in 1968 its North American selling, and general and administrative expenses were 16.1 per cent of sales. This compares with the 9.1 per cent reported by the four Group I companies for Canada in the same year.

It appears paradoxical that the farm machinery companies should be selling tractors at much higher prices in Canada than in Britain–30 to 45 per cent higher in 1968, and 22 to 32 per cent higher in 1970–and yet reporting a loss on their total farm machinery sales in Canada for 1969. In very considerable measure this simply reflects the higher costs of an expensive distribution system, costs that have been particularly vulnerable to recent large increases in interest rates. Then, too, it may reflect the fact that tractors are one of the few machines currently being sold in Canada where the major companies can still maintain a reasonable profit margin.